TESTING APPLICATION OF RESEARCH FINDINGS TO SUPPORT EMPOWERMENT OF WOMEN FOR IRRIGATED FOOD PRODUCTION AND IMPROVED HOUSEHOLD FOOD PRODUCTION

Report to the
Water Research Commission

by

Maxwell Mudhara, Joyce Chitja and Avrashka Sahadeva
School of Agriculture, Earth and Environmental Sciences, University of KwaZulu-Natal, Pietermaritzburg Campus

WRC Report No. 2956/1/20
ISBN 978-0-6392-0168-9

June 2020

WATER RESEARCH COMMISSION

UNIVERSITY OF KWAZULU-NATAL
INYUVESI YAKWAZULU-NATALI

Obtainable from
Water Research Commission
Private Bag X03
Gezina, 0031

orders@wrc.org.za or download from www.wrc.org.za

EXECUTIVE SUMMARY

Women constitute the largest proportion of smallholder farmers and yet are amongst the poorest in South Africa, as they are less empowered in various ways. The involvement of women in smallholder farming plays a significant role in sustaining livelihoods and food security. Furthermore, about 60-80% of women in South Africa engage in smallholder farming, a higher proportion than the rest of the world.

Past research studies on women's empowerment in South Africa investigated the constraints, opportunities, and challenges undermining women empowerment and their achievement of sustainable rural livelihoods. The studies pointed to the need to take account of women's circumstances, such as literacy levels, appropriate training techniques, and the need for multi-stakeholder dialogue inclusive of rural women, appropriately designed government programmes and extension approaches that meet the needs of rural women, policy awareness, and training on market access, institutional development and appropriate people-centred approaches for empowerment.

The University of KwaZulu-Natal implemented a research project commissioned and managed by the Water Research Commission entitled "Testing application of research findings to support the empowerment of women for irrigated food production and improved household food production (Project No. 2956)". The research aimed to test appropriate interventions for rural women under irrigation schemes, so that they can understand their rights and access to land and water, and activate improved market access and enhance fulfilment towards their development needs. The study was undertaken through activities designed to enhance learning. First, a literature review and situation analysis of women in smallholder irrigation schemes were undertaken. Two research sites were selected, namely Steelpoort in Limpopo Province, and Tugela and Moor River Irrigation Schemes in KwaZulu-Natal Province. Focus group meetings were convened in the respective irrigation schemes to understand the major opportunities and challenges facing female farmers. This was followed by a multi-stakeholder platform where farmers and stakeholders participated.

The study confirmed that women's empowerment in agriculture has the potential to improve livelihoods of the rural communities and ensure sustainability in agricultural production and development. This can be achieved if women access productive resources and knowledge such

as land, education and financial services. Through the recognition of the importance of women in agriculture, South Africa formulated and implemented, to some extent, several policies to improve women access to productive resources, especially water. The policies include irrigation strategy for South Africa, National Water Act (NWA (1998)), the Irrigation Management Transfer (IMT), the white paper on water policy, National Water Resource Strategy-1 (NWRS-1) and NWRS-2. At the core of these policies is equity in access to water regardless of gender or race. Land is also a critical resource requiring equity.

Considering that women in rural areas of South Africa form part of the most disempowered groups, investment in their agricultural and non-agricultural skills training is an effective strategy to improve their livelihoods. In both study sites, women pursue multiple livelihood activities and have different levels of skills. In general, most women in the selected areas have high levels of agricultural skills, but generally low levels of off-farm skills. Non-farming skills are critical for participation in the value chain, and these are lacking.

The study showed that the women's enterprise/business management skills are poor because they have poor numeracy and literacy levels, operations management skills, financial knowledge and marketing skills. The lack of economic opportunities in the rural areas for women without non-farming skills means that such women have to rely on agriculture alone to sustain their livelihoods.

The need for various interventions were identified. In particular, organizational structures within farmers schemes need to be developed and practiced for an effective multi-stakeholder platform. Currently there is a lack of social capital and functional marketing institutions amongst farmers across schemes. Institutional failure is at the core of the challenges facing farmers in marketing their produce. While institutional challenges exist in the management of irrigation schemes, it is evident that the lack of organisation during marketing exacerbates this problem.

There is also a need for farmers to change their mindsets. The change of mindset from subsistence farming to being strategically commercially oriented and strategic will require mentorship. Extension officers should use participatory methodologies to create a functioning farmers' organisational structure and introduce new information technologies (Facebook, various agricultural apps).

For farmers to succeed in the value-chain, the main challenges that need to be focused on include trusting each other, consistent pricing, better communication, good record keeping, solid budgeting, knowledge on market needs, and being tech-savvy.

As it currently stands, the rural value-chain is a buyers-market as farmers are passive price recipients. This needs to change to ensure that farmers gain greater influence on the market. A new approach that ensures the formation of local market institutions is needed to facilitate effective participation in the market. This demands that development agents use creative ways of training farmers on how to enhance market access and control.

The study recommends that the following needs to be prioritized for the realization of improved livelihoods and effective empowerment of women along the value chain:

- Farmers' knowledge of sustainable irrigated agricultural techniques and practices, and marketing knowhow need to be enhanced.
- Farmers require mentorship to understand and participate in the value-chain. This includes understanding the business and marketing aspect of the agricultural commodities they are involved.
- Development agents should facilitate and form platforms that women can access to assert their rights to relevant resources, which can culminate in improved participation in the value-chain. Additionally, institutional structures need strengthening to build trust and enable information to be effectively disseminated.
- Farmers require mentorship on how to meet market demands. This involves reading market intelligence, and developing and implementing long-term plans.
- There should be well-publicised and accessible ways of providing price information to farmers.
- Farmers need assistance on farm planning to synchronise production with market requirements.
- Formation and development of scheme-level marketing institutions to facilitate synchronised production, crop choice, pricing and marketing.
- Farmers require support to identify alternative economically viable crops demanded on the market.

ACKNOWLEDGEMENTS

This study was done under the auspices of the Water Research Commission (WRC) project Project No. K5/2956//4 entitled "Testing application of research findings to support the empowerment of women for irrigated food production and improved household food production". The WRC initiated, managed and funded the project.

The study also benefited from the willingness of irrigation farmers to readily participate in the various sessions of discussions they were engaged in. Specifically we would like to mention irrigation farmers from Tugela Ferry, Mooi River and Steelpoort Drift Irrigation Schemes. Various stakeholders made significant contributions to the project, i.e. Extension officers in Msinga (N. Vilakazi, M. Zakwe, S. Dinga, Mr Zulu and D. Zungu) and M.E. Motseo in Limpopo Province. We also appreciate the support of the agricultural produce procurement managers at Spar Tugela Ferry and Arheers Greytown and various bakkie traders at Tugela Ferry. Mr Bongumuda Mbatha of Farmer Support Group was instrumental in facilitating interviews with various stakeholder.

The following students contributed to the accomplishment of outcomes in this project: Noxolo Zuma, Bright Mkwedeya, Tobani Cele and Siyanda Ngqongo from the University of KwaZulu-Natal. We appreciate and are thankful for the support.

AUTHORS

Maxwell Mudhara	Project Leader School of Agriculture, Earth and Environmental Sciences University of KwaZulu-Natal (Corresponding: mudhara@ukzn.ac.za)
Joyce Chitja	Principal Researcher School of Agriculture, Earth and Environmental Sciences University of KwaZulu-Natal
Avrashka Sahadeva	Researcher School of Agriculture, Earth and Environmental Sciences University of KwaZulu-Natal

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

CMA	Catchment Management Agency
DAFF	Department of Agriculture, Forestry and Fisheries
DARD	Department of Agriculture and Rural Development Extension officers
DFID	Department of International Development
DWAF	Department of Water Affairs and Forestry
FABLIST	Farm Business Linkage Stakeholder
FAO	Food and Agricultural Organization of the United Nations
FT-FaDDE	Facilitators' Training for Farmers' Demand Driven Extension
GDP	Gross Domestic Product
GEI	Group Empowerment Indicators
GPI	Gender Parity Index
IFAD	International Fund for Agricultural Development
IFPRI	International Food Policy Research Institute
IMR	Irrigation management committee
IMT	Irrigation Management Transfer
IWRM	Integrated water resources management
JEF2G	Joint Extension Staff & Farmers' Dual Gender
JICA	Japan International Cooperation Agency
KZNPPC	KwaZulu-Natal Provincial Planning Commission
LRAD	Land Redistribution for Agricultural Development
NDP	National Development Plan
NWA	National Water Act
NWRS	National Water Resource Strategy
PRA	Participatory Rural Appraisal
PTO	Permission to Occupy
RDP	Reconstruction and Development Programme
SCI	Social Cohesion Index
SDG	Sustainable Development Goal
SHEP	Smallholder Horticultural Empowerment and Promotion
SLA	Sustainable livelihood approach
SLF	Sustainable Livelihoods Framework
SSA	Sub-Saharan Africa

WEAI	Women Empowerment in Agriculture Index
WRC	Water Research Commission
WUA	Water User Associations

CHAPTER ONE: INTRODUCTION

1.1 Background

Most rural women are disempowered due to socio-cultural and economic constraints, which contribute to their low agricultural productivity and make them vulnerable. The lack of livelihood assets affects their participation in the food value-chain. The proposed participatory research seeks to build on three research projects on women empowerment conducted across four provinces, i.e. Eastern Cape, KwaZulu-Natal, Limpopo, and North West (Chitja et al., 2016, Denison et al., 2015, Oladele, 2016). The research investigated the constraints, opportunities, and challenges undermining women empowerment and their achievement of sustainable rural livelihoods. The recommendations from the studies pointed to the need to be cognisant of the women's circumstances. The circumstances include literacy levels, appropriate training techniques, and the need for multi-stakeholder dialogue inclusive of rural women, appropriately designed government programmes and extension approaches that meet the needs of rural women, policy awareness, and training on market access, institutional development and appropriate people-centred-approaches during empowerment. However, engendering of key agricultural resources, such as water and land, through policy implementation can unlock meaningful transformation for women farmers (Chitja & Mkhize, 2020).

There is also a need for activities to be inclusive of youth. In this regard, University of KwaZulu-Natal is implementing a research project commissioned and managed by the Water Research Commission entitled “Testing application of research findings to support empowerment of women for irrigated food production and improved household food production (Project No. 2956)”.

1.2 Objectives

The research aim is to test appropriate interventions for rural women under irrigation schemes, so that they can understand their rights and access to land and water, and activate improved market access and enhance their development needs. The specific objectives are as follows:

Specific objective 1: To conduct a literature review and situation analysis to understanding women's status, social cohesion, functioning of their groups, and their welfare as informed by their participation along the value chain.

Specific objective 2: To form multi-stakeholder platforms, predominantly comprised of

women and youth, to allow active dialogue with stakeholders towards support women's livelihoods. The platforms will comprise of women's groups that are self-organized for access to services and to interact with stakeholder and other relevant stakeholders.

Specific objective 3: To facilitate and mentor women using practical agricultural training, emphasizing on entrepreneurship in niche crops and along the value chain. The training should meet the low literacy levels of rural women.

Specific objective 4: To hold workshops with various markets in each province to assess their quality and quantity requirements. To specify appropriate changes to existing policies, strategies, rules, regulations and governance programmes that can enhance the performance of smallholder irrigation schemes in South Africa. This can include recommendations on new policies, strategies, rules, regulations and governance programmes that can enhance the performance of smallholder irrigation schemes in South Africa.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter reviews literature and presents an overview of status of women in irrigated agriculture and value chains, women access to productive resources for irrigated agriculture, frameworks used for assessing women's empowerment in agriculture, smallholder irrigation in South Africa, and synthesises the linkages among irrigation access, water security, and household welfare and South Africa's water reforms and policies. The chapter also presents evidence from other African countries in and developing countries further afield.

2.2 Smallholder Irrigated Agriculture and Food Security

Smallholder irrigation plays an important role in the fight against rural poverty, women empowerment and food security in developing countries. Accordingly, the South African government has invested substantially in smallholder irrigation. Despite these efforts, smallholder female farmers remain at a disadvantage in their efforts to eke out a livelihood from irrigated farming.

Smallholder irrigated farming plays a pivotal role in food security and wealth generation, especially in rural settings of developing countries in Africa (Dube & Sigauke, 2015). Irrigated farming generally allows farmers to increase production and farm incomes. Access to irrigation enables farmers to adopt new technologies such as seed, fertilizers and pesticides and intensify cultivation, leading to increased productivity, and greater returns from farming (Tesfaye et al., 2008). Furthermore, smallholder irrigation allows farmers to switch to high-value crops, have more harvest per year, and rely less on the increasingly variable rainfall patterns. Irrigators often have the advantage of producing more food and greater output compared to non-irrigators (Nhundu & Mushunje, 2012). With the population projected to reach 8.5 billion by 2030, smallholder irrigation has a big role to play in meeting the growing world food demand and food security (Desherbinin & Dompka, 2005; Fanadzo & Ncube, 2018). Irrigated farming can ensure a stable and steady supply of food especially in prevailing climatic conditions being (Fanadzo & Ncube, 2018; Ntai, 2011).

A growing body of literature shows that irrigation farming has a positive impact on household food security. In a study on food security, Nkhata (2014) found that non-irrigator farmers were less food secure than irrigator farmers, holding all other factors constant. Similarly, in South

Africa, Maziya et al. (2017) showed that 29% of non-irrigators in the study area were severely food insecure compared to 23% of the irrigators, whilst 45% of irrigators were moderately food insecure compared to 47% of non-irrigators and 8% of irrigators and 6% non-irrigators were food secure. Sinyolo et al. (2014) also showed that 75% and 25% of non-irrigators and irrigators, respectively, were poor during the time of the study. They concluded that smallholder irrigation contributes to household food security and thus should be a national priority.

2.2.1 Overview of irrigated agriculture in South Africa

South Africa is a semi-arid, water-stressed country with an average annual rainfall of 450 mm, which is below the world average of around 860 mm (Schreiner, 2013). South Africa is the world's 30th driest country. Most parts of the country are water scarce, particularly in the northern and western areas (Department of Agriculture, Forestry and Fisheries (DAFF), 2015; Van Averbeke et al., 2011). Surface water resources are the main source of water supply in South Africa.

Agriculture is the country's largest water user, using an estimated 62% of the nation's water supply (Fanadzo & Ncube, 2018). The agricultural sector of South Africa in general, and the irrigation sector in particular, is characterised by a dualistic production structure that is, commercial farming and smallholder farming. Approximately 1.6 million hectares of the country's land is under irrigation and 50 000 hectares are allocated to smallholder irrigated agriculture (DAFF, 2015). In terms of water usage, smallholder irrigation farming uses about 4% of the irrigation water, while commercial agriculture uses the rest (Perret, 2002). Smallholder irrigation farmers fall into four groups namely (i) farmers on irrigation schemes; (ii) independent irrigation farmers; (iii) community gardeners, and (iv) home gardeners (Van Averbeke et al., 2011).

The country's water scarcity conditions exacerbated caused by the changing climatic conditions, has resulted in a vital need to promote irrigated agriculture (Fanadzo, 2012). Irrigation and agriculture are important, regardless of the relatively small contribution to the Gross Domestic Product (GDP) (Bonthuys, 2018). There have been substantial changes in South African irrigation schemes where their production has decreased significantly, and some schemes have collapsed.

2.2.2 Smallholder irrigated farming

South Africa has approximately 302 irrigation schemes, 79% of which are in the Eastern Cape, KwaZulu-Natal and Northern Cape (Fanadzo, 2012; Ncube, 2018). A large number of irrigation schemes in the country are not functional or the functional schemes may not be operational (Ncube, 2018). Where these schemes are functional, agricultural production contributes significantly to household and community livelihoods (Murugani, 2016). The irrigation schemes use various irrigation systems, including gravity-fed surface, pumped surface, overhead/sprinkler, and micro-irrigation (Van Averbeke et al., 2011).

Smallholder farmers are important for ensuring socio-economic development in less developed countries (Ntai, 2011). A large number of farmers in smallholder farming are women and are amongst the poorest in South Africa, lacking livelihood assets (Thamaga-Chitja & Molojele, 2014; Ncube, 2018). In South Africa, most of the smallholder farmers engage in dryland production, which is vulnerable to the changing climatic conditions. In this context, irrigation schemes lessen the risks involved in dryland production, increasing the chances of producing throughout the year (Ncube, 2018).

Developing smallholder irrigation schemes is important for achieving development of rural communities (Murugani, 2016). The initial development of the irrigation schemes in South Africa aimed to ensuring economic development for the previously disadvantaged communities. This could be achieved through promoting sustainable crop production to enhance food security and alleviate poverty, as well as employment creation of employment and improvement of farm incomes (Perret & Touchain, 2002; Speelman et al., 2008; Fanadzo, 2012).

Though irrigation schemes are a better option than dryland production, a large number of smallholder irrigation schemes in South Africa have collapsed, and others are experiencing problems for different reasons (DAFF, 2015). The failure and poor performance of smallholder irrigation schemes are due to low productivity, different factors (like socio-economic, technical, political, institutional), climate variability and lack of participation of farmers in the schemes (Fanadzo, 2012). The poor performance of these schemes may also be associated with poor crop and water management practices (ibid). The smallholder irrigation schemes achieve low yields, degrading infrastructure, limited access to services, weak and unclear institutions on water and land and limited support services (Muchara, 2014).

To address the poor performance of the irrigation schemes, revitalising of the existing irrigation schemes, determination of development capacity, and placement of effective organizations responsible for policy making, as well as improving the efficiency of water-use is needed (Backeberg, 2005). According to Mwendera and Chilonda (2013), the government of South Africa focuses beyond renovating and reconstructing the irrigation infrastructure. It also seeks to improve individuals' human capital development by increasing access to information, developing markets and business strategies for the smallholder farmers.

2.2.3 Smallholder irrigated farming in rural livelihoods

Irrigation agriculture is an essential component of any strategy to improve rural livelihoods and food security. The benefits of irrigated farming have resulted in lower food prices, higher employment opportunities and more rapid agricultural and economic development (Dube, 2016; Lemke et al., 2012; Moyo et al., 2016). Looking at production, smallholder irrigation allow farmers to produce food more than once a year, boost crop yields and reduces the risk of crop losses in rain-fed systems (Tesfaye et al., 2008). Agriculture occupies a key position as a livelihood activity and a source of food for poor rural household in South Africa (StatsSA, 2018). Mudima (2002) in five irrigation schemes in Zimbabwe found that famers engaging in irrigation scheme never ran out of food, unlike their counterparts using on rain-fed agriculture. Siraw (2016) observed differences in crop production between irrigation users and non-users, implying that the production of farmers with access to irrigation were better than for farmers without access.

Smallholder irrigation farming is the main source of income for the disadvantaged rural people who are mostly women (Thamaga-Chitja & Molojele, 2014). Having most of the rural households unemployed, most family's income levels are low and inadequate to acquire basic household needs and wants. Moyo et al. (2016) found that irrigated farming significantly improved farm incomes. This can translate into increased expenditure, investment, construction and trade. In North West province of South Africa, Balarane & Oladele (2014) found that 53% of the farmers on irrigation schemes, farming was the main source of income. Similarly, Tshuma & Monde (2012) found that smallholder irrigation was the main source of income for most of the farmers in the Zanyokwe Irrigation Scheme. However, men and women tend spend agricultural income differently, with women more likely to spend more on food, health, and education expenses. Thus, better health and nutrition gains may be realized when women's income from irrigated production increases.

Irrigated agriculture plays a vital role in the supply of water for sanitation and health. Access to technologies can also be beneficial when irrigation water has multiple uses, including watering of livestock and crops, drinking and washing purposes (Tshuma & Monde, 2012). Given that it is typically women's responsibility to collect domestic water, their involvement in the design of irrigation systems and their access to irrigation technologies can reduce the time spent collecting water and make more water available for good hygiene practices. Furthermore, emerging evidence suggests that women prefer to grow a more diverse set of crops, which can lead to improvements in dietary quality, while men favour growing cash crops. This clearly shows the importance of rural women in agriculture and values chains.

2.3 Status of Women in Irrigated Agriculture and Value Chains

Women are the farmers, workers, entrepreneurs and their involvement in smallholder farming is crucial, as play a significant role in ensuring sustainable livelihoods and food security at all levels (Sharaunga et al., 2016). They engage in several activities along the agricultural value chain such as land preparation, planting, weeding, harvesting, storage, handling, post-harvest processing and caring for livestock (Chitja et al., 2016; Oladele & Mudhara, 2016; Muzari, 2016). Women comprise 43% of the agricultural labour force in developing countries. In South Africa, over six million households engage in agricultural activities, two million being female-headed (Mudau, 2010). Furthermore, about 60-80% of women in South Africa engage in smallholder farming, which is higher than the world's average (Murugani & Chitja, 2018).

While women are the dominant farmers in South Africa, Machethe et al. (2004) observed that in five irrigation schemes in Limpopo Province, women participated less in decision-making compared to males. In contrast, men are dominant in the management and decision-making in many irrigation committees. This demands efforts to increase women representation in local institutions and governance structures and participation in decision-making (Food and Agricultural Organization of the United Nations (FAO), 2018). According to Murugani (2016), transformation of institutions is required otherwise; women will remain disempowered despite interventions to uplift smallholder farmers. Empowered individuals or the groups can make sound decisions and transform their decisions into positive outcomes. Thus the main aim of empowering the poor, particularly women in rural areas, is to enhance their desirable livelihood outcomes (World Bank, 2001; Alsop et al., 2006 cited in Sharaunga, 2015).

While women are the key role players in the agricultural production level they still remain susceptible to food insecurity. Agriculture is important to women, but they have limited access

to agricultural productive resources and services (FAO, 2018). Women have poor access to land, education, irrigation technologies and livestock, and are less likely tha2.1.2 Smallholder irrigated farming

2.4 Women Access to Productive Resources for Irrigated Agriculture

Closing the gender gap in agriculture has shown to have positive outcomes, not only for women themselves but also for the household and the nation at large. Empowering rural women through improved access to key productive resources and agricultural services is one of the possible options to alleviate rural poverty and food insecurity. Equal access to resources and services for women farmers worldwide can increase farm yields up to 30 percent, meaning 100 to 150 million fewer people would go to bed hungry every day. The sustainable livelihoods framework allows analysis of the implications of resource ownership on women and development.

A livelihood comprises of the capabilities, assets and activities required for a means of living. Livelihoods are sustainable when they can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base (Department of International Development (DFID), 2000). The Sustainable Livelihood Approach has developed from decades of evolving perceptions with regards to poverty and the manner the poor construct their lives and the importance of structural and institutional issues (Scoones, 2016). The Sustainable Livelihoods Framework (SLF) is a comprehensive and complex approach to understanding how people make a living (Sharaunga, 2015). In this regard, the framework can enable a better understanding of how women access productive resources in irrigated agriculture. Sharaunga (2015) argues that women empowerment is essential for giving an individual capability to overcome shocks that threaten food security.

Increasing asset base enables the poor and vulnerable households to improve their livelihoods, and in the process, their food security (Oladele & Mudhara, 2016). It is crucial that households' gain access to livelihood assets in order to ensure food security. The livelihoods approach is concerned, primarily, with people and it seeks to gain an accurate and realistic understanding of people's strengths. People endeavour to convert these strengths into positive livelihood outcomes. The approach operates on the belief that people require a range of assets to achieve positive livelihood outcomes. The SLF identifies five types of assets or capitals upon which

livelihoods depend, namely human capital, social capital, natural capital, physical capital and financial capital.

2.4.1 Human assets

The level of human capital available in a household correlates with aspects such as agricultural productivity, household income, employment and nutritional outcomes, which in turn, affect household welfare and ultimately economic growth at the national level (Oladele & Mudhara, 2016). Cheteni (2016) and Mango et al. (2014) revealed that education positively influenced household food security. It improves income or wages and indirectly helps in attaining the basic needs and wants such as sanitation, shelter and water (Awan et al., 2011). A World Bank study determined that farmers with basic education were 8.7% more productive than the uneducated (Gasperini, 2000. Jamison and Moock (1984) and Pudasaini (1983) showed that education enhanced agricultural productivity primarily by improving farmers' decision-making ability and secondarily by enhancing their technical efficiency.

Significant differences in levels of education exist across gender. Besides, women in rural areas are less educated than males (Adedeji et al., 2019). Women in developing countries lack access to education and capacity-development resources such as extension services. According to Abbott et al. (2015), women's poor access to education and lack of skills, hinder them from achieving sustainable livelihoods and participation in governance as this contributes negatively to their capabilities and confidence. This, therefore, affects their empowerment, which may impede their agency. According to Murugani (2016), improving women access to education will enhance their agency and "indirectly" affect their household food security and livelihoods as educated farmers seem to have better access to market, compared to the less educated farmer.

2.4.2 Social assets

Social assets relate to the formal and informal social resources that people draw upon in their livelihoods. Social assets develop by investing effort and time in participating in formal groups or organizations and informal interactions (Adejeja et al., 2019). This interaction increases access to information leading to increased people’s power and influence. According to Hebinck & Bourdillon (2001), social capital defines the quality of relationships amongst individuals and the extent to which an individual can count on support or assistance from family or other acquaintances.

These elements facilitate farmers to earn market access such as contract farming, access to informal credit, and entering contractual agreements with market stakeholders (Van Tilburg and Van Schalkwyk., 2012). Mjoli & Nonzhelele (2009) show that in KwaZulu-Natal by women in the area indicated that their participation in Management Committees of water users' organizations provided them with an opportunity to learn about the water resources management and they learnt from the experience of other members.

Women play a significant role in agriculture as unpaid workers on family farms, paid labourers and farmers on their own account (Oladele & Mudhara, 2016). They engage in livestock and crop production and account for 43% of the agricultural labour force in developing countries. Summing up the contribution of women in agriculture shows their significant role in ensuring sustainability in agriculture production and food security. However, in most rural areas women's participation in local institutions such as water users organizations (WUAs) or farmers' organizations is limited (FAO, 2018). Even when they do belong to organizations, social restrictions often prevent them from participating in decision-making, and male members often do not acknowledge the relevance of increasing women's access to resources and services and broadening their involvement in local organizations. This situation hinders more participatory and equitable decision-making on water resources at local and national levels.

2.4.3 Natural assets

The land is an important economic resource to most rural people in developing countries who rely on agriculture for their wellbeing (Sinyolo, 2013). Land serves as a base for food production, income, employment and collateral for credit. It plays a crucial role in the social asset, as it is important for political power and participation in decision-making. Women's access to land determines their household food security. Strengthening women's access to, and control over, land is an important means of raising their status and influence within households and communities (Abbott et al., 2015). Poor access to land increases their vulnerability to hunger, poverty and gender-based violence (Ngema et al., 2018). Women are responsible for producing an estimated 80% of food in developing countries yet they rarely control, access and own the land they work on, have no tenure security or control over the land. In sub-Saharan Africa, only 15 of women are agricultural landholders.

Women lack adequate land rights independent of their husbands or male relatives (Mudhara et al., 2019). Women's access to land is indirect, meaning that mem control it: their father,

brother, husband or even son (Masamha et al., 2018). Literature also points to structural tensions between the recognition of traditional authorities and the empowerment of women in rural areas. In South Africa, traditional authorities, who have considerable influence in local governments, may resist granting women access to land or allowing women to participate in decision-making.

When women have secure land rights, they have higher economic gains. In Tanzania, women with strong land rights were three times more likely to work off-farm, earned up to 3.8 times more income, and were 1.35 times more likely to have individual savings. When women have secure access to land, nutrition outcomes also improve. In Ethiopia, an increase in land allocated to women decreased household food insecurity by 36 percent. In Nepal, in households where women own land, children are 33 percent less likely to be severely underweight.

2.4.4 Physical assets

Since most of the rural poor depend on agriculture for their livelihoods. Therefore, access to water plays a significant role in ensuring food and nutrition security. Access to water ensures improved production and farm incomes, higher levels of nourishment, lowered poverty and food insecurity (Sinyolo, 2013). Despite the proven benefits of irrigation, not all farmers access the benefits of these systems as women are often left out (Muchara, 2014). In Tanzania, for example, research found that even as men in the community began to use motor pumps and drip irrigation, many of the women continue using labour-intensive manual methods such as buckets, bowls and their hands to distribute water. Women face different challenges and few opportunities access and benefit from irrigation technologies (FAO, 2018).

Women make up a substantial majority of the agricultural workforce and produce most of the food consumed in most developing countries, South Africa inclusive. This makes them the principal agents of food security and household's welfare, especially in the rural areas. Therefore, improving women access to irrigation technologies can lead to improved health, production, livelihood and nutrition outcomes along several pathways and should be a priority (Joshi et al., 2017). Land tenure insecurity is one of the underlying causes of women's limited access to irrigation infrastructure. Women's plots are typically smaller than those owned by men and are less likely to have access to irrigation or be further away from water resources (Sinyolo, 2013). Land tenure insecurity discourages women from making investments that improve water access, thus limiting their agricultural productivity.

2.4.5 Financial assets

Financial asset denotes the financial resources an individual uses to achieve his or her livelihood objectives. According to Oladele & Mudhara (2016), financial services such as savings and credit provide opportunities for improving agricultural output and food security. Credit markets or other credit sources allow farmers to cover their short-term expenses or purchase more productive and expensive farm technologies (Sinyolo, 2013). Poor or lack of access to credit makes it difficult for farmers to bear the risks and to meet up-front costs needed to purchasing new technologies (FAO, 2018). In a study by Waithanji et al. (2014), access to financial services significantly improved food and nutrition security, education, social cohesion and has the potential to empower rural women. Studies have shown that improving women's access to financial resources leads to higher investments in human capital, in the form of children's health, nutrition and education.

However, financial resources tends to be the least accessible livelihood asset, especially for rural women. Evidence shows that credit markets are not gender-neutral. Legal barriers and cultural norms sometimes bar women from holding bank accounts or entering into financial contracts in their own right (FAO, 2018). Lack of collateral security among the women also affects women access to credit (Van Tilburg et al., 2012). Most women lack ownership to productive resources such as land, which is collateral (Waithanji et al., 2014). In Madagascar, for example, the share of female-headed households that use credit is nine percentage smaller than the share of male-headed households who do so. Even if women have access to credit, they have no control over the money that is borrowed and may even have less control over the enterprise that money was borrowed for, and men may have dominance in decision-making (Waithanji et al., 2014).

2.5 Frameworks for Assessing Women's Empowerment in Agriculture

With the increasing recognition of the need for women empowerment in agriculture as a prerequisite to achieving food and nutrition security, policymakers are increasingly developing and implementing agricultural policies and programs that can improve women empowerment in agriculture. However, gender systems are diverse and complex. The nature and extent of gender gaps in farming and the conditions required to empower women vary across regions, country, community and household. For this reason, several frameworks have been developed to assess women empowerment. Examples include the Women Empowerment in Agriculture

Index (WEAI), Social Cohesion Index (SCI) and Smallholder Horticultural Empowerment and Promotion (SHEP). These are discussed below.

2.5.1 Women Empowerment in Agriculture Index

According to Jeckoniah et al. (2012), participation of women in the value chain does not always result in their empowerment. This arises due to the challenge of determining how women have access to, or the level of access and control over productive resources (Adedeji et al., 2019). The agricultural sector does not recognise women due to cultural norms, limited access to education, land, credit and agricultural services (Hart, 2009; Sraboni et al, 2013). Many women are disempowered and engage less in farming. This has resulted in the development of the WEAI. The index is a widely used framework for assessing women empowerment in the agricultural sector.

The initial development of the WEAI stemmed from the problem of uncertainty in the extent to which women's contribution to the agricultural sector will result in their empowerment (Murugani, 2016). The WEAI measures empowerment, agency, and inclusion of women in agriculture and identifies solutions towards the constraints and challenges women face (International Food Policy Research Institute (IFPRI), 2012). The WEAI determines the linkage between empowerment of women, food security and agricultural growth (IFPRI, 2012). According to Alkire et al. (2013), WEAI measures the impact of the interventions directed towards women empowerment. The tool allows for measuring and monitoring the impact of these interventions.

WEAI comprises of two sub-indexes, i.e. one that assesses empowerment of women in five domains and the second, which is Gender Parity Index (GPI). The latter measures the percentage of women whose achievements are at least as high as men in their households and, for women lacking parity then identifies the relative empowerment gap with respect to the male in their household (Alkire et al., 2013; Malapit et al., 2015). The five domains are (1) decisions about agricultural production, (2) access to and decision-making power about productive resources, (3) control of the use of income, (4) leadership in the community, and (5) time allocation (Alkire et al., 2013)

2.5.2 Five Domains of Empowerment

The five domains of empowerment (5DE) consist of 10 indicators. Each of these indicators weigh equally (IFPRI, 2012).) The 5DE sub-index uses a robust multidimensional

methodology known as the Alkire-Foster Method (Alkire et al., 2013). This method measures multidimensional poverty, well-being, and inequality. It measures outcomes at the individual level against multiple criteria (domains and/or dimensions and indicators) (IFPRI, 2012). This sub-index contributes 90% to the weight of WEAI and measures empowerment rather than disempowerment of women (IFPRI, 2012). A woman is empowered when she has adequate achievements in the four of the five domains or if some of the weighted combinations of the indicators result in 80% of the total adequacy (IFPRI, 2012).

The domain indicators have the following definitions.

- Production: Sole or joint decision making over food and cash-crop farming, livestock, and fisheries as well as autonomy in agricultural production (IFPRI, 2012). Two indicators are used, i.e. input in productive decisions and the extent to which the individual feels he or she can make his or her own personal decisions about the different aspects of household life (Alkire et al., 2013).

- Resources: Ownership, access to, and decision-making power over productive resources such as land, livestock, agricultural equipment, consumer durables, and credit (IFPRI, 2012). It focuses on questions about who makes decisions concerning the purchase, sale or transfer of land and assets (Alkire et al., 2013).

- Income: Sole or joint control over income and expenditures (IFPRI, 2012). The single indicator of this dimension measures the extent of input in decisions about the income generated from productive activities (Alkire et al., 2013).

- Leadership: Membership in economic or social groups and comfort in speaking in public (IFPRI, 2012). This domain focuses on community leadership, recognizing the value of capital as a social resource (Alkire et al., 2013).

- Time: Allocation of time to productive and domestic tasks and satisfaction with the available time for leisure activities (IFPRI, 2012).

2.5.3 Social Coh10esion Index

"Social cohesion refers to the property by which societies, and the individuals within them, are bound together through the action of specific attitudes, behaviours, rules and institutions which rely on consensus rather than pure coercion" (African National Congress, 2011: 14 cited in

Struwig, 2013). The KwaZulu-Natal Provincial Planning Commission (KZNPPC, 2015) shows that power asymmetry results in a division in the society and hinders social cohesion. Individuals often struggle to align their roles into the broader society. There exists socio-cultural barriers to women empowerment and the issue of including men in the process of empowering women that gender and power dynamics do not threaten social cohesion. Issues that threaten social cohesion include income inequality, criminal victimisation, declining public confidence in political institutions and state performance, low levels of interpersonal trust, racism, xenophobia and the straining of traditional family and community safety nets (Struwig at al., 2013).

The Social Cohesion Index (SCI) consists of three domains. The first domain discusses issues of economic development and fosters strategies to reduce wealth disparities. The second domain (socio-cultural) incorporates issues of social capital, trust, tolerance and shared identities. The third domain (the political or civic), discusses issues relating to common values and lively civic culture. The conceptual framework refers to a society in which social disorder is absent and social control mechanisms are established (Struwig, 2013). This framework can be used to assess woman empowerment through obtaining the three domains, income inequality among women and men in the agricultural sector, while the socio-cultural domain can account for factors that serve as barriers to women empowerment, the civic domain can assess the inclusion of women in the management positions.

2.5.4 Smallholder Horticultural Empowerment and Promotion

The SHEP approach is a market-orientated approach, aiming at developing the capacity of smallholder farmer groups (Aikawa, 2013). It enhances the technical and managerial capacity of smallholder farmers, enabling opportunities to venture into "market orientated horticultural farming" (Japan International Cooperation Agency (JICA), 2014). SHEP further draws on psychological and technical aspects of human development to empower farmers. Rangarajan and Chitja (2020) also indicate that for transformation of farmer productivity, farmers and those that facilitate their empowerment should be better equipped in human development. The development and implementation of this approach, particularly in Kenya, was to address the challenges that smallholder farmers faced leading to nominal incomes for farmers regardless of their significant role in the agriculture food production, resulting from insufficient production, lack of quality management skills, limited market access, high fluctuations on the farm gate price and poor transportation (JICA, 2014).

The implementation of the SHEP has shown success where the incomes of the beneficiaries have doubled through farmers conducting market surveys and strategic selection of crops to plant, farmer groups developing of action plans, and technical assistance (Aikawa, 2013). The SHEP approach requires farmers to survey the market, establish a business by creating linkages between farmers and business service providers and promotes gender equality by strengthening farming couple's relationships (JICA, 2014). Furthermore, the approach enhances livelihoods, enables the farmers to scale up production, promote farmer investments in farm inputs and further contributes on strengthening solidarity and cohesion of the farmer groups; improving gender relations, increase youth engagement in agriculture food production (JICA, 2014).

The approach transforms the awareness and behaviour of farmers. It involves a series of training and a range of activities. The activities are market orientated, systematic and closely linked to achieve the goal of improving the livelihoods of smallholder farmers (JICA, 2014). Market-orientation of the approach means encouraging the smallholder farmers to move away from "growing and selling" towards "growing to sell" (DAFF, 2019). That is, seeking to ensure that farmers produce the required quantity and quality for the market through access to market information and networking with the market stakeholders. The SHEP helps with bridging information between the smallholder farmers and the market by enhancing information exchange, which is the first step towards “growing to sell” (JICA, 2014).

The SHEP is implemented using the following 10 steps:

1. Sensitization Workshop,
2. Selection of Target Sub-Counties,
3. SHEP Organizers’ Training,
4. Baseline Survey,
5. Farm Business Linkage Stakeholder (FABLIST) Forum,
6. Joint Extension Staff & Farmers’ Dual Gender (JEF2G) Training,
7. Group Exercises: Market Survey and Formulation of Action Plan,
8. Facilitators’ Training for Farmers’ Demand Driven Extension (FT-FaDDE),
9. In-Field Training by Extension Officers, and
10. Sale of Crops (JICA, 2014).

Aikawa (2013) outlined the range of activities and series of training that were carried out during SHEP in Kenya. The first step was to inform and formalize the relevant stakeholders (including, ministerial officials, provincial, district and divisional staff, extension officers, and

targeted farmers) about this approach through "Sensitization Workshops". Next was a situational analysis of the smallholder farmers, where data was collected using surveys mainly focusing on the conditions of farmers production and production techniques and the level of the capacity of farmers as organisations. Thereafter, the project arranged opportunities for the farmers' group representatives and extension officers and stakeholders (suppliers of seed, fertilizer and agrochemical and agricultural equipment companies, agro-processing companies, financial institutions, agricultural research institutes, retail lenders, government agencies and NGOs) to meet and engage in discussions. The stakeholder displayed products, provided information, and had profiles of farmer groups, and farmers' group representatives and extension officers with profiles of stakeholders.

Thereafter, the next project targeted the participating farmers, focusing on providing training, including market survey, crop selection, problem analysis and gender awareness training. In addition, the training included the modules on road maintenance using the sandbag technology and gender awareness training consisting of lectures and practical training such as workshops, mainly focusing on couples (JICA, 2014). After the training, farmers engaged in-group exercises to put lessons into practice. This included the market surveys led by the farmer group representatives and the extension officers. Based on the survey results, the crops to be produced were selected and marketing action planned. The prices for which the horticultural produce was determined and formulated. Lastly, extension officers facilitated in-field training to transfer information and knowledge about the selected crops to farmers.

Components of the SHEP could be essential for assessing women's empowerment. For example, step 4 is a baseline survey inclusive of a situation analysis of groups and their members. It uses "Group Empowerment Indicators (GEIs)", where farming groups along with the extension officers, assess the status of their organization and measure improvement in the measurement of leadership, cooperative relationships and gender-related matters of the group (JICA, 2014). Also, can further ensure market access and participation for women as step 6 of the SHEP accounts for gender-related issues and presents dual gender training requiring equal male and female participation.

The gender awareness training consists of lectures and practical training such as workshops, mainly focusing on couples. Extension officers facilitate the training. This may include other stakeholders such as Gender Officers (JICA, 2014). Therefore, this framework can improve women inclusion in agriculture production, improve gender dynamics by ensuring that women

understand the role they play in food production and men learn about women empowerment, and raise awareness of both women and men about gender-related issues in agriculture, along with improving crop production and practices and improved access to market.

South Africa has also engaged with JICA in the venture to assist the farmers to improve their farm incomes through capacitating the farmers to better manage group dynamics and improving production using the different techniques, e.g. acquiring market information before producing (DAFF, 2019). DAFF (2019) states that South African smallholder farmers need this project as it presents the concept of farming as a business. The project started in 2019 involving 743-smallholder producers from Limpopo, KwaZulu-Natal and Mpumalanga Provinces have benefited from improved access to formal markets and show less dependence to government assistance, and further, anticipate there will be an increase in employment.

2.6 Water Utilisation, Management and Irrigation

Water is a scarce resource in South Africa, especially given its unequal distribution across the country's various sectors (Zhuwakinyu, 2012). The water scarcity compounded by a high demand has drown government attention to the need to promote proper and efficient usage. Government strives to achieve this through the review, amendment and repealing of some policies that existed before the attainment of democratic rule in South Africa, as it seeks to ensure water management and sustainability. The need for adoption of new water principles was motivated by the fact that the 1956 Water Act took water use as determined by "the riparian principle which establishes right to use water and ownership of the land adjacent to that water and separation between the public and private water" (Mapholi, 2018: 110). From 1994, the democratic government undertook policy transformation to address the past inequalities and reduce poverty. This section reviews the National Water Act (1998), the white paper on water policy, National Water Resource Strategy-1 and National Water Resource Strategy-2, which shape the evolution of water policies in South Africa.

2.6.1 Irrigation strategy for South Africa

Water utilisation in South Africa is classified into three use categories, i.e. agricultural, industrial and domestic. The farming sector is dual, comprising of a well-developed commercial sector and a subsistence-oriented sector. The Agricultural sector formally employs 7.2% of South Africans (Agbonijinmi, 2007). Fifty percent (50%) of freshwater is used for agricultural purpose (Agbonijinmi, 2007). More than 1.3 million hectares are under irrigation.

The country's irrigation strategy aims to improve smallholder irrigation for employment creation, poverty reduction and skills development (Department of Agriculture, Forestry and Fisheries (DAFF), 2015). The same strategy seeks to perform irrigation within the limited natural resources (DAFF, 2015).

The irrigation strategy particularly targets small-scale farmers previously marginalized during apartheid era. Pre-democracy, the distribution of water and land was unequal, while support and investment in irrigation infrastructure biased towards white commercial farmers (Cousins, 2012). Irrigation strategy seeks to support revitalisation of irrigation schemes and development of the new irrigation schemes. DAFF (2015: 4) points to the recognition is the existence of a large amount of under-utilised irrigation land within the former homelands as a key resource. The strategy recognizes that land reform should contribute to creation of opportunities for the smallholder irrigation sector beyond the status quo. DAFF is responsible for guiding irrigation in South Africa and act as the controller of irrigation strategy of South Africa.

2.6.2 National Water Act (1998)

The introduction of irrigation to supplement the water supply for farming activities is the main government intervention to improve the productivity and income of smallholder farmers in rural areas. (Tekana & Oladele, 2014) noted that the establishment of new irrigation schemes is part of the economic development strategy of the former homelands. Post-apartheid, South Africa adopted a new constitution in 1996 followed by a new water policy named the National Water Act (Act 36 of 1998). Fundamentally, the NWA aimed to reform weaknesses of the apartheid era Water Act 56 of 1956. The latter was discriminatory in how it allocated water as it prescribed that white farmers accessed most of the water. The Act's reliance on entitlements based on the ownership of riparian land meant that white farmer, who had privileged access to land, had unjustifiable water rights (Speelman et al., 2010). The NWA introduced many transformations in water management and use.

National Water Act (1998) premised on the recognition that South Africa has limited water resources as it receives an average annual rainfall of 495 mm (Ledger, 2017). This situation points to protect the water resource, managed it well and distribute it equitably to the nationals. The act endeavours to balance three aspects, i.e. the social benefit, economic efficiency and environmental sustainability. In addition, it sets out the legal framework for the national government to "protect, use, develop, conserve, manage and control water resources in the country" (Schreiner, 2013: 240). The act also redresses gender discrimination but mandating

that water should be shared equally so that the needs of the citizens are met across the gender divide. The Act introduced new principles such as decentralisation of water management and subsidiarity between central and local institutions (Farolfi & Hassan, 2003). Muchara et al. (2014) notes that the Act emphasises the need for the formation of water user associations (WUAs) as a means of enhancing farmer participation in irrigation water management. Perret (2002) argued along the same line, pointing that the Act offered an opportunity for re-thinking the paradigm underlying development of smallholder irrigation schemes in South Africa and develop new institutions.

The NWA presents government as a public trustee of the country's water resource and points to its obligation to ensure the proper management of the resource, its conservation and protection (Perret, 2001). The NWA identifies several institutions and instruments required for effective management of water, i.e. National Water Resource Strategy (NWRS), Catchment Management Agency (CMA), Catchment Management Strategy, and Water User Associations (WUAs). The Act envisaged a commitment from smallholder irrigation scheme farmers to take charge of institutional and financial terms of their schemes and each scheme to be under the management of WUA responsible for selling water to willing-to-pay farmers with an aim achieve financial sustainability (Perret & Geyser, 2010). The main aim of the WUAs is to ensure distribution of water rights, collection of water charges, inspecting the irrigation systems used for better managing distribution and ensuring equity and preventing water wastage (Ntsonto, 2005). Muchara et al. (2014) illustrate that where water is provided with no charge to many users, as often happens in smallholder irrigation schemes (SIS), there is unequal distribution among the users, poor management and low water-use efficiency. Therefore, the argument is that water charges, calibrated on use, are crucial for maintaining irrigation schemes.

The riparian approach to water rights, as practiced before South Africa attained democracy, no longer applies under the rights-based approach stipulated in the NWA as water is regarded as a common asset (Chitja et al., 2016; Perret, 2002). The Act presented water as an economic good to levy for its use (Speelman et al., 2008). Therefore, the Act introduced water pricing, in pursuit of the objective of efficient and productive water use. The Act emphasizes that water is a public resource, where users have use-right rather than ownership. For this purpose, water users should register, obtain water license and pay for this right (Perret, 2002). The licensing of water-use or permitting system derives from the water scarcity in South Africa. The Act

once a user is given a water-use permit, it binds it is holder to responsible water use (Viljoen, 2017).

The NWA (1998) is a progressive water legislation and is in line with the concept of integrated water resources management (IWRM) (Schreiner, 2013). According to Schreiner (2013), other countries, such as China and Zambia, have adapted the Act for their own circumstances. However, its implementation has been inadequate. On the institutional arrangements, the Act recommends the formation of Catchment Management Agencies (CMAs) at the level of Water Management Areas 19 throughout South Africa (Farolfi & Hassan, 2003), including the conversion of existing irrigation boards into user associations, and the formation of agencies to manage the national water resource infrastructure (Schreiner, 2013). As of 2013, the first two processes remain (ibid). Of the proposed nine CMAs, only two exist (ibid). Changes of the irrigation boards were supposed to take six months but have not been completed five years later (ibid). The issues of reallocation and equity required in the Act remain yet were the key principles of the legislation. As a result, largescale commercial farmers remain the biggest users of water in South Africa.

2.6.3 Irrigation Management Transfer policy

The NWA introduced Irrigation Management Transfer (IMT), which encourages farmers to participate in the management and operation of the irrigation scheme. IMT refers to the replacement of power and responsibility of government agencies in the handling of irrigation systems (under public sector) to WAUs or other private sector entities (Muchara et al., 2014). IMT was implemented through the Reconstruction and Development Programme (RDP), which was based on improving food security at the community level and favouring the establishment of small schemes to ensure that people took control of their own resources (Ledwaba, 2013). Sixty-four new irrigation schemes were established during this era, adding 2,400 ha to the total smallholder irrigation scheme area (Ledwada, 2013).

The government implemented IMT policy to eliminate or reduce its financial input into the operation and maintenance costs for irrigation and system while also increasing farmer supervision over water-use (Tiaguaro-Rea, 2012). Furthermore, this is the government strategy to ensure that empower communities through decentralization and increase accountability. Perret (2002) outline that during the IMT in 1990, several issues emerged, e.g. low participation by irrigators, lack of local organization, and land rights belonging to men while women were the actual irrigators, and heavy operation and expensive maintenance costs in most schemes.

Besides, most of the irrigators were still at subsistence level. ”Within the IMT framework, the South African government embarked on a scheme revitalisation process, that includes whole enterprise planning, human capital development, sustainable financial development strategy for schemes alongside repair and re-design of existing infrastructure” (Muchara, 2014: 15)

IMT policy was implemented to increase local farmer associations' control over have on irrigation infrastructure and water distribution. IMT means that farmers do not have to wait for the national agency to undertake repairs (Bandyopadhyay et al., 2007). In the past, the government was responsible for managing smallholder irrigation schemes. However, due to many problems, this system of centralizing control faced such as over-dependence on technical solutions without supporting arrangements, the government had decentralised power and responsibilities (Machethe et al., 2004). IMT programs in some developed countries such as the USA, New Zealand and Turkey have been successful. Machete et al*.,* 2004 argued that IMT tends to be successful in conditions where the irrigation is central to dynamic high performing agriculture. In the province of KwaZulu-Natal smallholder Sugar cane farmers, IMT was successfully implemented and it is said to have had a positive impact on small-scale farmers' yields, and also increase their participation in decision-making and management at all levels (Machethe et al., 2004).

2.6.4 The white paper on water policy

The White paper was published in 1994 with the aim of forming new national water departments in South Africa. Many water policies have been developed and implemented since 1994, and are reflected in the white (DWAF, 2002). Three years after democracy, in 1994, the white paper, which supplemented the water policy, was developed after the review of Water Law principles of 1996 (Chitja, 2016). “National Water Act 36 of 1998 and the 1997 White Paper of the National Water Policy for South Africa (RSA, 1997) legislate for the establishment of WUAs in South Africa, which make up the third tier of water management and allow for the input of local users” (Madigele et al., 2015: 7). The main objective of the white paper on water policy is to suggest government policies that ensure management of the quality and quantity of water resources in South Africa and for farmers to have sustainable and equitable access to water (DWAF, 1997). Moreover, White paper reviews the pre-apartheid 1956 water act and the present operation of the institutional arrangements for water management in South Africa.

The white paper identifies the principle of equity as being central to the water law reform process. It identifies the need to ensures that it address past inequalities arising from apartheid.

It identifies institutions and policies that will ensure the principle of equity and equitable access (Mapholi, 2018). More significant is that the policy recognizes the role of equitable water access in strengthening rural agriculture and livelihoods of the previously disadvantaged South Africans.

Raynor (2014) argued that the White Paper on National Water policy of South Africa foresee the basic need component of the reserve having a priority over the environment, however, the NWA does not appear to do this. The white paper on water policy outlines that new approaches for water management will be needed to promote water efficiency. In addition, section 6.5.3 of the White Paper, all main water users will be charged regardless of where it is taking place. The only exclusion will be in respect of the reserve for basic human needs. This is also enshrined in the NWA No. 36 of 1998 Part 3.

2.6.5 National Water Resource Strategy-1

There are two editions of the National Water Resource Strategy (NWRS), with the first one introduced in 2004. The NWRS is the implementation strategy for the National Water Act (1998) (Farolfi, 2004). The first edition of the NWRS explains how the water resources of the country will be protected, used, developed, conserved, managed and controlled in accordance with the requirements of the policy and the institutions to be established (DWAF, 2004: 1). Managing water resources ensures that water is equally distributed, ensuring sustainable social-economic development (DWAF, 2004). The strategy strikes a balance between water demand and supply in line with sustainability, efficiency, equity and goals of the NWA (Farolfi, 2004).

Water conservation is an important element of NWRS-1 and supports efficiency in water use. In addition, NWRS-1 outlines that water conservation can be achieved through water pricing and NWRS includes provisions for subsidising previously disadvantaged water users (DWAF, 2004). “Conservation would be promoted by improving efficiency in the sector through reduced wastage, in which a key strategy would be modernisation and maintenance of conveyance infrastructure equipment” (Chitja, 2016: 12). Therefore, this is in line with the National Water Act (1998) and the White paper on Water policy which promotes similar principles of water management in South Africa. The strategy is characterised with the system of licensing water. A license is valid for 40 years, but is subject to review every five years (Department of Water Affairs and Forestry (DWAF), 2004).

The principles of National Water Act of 1998 inform the NWRS-1, that is, decentralisation of power and responsibilities for water resources management to catchment management agencies (CMAs). Water User Associations (WUA) was one of the key institutions and principles proposed for controlling NWRS-1 (DWAF, 2004). Irrigation boards which had existed prior were to change to WUAs and fall under the CMAs (Chitja et al., 2016). These institutions and other stakeholders would ensure sustainable water management. Finally, NWRS-1 was to provide information on water resources, enabling coherent and holistic planning and forming a platform for informed interactions between water resource managers and development planners in other sectors (DWAF, 2004).

2.6.6 National Water Resource Strategy-2

The National Water Resource Strategy-2 (NWRS-2) builds on the NWRS-1. The purpose of the NWRS-2 is to ensure that national water resources are protected, used, developed, conserved, managed and controlled in an efficient and sustainable manner towards achieving South Africa's development priorities in an equitable manner over the a five to 10 year period (Mthethwa, 2016). The major focus of the NWRS-2 is equitable and sustainable access and use of water by all South Africans while sustaining the water resource. The NWRS-2 includes a sub-strategy on agricultural infrastructure development and management to create new job opportunities (Nkondo et al., 2012: 24). The strategy supports the National Development Plan (NDP) and the National Water Act, which also targets agriculture as one of the key sectors to sustainable development.

The NWRS-2 aim to eliminate poverty through the establishment of subsidised infrastructure and places an order of priorities for water rights (Chitja et al., 2016). The major focus of NWRS-2 is the adoption of the water management perspective that ensures the sustainability of water resources while citizens continue to access and use water (Nkondo et al., 2012). The strategy supports both the National Water Act 36 (1998) and the National Water Policy. NWRS-2 emphasises equity and redistribution. Mthethwa (2017) argued that these can be attained through the process of authorisation and provision of financial support to smallholder farmers and water allocation reform. NWRS-2 recognises the need to ensure that the NWA is the instrument that enables social and economic development.

NWRS-2 recognizes the growing population in South Africa which is putting pressure on the water resources (Nkondo et al., 2012). NWRS-2 states that mining, energy, agriculture, industrialisation and urbanisation put pressure on water resources in terms of management and

allocation (Mthethwa, 2018). Therefore, the strategy prioritizes water conservation and management in the stated sectors to increase the water productivity (Nkondo et al., 2012). Finally, NWRS-2 makes provision for infrastructure development to support the implementation of the irrigation strategy of South Africa as developed by DAFF.

2.7 Water Security, Smallholder Irrigation and Household Welfare Linkages

Access to good irrigation plays a significant role in improving productivity and greater returns from farming (Fanadzo, 2012). Smallholder irrigation can improve livelihoods through improved farm income, employment creation and steady supply of food for consumption. However, participation in irrigation scheme alone does not guarantee improved household welfare and productivity. It is consistent access to irrigation water that improves productivity (Oladele & Mudhara, 2016). Since poverty is more dominant in rural areas several scholars agree that achieving the Sustainable Development Goal (SDG) of eliminating poverty and hunger (SDG2), high priority should be given to smallholder agriculture (Parker et al., 2016). The smallholder irrigation sector is important in South Africa because more rural people benefit directly or indirectly from farming (Speelman et al., 2009). Therefore, access to reliable and adequate water is important for rural farmers to increase yield production and producing every season.

Water security is defined as the "the availability of an acceptable quantity and quality of water for health, livelihoods, ecosystems and production, coupled with an acceptable level of water-related risks to people, environments and economies" (Sershen et al., 2016. pp.456). "A household's access to irrigation, coupled with physical, socio-economic and institutional factors, leads to household water-use security" (Oladele & Mudhara, 2016: 40). Water use security allows households to invest in different inputs such as quality seeds and fertilizers that have the ability to increase crop production and incomes (Oladele & Mudhara, 2016). In addition, access to reliable irrigation enables farmers to adopt new technologies and intensify cultivation, contributing to increased agricultural productivity and greater returns from farming. In turn, this creates new employment opportunities on and off-farm. Therefore, the availability of water for irrigation can have a significance wealth-generating function in rural areas (Khanal et al., 2014).

Sinyolo (2013) stated that the physical aspect of irrigation schemes, such as canal infrastructure and water pumps, ensure reliable water supply. Socio-economic circumstances of the farmer influences access to irrigation water. In order for the irrigation schemes to be sustainable,

institutional and organizational structure are important to enforce water rights and resolve conflicts within the scheme. These aspects are important in achieving water use security. Kumar (2003) argued that household water-use security encourages investment in improved water management and modern technologies. This leads to an increase in agricultural yield and household welfare, which positively affects water-use security and income (Oladele & Mudhara, 2016).

Equitable access to water among irrigators allows irrigation scheme to operate successfully and improves household's food security (Kumar, 2003; Van Averbeke et al., 2011). However, the existence of upstream and downstream farmers in the irrigation schemes sometimes which may lead to the poor performance of some irrigators. Downstream farmers are usually water insecure and economically poor because of the unavailability of water (Mbatha & Antrobus, 2008; Oladele & Mudhara, 2016). This results in poor production and lower household's income.

2.7.1 Land tenure security

Land tenure security is defined as a degree of confidence, certainty and protection against forced removal (Supriatna, 2018). The idea of confidence means that the landowners may enjoy and benefit from the land through rights, but it mainly lies in the perception of the landholder. "Certainty is considered as the result of the recognition of such rights over land by others, including local authorities, in that people are protected in cases of specific challenges, e.g. competing claims or eviction" (Supriatna, 2018. pp.23). Tenure security is influenced by different factors such as the social and legal recognition, enforcement mechanisms, or social or legal sanctions against those who break the rules (Zwelendaba, 2014). Land tenure security is significance for agricultural production and it also allows people to practise different livelihoods such as using their land as collateral (International Fund for Agricultural Development (IFAD), 2009). Namubiru-Mwaura (2014) argued that secure tenure is important for women as it enables them to have authority over major decisions such as types of crops to grow, techniques to use and what to consume or sell.

In developing countries such as South Africa, women have unequal access to rural land and other natural resources. Customary law, religious law and legislation in the past marginalized women from owning land (Murugani et al., 2013; Mudhara et al., 2019). Even though this has been recognised, in most part of the developing countries policy reform, land management and development programs still ignore these realities during interventions. Therefore, this increases

rural women land tenure insecurity (Namubiru-Mwaura, 2014). Implementation of policies in South Africa such as land reform programme recognise the rights of women's access to irrigated land and other natural resources. Tenure security has a positive impact on increasing agricultural productivity and participation in decision making (Xianlei, 2013). Zwelendaba (2014) argues that even if the land can be transferred to women through land reforms it is highly impossible to improve agricultural productivity if there are no improvements in their access to input for agricultural production (credit, labour and technology).

Chigbu et al. (2019) stated that land tenure security is recognized as a significant tool for improving livelihood opportunities of people in Sub-Saharan Africa (SSA). This is more significant for women empowerment in SSA because they have the least access to livelihood opportunities (Chigbu et al., 2019). Namubiru-Mwaura (2014) argues that land tenure security is a key for women empowerment and a requirement for building a secure and resilient community. Rural women in South Africa can obtain access to land albeit being often denied this right due to some biased local and cultural practices providing them only with secondary rights although they are legally due to access land as individuals. In rural areas, they can receive a document called a permission to occupy (PTO) providing secure user rights (Chitja & Mkhize, 2020). Namubiru-Mwaura (2014) argued that even though policies are well drafted to address past injustice against women and land tenure insecurity they have not been supported by social acceptance. Therefore, women land rights are recognizable legally but are often not socially enforceable or recognizable (Duncan & Ping, 2001).

2.7.2 Impact of reforms and policies on women farmers

Smallholder irrigation positively contributes to food security, poverty reduction and employment creation (Nelson et al., 2012). The majority of the people involved in agriculture are women and they central to on-farm decision-making, water application, maintenance and related collective irrigation activities (Denison & Manona, 2006). It is argued that more women than men are involved in agriculture. However, women are usually denied to hold Land Permission to Occupy (PTO) which is usually allocated to men. "Women's access to land is compromised still further by customary practices that are often deeply patriarchal" (Chitja et al., 2016. pp.22). The gender gap constrains productivity and reduces women participation in the agriculture sector and the achievement of broader economic goals (Nelson et al., 2012). Women have weaker rights than men and are often excluded from key decisions regarding land access and use.

Land reform policies in South Africa aim to readdress the racial and gender inequalities on ownership and access to land. Various documents talk of transferring land to black women. For example, the Land Redistribution for Agricultural Development (LRAD) programme is one of the land reform strategies that focus on transferring at least one-third of the land in South Africa to black women (Oladele & Mudhara, 2016). The constitution of South Africa and policies, sought to ensure equity to water and land access in situations where access had previously been denied under the apartheid. People that were forcefully removed from their land after 1913 were compensated in the form of money or given the land. Women in land restitution mostly benefited as households (Chitja et al., 2016). Reforms programs and policies in South Africa have positively impacted women. They now have access to ownership of land, access to water for irrigation and other resources which are significance for farming thus giving many women a feeling of belonging (Chitja et al., 2016). However, much more still need to be done in terms of redressing women's issues (Mudhara et al., 2019).

Reconstruction and Development Programme (RDP), the 2011 Green Paper on Land Reform recognises women's land rights. These policies commit to ending discrimination and ensuring gender equity in land ownership. Women farmers that are now owning the land and accessing water and are able to produce food for their families, communities and markets (Dlamini, 2016). Furthermore, women farmers often had little input into decision-making. However, the introduction of different policies supporting women have led to improved participation of women in decision-making in the irrigation schemes. Women farmers that have secured land rights have managed to get higher economic gains. Reforms and policies have positively impacted women farmers through ownership, women authority to decide which crops to grow on land have increased. There has been effort that has been done by the South African Land Reform Programme to improve women access to land, wealth and authority (Oladele & Mudhara, 2016). Nevertheless, gender inequality in land access and ownership in South Africa still exists.

2.8 Summary

Women empowerment in agriculture has the potential to improve livelihoods of the rural communities and ensure sustainability in agricultural production and development. This can be achieved if women access productive resources such as land, education and financial services. However, approaches, processes and strategies of empowerment are as important as activities and should transform those offering such empowerment as well for true transformation.

Extension personnel, educators and researchers equally should take cognizance that they play a role in engendering the areas and spaces of involvement. Through the recognition of the importance of women in agriculture South Africa formulated and implemented several policies to improve women access to productive resources, especially water. The policies include irrigation strategy for South Africa, NWA (1998), the IMT, the white paper on water policy, NWRS-1 and NWRS-2. At the core of these policies is equity in access to production resources regardless of gender or race. Land is also a critical resource.

Considering that women in rural areas of South Africa form part of the most disempowered groups, investment in their agricultural and non-agricultural skills training is an effective strategy to improve their livelihoods. In both study sites, women pursue multiple livelihood activities and have different levels of livelihood skills. In general, most women in the selected areas have high levels of agricultural skills, but generally low levels of off-farm skills. Off-farm skills are critical for participation in the value chain.

In agriculture, women farmers were competent in determining seed depth, appropriate planting methods, plant spacing, water conservation methods and fertility management methods, but were incompetent in weed and pest control techniques, animal husbandry skills, and farm management skills. Lastly, in agriculture, women would need more training in post-harvesting techniques to increase profitability of their agricultural activities by preventing post-harvesting losses. Their enterprise/business management skills are poor, because they have poor numeracy and literacy levels, operations management skills, financial knowledge and marketing skills. The lack of economic opportunities in the rural areas means most women with vocational skills (e.g. saloon, cooking and sewing) out-migrate to find opportunities elsewhere outside their communities.

CHAPTER 3: STUDY METHODOLOGY

3.1 Introduction

The study was conducted through a series of activities aligned to the project objectives, i.e. a literature review, a situation analysis, multi-stakeholder platform meetings and training conducted as part of the interactions with the female farmers.

The study adopted the sustainable livelihood approach (SLA) (DFID, 2000, cited in Hart, 2009) with a focus on human and social asset development, in an endeavour to capacitate female farmers to use their natural and physical assets most productively, while ensuring that their physical assets, such as the irrigation infrastructure, are optimally used. The SLA is people-centred and focuses on objectives and indicators of rural women's well-being. The project used Participatory Rural Appraisal (PRA) tools and techniques, which allowed the communities to participate effectively, irrespective of their literacy and numeracy levels. The approach allow community members to gain confidence in the knowledge accumulated and enhance agency.

A literature review was conducted using completed WRC projects to identify recent social and human asset development approaches and indicators relevant to irrigated agriculture. A needs assessment then conducted with women in the selected irrigation schemes to update the work already done. The assessments paid attention to the women's socio-cultural development, and their human and natural assets. Lastly, results of the needs assessment were implemented through a multi-stakeholder engagement, accompanied by training/awareness on development activities. Project activities focussed on facilitating practical agricultural training befitting the women's low literacy levels and socio-cultural contexts; and creating a multi-stakeholder platform followed by workshops with various market players to assess their quality and quantity requirements.

3.2 Research Sites

A situation analysis was drawn from the work previously conducted in the research sites. The research was conducted on three irrigation schemes, i.e. Steelpoort Irrigation Scheme located in Sekhukhune District Municipality, Limpopo Province and Mooi River and Tugela Ferry Irrigation Schemes in Umzinyathi District Municipality of KwaZulu-Natal Province. The sites were chosen based on specific criteria such as having access to markets, access to irrigation water, social cohesion, support of traditional authorities and dominance of women. The selected areas have challenges of market access, lack of entrepreneurship, and poor group self-

organization. Mooi River and Mooi River Irrigation Schemes are located near Tugela Ferry town, and is characterized by inequitable water distribution along the main irrigation water canal, reflecting governance problems (Table 3.1).

Table 3.1: Summary of research sites in the study

District Municipality	Irrigation Scheme	Total Number of people	Name of Co-operative
Sekhukhune	Steelpoort	69	Malekana
UMzinyathi	Mooi River	150 (87% women)	Madulaneni
UMzinyathi	Tugela Ferry	60 (90% women)	Shayuphondo

The three sites were chosen based on specific criteria such as having access to markets, access to irrigation water, social cohesion, support of traditional authorities and dominance of women. The three selected areas have challenges related to market access, entrepreneurship and poor market-oriented group self-organization. Mooi River and Tugela Irrigation Schemes are located near Tugela Ferry town and is characterized by inequitable water distribution along the main irrigation water canal, reflecting governance problems. Tugela Ferry Irrigation Scheme recently had its infrastructure rehabilitated, which has significantly improved access to irrigation water.

3.2.1 Mooi River Irrigation Scheme – KwaZulu-Natal

In Mooi River Irrigation Scheme (MRIS) water is diverted from a weir constructed across the Mooi River into a parabolic canal, which runs for 20.8 km from the diversion point to the end of the scheme (DAEA, 2001). The scheme is divided into 15 blocks of different sizes for management and ease of water distribution.

The scheme was intended to provide food and jobs to the local people. It covers 600 hectares and consists of distinctly demarcated plots, approximately 0.1 ha each in size. Some farmers own or use more than one plot, with most of them using 0.5 ha. There are 824 farmers participating in the scheme. Water is distributed into the various plots through parabolic distributary canals of varying size, depending on the area to be irrigated in the block. The scheme blocks are of varying sizes, averaging 40 hectares.

The scheme is managed through block committees, which are responsible for water distribution at block, among other responsibilities. The overall scheme is managed by an irrigation

management committee (IMR) made up of the chairpersons and secretaries of all blocks. The irrigation management committee ensures equitable water distribution among the blocks, inspection of irrigation infrastructure and sourcing funds for repairs and conflict resolution (Gomo, 2012).

3.2.2 Steelpoort Drift Irrigation Scheme – Limpopo

Steelpoort Drift Irrigation Scheme (SDIS) was established before South Africa's democracy in 1994. The community is part of the Tubatse Steelpoort Rural Land Council and is Pedi-speaking (Stimie, 2001; GTM LEDS, 2007). Greater Sekhukhune's rural economy is dependent on small-scale agriculture but water scarcity is a limiting factor. The residents moved to the site in 1970, after their traditional chief had applied for and was allocated agricultural land by the government (Stimie, 2001). The government then built the Dr Eiselen Dam and the Steelpoort vegetable irrigation scheme (Stimie, 2001). The scheme is 69 ha in extent and has 69 registered farmers (Monare-Motseo, 2011). Sub-division of the plots between family members is a common practice.

Water at Steelpoort is supplied from a reservoir in the Dwars River approximately 4.5 km from the irrigated area. The reservoir is filled by run-off water, and water for the scheme is released into the river below the wall through a controlled outlet. The valve is reportedly seldom adjusted. The water then flows down the river for approximately 3 km to a small weir, from where it is diverted into a stilling basin with a sand trap and a Cipoletti measuring weir. The water then flows for about 1.1 km under gravity in a pipeline to a concrete canal that enters the village via an inverted syphon that crosses a storm water furrow. After approximately 300 m, the canal flows into a balancing dam at the top of the scheme. Water is supplied to the scheme through a canal that is fed from an outlet at the bottom of the balancing dam, where another Cipoletti measuring weir is installed. The canal that flows into the dam also continues past the top of the dam to join up with the main canal supplying water from the balancing dam to the fields.

3.3 Livelihood Strategies

The SLA allows the analysis of the relationship between people's access to resources, their diverse livelihoods activities and factors, at micro, intermediate and macro levels. It is also a framework for assessing and prioritizing interventions (Adato & Meinzen-Dick, 2002).

This section provides information on livelihood strategies employed by women in the Mooi River and Steelpoort Irrigation Schemes. Furthermore, the key highlight in both schemes where that human and social assets are indeed critical in capacitating people to use their resources to best transform their livelihoods.

3.3.1 Human capacity

In both schemes, crop management skills, farm financial management skills, water-use security, animal husbandry skills and weed and pest management skills were the dominant dimensions of women's empowerment in agriculture. Some 46.8% of women have attended vocational skills training. The majority of women (44.9%) have attended skills training in agricultural production. Very few women had attended non-agricultural training. Majority of women farmers indicated moderate competency in determining seed planting depth, appropriate planting method, plant spacing, water conservation methods and fertility management methods, but incompetent in weed and pest control techniques. However, there was a consensus among the women in the two areas on the need for training in weed management and pest control techniques (Table 3.2). All groups of farmers acknowledged the need for training on herbicide and pesticide application (95.7%), as well as on use of knapsack sprayers.

Table 3.2: Training on agricultural skills for women farmers

Agricultural Skills	Mooi River Irrigation Scheme	Steelpoort Irrigation Scheme
Crop protection	95.7%	95.7%
Crop management		65.2%
Crop rotation		34.8%

Approximately, 33.1% of women farmers were also incompetent in animal husbandry skills. They have poor knowledge of animal health, animal nutrition, animal welfare requirements and meat processing skills. Analysis of women's business management skills indicates that

their majority had very poor levels of numeracy (34.7%), literacy level (49.8%), operations management skills (55.3%), financial knowledge (47.6%) and marketing skills (61.8%).

The women are incompetent in farm management skills, e.g. knowledge of farm record-keeping, farm financial management skills, marketing contracts, knowledge of product markets and price determination skills.

In both schemes, knowledge gaps are evident in terms of land and water user rights and access and the role of extension services. In the Steelpoort Scheme, the majority of women farmers could not differentiate between officials or departments and had misconceptions as to what the government was doing with regard to land reform. In the Mooi River Scheme extension services were used differently, whereby farmers would contact extension services for tillage facilities and when they needed agricultural inputs. This is contrary to the traditional extension role of disseminating agricultural knowledge. This indicated the distant nature and poorly positioned role of government for empowerment through knowledge support and the low level of farmers' understanding of the crucial function of extension services in their own transformation. Furthermore, it was noted that extension officers are usually not well-equipped to disseminate knowledge/ information based on farmers' circumstances. Rangarajan & Chitja (2020) point that human capital required for transforming farmers' production will take capacitation of extension workers in both technical and human development skills.

Women often suffer from time constraints, which leaves no time for leisure time. Thus, those women farmers should be trained on labour-saving technologies, such as use of herbicides, which would also alleviate the burden and tardiness of hand-hoe weeding. Farmers also have poor market information, and thus are unwilling or not keen on participating in the formal market sector. Mechanisms for enhancing access to information are required.

In the selected areas, the limited role farmers played in the maintenance of irrigation infrastructure could be attributed to lack of necessary training. No workshops were held in the scheme to raise awareness and educate people on the importance of repairing irrigation infrastructure. Knowhow on how to identify relevant suppliers for repair and maintain equipment and infrastructure was limited. It was also evident that there was an expectation that the males were the ones responsible for looking after the pumps. Ways of communicating with farmers, so that they see the schemes as belonging to them should be explored.

3.3.2 Economic activities

For economic development and improved livelihoods there must be linkages between the irrigation schemes and external institutions such as markets and extension services. Agriculture is the second most important contributor of incomes for female-headed households, after government grants. Other data have shown the importance of agriculture for the ultra-poor, particularly women to be very important as a source of extra food and an economic activity South Africa (StatsSA, 2018). More specifically, 29.6% of economic activities are from crop production.

Women in the selected areas are operating in environments characterised by high levels of poverty and lack of economic opportunities. They have low education levels and lack employment opportunities. There are few opportunities to diversify household incomes away from agriculture due to the low levels of economic activities. Although agriculture could be the way out of poverty, women face a number of institutional constraints ranging from lack of support services to poor management, especially in irrigation schemes and socio-cultural constraints.

No formal credit facilities are available in the areas for agricultural activities. The majority of farmers indicated that they relied on informal institutions for credit. Fourteen percent of women had access to credit. Most (27.1%) of the women farmers had received credit/loan facilities from savings club or *stokvels*. This was followed by 15.3% who received credit/loan from their family/friends/relatives. The South African tradition of informal lending known as *stokvels* also extends to these areas. Burial schemes were popular in the communities. However, although members made monthly contributions there was not much they could do in terms of decision making in such structures. There is need to determine why credit schemes seem to be limited to burial insurance (and now more recently annual grocery bulk buying) rather than any mutual arrangements for credit in agriculture. The overriding problem was the money needed to work the land they used, and because of this, they only worked on small portions. The increased participation of the state agencies could bolster and empower the local communities by providing them with the necessary resources (financial, knowledge or skills).

3.3.3 Social issues and dynamics

The irrigation schemes have weak institutions. Although NWA (Act 36 of 1998) stipulates the formation of WUA to ensure that people use water wisely and that they pay for it, only 16.5% of farmers in the Mooi River Irrigation Scheme were members of the WUAs. The impact of

WUA in the studied irrigation scheme was very limited and unrecognised. These challenges could be attributed to the low social cohesion amongst the members in the schemes and the role that government institutions plays in the schemes, making it unnecessary to have WUAs.

The poor social cohesion amongst community members is evident in the both schemes. The majority (58.8%) of the conflicts are related to water. In the MRIS, the majority of group members do not follow rules, and the rest of the members are afraid to enforce rules, to the extent that they have requested law enforcement or government to assist with operations and maintenance of the scheme. Furthermore, there is low compliance of members in making payments towards diesel and electricity. Overall, 46% of those paying for diesel indicated that they were not always able to pay the required amounts, while 51.2% of those using electric pumps sometimes failed to pay for their electricity bills. The majority of middle section farmers (40.7%) indicated that they were facing water shortages, mainly because the upper section farmers were not adhering to their irrigation schedules.

In Steelpoort Scheme, women are vocal and demonstrate agency in negotiating their livelihoods. However, there were also huge issues of trust that prevented farmers from entrusting their produce to others for sale to the agency. They preferred to sell their produce in the local market along the main road. The findings indicate the need to develop structured platforms where farmers could deliberate about issues related to the scheme and their aspirations to produce for the market.

Institutions play a crucial role as a vehicle and catalyst for accessing land and water, and ultimately achievement of set goals and aspirations. For sustainable livelihoods, empowerment approaches must be sensitive to people's needs, capabilities and aspirations, and enhancement of agency must be a central focus for transformed institutional policies and programmes in support of the empowerment. In the selected sites one of the biggest problems, especially with national or external institutions, has been lack of responsiveness to local needs and difficulties affecting local communities, coupled with failure to heed existing knowledge systems and arrangements by which local people creatively manage and navigate their needs. Furthermore, government has made it clear that it will not provide resources to individuals, but only to registered co-operatives. This incentive to form co-operatives has meant that the majority of women farmers in the study areas were part of agricultural associations or co-operatives.

The interaction between communities with government and/or within their groups have been challenging. It was noted that women seem to acclimatize to the circumstances to make it work

for them. However, there are situations, such as infrastructural issues, whereby 92.3% of farmers perceive that it is the government's responsibility to maintain large capital infrastructure. Consequently, there should be platforms created to allow communication to be unhindered and transparent.

3.3.4 Natural resources

The severity of poverty depend on the level of control over natural resources such as water, rather than on the overall endowment (Namara et al., 2010). Inequity in access to land and water resources results in low productivity. Gender inequality in access to resources hinders the potential of smallholder farming to reduce poverty and food insecurity. Limited access to land and water are the main constraints to women's contribution to food security.

In MRIS, 14% of the women were renting land, 11.8% were using borrowed land and 9.4% were share-cropping. Sampled women highlighted that land usage was mainly used by the owner (92.4%). The rest of the land was either leased or rented due to an array of factors, such as water shortage (21%). The majority of the women (57.6%) indicated that they were the legal holders of the irrigation plots. All the women who were legal holders of land were not married. Women were becoming the legal holders of the irrigation plots, following the death of their husbands (89%), or after the death of both parents, in the case of daughters. The majority of the farmers (77.4%) indicated that the pieces of land had been allocated to them through traditional authorities, while fewer (22.6%) had inherited it. The majority of the women indicated that there were no threats of eviction and were very satisfied with their security of land tenure.

In MRIS, a larger proportion of men (31.1%) were water-use secure, while a larger proportion of women (82.3%) were water use insecure. The majority of unemployed farmers (91.2%) were water-use insecure majority of farmers from Mooi River were water-use insecure (48.0%). The majority of farmers using gravity (45.1%) and electric pump (38.3%) for irrigation were water-use secure while the majority of diesel pump-fed farmers (27.0%) were water-use insecure. In the study, schemes face limited water as the resource is often used for an array of activities (agricultural and non-agricultural), which often has a negative impact on water availability for women in the scheme. As some relevant institutions and organisations for water management are located outside the communities where water is needed, coordination is necessary. It was noted that lack of coordinated interactions, processes and relationships between the internal/local and external/regional institutions and organisations compromised water

accessibility and use in the selected sites. The absence and lack of support by government water departments was raised as a great concern by women in the schemes. Farmers perceived the lack of interaction with the irrigation scheme members as undermining the knowledge that they could gain on water scheduling. Although the local communities had developed their own ways of managing water use, the limited roles of the state and external agencies meant that critical aspects of water use and management that extended beyond the capacities of the local communities could not be addressed or attended to.

In Steelpoort scheme women's land access depends on their association with men, either through marriage or relation. This scenario emphasises the importance of marriage for enabling women's access irrigated plots and water in the schemes. The tradition in these communities was that the husbands inherited land from their families and then allocated it to the spouses. On the other hand, in MRIS inheritance on land by women was common. Women could be legal owners of irrigation plots irrespective of marital status. Plots could even be leased out or borrowed to other female members.

Access to water cannot be considered independently from access to land. Water without guaranteed access to land will not be sufficient and land without access to water will not be very effective for a farmer. Development has to take into consideration the interaction between the two important factors of production to improve food security (Bacha et al., 2011).

3.3.5 Physical assets

Over 60% of farmers, mostly women, had ownership of small production equipment such as hoes and knapsacks for spraying pesticides. Those who did not have these basic items borrowed them from neighbours, or used their hands (Table 3.3).

Table 3.3: Agricultural resources owned by women farmers

Agricultural Resources	Mooi River Irrigation Scheme (%)	Steelpoort Irrigation Scheme (%)
Hoes	98.8	69.6
Garden Forks	60.0	60.2
Spades	65.8	
Rakes	68.2	
Trucks	7.0	
Tractors	7.0	2.2

Indeed, the poor agricultural performance in the irrigation schemes partly associated with a range of factors, including poor maintenance of infrastructure and equipment. It was evident that irrigation schemes are still very dependent on government, especially for repairing irrigation infrastructure. In MRIS, government and the municipality provided tillage services in the irrigation scheme. All farmers relied on government tractors, but at times supplemented with hired private service providers. Farmers indicated that tillage provision was always late and when they no longer required it. Government appears to be under-resourced, particularly in tillage facilities.

Constraints identified by farmers that affected their production levels were tractor availability and expense (34.8%), insufficient water (26.1%), seed and fertilizer availability and cost (13%), animal invasion (34.8%), and market access (21.7). In both schemes, many farmers had limited or no contact to extension officers. The main reason for contacting the extension officers, among the few who had contact, was to source tillage facilities (56%) and to access other agricultural inputs such as seeds (37%).

In summary, the situation analysis recommends that the following needs be a prioritized the realization of improved livelihoods:

- Human capacity: – the knowledge of different sustainable irrigated agricultural techniques and practices, and marketing knowhow.
- Financial capacity: – the mentorship to understand and participate in the value-chain. This includes understanding the business and marketing aspect of the agricultural commodities they are involved in.
- Social and physical aspects: – facilitate and form platforms that women can use to assert their rights to relevant resources, which can culminate in improved participation in the value-chain. Additionally, institutional structures need to be strengthened for the trust and information to be effectively disseminated.

3.4 Enquiry Sessions

The enquiry sessions used PRA tools and techniques to allow the communities to participate effectively, irrespective of their literacy and numeracy levels. The approach seeks to allow community members to gain confidence in the knowledge accumulated and enhance agency. Focus group discussions were conducted. Guiding questions (Appendix 1) that dissected the

agricultural value-chain into components were used. The meetings were divided according to different stakeholders to obtain different perspectives, these were:

- Co-operatives within the three schemes. The meetings across all sites were well attended. Some 90% of participants were women.
- Limpopo – local chief
- Department of Agriculture and Rural Development Extension officers (DARD), Msinga and Steelpoort.

The value-chain was unpacked to identify the gaps, successes, and understand the relevant stakeholders involved within the value-chain and their role in enabling rural women's participation in the produce market.

3.5 Multi-stakeholder Workshop

The Multi-stakeholder platform was conducted in Tugela Ferry with the three co-operative (Table 3.4). Of the attendees 50% were youth, 40% between 36-59 years and 10% was over the age of 60 years.

Table 3.4: Irrigation Scheme involved in the research located in UMzinyathi District Municipality

Irrigation Scheme	Block	Total Number of representatives
Mooi River	10, 11, 12 and 13	3
Tugela Ferry	5	3
Tugela Ferry	4	3

The farmers at Steelpoort Irrigation Scheme in Limpopo forged relationships with key stakeholders participating in the value-chain. Due to low production levels, participation in the market was limited to local sales. Current efforts by the Chief and Department of Economic Development to revive the infrastructure and local institutional structures could enhance production in future. Msinga irrigation schemes showed a need to create an engagement platform for women, buyers (including transporters), and extension officers. The women mentioned having the potential to meet market demand yet failing to do so due to various impediments. Inconsistency in buyers' demand for their crops demotivated them from participating in the market.

Engagement with farmers revealed that the main buyers of their produce were hawkers, large supermarkets in Greytown, and bakkie traders. Potential to sell in local supermarkets such as

Spar was identified, although the relationship needed to be developed. More so, the results indicated that buyers sometimes reject produce due to issues of quality and quantity. As a result, the buyers were invited so that they could engage with farmers on the challenges experienced.

Prior to the day for the eng0agement, supermarkets and bakkie traders and vendors were interviewed informally to get detailed accounts of their experiences and issues of concern.

CHAPTER 4. PLATFORMS AND VALUE-CHAIN CONFIGURATION

4.1 Introduction

This chapter focusses on the engagement with stakeholders and smallholder irrigation farmers on their value-chain activities. Furthermore, the information gathered from the engagement sessions informs the development of appropriate multi-stakeholder platforms. The report highlights:

- Women's status, social cohesion, the functioning of their groups, and their welfare as informed by their participation along the value chain;
- An assessment of the women's level of engagement in the value chain from various stakeholders (local and provincial government, traditional council) and
- To understand the gaps in the value chain for rural women and their participation in the market.

4.2 Findings

This section discusses responses from different stakeholders; including farmers, on the understanding and participation in the value chain. Furthermore, the section present gaps, successes, and understanding of relevant stakeholders involved in the agricultural value-chain, particularly for rural women's participation in the market.

Figure 4-1. Cooperative members participating during group discussions

4.2.1 Governance Structures

All groups that participated in the study are registered cooperatives with the provincial departments of agricultural extension, with an extension officer and available agricultural economic advisor in Steelpoort assigned to work closely with them. The governance structures within the cooperatives are weak as they operate as individuals for planting and selling. Cooperative members work as groups when accessing inputs that the departments of agriculture distribute and/or when they face urgent challenges that can affect their productivity or income.

The Tugela Ferry Irrigation Scheme (Block 5) members comprise of two sub-cooperatives. Primary cooperatives across the scheme form a secondary cooperative. With regards to their market access, the scheme members can roughly be divided into broad categories as follows:

- Those who wait for customers (pick-up truck traders and/or hawkers) to come to them. Some mentioned that buyers are not always reliable. The farmers can produce in the hope of selling but are let down as some buyers end up purchasing agricultural produce from commercial farmers at lower prices. This means that the farmers end up reducing their prices to dispose of their produce. There is little trust between these farmers and buyers such that their transactions are only on a cash basis.
- Those that have their own buyers. This group of farmers may have specific people that link with certain traders when crops are ready for sale that buyer certain crops (tomato and potato).

In Limpopo, the cooperative is made up of aged members who sell their surplus locally and by the roadside. The group has strong governance, members plan activities together, even though they plant individually. However, the group has not marketed as a group. Group members are good at sharing information on the availability of inputs in shops and can purchase inputs from well-stocked retailers in Steelpoort or Burgersfort town. However, members do not often market as a group, especially the older members. Recently, the youth within the group underperformed on a Walmart cabbage contract due to poor group dynamics, and poor logistical and operational capacity despite a good crop that met Walmart's stipulated standards.

The group has a challenge of not having any collective saving s. Due to the old ages of most members, productivity has decreased over time. The provincial agricultural department and the local chief have made efforts to recruit the youth to participate in agricultural activities.

However, the youth have not heeded the call in anticipated numbers as they prefer to work in nearby mines. Elderly farmers have pointed out that most of the youths lack the interest to work in the scheme, which has resulted in the scheme reducing productivity due to labour shortage and poor water supply. However, there is a current scheme infrastructure and water availability improvement at almost 80% completion, which promised to improve water challenges. The cooperative members mentioned that some of them can produce for the market but would require labourers to assist them to increase production for formal markets.

4.2.2 Water availability

All schemes in the study face limited water as the resource is often used for an array of activities, agricultural and non-agricultural. Excessive water demand negatively impacts on water availability for women in the scheme. Lack of coordinated interactions, processes and relationships between the local and external institutions and organisations compromised water accessibility and use in the research sites. Consequently, during meetings, farmers mentioned that they had to forgo market opportunities in light of the water challenge and consequently low yields.

In Limpopo, the members' disconnection from the co-operatives has resulted in poor discussions or cooperation on the maintenance and repairs to their boreholes. The lack of cooperation was mainly due to financial constraints for repairs. Farmers mentioned that they use dryland farming or the Eastland Dam, even though the sources are very limited. Farmers mentioned that their co-operative developed a strategy so that all have equal access to limited water resources. According to the chief, the water system was not maintained. However, there is a current scheme infrastructure and water availability improvement at almost 80% completion funded by the Department of Rural Development, which promises to improve current water challenges. As part of this revitalisation, the mining companies have assisted with adding a thick plastic layer in the reservoir to prevent further siltation. Additionally, the cost of repairing the dam and reservoir is high. Foul play by vandals from neighbouring communities raises concerns of repeatedly spending money for the same issue, which is not an efficient use of resources. Alongside the revitalisation of the irrigation scheme is a household water availability programme that also has a purification system. Inconsequently, the availability of water at homesteads has affected the schemes productivity as many households now have their gardens and produce the same vegetables as the scheme. Marketing fresh produce within the community has become less rewarding and discourages productivity. The

irrigation scheme revitalization project underway will include a reservoir and two boreholes (Figure 2). These interventions could increase access to water.

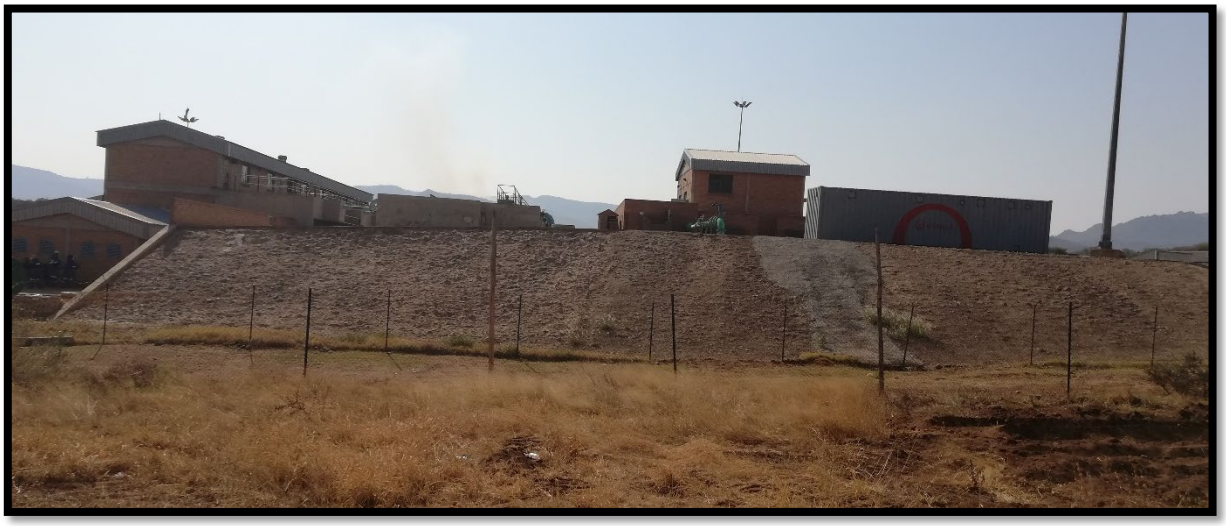

Figure 4-2. Construction of a water reservoir at the Steelpoort Irrigation Scheme

In Mooi River, farmers rely on water from the dam, which often runs low. When this happens, there is a request by water users association, dominated by the commercial farmers, to release water via the scheme main canal. The lack of governance exists as rules and regulation are not always followed especially when water is distributed to the different blocks. Although the scheme has a watering schedule, the upper blocks take water meant for the lower blocks as they do not turn off the water when they are supposed to. The upper blocks use water even on the days that they are not scheduled to use it. Famers in the scheme have resorted to hiring vehicles to collect water from the upper blocks, which is expensive. They have raised that in previous years, there were government-paid bailiffs who controlled water distribution, and the system worked well. However, due to depletion of government financial resources, the bailiffs were removed, and hence fail to adhere to water schedules.

4.2.3 Smallholder farmer value chain engagement

This section details farmers' response concerning their participation in the different components within the value-chain (Table 4.1), stakeholder support (Table 4.2) and their challenges. Table 4.1 shows the value chain activities in which farmers could participate, and how they participate in the irrigations schemes.

Table 4.0.1: Agricultural Value-chain components and activities of stakeholders

Value-chain level	Farmers	Pick-up truck Traders	Extension Officers
Transportation	x	X	
Pricing	x	X	
Storage and processing	x		
Production and harvesting	X		
Land preparation	X		
Input supply	X		X

x – Low levels of participation; X – High levels of participation

It emerged that the farmers' understanding and involvement in the value-chain is very shallow. Consumption is their main purpose for production. Those that realise surpluses, sell on informal markets. It appeared that the farmers fear the unknown, so they would rather continue with the practice they are familiar with. To this extent, farmers in both Limpopo and KwaZulu-Natal are scared to plant new crops. They may not have and or accept the new farming methods as they would rather employ accumulated knowledge and fear taking risks by using the available resources on something that might not work. Similarly, to reduce risks, farmers prefer to be paid cash "on delivery" during any marketing transaction. The older Steelpoort farmers explained that this is their assurance that they get their effort back compared to handing over one's hard work

Table 4.2: Stakeholders involved with farmers in the irrigation schemes along the value chain

Value-chain Components	Tugela	Mooi River	Steelpoort
Input	Local Agricultural Shops (TWK), Extension Officer	Extension officer, Local agricultural shops (TWK and RTS)	Agriculture shops (OTK), Extension officer
Land preparation	Self, Extension Officer	Self, Extension Officer	Self, private tractor owners, Extension Officer
Production	Self, Extension Officer	Self, Extension Officer	Extension Officer (manual was provided)
Harvesting and grading, Storage and processing, Pricing	Own initiative	Own initiative	Own initiative

Value-chain Components	Tugela	Mooi River	Steelpoort
Transportation	Local, public, bakkie-traders, Extension officer	Local, public, bakkie-traders, Extension officer	Local walk-ins, walking door-to-door
Market	Pick-up truck traders, locals, and pension point	Extension officer, Pick-up truck traders	Extension officer, local makeshift outside the scheme

4.2.4 Input supply

Farmers across all schemes mentioned using inorganic methods of production. They buy most of their inputs from local agricultural shops. In Limpopo, local agricultural shops assist farmers in choosing the correct chemicals and seeds. Additionally, farmers mentioned not using saved seeds due to low yields and therefore prefer buying seeds. They further expressed that they recall an era where they could improve and save their seed. However, the modern seed they now get from extension services and shops do not perform well in the second season. Due to their old age, they require assistance in understanding the usage of agrochemicals in the field and extension officers assist them. However, the support is minimal and, coupled with the issue of water unavailability, farmers have mentioned that increasing production would be taking a risk. Another issue raised was the usage of an electric pump, which is expensive. Farmers preferred having a prepaid system which would allow them to monitor costs. They expressed concerns about the larger electric energy demands after the revitalisation and were concerned about the affordability of phase three power supply.

In uMzinyathi District, the farmers in both schemes mentioned that they buy inputs from different sources, depending on price and quality. Most agricultural inputs can be found in dealerships in a nearby town. For potatoes, farmers buy seed in bulk with assistance from the extension officer who also provides transport to transport the seed to the scheme. This shows that farmers have experience and trust in certain suppliers, however, price is a major determining factor.

4.2.5 Land preparation

All schemes reported that each person has their own plot/s, which they prepare individually. Furthermore, farmers understood the importance of soil testing. In Limpopo, farmers mentioned that although the extension office is next to their site, the advice provided is minimal

or often too late for soil testing. The soil is tested after every couple of years but the results are not interpreted.

4.2.6 Production

The use of fertilisers in production can be attributed to the agricultural extension advice provided to farmers, i.e. input and training. Despite extension support that farmers receive, it does not culminate in them producing solely for markets. They continue to emphasize production for consumption.

Low water availability contributes to low productivity, which was noted across all schemes. In Mooi River and Steelpoort, farmers mentioned the challenge of water preventing them from increasing production. In Tugela, water is not a major challenge such that some farmers realise higher yields than water constrained schemes (Figure 3).

Overall it was noted that many factors such as age, water access, knowledge, affect productivity. This can be further understood that farmers are comfortable with their current shallow engagement in the agricultural value chain. This is due to poverty, low literacy levels and unattainable demands of the formal market.

Figure 4-3. Current production in Tugela Block 5 Irrigation Scheme

4.2.7 Value addition

Value addition can be in the form of grading, processing, packaging and/or storage. In Limpopo, farmers are within 5 km of formal markets and say that they have taught themselves on determining customer needs. They have a good strategy and planning mechanism that allows all members to sell their products although this is changing as households have started producing for themselves. Members take turns in planting so that their crops can be harvested

at different times (usually a week apart). This means that there is no excess supply of products on the market and also that there is no need for storage. Their experience has shown that locals prefer fresh produce over processed produce.

Tugela Block 5 irrigation scheme is close to the town and they are easily accessible for hawkers and pick-up truck traders. There are two types of farmers groups in this scheme. The first type is proactive in forming good relationships with pick-up truck traders to sell their produce. The other group of farmers produce in the hope that hawkers and/or pick-up truck traders buy their products without any special arrangements. In some instances, some farmers have to transport their produce to local towns for sale by the roadside. However, due to inadequate storage and the high temperatures often experienced in the area, farmers end up selling their produce, especially tomato, at a lower price, so that they prevent rotting and total loss of income.

Inadequate storage and high temperatures affect market and productivity in Mooi River Scheme, as the scheme is located some distance from nearest towns. The farmers largely produce for consumption. When customers come to them to buy products they sell at a lower price. They also take advantage to sell at the points where pensions are paid out monthly. Farmers organise transport to markets individually, which makes it expensive for them.

4.2.8 Marketing

Age emerged as a critical factor in access to markets. Older people are satisfied with their current level of interacting with markets. They believe that local markets are easier to manage. Due to low literacy levels and onerous requirements of the formal markets, farmers have become reluctant to participate. This was particularly evident in Steelpoort Scheme and Mooi River Scheme. In the Tugela Block 5 Scheme, the younger (youthful) members are key players in accessing pick-up truck traders and organizing other farmers to meet the supply and demand. Such farmers in Tugela phone the pick-up truck traders to inform them when produce is ready for the market. In turn, the traders tell the farmers of the quantity and packaging required at a specified time. The traders then collect the produce (Figure 4). Furthermore, when interrogated on why farmers do not transport their produce to sell, the farmers mentioned that the cost of transportation is high and there is no guarantee that all products will be sold, making it risky. Therefore, they should sell from within the scheme to the pick-up truck traders.

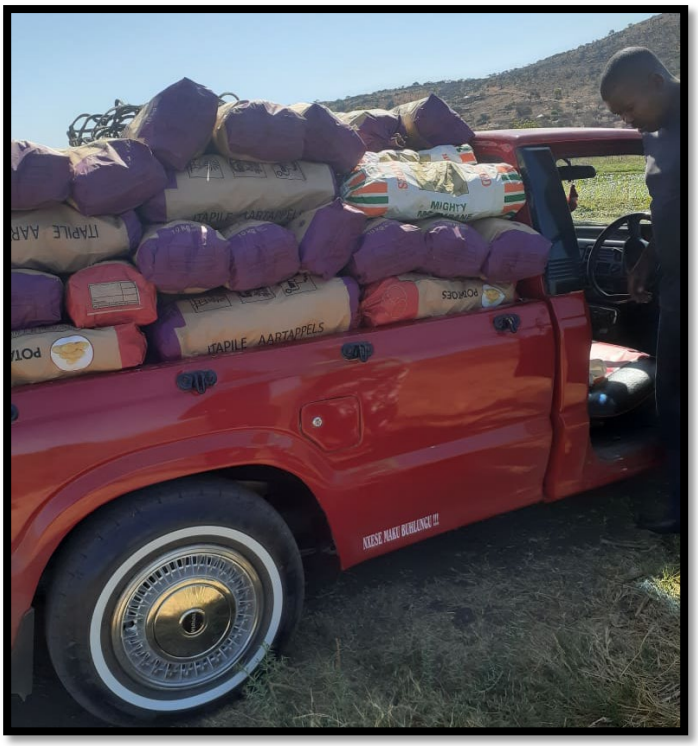

Figure 4-4. Pick-up truck trader in Tugela Irrigation Scheme fetching packaged potatoes from farmers' plots

Farmers' location and their surroundings play important roles in product marketing. The two schemes in KwaZulu-Natal are adjacent to other irrigation schemes and commercial farms, which means that there is stiff competition to secure access to the preferred pick-up truck traders and hawkers, even though prices are not always consistent. Therefore, new marketing platforms such as GPS-based Hello Fresh, are strongly recommended, both in Limpopo and KwaZulu-Natal, to overcome market identification and discovery challenges. HelloFresh collects produce from the farmers once it has identified a market and pays farmers before collection their produce. In Limpopo, the scheme is surrounded by villages where people are working in the mines, who prefer to buy from formal markets and rarely from the scheme.

In Steelpoort, farmers that are prepared to sell commercially to formal markets need to deal with water shortage issues and access to land. Although farmers have a good understanding of market needs, and whom to talk to when produce is ready for sale, however, language is a barrier to their participation as they should use English in the formal market. This hinders their participating in the formal market.

4.2.9 Pricing

All participants across the schemes felt that there was no need for training on pricing required, as they are price takers and do not determine any prices. To arrive at prices, they simply observe prices on the formal market. Both schemes in the KwaZulu-Natal are close to commercial farms and other irrigation schemes, so they sell the product cheaper than that of the competitors. However, this means they may not always make a profit. More so, to sell produce to traders, there are negotiations and discounts they have to grant for bulk purchases. Additionally, farmers grade potatoes into large and small sizes. All farmers know that supply and demand plays a crucial role in determining prices.

4.2.10 Transportation

All schemes mentioned that transport is not a key factor in compromising their supply to the market. In Steelpoort, farmers sell locally in buckets at a nearby bridge, thus they do not need transport. Whereas, in KwaZulu-Natal, both Schemes are close to nearby towns and traders, so their customers come to them. A few farmers in Mooi Irrigation Scheme use public transport to take their produce to pension payment points for sell.

4.3 Development Agent Engagement

This section was done by interviewing key stakeholders that influence farmers to participate in the agricultural value chains. In Limpopo extension officer and the local chief were interviewed, while in KwaZulu-Natal, extension officers were interviewed.

4.3.1 Kgoši/Chief Malekane

The research team interviewed the Kgoši (chief) about his interaction and influence on the participation of local irrigation scheme members in the value chain. The Kgoshi mentioned the weaknesses of the current members of the irrigation cooperative. He noted that farmers are old and produce mainly for own consumption and make little income. He pointed out that the youth were unwilling to participate in agricultural activities. Although mines employ the local youth but took away labour from participating in agricultural activities. Notably, he has been motivating youth and locals to take agriculture as a business. However, due to literacy levels, older farmers are reluctant to participate in the formal sector. He has identified a group of 12 youth whom he would like to groom into a strong agricultural cooperative. He has held workshops with them already.

The chief also mentioned that seven million Rand had been committed for the revitalisation of the scheme by the Department of Rural Development and Land Reform. A reservoir will be constructed and increase the land of the scheme to 68 hectares. This work is already 80% completed. The aim is to convert the irrigation scheme farmers from subsistence to commercial orientation by dividing the 68 hectares into four blocks and produce niche crops for sale to the formal market. Additionally, the new project is envisaged to employ labourers, and farm managers to run the scheme. The chief also mentioned that there will be a mall with Shoprite and Boxer, of which he envisions the scheme being the supplier.

4.3.2 Department of Agriculture and Extension Officers

Extension officers play a key role in the development of farmers' areas. The services offered are the distribution of production inputs, development of a production plan, training in crop production, and some cases contacting formal markets. The ultimate aim of extension officers is to move the schemes from subsistence to commercial status. However, extension officers mentioned that the social cohesion, old age, poverty, literacy levels play a crucial role in determining farmers' access to markets.

Extension officers in all schemes have discussed with formal markets what their farmers could supply. In Steelpoort, the extension officer has organized a farmer field day with hawkers forum and the irrigation scheme members to discuss the harmonization of supply. This culminated in a quarterly plan being produced for farmers to monitor their progress in meeting the market demand. However, implementation of this plan will only commence once the scheme revitalization is completed and water availability is solved. In Tugela Ferry Block 5, the extension officer mentioned that group cohesion is weak, everyone produces and sells individually. She has spoken to the formal market in a nearby town, to buy from farmers. The idea is to form commodity groups which will produce together for market needs and ensure a continuous supply. However, such commodity groups require social cohesion to enable farmers to pool resources and produce, and also to stagger their plantings to ensure a consistent supply to the market.

In Steelpoort, extension officers felt that the scheme members are old and hence there is a need to get the youth involved in production and marketing. Extension officers advocate for the youth to be a part of the group. The youth lack farming experience hence the heed for them to partner with the elders. This was observed during a recent failed project with youth members and Massmart. The contract was terminated due to youth failing to meet the market demand

within the specified time, failing to manage pests, and using incorrect packaging and grading if their produce met maturity standards.

Overall, the extension officers see potential in the scheme extra assistance is required for success on account of low literacy levels. Additionally, in Steelpoort, the extension officer pointed out that their interaction with the scheme members is curtailed by the ever-changing government policies. Currently, the policy is to focus on youth involvement in agriculture. However, the reality on the ground shows that the majority of youth are more interested in making money through non-agricultural options. They see agriculture as a hobby for old people. Current policies, e.g. the National Water Act, do not make sense locally and need a bottom-up approach in their formulation.

The study showed the lack of synergy between farmers' needs and government programmes, which contributes to project failure. Development agents want a mono-cropped approach, whilst farmers produce diversity crops for their livelihood needs. Farmers are old-school and if they use their own money to buy inputs, they will not change their approach. Extension officer in Msinga has mentioned that farmers work on a cash basis given their limited cash flows and need to minimize risk.

4.4 Platforms

The study revealed that platforms developed need to be cognisant of farmers' circumstances, such as literacy levels, appropriate training methods, and employ appropriate people-centred approaches.

Interactions with different stakeholders (including farmers) showed farmers' lack of understanding of key role-players within the value-chain. Farmers regarded the agricultural department (and extension officers), as the only development agent to provide them with services. A gap was noted on farmers' understanding of the role of extension officer, as farmers felt that extension officers had the responsibility to assist in the maintenance of boreholes, replacing stolen fences, and contacting formal markets.

Informal training was conducted to make farmers aware of different agents within the value-chain. Nevertheless, a workshop involving farmers and key roles players needs to be conducted. This workshop would then lead to a structured platform that should include those that buy from the scheme. Such a platform could create a good working relationship with

farmers and traders, which can ultimately result in farmers owning and driving the marketing process.

4.5 Summary

The interactions with different stakeholders showed that development agents and farmers have different views of the value chain. On one-hand, most farmers produce for daily livelihood income and, due to their literacy levels, are limited in entering the formal sector. On the other hand, development agents push farmers into producing for formal markets and to have structured institutions such as co-operatives, having bank accounts, packaging their produce. The lack of congruency in visons and "blindness" in the capacity and capabilities required for participating in formal markets by both farmers and development agents, accompanied by a failure to meet market requirements, tend to demotivate farmers.

Small-scale farmers primarily enter the value chain to improve their livelihoods. Farmers consider formal markets to be too stringent on the terms for accepting their produce, which does not take account of their special needs and circumstances.

Formal market conditions cannot be met due to several factors, e.g. poor infrastructure, low literacy levels, onerous requirements to be registered and have income tax records. Development agents have tried to inculcate the culture of working in groups to overcome some constraints hindering access to the formal market. However, collective actions face challenges when social cohesion is limited. In effect, the cooperatives largely only serve the purpose of accessing government allocated free production inputs. Poverty among irrigators is a strong determinant of their ability to participate in the formal markets. Poverty makes farmers risk-averse. Therefore, they only prefer to transact on a cash basis. This is incompatible with the modus operandi of entities in the formal market.

The research identified that although farmers are determined to access formal markets, they require training for them to shift their perception of agriculture, i.e. to take it as a business. More so, appropriate platforms will have to fit the needs of local farmers and their visions for participating in the value chain. Technology-based markets such as Hello Fresh need to be engaged to assess its effect in the push and pull of farmers' produce into the market.

Structured platforms need to be sensitive to the literacy level of farmers and thus implement appropriate interventions. Although farmers have shown no interest in being trained on

business management, this does not preclude their determination to partake in the formal market.

Women are already organised into cooperatives. However, the cooperatives have limited focus, capacity and capability in terms of marketing activities. Therefore, women's' institutions are not assisting them in marketing but in accessing production inputs from government.

There is no clear and systematic way in which farmers determine the prices of their commodities. Ways of availing price guidelines should be explored. SMS messages could be sent to group leaders regularly and technology such as Hello Fresh be engaged.

CHAPTER 5: MULTI-STAKEHOLDER MEETINGS ON STRATEGIES FOR WOMEN EMPOWERMENT IN THE FOOD VALUE-CHAIN

5.1 Introduction

The project established that various stakeholders have a role to play in the ability to empower women to participate in the value chain and realise their aspirations of increasing production and making an income to sustain their livelihoods. Therefore, a multi-stakeholder meeting was deemed crucial for holistically investigating the constraints, opportunities, and challenges undermining women empowerment and their achievement of sustainable rural livelihoods. The previous engagements with farmers pointed to the need to be cognisant of the women's circumstances, such as literacy levels, and knowledge of appropriate training techniques, and to the need for multi-stakeholder dialogue inclusive of rural women. More so, appropriately designed government programmes and extension approaches, which meet the needs of rural women, policy awareness, and training on market access, institutional development and appropriate people-centred approaches are critical components for achieving women's empowerment.

Stakeholders are defined according to their roles and the power they hold in the value chain. The engagement with irrigation scheme female farmers, it became evident that a multi-stakeholder platform is central to the sustainability of the value chain. A multi-stakeholder platform can forge relationships between the farmers, buyers and other service providers. A multi-stakeholder platform would be instrumental in the creation of trust created between the parties. More so, when development agents become a part of the platform the services they provided to the women farmers are enhanced as t0heir activities are better known to farmers. When the engagement is aimed at establishing and maintaining mutually beneficial relationships for all players, it creates opportunities to improve market efficiency and effectiveness.

A multi-stakeholder dialogue was convened in Msinga to create a platform for women within the irrigation scheme and other relevant stakeholders to interact regarding production and product marketing. This allows for suitable engagement with relevant stakeholders for their sustainable entry into the value-chain. The chapter will further highlight:

- Farmers' understanding of market sector needs;

- Discussing the gaps in the functions needed in the value chain for rural women and their participation in the market;
- Discuss solutions to ensure smooth operational arrangements between farmers, extension officers, buyers/transporters.

5.2 Stakeholder Roles in the Value Chain

This section discusses responses from different stakeholders' (including farmers) on their participation along the value chain. Furthermore, the section presents gaps, analysis of trust amongst, youth participation, and information technology used to ensure that a smooth pathway is created between farmers and buyers within the value-chain.

The meeting noted that all stakeholders have a role in the value chain as listed in Table 5.1.

Table 5.1: Roles of stakeholders in the value chain

Stakeholder	Role
Irrigation scheme Women	Produce for consumption and market
Extension officers	Provide agriculturally related advises. Often provide inputs to farmers. Also, assist farmers in purchasing and delivering production inputs
SPAR –Tugela Ferry	Has own irrigation site where they produce vegetables. Also buys from local farmers when the demand is high
Aheers Supermarket – Greytown	Open to buying from farmers in the irrigation scheme. But consistency and quality are not often met. Thus mostly relies on a fresh produce market in Pietermaritzburg
Bakkie Traders	Buy from farmers, but they are negotiators and often buy at a very low price
Hawkers	Some are farmers and sell their produce, the rest buy either from other farmers or Bakkie traders.

Farmers indicated their dissatisfaction with the nature of their relationship with Spar. They complained that its prices were low and lack of consistency in procurement.

The meeting held at the Msinga Library sought to find a solution regarding challenges with market access for the Moor River and Tugela Ferry irrigation schemes. All parties involved were invited to the meeting to iron out challenges for a smooth relationship between producers, supermarkets and bakkies traders around the area. Various circumstances forced supermarkets and bakkies traders to not attend the meeting but further engagements were done to get the insight on the matter.

5.2.1 Supermarkets

The project engaged Khonzinkosi Spar (Tugela Ferry) through its manager. The manager indicated the supermarket's interest to buy from Tugela Ferry and Mooi River Irrigation Schemes. However, currently, they mostly buy from farmers who are nearer to the supermarket. He indicated that there has been no agreement or engagement with farmers from the other blocks regarding the supermarkets' specific agricultural produce requirements. The Spar supermarkets pointed to the following standards that farmers have to meet to be eligible to supply them with fresh produce:

- Farmers must be organized in a way that allows them to send their agricultural produce as one unit. This will enable the supermarket to issue one invoice and not many.
- The agricultural produce must be traceable to its source. In other words, each farmer should be able to identify the names of chemicals applied to the crops, quantities used, dates of application, and the retailer for the chemical. This condition makes it imperative that farmers work with the extension officer so that they can apply the correct chemicals and their amounts.
- The crops which are always in demand are cabbage, tomato, butternut and pepper.
- Famers should grade their produce, especially by size before delivering.
- They prefer that once farmers are in a group, farmers should not be allowed to market their agricultural produce individually.

At Aheers Super Trade (Greytown), the manager of the fresh produce section was interviewed. He indicated that they have been buying from Simunye Co-op of Mooi River Irrigation. However, they have never discussed standards and procedures with the cooperative. The cooperative supplied them with cabbages, spinach and pepper. He indicated that they can buy from both irrigation schemes and previously received produce from some farmers in Tugela Ferry in past. Farmers can supply agricultural produce as individuals or cooperatives. He indicated farmers must provide transport for their produce to the supermarket. Farmers should also supply samples of their produce. However, their experience is that some farmers present them with samples that differ from the bulk of the agricultural produce to be supplied, resulting in a reduction of the price offered. He further mentioned that they are not particular on whether the produce is organic or conventional as they are only interested in getting produce of good quality. One challenge he mentioned is that farmers sometimes use wrong packing materials, such as using a 30Kg cabbage bag for peppers. The farmer will then have the wrong impression

of having supplied 30 kg of peppers. While they may agree on the price during telephone calls, when they find that the weight is wrong, they will only pay less. He emphasized the importance of proper packaging and grading of produce. He suggested that farmers should weigh their produce in the field or pack before sending it to the market. He also suggested that farmers should be made aware of the prevailing market-determined prices and that the prices change from time-to-time. The following are crops that they require from producers; cabbage, spinach, green beans, green chilies, pepper and broccoli.

5.2.2 Bakkie Traders

Two bakkies traders interviewed separately at Tugela Ferry. They indicated that they supply Tugela Ferry roadside hawkers and small businesses with cabbage, potatoes and green mealies. They procure agricultural produce from farms outside Msinga Municipality and from the fresh produce market in Pietermaritzburg. They indicated that even though they have worked with both irrigation schemes, their relationship is not as smooth as challenges keep coming up every year. Their first challenge with farmers is with their failure to grade produce. The traders indicated that farmers are not aware of the need for grading, which results in arguments regarding pricing. As they normally buy from big markets, such as Mkhondeni, where the issue grading is the norm. The other issue of concern to bakkie traders is that some farmers, especially around Tugela Ferry, sell produce both on-farm and also by the roadside in Tugela Ferry directly to consumers, meaning that farmers are occupying both market space. The traders alleged that this results in their customers rejecting their prices as they can buy directly from producers. They indicated that they wish farmers should remain as producers and allow the bakkie traders to be middlemen, supplying to the hawkers and small businesses around Tugela Ferry.

5.2.3 Youth participation

It was noted that the market outlets (hawkers, bakkie traders, and formal markets) adhere to have specific standards and regulations when buying produce from farmers. Farmers often fail to meet these standards when supplying to markets due to the complexity of the regulations and the low literacy levels among farmers. However, during the engagement older farmers expressed concern in youth not participating in agriculture. They highlighted that youth do not believe that agriculture can give them the income that allows them to lead a modern lifestyle. As a result, youth prefer formal employment. Yet if the youth could be crucial for bridging the language barrier that elderly farmers faced and to ensure appropriate responsiveness to the

market needs. They can conduct enquiries on current market trends; therefore assist irrigation scheme producers on the market needs and demands.

Farmers suggested that the youth should undergo a reorientation so that they take farming as a business. The teams identified the need for holding an event to motivate the youth to participate in agriculture urgently. The meeting proposed that other youth who were active in agriculture would share their success in their agricultural enterprises.

Although 50% of participants in the multi-stakeholder meeting were youth irrigation farmers they expressed their interest in producing new cash crops as they were concerned about their economic returns, seeing that everyone tended to produce the same crop. As such, they did not feel the need to produce traditional cash crops, which did not guarantee them a stable income required for supporting their households. Some 20% of producers, especially the youth, assured themselves of stable markets by having their dedicated bakkie traders buying from them. They contact the respective traders once their agricultural produce is ready for marketing. They pack according to buyers needs as they would have established a rapport.

5.2.4 Supply and demand

Farmers expressed their concern in the market being flooded and with the seasonal agricultural produce as they tend to produce the same crop at the same time. The excess supply in the market means that they often losing their produce or selling it at a lower price. Although many farmers want to sell on the market, only a few are satisfied with their market access. Farmers expressed their dissatisfaction with the failure of buyers to be consistent in their procurement patterns. One female farmer said, “I often have to sell my crop at a very low price. For instance, when cabbage is usually sold for R8.00/head, I have to sell as low as R2.00/head to avoid total loss on income.”

Another farmer noted that although many of them farmer, only few access market. This is often demotivating for farmers. Another farmer said, “When supply is high, whatever isn’t sold is put on the compost. Therefore, farmers make losses”

Although farmers expressed the challenges on the market, the extension officers did not agree with their views. Extension officers explained that they always inform the farmers about the need to stagger the planting of their crops to avoid a situation where the market gets flooded with a single crop within a limited space of time (while other crops are in short supply). The extension officers lamented about farmers’ failure to change their practices. They pointed out

that farmers do not change and they do not learn from challenges experienced in the previous season. Farmers explained that their practice of planting at the same time was due to the internal competition among themselves. Each farmer wanted to outperform the others. Therefore, they fail to liaise among themselves about how to optimize production and not to saturate the market. In their perception, if they stagger their production, they will risk losing their buyers.

The research team recommended that the extension officers identify one group of farmers that they could use as a pilot to stagger planting. This group would go to the market and forge an agreement on produce off-take. Farmers would then plant crops according to needs and all will sell at the same price. Another suggestion from a youth farmer is that they have a steady and concrete market buyer that will ensure whatever they produce in staggered planting is marketed. Thus, all farmers will have an opportunity to sell. Alternately, each farmer could be allocated a specific quota of the area during the staggering period. This way each producer would have produce available for selling over the extended period.

Additionally, the research team suggested that people plant alternative cash crops. However, some farmers indicated that they were aware of cash crops (garlic, sweet potato, and beans) but they felt these crops had one disadvantage or another compared to their current practice. For example, farmers pointed out that garlic took long to mature and its growth overlaps into the next season, which means a loss of productivity, as they will only make an income in one season rather than the normal two. However, farmers could not provide a good reason for not producing sweet potatoes despite that it used to be a very dominant crop in the scheme.

5.2.5 Price determination

It was noted that farmers do not communicate with each other on prices. They rather set their prices or are price-takers due to desperation to sell. Furthermore, farmers highlighted that due to inputs being expensive they prefer to set their price if they can. This usually happens early in the marketing season, when the supply is not yet excessive. More so, due to their lack of budgeting and poor record keeping, farmers do not determine whether they make losses or profits.

5.2.6 Organizational structures

It became apparent that organizational structures that can facilitate marketing are not available in the schemes. This results in farmers being needlessly competitive with each other such that the buyers take advantage of them and end up buying at lower prices than they should. It was

evident that farmers do not trust each other and prefer to sell individually. As a result, farmers do not share information on prices and grading and rather compete with each other.

It was noted that organizational structures are important to ensure market demands and needs are met and to ensure that farmers make profits.

Farmers also pointed to the need for them to change the mindset with which they conduct business. They do not take time to study the market opportunities to which they would then adjust their production strategy accordingly. One example highlighted was that during maize season, tomatoes are a scarce crop that is in high demand. As a result, some young female farmers diversified production from maize only to a mixture of maize and tomatoes. They are realizing better returns. The tomatoes sold at high prices. Nevertheless, she said that this information on such successful experiences is not shared readily.

5.2.7 Use of market information technology

Youth is crucial for bridging the deficiencies that most elderly farmer face currently, e.g. the language barrier and the communication skills required in markets under the fourth industrial revolution (4IR). Active involvement of youth is required for analysing current market trends, so to assist irrigation scheme producers on the market needs and demands.

Use of up-to-date market information and operations is crucial for farmers to succeed in marketing. The research team noted that farmers require assistance in finding appropriate markets (e.g. Hellofresh). However, for farmers to successfully engage markets, they need to change their current production practices and to stagger production, produce consistently, agree one price for a given time and grade, and cooperate. However, farmers would have to accept different payments to be made to a common bank account for the group and then share the money afterwards. Farmers raised concerns about the common bank account. Once again this concern emanated from the lack of trust and the consequent lack of inclusiveness. They believe that such bank accounts could only work if an external person (e.g. extension officers) handled them. They mentioned experience in having a common bank account and being deceived. As a result, they only prefer cash.

CHAPTER 6: CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

The research aimed to test appropriate interventions for rural women under irrigation schemes, so that they can understand their rights and access to land and water, and activate improved market access and enhance their development needs. The study was undertaken through activities designed to enhance learning. First, a literature review and situation analysis of women in smallholder irrigation schemes were undertaken. Two research sites were selected: Steelpoort in Limpopo Province and Tugela and Moor River Irrigation Schemes in KwaZulu-Natal Province. Focus group meetings were convened in the respective irrigation schemes to understand the major opportunities and challenges facing female farmers. This was followed by a multi-stakeholder platform where farmers and stakeholders participated.

6.2 Conclusions

The study confirmed that women's empowerment in agriculture has the potential to improve livelihoods of the rural communities and ensure sustainability in agricultural production and development. This can be achieved if women access productive resources and knowledge such as land, education and financial services. Through the recognition of the importance of women in agriculture, South Africa formulated and implemented several policies to improve women's access to productive resources, especially water. The policies include irrigation strategy for South Africa, NWA (1998), the IMT, the white paper on water policy, NWRS-1 and NWRS-2. At the core of these policies is equity in access to water regardless of gender or race. Land is also a critical resource requiring equity. Despite these policies, the study concedes that much engendering and capacitating of extension personnel and other role players needs attention for empowerment to be realised.

Considering that women in rural areas of South Africa form part of the most disempowered groups, investment in their agricultural and non-agricultural skills training is an effective strategy to improve their livelihoods. This includes investing in the capacity of "non-technical" skills of extension officers as agency enhancers while strengthening their technical knowhow to create an extension service that is empowering in its approach and delivery. In both study sites, women pursue multiple livelihood activities and have different levels of skills. In general, most women in the selected areas have high levels of agricultural skills, but generally low

levels of off-farm skills. Non-farming skills are critical for participation in the value chain, and these are lacking.

In agriculture, women farmers were competent in determining seed depth, appropriate planting methods, plant spacing, water conservation methods and fertility management methods, but were incompetent in weed and pest control techniques, animal husbandry skills, and farm management skills. Lastly, in agriculture, women would need more training in post-harvesting techniques to increase profitability of their agricultural activities by preventing post-harvesting losses. The study showed that the women's enterprise/business management skills are poor, because they have poor numeracy and literacy levels, operations management skills, financial knowledge and marketing skills. The lack of economic opportunities in the rural areas means that most women without non-farming skills in rural areas have to rely on agriculture alone to sustain their livelihoods.

The need for various interventions were identified. In particular, organizational structures within farmers schemes need to be developed and functioning for an effective multi-stakeholder platform. Currently, there is a lack of social capital and functional marketing institutions amongst farmers across schemes. Institutional failure is at the core of the challenges facing farmers in marketing their produce. Hence, the need for an extension service that is capacitated to transform farmers into empowered farmers who have agency. While institutional challenges exist in the management of irrigation schemes, it is evident that the lack of organisation during marketing exacerbates this problem.

There is also a need for farmers to change their mindsets. The change of mindset from subsistence farming to being strategically commercially oriented and strategic will require appropriate mentorship. Trained extension officers should use participatory methodologies to create a functioning farmers organisational structure and introduce new information technologies (Facebook, various agricultural apps).

For farmers to succeed in the value-chain, the main challenges that need to be focused on include trusting each other, consistent pricing, better communication, good record keeping, solid budgeting, knowledge on market needs, and being tech-savvy.

As it currently stands, the rural value-chain is a buyer's-market as farmers are passive price recipients who do not harness the power of their numbers to co-operate better to meet market demands. This needs to change to ensure that farmers gain greater influence on the market. A

new approach that ensures the formation of local market institutions is needed to facilitate effective participation in the market. This demands that development agents use creative ways of training farmers on how to enhance market access and control.

6.3 Recommendations

The study recommends that the following needs be a prioritized the realization of improved livelihoods and effective empowerment of women along the value chain:

- Farmers' knowledge of sustainable irrigated agricultural techniques and practices, and marketing knowhow need to be enhanced.
- Farmers require mentorship to understand and participate in the value-chain. This includes understanding the business and marketing aspect of the agricultural commodities they are involved.
- Capacitation of extension officers in empowering and transformative approaches to extension.
- Development agents should facilitate and form platforms that women can access to assert their rights to relevant resources, which can culminate in improved participation in the value-chain. Additionally, institutional structures need strengthening to build trust and they should enable information to be effectively disseminated.
- Farmers require capacity and capability including mentorship on how to meet market demands. This involves reading market intelligence, and developing and implementing long-term plans.
- There should be well-publicised and accessible ways of providing price information to farmers.
- Inclusion of market driven produce-for-market schemes, tailored for young farmers and incubated by retailers and other buyers as a co-operate social investment responsibility.
- Farmers need assistance on farm planning to synchronise production with market requirements.
- Formation and development of scheme-level marketing institutions to facilitate synchronised production, crop choice, pricing and marketing.
- Farmers require support to identify alternative economically viable crops demanded on the market.

REFERENCES

ABBOTT, P., MUTESI, L. and NORRIS, E. (2015). Gender Analysis for sustainable livelihoods and participatory governance in Rwanda. Oxfam International, Kigali, Rwanda.

ADATO, M. and MEINZEN-DICK, R.S. (2002). *Assessing the impact of agricultural research on poverty using the sustainable livelihoods framework* (No. 581-2016-39396).

ADEDEJI, O., SUDARKASA, M., ROWAN-CAMPBELL, D. and REYNIER, A. (2019). Women's agribusiness access index. CTA Technical Brief 23. Wageningen: CTA.

AGBONJINMI, A.P. (2007). Enforcement of criminal offences in terms of the National Water Act 36 of 1998 (Doctoral dissertation, University of Limpopo).

AIKAWA, J. (2013). Initiatives of SHEP and SHEP UP-Capacity development of small-scale farmers1 for increased responsiveness to market needs. *For inclusive and dynamic development in sub-Saharan Africa*, pp.143-169.

ALKIRE, S., MEINZEN-DICK, R., PETERMAN, A., QUISUMBING, A., SEYMOUR, G. and VAZ, A. **(**2013). The women's empowerment in agriculture index. *World Development 52* 71-91.

BACHA, D., NAMARA, R., BOGALE, A. and TESFAYE, A. (2011). Impact of small-scale irrigation on household poverty: Empirical evidence from the Ambo District in Ethiopia. *Irrigation and Drainage* 60 1-10.

BACKEBERG, G.R. (2005). Water institutional reforms in South Africa. Water Research Commission, South Africa. *Water Policy* **7** 107-123.

BALARANE, A. and OLADELE, O.I. (2014). The impact of irrigation farming on livelihood strategies among smallholder farmers in the North West Province, South Africa. Sustainable Irrigation and Drainage V: Management, Technologies and Policies, 185, p.223.

BANDYOPADHYAY, S., SHYAMSUNDAR, P. and XEI, M. (2007). Yield impact of irrigation management transfer: story from the Philippines. The World Bank.

BONTHUYS, J. (2018). In-depth study sheds light on irrigated farming areas, water use. *Water Wheel 17*(4) 26-29.

CHETENI, P. (2016). Youth participation in agriculture in the Nkonkobe district municipality: South Africa. *Journal of Human Ecology* 55(3) 207-213.

CHIGBU, U.E., PARADZA, G. and DACHAGA, W. (2019). Differentiations in Women's Land Tenure Experiences: Implications for Women's Land Access and Tenure Security in Sub-Saharan Africa. *Land* 8(2) 22 (https://doi.org/10.3390/land8020022)

CHITJA, J., MTHIYANE, C.C.N., MARIGA, I.K., SHIMELIS, H., MURUGANI, V.G., MOROJELE, P.J., NAIDOO, K. and APHANE, O.D. (2016). Empowerment of women through water use security, land use security and knowledge generation for improved household food security and sustainable rural livelihoods in selected areas in Limpopo. WRC Report No. 2082/1/15. Water Research Commission.

CHITJA, J.M. and MKHIZE (2020) Engendering Agricultural Transformation In: Sikora R, Terry E, Vlek P and Chitja J. Transforming Agriculture In.: Southern Africa. Routledge, Taylor and Francis.

COUSINS, B. (2012). Smallholder irrigation schemes, agrarian reform and 'accumulation from below': Evidence from Tugela Ferry, KwaZulu-Natal. Strategies to overcome poverty and inequality: Towards Carnegie, 3, pp.3-7.

DE SHERBININ, A., VANWEY, L.K., MCSWEENEY, K., AGGARWAL, R., BARBIERI, A., HENRY, S., HUNTER, L.M., TWINE, W. and WALKER, R. (2008). Rural household demographics, livelihoods and the environment. *Global environmental change*, *18*(1), 38-53.

DENISON, J. and MANONA, S. (2006). Principles, Approaches and Guidelines for the Participatory Revitalisation of Smallholder Irrigation Schemes. Volume 1 – A Rough Guide for Irrigation Development Practitioners, Republic of South Africa.

DENISON, J., MURATA, C., CONDE, L., PERRY, A., MONDE, N. and JACOBS, T. (2015). *Empowerment of women through water use security, land use security and knowledge generation for improved household food security and sustainable livelihoods in selected areas of the Eastern Cape.* WRC Report No. 2083/1/15. Water Research Commission.

DEPARTMENT OF AGRICULTURE AND ENVIRONMENTAL AFFAIRS (DAEA) (2001). Mooi-River Irrigation Scheme Topographic Survey, Southern region. DAEA, Pietermaritzburg, RSA.

DEPARTMENT OF AGRICULTURE, FORESTRY AND FISHERIES (DAFF) (2015). *Irrigation Strategy for South Africa*. [Online]Availableat:https://www.daff.gov.za/doaDev/sideMenu/ForestryWeb/dwaf/cmsdocs/Elsa/Docs/Forests/Woodl/Final%20Irrigation%20Strategy%20March%202015%20with%20cover%20 (3).pdf [Accessed 7 May 2019].

DEPARTMENT OF AGRICULTURE, FORESTRY AND FISHERIES (DAFF) (2019). Smallholder horticulture empowerment and promotion approach. https://www.daff.gov.za/daffweb3/Home/aid/1129 [Accessed 20/2/2020]

DEPARTMENT OF INTERNATIONAL DEVELOPMENT (DFID) (2000). Sustainable Livelihoods Guidance Sheets. Department for International Development. Available at: http://www.livelihoods.org/info/info_guidancesheets.html [Accessed 10 April 2002)

DEPARTMENT OF WATER AFFAIRS AND FORESTRY (DWAF) (1997). White Paper on a National Water Policy for South Africa. Pretoria: Department of Water Affairs and Forestry (DWAF). Available at: http://www.dwaf.gov.za/Documents/Policies/nwpwp.pdf [Accessed 13 April 2019].

DEPARTMENT OF WATER AFFAIRS AND FORESTRY (DWAF) (1998). National Water Act (Act no. 36 of 1998) [Online]. Pretoria: Department of Water Affairs and Forestry (DWAF). Available at: http://www.dwaf.gov.za/IO/Docs/nwa.pdf [Accessed 22 April 2019].

DEPARTMENT OF WATER AFFAIRS AND FORESTRY (DWAF) (2002). Using water wisely: A National water resource strategy for South Africa information document. Pretoria: Department of Water Affairs and Forestry (DWAF). Available at: http://www.dwaf.gov.za/Docs/NWRS/Information/ENGLISH%20INFO%20DOC.pdf [Accessed 22 April 2019].

DEPARTMENT OF WATER AFFAIRS AND FORESTRY (DWAF) (2004). National Water Resource Strategy. Pretoria: DWAF. Available at http://www.dwaf.gov.za/Documents/Policies/NWRS/Default.htm. [Accessed 2 April 2019].

DLAMINI, S.I. (2016). Transforming local economies through land reform: political dilemmas and rural development realities in South Africa (Doctoral dissertation).

DUBE, K. (2016). Implications of rural irrigation schemes on household economy. A case of Lower Gweru Irrigation Scheme, Zimbabwe. *South African Journal of Agricultural Extension* **44**(1) 75-90.

DUBE, K. and SIGAUKE, E. (2015). Irrigation Technology for smallholder farmers: A strategy for achieving household food security in Lower Gweru Zimbabwe. *South African Journal of Agricultural Extension 43*(1) 1-11.

DUNCAN, J. AND PING, L. (2001). Women and Land Tenure in China: A Study of Women's Land Rights in Dongfang County, Hainan Province. RDI Reports on Foreign Aid and Development, No. 110. Seattle, WA: Rural Development.

FANADZO, M. (2012). Revitalisation of smallholder irrigation schemes for poverty alleviation and household food security in South Africa: A review. *African journal of agricultural research 7*(13): 1956-1969.

FANADZO, M. and NCUBE, B. (2018). Challenges and opportunities for revitalising smallholder irrigation schemes in South Africa. *Water SA 44*(3): 436-447.

FAROLFI, S. (2004). Action research for the development of a negotiation support tool towards decentralised water management in South Africa (No. 1737-2016-140385).

FAROLFI, S. and HASSAN, R. (2003). Aware: a decision-support tool towards decentralised water management in South Africa, Proceedings of the International Conference "Water Governance and Sustainable Development", Sousse (Tunisia), 9-10 October.

FOOD AND AGRICULTURE ORGANIZATION (FAO) (2018). Empowering rural women, powering agriculture. Available at: (http://www.fao.org/3/CA2678EN/ca2678en.PDF) [Accessed 6 April 2019].

GASPERINI, L. (2000). Sustainable Development, Food and Agricultural Organization of the United Nations. Available at: (http://www.fao.org/ sd/exdirect/exre0028.html) [Accessed 10 May 2019].

GOMO, T. (2012). Assessing the performance of smallholder irrigation in South Africa and opportunities for deriving best management practices. Master of Science in Engineering Thesis. University of KwaZulu-Natal, South Africa.

GREATER TUBATSE MUNICIPALITY (2007). Integrated Development Plan (IDP). Greater Tubatse Municipality.

HEBINCK, P. and BOURDILLION, M. (2001). Analysis of livelihoods. In P. Hebinck and M. Bourdillion (eds). Women, men and work rural livelihoods in South-Eastern Zimbabwe.

INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE (IFPRI) (2012). Women's Empowerment in Agriculture Index. [online] Available at: http://www.ifpri.org/publication/womens-empowerment-agriculture-index [Accessed 8 May 2019].

INTERNATIONAL FUND FOR AGRICULTURAL DEVELOPMENT (IFAD) (2004). Enabling the rural poor to overcome poverty. Available at: https://www.ifad.org/documents/38714170/39309787/eng_1.pdf/69805352-18ca-47b2-82c7-4848121337cb [Accessed 22 April 2019].

JAMISON, D.T. and MOOCK, P.R. (1984). Farmer education and farm efficiency in Nepal: The role of schooling, extension services, and cognitive skills. World Development 12 (1), 67-86.

JAPANESE INTERNATIONAL COOPERATION AGENCY (JICA) (2014). Introduction to the SHEP Approach. [online] Available at: https://www.jica.go.jp/english/our_work/thematic_issues/...att/shep_02_en.pdf [Accessed 4 May 2019].

JECKONIAH, J., NOMBO, C. and MDOE, N. (2012). Women empowerment in agricultural value chains: Voices from onion growers in Northern Tanzania. *Research on Humanities and Social Sciences,* 2**,** 54-59.

JOSHI, J., ALI, M. and BERRENS, R.P. (2017). Valuing farm access to irrigation in Nepal: A hedonic pricing model. *Agricultural water management 181*: 35-46.

KHANAL, P.R., SANTINI, G. and MERREY, D.J. (2014). Water and the rural poor: interventions for improving livelihoods in Asia. RAP Publication.

KORNEGAY, E. (2009). South Africa's National Policy Framework for Women's Empowerment and Gender Equality. *The Office on the Status of Women. National Gender Policy Framework. South Africa*.

KUMAR, M.D. (2003). Food security and sustainable agriculture in India: The water management challenge, IWMI Working paper 60. Colombo: International Water Management Institute

LEDGER, T. (2017). Case study on the forestry regional value chain in Southern Africa : South Africa, Mozambique and Tanzania. Trade & Industrial Policy Strategies. Pretoria, South Africa.

LEDWABA, M.S. (2013). Evaluation of the revitalization of smallholder irrigation schemes: a case study of Krokodilheuwel Irrigation Project in Sekhukhune District, Limpopo Province (Doctoral dissertation).

MACHETHE, C.L., MOLLEL, N.M., AYISI, K., MASHATOLA, M.B., ANIM, F.D.K. and VANASCHE, F. (2004). Smallholder Irrigation and Agricultural Development in the Olifants River Basin of Limpopo Province: Management, Transfer, Productivity, Profitability and Food Security Issues. *WRC Report,* 1050/1/04. Water Research Commission, Pretoria, South Africa.

MADIGELE, P., SNOWBALL, J. and FRASER, G. (2015). Water, water everywhere: Is integrated water resource management the right institutional prescription for South Africa's water management challenges. In Presentation to the Economic Society of South Africa (ESSA) conference 2nd-4th September.

MALAPIT, H., KOVARIK, C., SPROULE, K., MEINZEN-DICK, R. and QUISUMBING, A.R. (2015). Instructional Guide on the Abbreviated Women's Empowerment in Agriculture Index (A-WEAI). Washington, DC: International Food Policy Research Institute.

MANGO, N., ZAMASIYA, B., MAKATE, C. and NYIKAHADZOI, K. (2014). Factors influencing household food security among smallholder farmers in the Mudzi District of Zimbabwe. *Development Southern Africa* 31(4): 625-640.

MAPHOLI, M. (2018). Facilitating an improved Integrated Water Resources Management (IWRM) model in Madibeng Local Municipality (Doctoral dissertation, North-West University).

MASAMHA, B., UZOKWE, V.N. and THEBE, V. (2018). Women's empowerment in traditional food value chains at the micro-level: Evidence from cassava smallholder farming in Tanzania. *Agroecology and Sustainable Food Systems 42*(1): 28-47.

MAZIYA, M., MUDHARA, M. and CHITJA, J. (2017). What factors determine household food security among smallholder farmers? Insights from Msinga, KwaZulu-Natal, South Africa. *Agrekon 56*(1): 40-52.

MBATHA, C.N. and ANTROBUS, G.G. (2008). Institutions and economic research: a case of location externalities on agricultural resource allocation in the Kat River basin, South Africa. *Agrekon* 47(4): 470-490.

MJOLI, N. and NENZHELELE, R. (2009). Assessment of gender equity in water user associations. South Africa: Water Research Commission

MOYO, T. (2016). The contribution of smallholder irrigation farming to rural livelihoods and the determinants of benefit distribution: the case of Limpopo Province of South Africa (Doctoral dissertation, University of Pretoria).

MTHETHWA, N.I. (2018). Evaluating water conservation and water demand management in an industrialised city: a case study of the City of uMhlathuze in Richards Bay (Doctoral dissertation, University of Cape Town).

MUCHARA, B. (2014). The economics of smallholder irrigation water management: institutions, water-use values and farmer participation in KwaZulu-Natal, South Africa (Doctoral dissertation, University of KwaZulu-Natal).

MUCHARA, B., ORTMANN, G., WALE, E. and MUDHARA, M. (2014). Collective action and participation in irrigation water management: A case study of Mooi River Irrigation Scheme in KwaZulu-Natal Province, South Africa. Water SA 40(4): 699-708.

MUDAU, K.S. (2010). Farmers' strategies and modes of operation in smallholder irrigation schemes in South Africa: a case study of Mamuhohi Irrigation Scheme in Limpopo Province (Doctoral dissertation, University of Pretoria).

MUDIMA, K. (2002). Socio-economic impact of smallholder irrigation development in Zimbabwe: A case study of five successful irrigation schemes. In Private Irrigation in sub-Saharan Africa; Proceedings of Regional Seminar on Private Sector Participation and Irrigation Expansion in sub-Saharan Africa (pp. 21-30).

MURUGANI, V.G. (2016). Women empowerment in agriculture: agency and institutions for improved market access and household food security in Limpopo Province (Doctoral dissertation).

MURUGANI, V.G., CHITJA, J. and KOLANISI, U. (2013). Land use security within the current land property rights in rural South Africa: how women's land based food security efforts are affected (Doctoral dissertation, University of KwaZulu-Natal, Pietermaritzburg).

MURUGANI, V.G. and THAMAGA-CHITJA, J.M. (2018). Livelihood assets and institutions for smallholder irrigation farmer market access in Limpopo, South Africa. *International journal of water resources development 34*(2): 259-277.

MUZARI, M. (2016). Gender Disparities and the Role of Women in Smallholder Agriculture in Sub-Saharan Africa. *International Journal of Science and Research 5*(1): 1869-1873.

MWENDERA, E. and CHILONDA, P. (2013). Conceptual framework for revitalization of small-scale irrigation schemes in Southern Africa. *Irrigation and Drainage 62*(2): 208-220.

NAMARA, R.E., HANJRA, M.A., CASTILLO, G.E., RAVNBORG, H.M., SMITH, L. and VAN KOPPEN, B. (2010). Agricultural Water Management and poverty linkages. Agricultural water management. 97(4):520-527.

NAMUBIRU-MWAURA, E. (2014). Land tenure and gender: approaches and challenges for strengthening rural women's land rights. Women's voice, agency, and participation research series; no. 6. Washington, DC: World Bank Group. Available at: http://documents.worldbank.org/curated/en/309091468153867580/Land-tenure-and-gender-approaches-and-challenges-for-strengthening-rural-womens-land-rights [Accessed 1 May 2019]

NCUBE, B.L. (2018). Farming styles, livelihoods and social differentiation of smallholder farmers: Insights from New Forest Irrigation Scheme in Mpumalanga Province of South Africa.

NELSON, S., SISTO, I., CROWLEY, E. and VILLARREAL, M. (2012). Women in Agriculture: Closing the Gender Gap for Development. Feeding a Thirsty World, 25.

NGEMA, P., SIBANDA, M. and MUSEMWA, L. (2018). Household Food Security Status and Its Determinants in Maphumulo Local Municipality, South Africa. *Sustainability 10*(9): 3307.

NHUNDU, K. and MUSHUNJE, A. (2012). "Irrigation Development – Food Security and Household Income Perspective," in M. Kumar (ed.), *Problems, Perspectives and Challenges of Agricultural Water Management*, Rijeka, Croatia: InTech.

NKHATA, R. (2014). Does irrigation have an impact on food security and poverty: Evidence from Bwanje Valley Irrigation Scheme in Malawi (Vol. 4), Intl Food Policy Res Inst.

NKONDO, M.N., VAN ZYL, F.C., KEURIS, H. and SCHREINER, B. (2012). National Water Resource Strategy 2 (NWRS-2): Managing water for an Equitable and Sustainable future. Pretoria: Government printers.

NTAI, P.J. (2011). Critical factors determining successful irrigation farming in Lesotho (Doctoral dissertation, University of Pretoria).

NTSONTO, N.E. (2005). *Economic performance of smallholder irrigation schemes: A case study in Zanyokwe*, Eastern Cape, South Africa (Doctoral dissertation, University of Pretoria).

OLADELE, O. AND MUDHARA, M. (2016). *Empowerment of women in rural areas through water use security and Agricultural skills training for gender equity and poverty reduction in KwaZulu-Natal and North West Provinces*. WRC Report No. 2176/1/16. Water Research Commission.

PARKER, H., OATES, N., MASON, N., CALOW, R., CHADZA, W. AND LUDI, E. (2016). Gender, agriculture and water insecurity. Overseas Development Institute (ODI) Insights. London.

PERRET, S.R. (2001). New water policy, irrigation management transfer and smallholding irrigation schemes in South Africa: institutional challenges (No. 1737-2016-140358).

PERRET, S.R. (2002). Water policies and smallholding irrigation schemes in South Africa: a history and new institutional challenges. *Water Policy 4*(3): 283-300.

PERRET, S. and GEYSER, M. (2010). The full financial costs of irrigation services: A discussion on existing guidelines and implications for smallholder irrigation in South Africa. *Water SA 33*(1): 67-78.

PUDASAINI, S.P. (1983). The Effects of Education in Agriculture: Evidence from Nepal. *American Journal of Agricultural Economics 65* (3): 509-515.

RANGARAJAN, A. & CHITJA (2020). Building Human Capacity to Transform Agriculture. In: Southern Africa. Ed Edited by Sikora R, Terry E, Vlek P & Chitja J. Routledge, Taylor & Francis.

SCHREINER, B. (2013). Viewpoint - why has the South African National Water Act been so difficult to implement. *Water Alternatives 6*(2): 239-245.

SERSHEN, S., RODDA, N., STENSTRÖM, T.A., SCHMIDT, S., DENT, M., BUX, F., HANKE, N., BUCKLEY, C.A. and FENNEMORE, C. (2016). Water security in South Africa: perceptions on public expectations and municipal obligations, governance and water re-use. *Water SA* 42(3): 456-465.

SHARAUNGA, S. (2015). The significance of women empowerment on rural livelihood outcomes among irrigation and dry-land farming households in Msinga, South Africa (Doctoral dissertation).

SINYOLO, S. (2013). The impact of smallholder irrigation and water security on household welfare: the case of Tugela Ferry irrigation scheme in KwaZulu-Natal, South Africa (Doctoral dissertation).

SIRAW, Z. (2016). The role of irrigation in household food security in Upper Blue Nile Basin: The case of Jedeb irrigation scheme, Amhara region, Ethiopia. *International Journal of Agricultural Economics* 1(4): 108-116.

SPEELMAN, S., BUYSSE, J., FAROLFI, S.., FRIJA, A., D'HAESE, M., & D'HAESE, L. (2009). Estimating the impacts of water pricing on smallholder irrigators in North West Province, South Africa. *Agricultural Water Management* 96(11): 1560-1566

SPEELMAN, S., D'HAESE, M., BUYSSE, J. and D'HAESE, L. (2008). A measure for the efficiency of water use and its determinants, a case study of small-scale irrigation schemes in North-West Province, South Africa. *Agricultural Systems 98*(1): 31-39.

SPEELMAN, S., FAROLFI, S., FRIJA, A, D'HAESE, M. and D'HAESE, L. (2010). The impact of the water rights system on smallholder irrigators' willingness to pay for water in Limpopo province, South Africa. *Environment and Development Economics* 15(4): 465-483.

SRABONI, E., MALAPIT, H.J., QUISUMBING, A.R. and AHMED, A.U. (2013). Women's empowerment in agriculture: What role for food security in Bangladesh? *World Development 61:*11-52.

STATISTICS SOUTH AFRICA (2012). Census 2011 Statistical release – P0301.4. Pretoria: Statistics South Africa.

STATISTICS SOUTH AFRICA (2018). General Household Survey. Statistics South Africa. Online: http://www.statssa.gov.za/publications/P0318/P03182018.pdf

STIMIE, C., RICHTERS, E., THOMPSON, H., PERRET, S., MATETE, M., ABDALLAH, K., KAU, J. and MULIBANA, E. (2001). Hydro Institutional Mapping in the Steelpoort River Basin, South Africa. Working Paper 17. International Water Management Institute. Pretoria.

STRUWIG, J., DAVIDS, Y.D., ROBERTS, B., SITHOLE, M., TILLEY, V., WEIR-SMITH, G. and MOKHELE, T. (2013). Towards a social cohesion barometer for South Africa. http://policyresearch.limpopo.gov.za/bitstream/handle/123456789/750/Towards%20a%20Social%20Cohesion%20Barometer%20for%20South%20Africa.pdf?sequence=1 (Accessed 6/6/2019)

SUPRIATNA, A. (2018). Analysing land tenure security of urban Kampung in Jakarta. PhD Thesis, School of Earth and Environmental Sciences, University of Queensland

TANG, Q., BENNETT, S.J., XU, Y. and LI, Y. (2013). Agricultural practices and sustainable livelihoods: Rural transformation within the Loess Plateau, China. *Applied Geography* **41** 15-23.

TEKANA, S.S. and OLADELE, O.I. (2014). Factors affecting women s empowerment on irrigation schemes in the North West Province, South Africa. Sustainable Irrigation and Drainage V: *Management, Technologies and Policies* 185 245.

TESFAYE, A., BOGALE, A., NAMARA, R.E. and BACHA, D. (2008). The impact of small-scale irrigation on household food security: The case of Filtino and Godino irrigation schemes in Ethiopia. *Irrigation Drainage Systems* 22(2) 145-158.

THAMAGA-CHITJA, J.M. and MOROJELE, P. (2014). The context of smallholder farming in South Africa: Towards a livelihood asset-building framework. *Journal of Human Ecology 45*(2) 147-155.

TSHUMA, M.C. and MONDE, N. (2012) A socio-economic impact assessment of a project to identify and implement best management practices at the Zanyokwe Irrigation Scheme at farm level. *Water SA 38* (5) 783-792.

UN Secretary General's High Level Panel on Women's Economic Empowerment, *Leave No One Behind: A Call to Action for Gender Equality and Women's Economic Empowerment*. Available at: https://www.empowerwomen.org/-media/files/un%20women/empowerwomen/resources/hlp%20briefs/unhlp%20full%20report.pdf?La=en. (Accessed: 28 May 2019).

VAN AVERBEKE, W., DENISON, J. and MNKENI, P.N.S. (2011) Smallholder irrigation schemes in South Africa: A review of knowledge generated by the Water Research Commission. *Water SA 37*(5): 797-808.

VAN TILBURG, A. and VAN SCHALKWYK, H.D. (2012) Strategies to improve smallholders' market access. In Unlocking markets to smallholders (pp. 35-58). Wageningen Academic Publishers, Wageningen.

VILJOEN, G. (2017) South Africa's water crisis: The idea of property as both a cause and solution. *Law, Democracy & Development* 21 176-200.

WAITHANJI, E., KAARIA, S., MUTUA, E., KORIR, L., BROOKS, R., MUKEWA, E., MUINDI, P. and MAINA, I. (2014) Microcredit and the empowerment of women (Vol. 37). ILRI (aka ILCA and ILRAD).

XIANLEI, M. (2013). Does tenure security matter? Rural household responses to land tenure reforms in northwest China. *PhD thesis*, Wageningen, The Netherlands: Wageningen University.

ZWELENDABA, V.V. (2014) An evaluation of the effects of land tenure security in on-farm investment and on-farm productivity: a case of the smallholder farmers in the Amathole District of the Eastern Cape Province of South Africa (Doctoral dissertation, University of Fort Hare).

APPENDICES

Appendix 1: Interview Guide Used in the Study

Enquiry and Introduction Meeting:

Strategies for Women Empowerment in the Food Value-Chain

Rural smallholder farmers

The group discussions will focus on where the group/ individual is currently, what has been the journey, what are the current struggles, and their future work. The sections of question are:

i. Explain your steps from planting a seed to the final product (harvest)?
ii. What do you do with the final product (harvest)?
iii. Who assist you in each of the steps to market?
iv. What process is done to identify market?
v. Do you have access to credit?
vi. Do you make a profit from your product sale?
vii. Do you ever run out of inputs which prevents you from providing a constant supply to market?

a. Input supply
   - How do you get your inputs?
   - What type of inputs do you get and by whom?
   - Do you know the difference between agrochemical and organic production? Which do you use? Why?
   - Who assists you in training?
   - Have you ever experienced challenges in accessing inputs?

b. Land preparation
   - Whom do you approach for land preparation (e.g. Tillage, Soil Testing, Fertilizer application)?
   - Do you have access to water all year round?
   - What are the gaps associated with land preparation?

c. Production
   - How do you determine what to plant? (Market dependant or household need dependant?)

- How many times a year do you produce?

  Who assists you in your production activity?

d. Harvesting and grading
   - Do you harvest all at once or on-demand?
   - Who determines the grading/ desirable characteristics of your produce for market?
   - Who assists you in harvesting and grading of your produce for the market?
   - Do you lose produce after harvesting due to rotting or grading requirements? If so, how much?

     What do you do with it (e.g. bottling, drying, donating, and/or selling)?

e. Storage and processing
   - Where do you store your produce after harvest?

     Is there a need to process (Bottling, packaging, etc.) your produce for market?

f. Pricing
   - Do you know about produce prices before going to the market? How do you get this information?
   - Who determines the price of your produce?
   - Did you receive training on pricing?
   - Do you agree with the buyer on the price of your produce?
   - Do you negotiate a price with the buyer?

g. Transportation
   - How do you transport your produce from farm to markets?
   - Is transport readily available?
   - When the buyer comes to your field using his/ her transport does this lower your price compared to if you sold for yourself?
   - Are the road systems good for marketing to transport every season of the year?
   - What challenges are associated with the transportation of your produce?

h. Market
   - Where do you currently sell your produce?
     - Formal
     - Informal
   - How long have you had access to the market:
     - Formal –
     - Informal –
   - How did you get into the market you are selling in?
   - Do you have contracts with your buyer or market? If yes, explain terms

- Do you receive different prices for your produce depending on the production method (Organic or Agrochemical)?
- Challenges associated with the market you currently have?
- Do you meet the quality and quantity of the market?

Stakeholders

- What service do you offer to SHF (e.g. training, transport, inputs, etc.)?
- Do you buy from smallholder farmers? How frequently? What produce?
- Is there a contract in place?
- How is the price determined?
- How does SHF produce to get delivered and how are they paid?
- How are the quality and quantity determined? Is this communicated with smallholder farmers before their harvest?
- Do you feel smallholder farmers can meaningfully contribute to the retail market sector? If so how? What can be the challenge?
- If there are any value-add to the produces is it sold at a higher price? (packaging, etc.)
- Do you conduct different interventions for people who want to access the market?
- What are your criteria to identify farmers ready for market?
- What interventions do you conduct for farmers to access markets? What do you conduct?
    - Discussion with farmers on a production plan
    - Discussion with markets
    - Transport to market
- What challenges do you face when mobilizing farmers for markets
- Has there been training in marketing-related activities?
- What are you currently doing with farmers to ensure their constant access to markets?

Appendix 2: Capacity building

- The project recruited two MAgric students. The students remuneration was paid though private funds.

- Farmer training was part of capacity building. The project trained farmers on marketing issues. The training took place during the interactions with the farmers, Topics conducted include grading, importance of pricing, communication, farm planning, etc.