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THE RELATIONSHIP BETWEEN PRODUCTION PERFORMANCE AND GOVERNANCE IN SMALLHOLDER IRRIGATION SCHEMES IN SWAZILAND

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THE RELATIONSHIP BETWEEN PRODUCTION PERFORMANCE AND GOVERNANCE IN SMALLHOLDER IRRIGATION SCHEMES IN SWAZILAND

By

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A thesis submitted in partial fulfilment of the requirements for the degree of Master of Science in Integrated Water Resources Management of the University of Zimbabwe

November 2013

DECLARATION

I, **Malangeni Andile Dlamini**, declare that this research report is my own work. It is being submitted for the degree of Master of Science in Integrated Water Resources Management (IWRM) of the University of Zimbabwe. It has not been submitted before for examination for any degree in any other University.

Date: _____

Signature: _____

The findings, interpretations and conclusions expressed in this study do neither reflect the views of the University of Zimbabwe, Department of Civil Engineering nor of the individual members of the MSc Examination Committee, nor of their respective employers.

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LIST OF SYMBOLS AND ABBREVIATIONS

ADEMU	AGRICULTURE DOWNSTREAM ENVRIONMENT & MANAGEMENT UNIT
CAADP	COMPREHENSIVE AFRICA AGRICULTURAL DEVELOPMENT PROGRAMME
E	EMALANGENI (PLURAL OF SWAZI LILANGENI SZL)
EAC	EASTERN AFRICAN COMMUNITY
EU	EUROPEAN UNION
FAO	FOOD AND AGRICULTURE ORGANISATION
FGDS	FOCUS GROUP DISCUSSIONS
GDP	GROSS DOMESTIC PRODUCT
GOS	GOVERNMENT OF SWAZILAND
ICWE	INTERNATIONAL CONFERENCE ON WATER AND ENVIRONMENT
IFAD	INTERNATIONAL FUND FOR AGRICULTURAL DEVELOPMENT
IWMI	INTERNATIONAL WATER MANAGEMENT INSTITUTE
IWRM	INTEGRATED WATER RESOURCES MANAGEMENT
KDDP	KOMATI DOWNSTERAM DEVELOPMENT PROJECT
LUSIP	LOWER USUTHU SMALLHOLDER IRRIGATION PROJECT
MOA	MINISTRY OF AGRICULTURE
NEPAD	NEW PARTNERSHIP FOR AFRICA'S DEVELOPMENT
O&M	OPERATION AND MAINTENANCE
PDA	PROJECT DEVELOPMENT AREA
RIS	RELATIVE IRRIGATION SUPPLY
RWS	RELATIVE WATER SUPPLY
SADC	SOUTHERN AFRICAN DEVELOPMENT COMMUNITY
SNL	SWAZI NATION LAND
SPSS	STATISTICAL PACKAGE FOR SOCIAL SCIENTIST
SSA	SUB SAHARAN AFRICA
SSA	SWAZILAND SUGAR ASSOCIATION
SWADE	SWAZILAND WATER & AGRICULTURAL DEVELOPMENT ENTERPRISE
TDL	TITLE DEED LAND
TI	TRANSPARENCY INTERNATIONAL
TCH	TONS CANE PER HECTARE
TSH	TONS SUCROSE PER HECTARE
WASH	THE WATER, SANITATION AND HYGIENE
WIN	WATER INTEGRITY NETWORK
WUA	WATER USERS ASSOCIATION
WSSD	WORLD SUMMIT ON SUSTAINABLE DEVELOPMENT

DEDICATION

To my mom, Alice and my wife, Tabo

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ABSTRACT

Smallholder sugarcane growing is central to rural development and poverty alleviation in Swaziland. The main objective of smallholder sugar cane growing is to reduce poverty through increased household income. This study investigated the relationship between water use agricultural and financial performance, and governance (accountability and transparency) in smallholder irrigation schemes under the Lower Usuthu Smallholder Irrigation Project (LUSIP). The study used data from 2010/2011 to 2011/2012 production seasons for 13 smallholder sugar cane irrigation schemes belonging to Madlenya and Ngcamphalala chiefdoms. Production records for the farmers' irrigation schemes were obtained from the Swaziland Water and Agricultural Development Enterprise. The amount of water consumed in Madlenya and Ngcamphalala was found to be 1.16 tonnes/m^3 and 0.98 tonnes/m^3 respectively and the average sucrose content was 13.4% and 12.8%. On average 351.24 ha and 476.1 ha were harvested from Madlenya and Ngcamphalala respectively. Less than half of the respondents cited that failure to follow best management practices as the major factor contributing to the poor performance of the schemes while 20% cited lack of capital, 17% blamed poor inputs suppliers,13% and 12% attributed poor performance to system of land ownership and labour availability respectively. In Madlenya low levels of accountability affected yields and financial performance. The study results indicated that on accountability the value of correlation (r^2) is at 0.642 on the question of the existence of committee, at 0.457 and 0.429 on the question of the committee reporting back to the scheme members. The relationship is a positive and moderate relationship and p-value is at 0.000 which indicates a significant relationship so the H_0. The relationship between transparency and production performance was explained by the value of correlation (r^2) at -0.354 on the question of the quality of committee election procedures, a negative and moderate relationship and the p-value is at 0.002 which indicates an insignificant relationship so the reason not to reject H_0. The relationship between transparency and production performance was also explained by r^2 at 0.418 on the question of the committee's knowledge of record keeping. The relationship is a positive and moderate relationship and p-value is at 0.000 which indicates a significant relationship so the reason to reject H_0.

Key words: governance, accountability, transparency, smallholder sugar cane irrigation schemes, performance

CHAPTER 1 INTRODUCTION

1.1 Background

Water is central to the economy of Swaziland as it contributes immensely to Gross Domestic Product (GDP) through agricultural export earnings as well as contributing to basic livelihoods (GOS, 2008) and the importance of water is reflected in the water policy and reforms that has been taking place in the country (GOS, 2008). Water development is also seen as critical in rural development as it promotes development of other infrastructure like roads, electricity and potable water, communication and provision of better health and education for the rural poor (GOS, 2005).

Since the demanding situations of poor agriculture productivity are most felt in the rural areas, the irrigated agriculture development programmes are implemented in SNL. These are aimed to raise productivity and enable smallholder Swazi farmers to move from chiefly subsistence to commercial crop production (Terry, 2007a). Consequently, the government has made extremely large investments in constructing and operating dams as a system or machinery for eradicating poverty and abrupt hunger in the rural areas. Similar investments include, firstly, the (KDDP) on the Komati River in the northern Lowveld, irrigating 7,400 ha and dependent upon the Maguga Dam which was completed in 2002. Secondly, is the Lower Usuthu Irrigation Project (LUSIP) of which it is currently servicing 14,500 ha in the southern Lowveld.

Sugarcane is by far the dominant irrigated crop in the country, covering over 91% (more than 50,000 ha) of the harvested irrigated cropped area consequently the largest single foreign exchange earner in the country (SADC, 2006). For that reason, the government is at the leading position in putting into effect irrigated agriculture development programmes with principal interest in the sugarcane industry of the country. Sugar cane is preferred because of its strong organizational structure and improved irrigation facilities hence reduced risks (SADC, 2006). As a result of the above advantages, it is able to attract the private banking sector to finance on-farm development based on the estimated market value of future production. Because of the organized structure, lenders are able to collect their loan repayments via the sugar mills which are the primary receipt point for sugar sales proceeds. On the contrary, the sustainability of smallholder

irrigation schemes cannot be guaranteed given the fact that the viability of sugar cane has been adversely affected by changes to the European Union (EU) Sugar Protocol.

The underlying problem is the poor and unsatisfactory performance of smallholder irrigation schemes, coupled by subsistence farming mindset that prevents farmers from increasing their cash income against a backdrop of high operation and maintenance costs (Rao, 1993). It has emerged that it is now difficult to manage irrigation schemes and as a result, they yielded the lowest returns compared to their expected potential. Improved smallholder agricultural performance can lead to improvements in the incomes of the poor. Irrigation can double, even quadruple yields. These are the reasons why the schemes are unable to be financially sustainable as was projected during their planning needs to be established such as is the case with commercial sugar cane production by smallholder irrigation schemes using water from the Lubovane dam.

While farmers located in the Lower Usuthu Smallholder Irrigation Project (LUSIP) project area are supposedly empowered by service providers such as SWADE, SSA and Ubombo Sugar Mill (Illovo) so as to enable smallholder farmers to undertake productive commercial agriculture based on sugar cane for delivery in the mill which will create wealth within the farmers' household as well as within communities at large, this has not been realised. Productivity has not been steady. There have been marginal increases and even declines in some cases (SSA, 2005).

Against a background of immense challenges of poor agricultural productivity in the smallholder irrigation rural areas, the Government of Swaziland implemented the smallholder irrigated agriculture development programmes under the Swazi Nation Land (SNL). The aim was to raise productivity and enable small scale farmers to convert from subsistence to commercial crop production Terry (2007a). As a consequence, the Government invested in the construction of dams and related projects. These include *inter alia* the Komati Downstream Development Project (KDDP) on the Komati River in the northern Lowveld, with the potential to irrigate 7,400 ha and dependent upon the Maguga Dam which was completed in 2002. More recently, the Lower Usuthu Irrigation Project (LUSIP) was initiated to service 14,500 ha and would benefit 2600 households in the southern Lowveld. The water will be drawn from the Lubovane dam with capacity of 155 million cubic metres of water (FAO, 2008).

1.2 Problem Statement

Performance studies in smallholder irrigation schemes in general and Swaziland in particular have tended to focus on technical performance, which has not led to a clear understanding of the poor performance. Governance of the schemes has been neglected particularly with regards to how this is related to agricultural and financial performance.

1.3 Justification of the study

Concerns have been raised as to the poor performance of smallholder irrigation schemes. Several technical constraints have been identified as having a negative effect on productivity performance. However, documented evidence on smallholder irrigation schemes in relation to agricultural and financial productivity and governance remain scanty. This study was undertaken to provide insight into the relationship between the performance of smallholder irrigation schemes and accountability and transparency and the underlying reasons. Information on the relationship between production performance and governance is important to enhance the management of smallholder irrigation schemes by irrigation managers and decision makers.

1.4 Study Objectives

1.4.1 Main Objective

The main objective of this study was to assess how the performance smallholder irrigation schemes in Swaziland was affected by governance as measured by accountability and transparency.

1.4.2 Specific Objectives

The specific objectives of this study were to:

1. Assess the agricultural and financial performance of the different irrigation schemes;
2. Assess the perceptions of farmers regarding the level of accountability and transparency and;
3. Explain the factors influencing performance of the smallholder irrigation schemes.

1.5 Hypothesis

The study was guided by the following hypothesis:

1. Smallholder irrigation schemes are not achieving their initial agricultural and financial objectives;

2. Low levels of accountability and transparency has contributed in poor agricultural and financial performance of smallholder irrigation schemes.

1.6 Limitations of the Study

Due to budget and time constraints the study had two main limitations. First, soils were not analyzed to assess the impact of irrigation on soil properties due to lack of time and laboratory facilities. Second, the analysis was limited to at least one year due to the lack of time series data.

1.7 Structure of the Study

Chapter 1-Introduction, research questions, objectives of the study, scope of the study on what other scholars have done with an indication of which main category of indicators were selected for the study and the limitations encountered in accessing information for these indicators.

Chapter 2-Literature review on what other authors have suggested relating to performance measurement in public utilities and public perceptions on water services provided by public utilities.

Chapter 3-The chapter gives the description and background of the area of study and criteria for selecting the irrigation schemes which were studied. Description of how the research was carried out, what data was collected and how it was processed including relevant data collection techniques that were used. This chapter indicates what actually happened in the field.

Chapter 4-This chapter looks at the raw data that was collected in line with the conceptual framework developed. All data collected during the face to face interviews, the analysis and discussion of the results.

Chapter 5-The chapter gives conclusion and recommendations derived from findings in chapter 4 while also outlining areas for future research. The researcher also narrates main observations made during the research.

Chapter 2 Literature Review

2.1 Introduction

Agriculture plays an important l role in the Swazi economic development and is also the main source of income for more than 70% of the population who live in the rural areas. It is the single largest exchange earner despite a fall in its share of Gross Domestic Product (GDP) from about one-third in 1968 to 11 percent in 2006 (SADC, 2006 in (Mlilo *et al*., 2008). Sugar cane is by far the dominant irrigated crop in Swaziland, accounting for over 91 percent of the irrigated cropped area. The sugar industry provides direct employment to about 16,000 people and indirectly to about 20,000 people (Mlilo *et al*., 2008).

Performance, accountability as well as the transparency of any system is pivotal for the allocation of resources in an economy across individuals, space and time. It provides for inter-temporal smoothing of consumption by households and expenditures by enterprises when there is no substantial competition from the financial markets, and through derivatives and similar techniques of cross sectional risk sharing and when there is a significant competition from the financial markets (Allan and Galle, 2000).

This chapter presents an analysis of the literature on smallholder irrigation schemes in Swaziland, and the importance of performance assessment (agricultural and financial) of smallholder irrigation schemes. It also presents issues regarding governance on in smallholder irrigation schemes and relates governance on agricultural and financial performance of smallholder irrigation schemes.

2.2 Smallholder irrigation schemes in Swaziland

Irrigation is essential in developing countries in general and in Swaziland in particular because of its contribution to agricultural production, income generation and rural development (Small and Svendsen, 2009). Unfortunately irrigation schemes perform below their potential, due to a number of factors, (Small and Svendsen, 1992). Irrigated agriculture through sugar cane smallholder irrigation schemes is critical to the Swazi economy. It provides for 66% of the total agricultural and financial output and 37% of total agricultural employment force. It contributes for 12 % in the GDP and in the process plays a major role in reducing poverty and food insecurity (Richardson, 2012).

A great number of smallholder farmers under KDDP are unable to pay their loans back and might be forced out of production. The problem will be exacerbated by the increase of internal conflicts within the farmers' associations as farmers are now becoming suspicious of their partners and committee members regarding financial security (Malaza and Myeni, 2009).

Nevertheless, the implementation of smallholder irrigation schemes in the country has been viewed differently by separate authors. Lankford (2001) argues that the success of the sugar sector and increasing area under irrigation does not necessarily suggest a healthy food security situation for the country and hence a need to promote crop diversification to reduce the risk of over-dependence on an exported cash crop. The author suggests two options for smallholder irrigation in Swaziland, which is to continue to provide and support formal smallholder irrigation that is able to cultivate cash crops, and to support traditional small-scale irrigation focused on food security by rural people. On the other hand, Manyatsi (2005) alleges that the contribution of small scale irrigation is constrained by lack of policy on agriculture and irrigation, lack of financial resources, lack of proper training, lack of adequate market for produce, and lack of appropriate technology irrigated agriculture. Further developments should consider issues of technology selection and design for management; institutional support for smallholder irrigation, and lastly the long term economic analysis of the scheme (Lankford, 2001).

2.3 Importance of performance assessment in smallholder irrigation

Performance evaluation conducted the world over on individual smallholder irrigation schemes, schemes at basin and schemes at national level for specific types such as those public-operated and transferred to users' associations or cross-system comparison of schemes, all with the aim of enhancing efficiency of resources utilisation (Turral *et al*., 2007 and Kuscu *et al*., 2009). Mohtadullah (1993) defined performance as a measure of the level of achievement of desired objectives. Indicators are used to assess performance. An indicator refers to a number that describes the level of actual achievement in respect of the objective of irrigation system (Molden, 1998). Performance indicators serve to simplify the complexity of internal and external factors affecting the performance of irrigated agricultural system and also serve as a guideline for further decision making and taking. Performance indicators should be carefully chosen, measured and interpreted (Molden *et al*., 2007).

Performance assessment in irrigation refers to the systematic observation, documentation and interpretation of activities so as to ensure continuous improvement. According to Bos *et al*. (2005) performance assessment is an activity that supports the planning and implementation process. The ultimate purpose is to achieve an efficient and effective use of resources by providing relevant feedback to scheme management at all levels. A systematic and timely flow of actual and information on key aspects of an irrigation scheme is an essential condition for monitoring of performance to become an effective tool for management.

Assessment of performance can be done from process and output points of view. Process measures refers to the assessment of performance in relation to a system's internal operations and procedures whereas with output measures the performance is examined in terms of quality and quantity of the system's final output (Small and Svendsen, 1992a). The effectiveness of the performance indicators depends on the objective and scale of assessment (Small and Svendsen, 1992b). Productivity and equity are effective and useful in the assessment of the impact and benefits of utilizing a given resource independent of other resources as inputs into the production system (Small and Svendsen, 1992b).

Agricultural and financial performance assessment can be described as the regular observation of certain agricultural performance parameters with the objective of acquiring essential information pertaining to resources use within an irrigation scheme and enable irrigation managers to make well informed decisions in terms of resources management (Bos *et al*., 2005). This process provides feedback information to scheme management at all levels. This process will enable a review of operations and evaluation of effective and efficient resources use.

The primary output of an irrigation scheme is the total crop yield or its economic equivalence per unit of land and water used. Most often the productivity is expressed in terms of land or water supplied to produce a certain level of output. Increases in productivity arise not only from technological change but also from institutional innovation, improvements in human capital and in the availability of biological and physical capital (Bonnen, 1998). Against this background, the productivity of smallholder farmers in most African countries is often considered to be low and has been declining during the past two decades (Cakmak, 2004). Low smallholder agricultural productivity implies low smallholder agricultural profitability and low productivity of smallholder

farmers is one of the most important reasons for the failure of most African countries to achieve poverty alleviation and food security (Kloezen 1998). Raising agricultural productivity is necessary if African countries are to overcome the challenges of poverty and food insecurity (Mushunje, 2003).

The present status of an irrigation scheme with respect to the selected indicators can be identified through assessing the performance. This helps to identify the underlying factors that contribute to a scheme to perform in a particular way, which in turn will advise on means of improvement. There are two major approaches to performance evaluation considered, how well service is being delivered and the outcomes of irrigation in terms of efficiency and productivity of resource use (Clemmens and Molden, (2007).

The performance of an irrigation scheme and/or system is the result of a variety of activities that include planning, design, construction, operation of facilities, maintenance and proper application of irrigation water and agronomic activities. Facilitation and execution of these activities requires proper coordination of functional processes of irrigation Small and Svendsen (1992b). These activities include personnel management and support, equipment management, financial management and accounting, and resources mobilization. Planning, design and construction of irrigation schemes mainly deal with creation of physical infrastructure to facilitate the capturing of water from its source and transportation up to the farm level. These physical facilities need to be properly operated to ensure the capturing, allocation and delivery of water at the right time and adequate quantity (Chiron, 2005).

Most problems of smallholder irrigated agriculture that hinder the further development of this subsector arise from its operational method and not from its construction and design (Gebremedhin and Pedon, 2002). They pointed out that irrigation development planning gave emphasis to the agronomic, engineering and technical aspects of water projects, with little consideration to issues of management, beneficiary participation, and availability of institutional support services such as extension, input supply, and marketing facilities.

Studies on performance assessment of irrigation schemes have gained momentum since the late 1980s due to the common perspective that land and water in irrigation schemes are not being managed appropriately. However, there is little that has been done on the

assessment of governance issues in relation to production performance on smallholder irrigation schemes in sub-Saharan Africa (SSA) (Bossio *et al*., 2011).

Dysfunctional infrastructure, lack of inputs and technology, extreme financial constraints and inadequate managerial skills among farmers and socio-economic settings are the major causes of poor performance in smallholder irrigation schemes (Molden *et al.*, 1998). Inefficient water management strategies and lack of farmer participation in scheme management as well as lack of markets are other constraints (Bembridge, 2000)

It has been noted that high irrigation investment costs together with declining world prices for food coupled with the failures of many past irrigation projects are believed to be the main reasons for the reluctance of financial and development agencies and governments in SSA to invest more financial and other necessary resources in irrigation. Cakmak (2004) argued that performance assessment enables verification of the degree to which targets and objectives are being realized. It also provides different stakeholders (system managers, farmers, and policy makers) with a better understanding of how a system and scheme operates. It can help determine problems and identify ways and means of improving system performance. However, the challenge is choosing the indicators for performance assessment and the criteria to determine the factors that contribute to poor performance of smallholder irrigation schemes.

Irrigation researchers world over have begun to show an enthusiastic interest in trying to develop indicators for evaluating the performance of irrigation schemes and also to assess the impact of different irrigation management strategies on crop yields and productivity of land and water quantitatively. That is in view of the growing shortage of irrigation water, and the competing demands for water from other sectors. Four main strategies which are examined are; providing deficit irrigation, improving the timeliness of irrigation, precision irrigation, and improving the quality as well as reliability of irrigation. One of the motivating factors behind this is to identify the best strategy for improving the performance of irrigation schemes, given its potential as a powerful tool to manage the demand for water in agriculture (Svendsen and Small, 1990).

According to Forster (1996) two institution defects are the underlying causes of poor performance. These are the ‘poacher-gamekeeper’ and the ‘politicization of management’ which relates to the tendency to base decisions on political rather than technical criteria

as a result of external influences from high echelons of power. The two underlying causes lead to poor performance through a number of transmission mechanisms. Foster's model can be portrayed in graphic form as shown in figure 2.8 below.

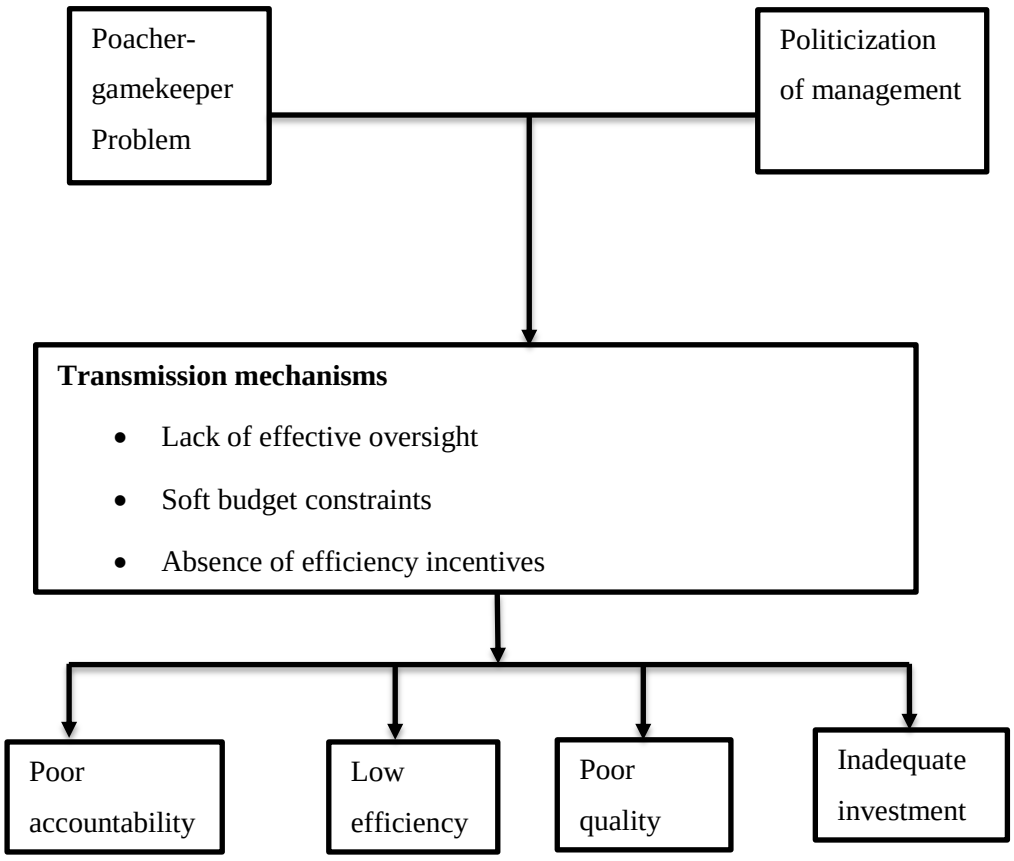


Figure 2. 1: Forster's model of public-owned enterprises (Source: Forster, 1996)

2.4. Performance indicators

Agricultural and financial performance indicators reflect the degree of adequacy in the use of resources to obtain the final outputs in irrigation schemes (Bos *et al*., 2005). Molden *et al*. (1998a) developed a set of nine indicators to enable comparison of irrigation performance across irrigation systems. These covered physical performance indicators which comprise of output per cropped area (tonnes/ha), relative water supply, output per unit command area (tonnes/ha), output per unit irrigation supply (tonnes/m^3), relative irrigation supply and the rate of irrigation; and financial performance indicators which comprise of gross return on investment (%), financial self-sufficiency (%) and staffing number per unit area (Kloezen and Garce's-Restrepo, 1998; Molden *et al*., 1998b; Bos *et al*., 2005; Vandersypen *et al*., 2006).

Gorantiwar and Smout (2005) summarized performance indicators proposed by various researches into allocation types and scheduling types. Allocation types performance indicators are the indicators which need to be attained mainly during the allocation of the resources at the planning and operation stages. Productivity and equity are performance indicators under allocation type category. Scheduling type performance indicators consists of irrigation scheduling, that is, temporal and spatial distribution of irrigation water to the users. This measures adequacy, reliability, flexibility, efficiency and sustainability.

Gorantiwar and Smout (2005) further grouped these two categories of performance indicators into: economic (productivity), social (equity), environmental (sustainability) and management (reliability, adequacy, efficiency and flexibility). Rao (1993) also summarized the different performance indicators proposed by various authors for measuring irrigation systems performance and explained their use. However, only few cross-system comparisons are available (Murray and Snellen, 1993). In the past the focus has chiefly been on irrigation systems while the scheme as a whole requires a holistic performance evaluation.

The difference between an irrigation system and irrigation scheme is that the irrigation system is part of the irrigation scheme which usually deals with the infrastructure while an irrigation scheme include socio-economic and institutional subsystems, human resources, irrigated land and the community at large (Bos et al., 2005). These various sub-systems have various roles and effects on each other and on the general performance the scheme, hence the need to look at the scheme holistic when carrying out either an agricultural or financial assessment.

2.4.1 Agricultural performance indicators

Agricultural performance indicators generally analyse the output from an agricultural system in relation to inputs into the system; that is agricultural productivity. As Molden (1998), authors like Malano and Burton (2001) and Burt (2002) strongly agreed on the proposed agricultural performance indicators. However, Molden *et al.* (1998) points out that these indicators must be viewed in the context of the region in which they are used. In an environment where water is the more constraining resource compared to land, then output per unit water may be more important than output per unit land (Greaves, 2007).

However, agricultural performance indicators are insufficient for decision making, planning and control operations in a dynamic irrigation environment. They do not reflect all dimensions of organizational performance in an integrative framework (Jusoh *et al*., 2008), hence the need to include financial performance and governance aspects when assessing an irrigation scheme's performance.

2.4.2 Financial performance indicators

Financial performance indicators concentrate on the costs and returns on monetary value and they include cost recovery, maintenance cost to revenue ratio, total cost of management, operation and maintenance per unit area command area and revenue collection (Greaves, 2007). According to Burt and Styles (1998) external or systems performance indicators are not adequate to describe the degree of performance either it is poor or good performance, hence the need to encompass the aspect of governance assessment of performance of smallholder irrigation schemes. It is necessary to have a comprehensive understanding of financial performance of an irrigation scheme. The inclusion of governance and financial performance implies that performance assessment would incorporate corporate and social evaluation, stakeholder satisfaction, accountability and transparency for continuous improvement of quality, standards and excellence (Kuscu *et al*., 2009).

This study will investigate in detail irrigation water productivity in its agricultural and economic sense as a performance indicator. However irrigation performance in terms of reliability, adequacy and flexibility will constantly be referred to because of its direct impact on crop yield (output) in terms of timing and application.

However, for smallholder irrigation schemes in Swaziland the data required to calculate the nine indicators are rarely available. The studies that have been conducted investigated issues of governance with regard to participation and inclusiveness neglecting accountability and transparency. It is against this background that this has to assess agricultural and financial performance in relation to accountability and transparency.

Further, it has been noted in many varied forums and conferences that the contribution of irrigated agriculture to achieving global food security and offering a way out of poverty are not in question (FAO, 2001; World Bank, 2009) but the response of the irrigated agricultural sector to changing situations is lacking purpose. Irrigated agriculture either small-scale or large-scale has played a pivotal role in keeping up with global food

demands in the 20thcentury, but into the 21st century there is prolonged evidence of a not so shining performance in public sector and a frustrated private sector.

In addition, the contribution of irrigated agriculture, especially in smallholder irrigation schemes, can be negative or positive and this depends on the management practices being put in use (Smith, 2004). Further, in the view of Panahi *et al.* (2009) irrigated agriculture has been the most highest productive sector in the economies of developed countries as well as developing countries. This is in the sense that it is the source of most economic growth, employment and the largest contributor to export revenues. This happens in a region where about 70% of the population live in the rural areas and are dependent on smallholder farming for their survival and their livelihood depends on less than US$1 Toenniessen *et al*. (2008).

Researchers and scientists who investigated on this subject matter have argued that the reasons behind the poor performance of the smallholder irrigation schemes in Sub-Saharan Africa include among other factors; policy and institutional failures; economic and financial challenges; declining investments; the inability of technology and water resources to supply the growing demand; poverty and rural income challenges; and environmental factors as well as the sustainability factor. Kydd *et al.* (2004) has further stated that the disappointing performance in smallholder irrigation schemes levels in Sub-Saharan Africa compared to other regions are a result of poor governance, uncertain price of products, uncertain market opportunities, low rainfalls and small land under irrigation. As a consequence of poor performance in smallholder irrigation schemes, more or less half of the population living in rural areas is living in absolute poverty, and earn a living on less than a $1/day, and one third are estimated to be undernourished.

According to Jama and Pizarro (2008), the promotion of well improved agricultural performance through smallholder irrigation schemes development can alleviate poverty in three broad dimensions:

1. The direct effects of increased agricultural productivity and income on the rural poor;
2. Benefits of cheaper foods for both the urban and rural poor; and
3. Agricultural contribution to economic growth and the generation of more opportunities in the farming sector.

Therefore, many African countries have made huge investments in irrigated agriculture for smallholder development as a means to fulfill or satisfy the demand for food that is coming up with the growing population. Panahi *et al.* (2009) stated that water management is critical for future growth and social wealth not for only developing but for developed countries as well. This is true given that within the agriculture sector, irrigated farming enhances value adding, farmer's income, and food security at global, national and at household level by rapidly satisfying the rising demand for food at affordable prices.

Smith (2004) established that where all conditions are favourable, irrigation can boost agricultural productivity in the following ways: It improves productivity by ensuring adequate water throughout the growing season, resulting in higher yields and high quality farm produce; securing a crop where rainfall is inadequate or too variable; allowing growth of multiple crops by making water available throughout the year and also cultivation of new crops or varieties for which market opportunities exist; improving the timeliness and /or crop duration, allowing area expansion and/or increased cropping intensities; enabling farmers to adopt timing of production to market demand and higher prices, to take advantage of good weather conditions, or to avoid adverse weather conditions; facilitating multiple farm enterprises around livestock, crops and agro-processing; and raising farm household and hired labour productivity as a result of high output expectations.

A study that was conducted by Fanadzo *et al.* (2010) in South Africa reported that smallholder irrigation schemes are performing poorly and have failed to achieve the intended goals and objectives of increasing crop production and improving rural livelihoods. This has been attributed to limited knowledge of irrigated crop production. In addition, studies conducted in other African countries such as Tanzania indicated that although irrigation plays a fundamental role in world food provision, up-to-date, it has performed below expectations in Sub-Saharan Africa (Panahi *et al.*, 2009).

2.5 Factors affecting performance of smallholder irrigation schemes

Agricultural productivity is greatly affected by a number of inputs such as land, labour, capital, seed, fertilizer, irrigation and soil. All the inputs are categorized into three main variables such as land, labour and capital, where labour consists of the hired labour, and family labour (Azam and Khan, 2010).

The irrigation water systems in the rural parts of Swaziland have in most cases been designed for small scale sugar cane production organized under cooperatives. In these communities, irrigation water is directed only to the distant sugarcane fields, not to the homesteads. As a result, individual household plots around the homesteads cannot benefit from the irrigation water. Thus rain-fed crop production on individual household plots continues to fail due to drought.

2.5.1 Water management

Water management practices refers to all aspects involved in diverting water from the sources to the field, maintenance of water delivery infrastructure, scheduling practices, and maintenance of infield infrastructure for the purpose of handling water in a manner that benefits the user (Bouman *et al*., 2007). Effective maintenance of water delivery infrastructure minimises losses. It assures reliable supply of irrigation water both in terms of quantity and time. This is critical to ensure improved water productivity (Kijne *et al*., 2003). On another note, also highlighted that there was and still room for improving yields on smallholder sugarcane farms provided small-scale farmers could be better organized in terms of accessibility to irrigation water, infrastructure, farming production inputs, co-operative harvesting associations and secondary seed cane schemes to provide healthy seed cane.

2.5.2 Farming Inputs

Smallholder sugarcane yields fluctuate more than the industry mean cane yield. These fluctuations are associated with production inputs not being affordable as well as internal disputes or changes in leadership and, to a lesser extent, climatic or environmental factors (Sifundza and Ntuli, 2001). It is important that sugar cane smallholder irrigation schemes to improve their yield and sucrose content to maximise their income. The major determinant of sugar cane productivity is adequate and timely application of inputs through the life cycle of the crop. However, farmers have the perception that lower inputs use will save costs. They overlook the fact that this act will also results in reduced productivity (Malaza and Myeni, 2009).

2.5.3 Land Ownership

Land tenure is broadly of two types, Swazi National Lands (SNL) and Title Deed Land (TDL), which account for 54 and 46 per cent of land area respectively. As a result of the importance of agriculture in Swaziland's economy, the government has prioritized water

driven agriculture development programmes. Since the challenges of poor agriculture productivity are most felt in the rural areas, the small-scale irrigated agriculture development programmes are implemented in SNL. These are aimed to raise productivity and enable small-scale Swazi farmers to convert from principally subsistence to commercial crop production (Terry, 2007b).

However, the SNL unlike in TDL is not defined by legislation, the land is being controlled and held in trust by the King and allocated by tribal chiefs according to traditional arrangements. Application forms for sugarcane financing had to be accompanied with a letter from the chief guarantying the land as well as a water permit. The majority of the other farmers had smaller farms and no water permits, and as such could not qualify for sugarcane credit. Under such setup it is difficult for small-scale farmers to use the land as collateral for loans as well as developing it. This show that either way, if water is not limiting factor access to farm land is the main limiting factor.

2.5.4 Lack of capital

According to the United Nation conference on Trade and Development (2000), access to finance is presently the biggest constraint for small-scale growers joining the Swaziland sugar industry. There are few institutions that lend money without collateral. It is very difficult to obtain a loan for farming on SNL, as there is no title deed for collateral. At one time the local development bank accepted livestock as collateral, but after experiencing difficulties in recovering loan money this was stopped.

2.5.5 Labour strength

In sugar cane production the area harvested, labour strength and prices paid to sugar cane farmers have positive a positive impact on agricultural productivityand finacial performance or profitability (Narayan, 2004).

Figure 2. 2: Schemes members planting sugar cane at Maphobeni

Most smallholder irrigation schemes are established in the belief that family labour will always be available, but this is not true in most sugarcane smallholdings. The young and energetic family members prefer to go for better paying jobs in cities or industries. Those left behind are forced to employ other elderly neighbours to assist in field operations (Dlamini and Dlamini, 2012). Given the demographic characteristics of rural areas, it follows that women and young children attend mostly to the fields.

2.6 Transparency and Accountability

Stemming from colonial times, many African governments remain characterized by bureaucratic behaviour of secrecy, exclusivity and upward accountability rather than downward (government accountable to the people). In the water sector, such behaviour is a recipe for failure, especially when the ability of service providers to reach poorer communities and maintain services in a sustainable manner depends on community participation and input (Magadzire, 1993).

The second principle of the International Conference on Water and Environment (ICWE) in Dublin, Ireland, 31 January 1992 states that:

"Water development and management should be based on a participatory approach, involving users, planners and policy-makers at all levels. The participatory approach involves raising awareness of the importance of water among policymakers and the general public. It means that decisions are taken at the lowest appropriate level, with full public consultation and involvement of users in the planning and implementation of water projects."

It is widely believed that the 'water crisis' is really a 'governance crisis'. Since water governance is about the way water is allocated and managed, it is essentially about decision-making and hence constitutes a political process (Franks, 2004). Good governance emerges when stakeholders engage and participate with each other in an inclusive, transparent and accountable manner to accomplish better service provision that is free of corruption and abuse, and performed within the rule of law. In the irrigation sector in Swaziland, especially in smallholder irrigated farming; most of the water users have little or no education at all. This makes it difficult for them engage modern techniques of water management as well as calculating irrigation water used against the costs and financial returns.

Good governance in irrigation schemes becomes "effective" or "good" when conditions of equity, accountability, participation, transparency predictability and responsiveness prevails (Tollefson *et al.*, 2013). However, governance is a complex product of socio-political interactions in which irrigation schemes committee leaders and members are involved in different levels. In this regard the committee's role should be that of an actor and facilitator rather than a top-down manager (Tollefson *et al.*, 2013). Good governance needs to be developed to suit local conditions.

Improved integrity and accountability in water-sector institutions constitutes an important tool for countries and local governments to achieve poverty reduction and to improve sustainable management of water resources. The past years have shown some promising signs. Decision-makers, development practitioners and researchers are increasingly focusing attention to improve accountability and integrity mechanisms in water management through various types of anti-corruption measures. Importantly, improved integrity, accountability and the application of anti-corruption measures are fundamental elements in efforts to reduce poverty, and to allocate and distribute water resources and services in fair and efficient ways in line with the principles of Integrated Water resources management (IWRM) (Earle *et al*., 2008).

2.6.1 Governance assessment in smallholder irrigation schemes

The Global Corruption Report published by Transparency International (2008) marks a renewed interest in understanding and curbing the dynamics of corruption in the water sector (Zinbauer and Dobson, 2008) and (O'Leary and Stalgren, 2008). This renewed interest stems from the recognition that lack of governance in the form of transparency

and accountability can have far-reaching consequences for the effectiveness and equity of public service delivery and more broadly, for development initiatives.

According to Water Integrity Network (WIN) accountability refers to the democratic principle that elected officials and those in public service can be held accountable for their actions and answer to those they serve. This includes political, administrative, and financial dimensions. It requires that citizens, civil society organisations and the private sector are able to scrutinize actions taken and decisions made by leaders, public institutions and governments and hold them answerable for what they have, or have not, done.

Again, WIN defines transparency as openness and public access to information so that citizens can understand the decision-making processes that affect them, and are knowledgeable about the standards to expect from public officials. Transparency can go a long way in improving the performance of small-scale irrigation schemes in Swaziland and world over.

Accountability and transparency in governance are closely inter-related, for transparency is a prerequisite for real accountability. For instance, transparency necessitates strong sector performance monitoring systems, which will enhance accountability for the use of resources by service providers. Only through access to the information these systems produce is the public able to keep service providers and governments accountable and participate fully in public consultation and appeal processes (Turral, 1995).

Improved access to water for irrigation is widely seen as a powerful tool to alleviate rural poverty. Access to irrigation water increases direct food supply; increases crop production and income generation; and reduces vulnerability to droughts caused by seasonal variability or climatic change (Hussain and Hanjra, 2003). Whilst the poor are the ones who can benefit the most from effective irrigation management, they have also been identified as the ones who mainly suffer from poor governance and corruption in the water sector (Plummer, 2007). Lacking formal education, and/or being excluded from political networks, the poor usually do not have the capacity to defend their rights and thus have to withstand corrupt practices.

Studies by Chambers (1998); van Koppen *et al*. (2002) and Zwarteveen (1994) shows how the allocation of irrigation water has reproduced existing inequalities, disregarding water use by women and prioritising large scale or upstream located farmers.

Earle *et al.* (2008) emphasized that the involvement of beneficiaries in planning, design and management of water systems (be they for water resources or services) implies the sharing of information providers and users, and this in turn necessitates service providers being responsive and thereby accountable to the public they serve. Civil society involvement in expenditure reviews, auditing and performance reviews of sector institutions can therefore provide needed checks and balances that is what accountable water governance demands. In addition, participation by disempowered groups such as women and the poor in water budgeting and policy development can also enhance the pro-poor focus of spending.

Investigating dynamics of corruption within irrigation planning processes appears particularly timely. Indeed, agricultural development, including investments in agricultural water, especially in sub-Saharan Africa, is the subject of renewed interest from the international community and national governments alike (NEPAD, 2003) and (Lankford, 2009). At the same time, a two-fold, yet seemingly disconnected, diagnosis threatens the sustainability of such a move. First, corruption is identified as a major obstacle to productive investments and the broader agriculture-for-development agenda (World Bank, 2007a). Second, many studies highlight lapses in the planning and implementation of water development and management projects Morardet *et al*. (2005). However they fall short of investigating the ways, and extent to which, corrupt practices might underpin them.

2.7 Conclusion

In this study accountability and transparency which are governance indicators are defined in terms of electoral procedures, committee meetings, access to information on expenditure and income and level of knowledge responsibilities.

A number of studies conducted by proponents of performance in irrigation schemes have revealed several challenges pertaining smallholder farming operations and management. These included poor performance in production, weaknesses in business planning, accountability and transparency. Documented evidence on these is scant.

For now, most studies leave major information gaps about the governance parameters that can be manipulated for the performance improvement of irrigation systems, which are also crucial for working out their operational policies. The smallholder irrigation schemes in Swaziland are working very hard to attain the national goals of economic growth and efficiency in the use of water resources. However, the water sector has not been able to address the other equally important stated welfare goals such as that of accountability and transparency in the irrigation sector. This limits the effectiveness of smallholder irrigated agriculture development in attaining other equally important development goals of food security and poverty alleviation.

Applying sustainable practices involve controlling water allocation /distribution, applying the required crop-water needs, resource mobilisation by Water Users' Association for maintenance of system, conflict management (total conflict resolution) and capability of institutional setting of management body resulting in effective performance such as catchment protection and accountability to the community. Some of these problems in the area of irrigation as in other sectors may be attributed to lack of good schemes governance (accountability and transparency).

Consideration in irrigated agriculture has not been given to smallholder irrigation schemes as entities that have to be empowered farmers organizations, sustainable, efficient, accountable and transparent. Thus a comprehensive and integrated effort is required to advance agricultural and financial performance through accountable and transparent systems of production and therefore, improved access to markets.

It is again safe to conclude that the problem facing smallholder irrigation schemes in Swaziland in particular is poor performance. The problems regarding the lack of accountability and transparency have not gone unnoticed. Countless interest groups and authors have analysed the functioning of smallholder irrigation schemes and presented explanation for their poor performance.

So this study will try to find out if small-scale irrigation schemes in Swaziland are performing according to their expected initial objectives and goals. It will again work towards finding out the extent to which the principles of good governance (accountability and transparency) are being observed by the membership as well as leaders of these irrigation schemes.

Chapter 3 Study Area

3.1 Introduction

Swaziland has a total land area of 1736,456 ha, of which 56% is Swazi Nation Land (SNL) and 44% is Title Deed Land (TDL). While SNL farmers mainly produce crops for self-consumption, TDL farmers produce crops for commercial purposes. About 70% of the country's population lives in rural areas and on SNL and most of them are smallholder farmers who depend on subsistence agriculture for survival (GOS, 2008b). The altitude ranges from 150 metres in the east to 1,800 metres in the west. The climate varies accordingly, though a generally subtropical climate with summer rains prevails. Between 75% and 83% of the annual rainfall comes from October to March. Precipitation ranges from 500 mm in the south-east to 1,500 mm in the west, the average being 1,200 mm.

3.2 Water use in Swaziland

The total renewable water resources of the country are 4.51km³/year and 1.87km³ originating from South Africa. The total water for agricultural, domestic and industrial purposes is estimated at just over 1km³. Over 95 percent of the water resource in the country is used for irrigation (Table).

Table 3. 1: Water use in Swaziland

Category	***Water withdrawal (million m³)***	***Water withdrawal (%)***
Irrigation	992.65	95.3
Livestock	12.51	1.2
Domestic	24.18	2.3
Industry	12.02	1.2
Total	**1,041.36**	**100**

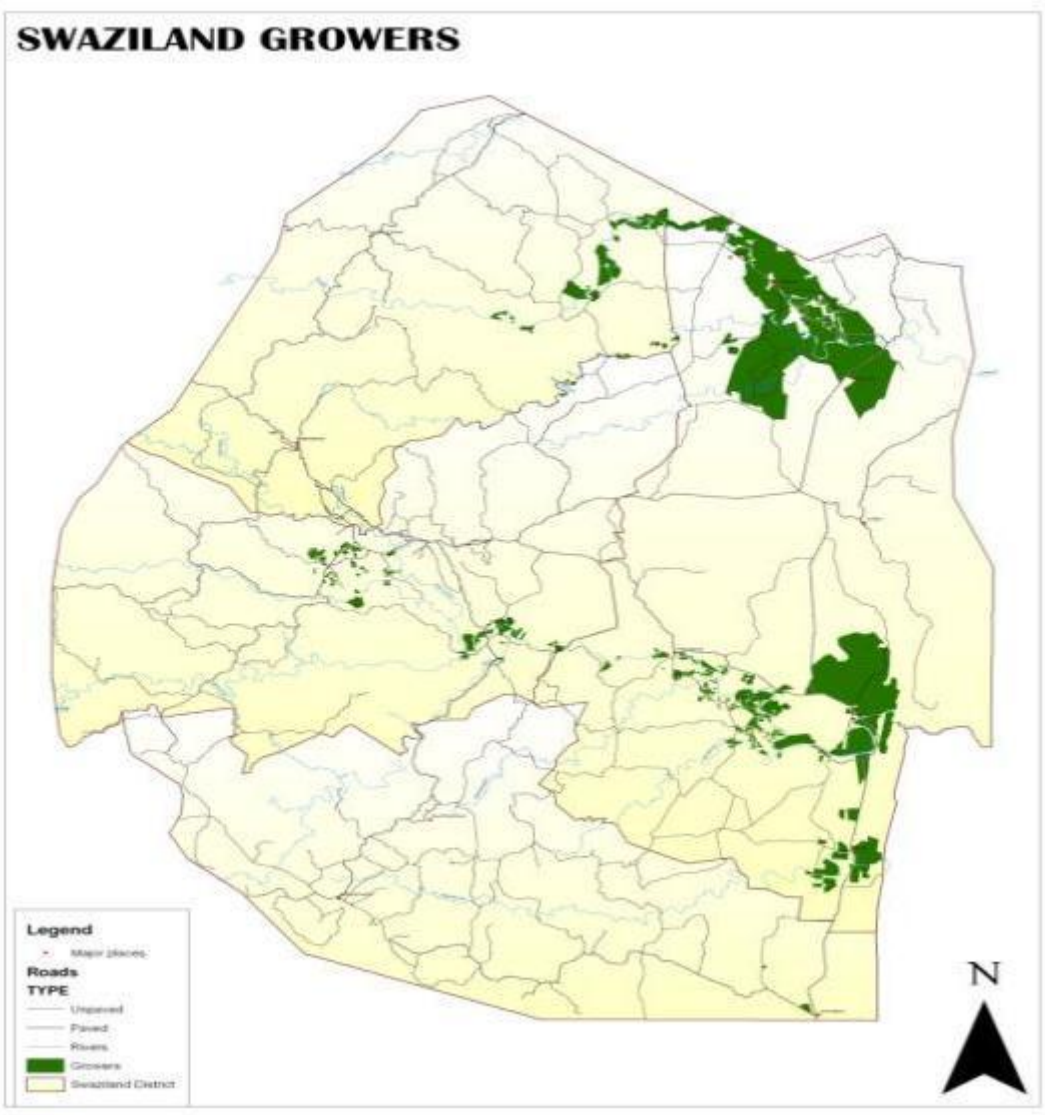


Figure 3. 1: Map showing Swaziland's major irrigation schemes (Source: SWADE 2012)

Agriculture is the main consumer of freshwater resources, accounting for almost 97% of withdrawal. Of this, over 90% is used in growing sugarcane as the main cash crop. Swaziland benefits from a quota of 120,000 tonnes under the Sugar Protocol to the Cotonou Agreement and also exports 30,000 tonnes under the Special Preferential Sugar (SPS) Agreement (SSA, 2010).

The country is split between largely rain-fed subsistence production by smallholders and cash cropping on large private estates. Smallholders constitute some 70% of the population and occupy 75% of the crop land, but their productivity is low, accounting for only 11% of total agricultural output. Poor availability of water for irrigation is a major constraint to smallholder production.

2002). Table 2 presents some basic social and economic data, some of them in comparison with indicators for Sub-Saharan Africa. However, these sectoral figures hide the fact "the majority of Swazi people continue to depend on agriculture as an important source of income and employment whereas it is.

Table 3. 2: Human, social and economic data of Swaziland in comparison with Su-Sahara

Item	*Swaziland*	*Sub-Sahara*
Population growth	3.1%	2.6%
GNP	US $ 1440	US $ 480
Population density persons /km²	55	24
Life expectancy (years)	60	51
Infant mortality (per 1000 births)	65	91
Illiteracy (% population +15 years old)	23	42
Access to safe water	60%	47%
Per capita freshwater resources, m³/head	4900	8441
Urban population	34%	33%

Source: Adopted from Lankford, 2007

According to the Central Statistics Office (GOS, 2005), 69% of the country is affected by poverty. The incidence of poverty is much higher in rural areas (75%) than in urban settlements (49%). About 84% of the country's poor people live in rural areas, where per capita income is one-fourth of the urban average, and people consume half as much food. About 66% of the population cannot meet basic food needs, and 43% live in chronic poverty (IFAD, 2008).

The irrigation potential for the country, based on the physical land capability and water availability, is estimated at 93,220 ha. Mlilo *et al.* (2011) reported that about 50,000 ha of the irrigated land are used for sugar cane production. Over 84% of the irrigated land is in the Lowveld, with 15% in the Middleveld. Concerning the types of irrigation, the author stated that about 52% of the land is under surface irrigation, while 48% is on other systems (draglines, fixed sprinklers and centre pivots). About 4000 ha of the irrigated land is under smallholder farmers mostly managed schemes, and irrigated mainly by overhead methods.

3.3 Lower Usuthu Smallholder Irrigation Project Area

The Lower Usuthu Smallholder Irrigation Project (LUSIP) area for the study was selected based on factors such as size, accessibility, age of the scheme, availability of secondary data, access to market and other socio-economic criteria with in the basin. LUSIP is one of the Swaziland Water and Agricultural Development Enterprise (SWADE) projects. The physical implementation started in the year 2005. Its objective is empowering 2600 rural poor households within the project area Siphofaneni to attain an improved quality of life and be able to sustain it thereafter.

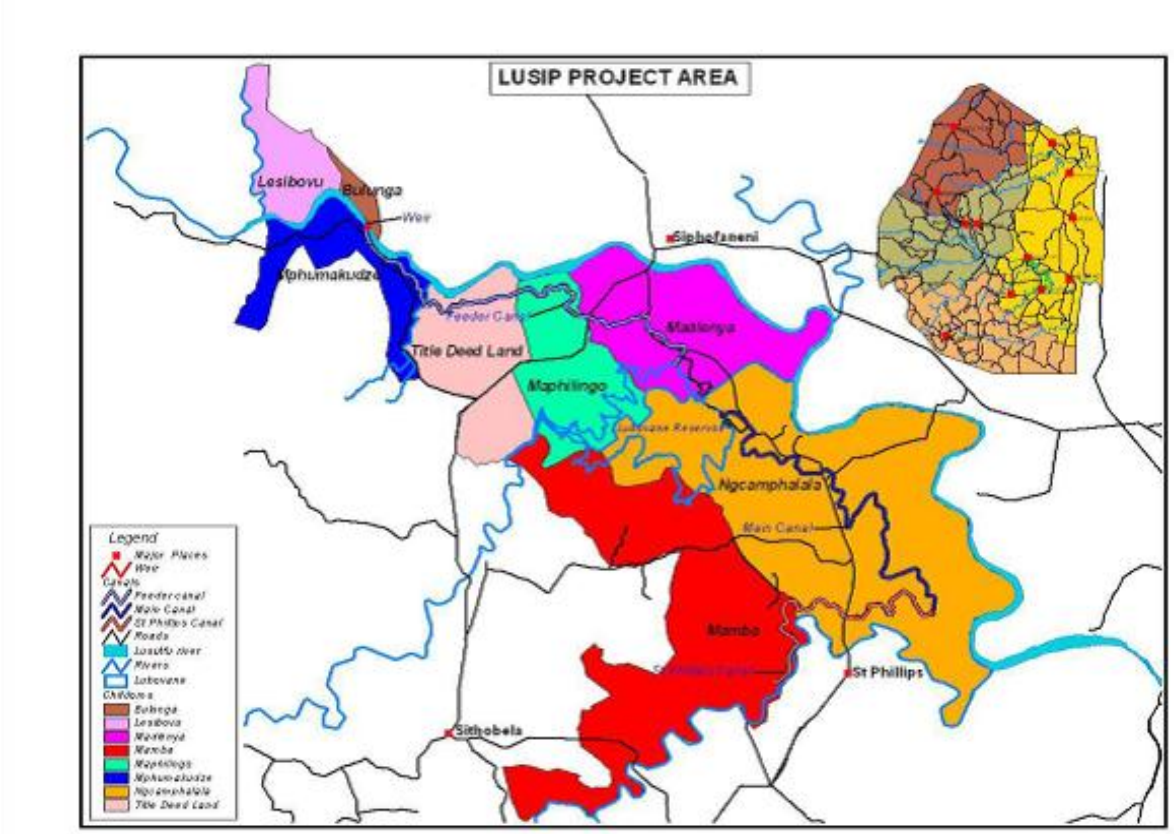


Figure 3. 2: Map showing the study area

LUSIP is located in the Lowveld agro-climatic region of Swaziland in Siphofaneni. The area has a summer-wet and winter- dry season with an altitude of 164m above sea level and mean temperatures of 30^0 Celsius. The total gross area for this study is 6500ha.The project area covers seven chiefdoms *viz*: Gamedze, Maphilingo, Mphaphati, Lesibovu, Mamba, Ngcamphalala and Mkhweli. This study will cover the irrigation schemes under the Ngcamphalala and Gamedze chiefdoms that had already started receiving the proceeds from sugarcane.

Chapter 4 Methodology

4.1 Introduction

This chapter discusses the methodological approaches and specific data gathering techniques applied. The chapter spells out the sources of data for use in the evaluation of the relationship between agricultural and financial performance and governance in smallholder irrigation schemes in Swaziland as well as the sampling techniques and sample size.

4.2 Research design

This study focused on 13 smallholder irrigation schemes under two chiefdoms, Madlenya and Ngcamphalala, which are within the Lower Usuthu Smallholder Irrigation Project (LUSIP). The choice of these study sites was based on their similarities such climate, management structure, population, irrigation technologies and chiefly the main source of water which is Lubovane Dam reservoir. The other reasons for selecting these irrigation schemes were that they have already started receiving proceeds from the production.

The study used a combination of both qualitative and quantitative methods of research. Qualitative Research involves identification of a number of often mutually related variables that give insight in the nature and causes of a certain problem. The study used a governance snapshot survey tool for collecting data pertaining accountability and transparency. A scheme governance snapshot is a tool used to capture how community governance systems are operating on WASH and other community IWRM structures (Stawicki, 2012).

4.3 Sampling procedure and sample size

For this study, purposive sampling was applied. The population identified for this study was smallholder farmers from irrigation schemes within Madlenya and Ngcamphalala chiefdoms. Only a sample was considered for the study since a sample is adequate for any study (Kinnear and Taylor, 1996). Swaziland Water and Agricultural Development Enterprise (SWADE) were used for the identification of farmers who have been involved since the project inception. This was because the 13 irrigation schemes that were selected were considered to be representative of the population in the two chiefdoms (Madlenya and Ngcamphalala).

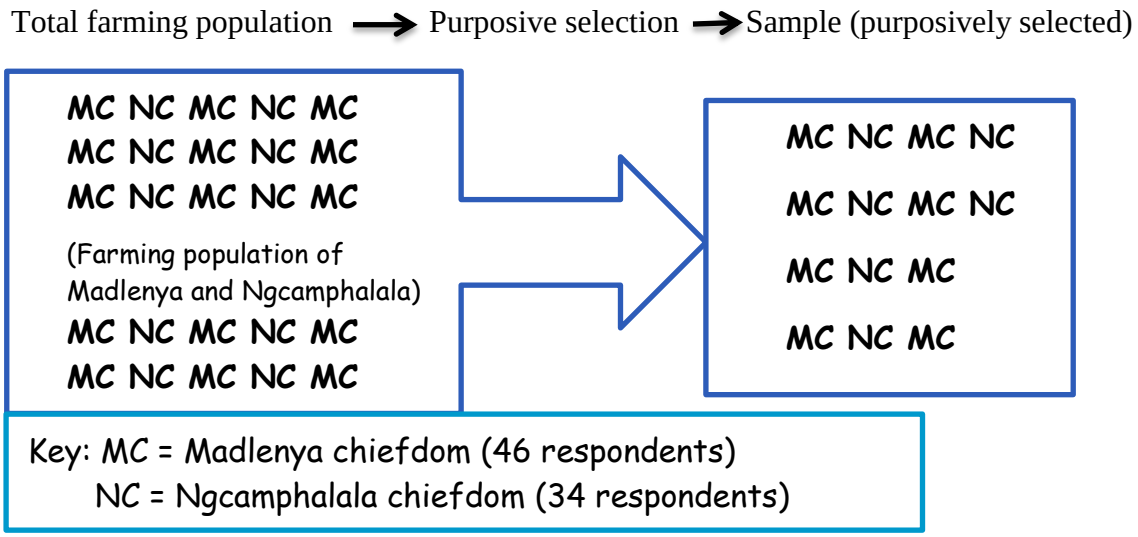


Figure 4. 1: Schematic sampling procedure

Sample size for this study was 13 smallholder irrigation schemes. Seven irrigation schemes were from Madlenya and six irrigation schemes from Ngcamphalala chiefdom. A total of 74 farmers who occupy the rank of chairperson and supervisors within the assessed small-scale irrigation schemes were interviewed, 42 farmers from the irrigation schemes from Madlenya chiefdom and 32 from the irrigation schemes from Ngcamphalala chiefdom. These farmers are chosen randomly from the total users of the irrigation schemes but taking only those farmers who were involved before and after the irrigation scheme's development.

4.4 Data Collection

Survey governance snapshot

The irrigation scheme governance snapshot survey was designed to capture quantitative and qualitative data pertaining smallholder irrigation schemes in two chiefdoms (Madlenya and Ngcamphalala). Further, irrigation schemes' members were gathered together to respond to survey questions related to their irrigation schemes, chiefly on the way they are managed and operated.

The snapshot governance survey consisted of 10 questions related to accountability and transparency. Each category consisted of five corresponding questions. Responses to the 10 questions were further provided by the snapshot survey tool. The answers provided by the members of the irrigation scheme given scores 1, 2, and 3. Score 1typicaly denoted a weak or negative response, while score 3 typically denoted a strong or positive responses. For example:

Question 1 What is the situation regarding committee existence?		
1	**2**	**3**
Committee meetings never been held	Committee held meetings in the past	Committee hold meetings regularly and last one can be stated/ minutes seen

For the 10 survey questions, irrigation schemes could receive a minimum score of 10 (scoring one on all entire questions) or a maximum score of 30 (scoring three on all the questions).

Primary data was collected from respective sites. Likewise secondary data were also collected from Swaziland Water Development Enterprise (SWADE), and the Ministry of Agriculture office. Moreover, a participator approach discussions were held with beneficiary farmers. The required information was collected through a comprehensive, well-designed as well as pre-tested questionnaire. This questionnaire contained basic information about irrigation scheme at farm level, infrastructure installed, costs and returns, off-farm income, minimum household expenditure and other questions related to this study. A structured questionnaire was used to solicit production and financial data, as well, as perceptions of farmers on accountability and transparency in the irrigation schemes.

4.5 Data Analysis

Descriptive statistics such as correlation were used in data analysis and was used in identifying determinants of production performance and the farmers' perceptions on accountability and transparency in these irrigation schemes. The cost and return analysis was used to assess profitability.

In addition, the analysis was based on the IWMI's comparative performance indicators especially the agricultural and financial performance of the schemes. To compute the total production of each scheme for the sugarcane grown in the respective sites are described and an average yield per hectare as well as an average price for sugarcane per quota as provided by the market.

The performance indicators which are going to be used for this paper are:

Table 4. 1: summary of agricultural and financial performance indicators

Agricultural performance Indicators	***Computation formula***
Water use (tonnes/m³)	$\frac{\text{total water use}}{\text{total yields}}$
Output per cropped area	$\frac{\text{production}}{\text{irrigated cropped area}}$
Financial Performance Indicators	
Gross return on investment (%)	$\frac{\text{production}}{\text{total cost of infrastructure}}$
Financial self-sufficiency (%)	$\frac{\text{annual fee revenue}}{\text{total annual expenditure}}$
Staffing number per unit area (SNA)	$\frac{\text{total number of personnel in O\&M}}{\text{total command area being serviced}}$

Source: Molden, 1998

For this research sugarcane is selected as predominant (base) crop and the equivalent production at world prices is taken as US$227.00/ton. This is due to the reason that sugarcane is by far the dominant irrigated crop in the country, covering over 91% (more than 50,000 ha) of the harvested irrigated cropped area hence the largest single foreign exchange earner in the country (SADC, 2006). Therefore, the government is at the forefront in implementing irrigated agriculture development programmes with primary interest in the sugarcane industry of the country.

Snapshot data was analyzed through simple Excel formulas as well as SPSS. Qualitative data collected through the focus-group discussion and in-depth interviews was coded and summarized.

Chapter 5 Results and Discussions

5.1 Introduction

This chapter present results of the analyses of the data. The chapter begins with an analysis of water use and agricultural performance data. Last to be presented is the association between performance and governance parameter namely, accountability and transparency. Reasons for the performance are discussed.

5.2 Water use performance

Water use performance was determined for each of the schemes in terms of yield produced per cubic metre of water expressed by tonnes/m³. During the field observation process, the findings were that lack of good management practices in relation to irrigation and the issue of staff leaving the irrigation schemes and especially for Imbali (0.85ton/m³), Sibhotela (0.86 ton/m³) and Sukumani (0.8 ton/m³) there has been without irrigation officers for the whole season (Table 5.1).

Table 5. 1: Water use efficiency (tons/m³) of irrigation schemes in Madlenya chiefdom

Irrigation scheme	***Water use performance (tonnes/ha)***
Mganyaneni	0.99
Inyoni	0.96
Kuselangeni	0.96
Sitamimphilo	0.91
Sibhotela	0.86
Imbali	0.85
Sukumani	0.80
Weighted average	**0.9**

The water use for the various irrigation schemes was not satisfactory in that all the schemes were below the threshold of 1m³of water (Carr, 2011).

Table 5. 2: Water use efficiency (tons/m³) of irrigation schemes in Ngcamphalala chiefdom

Irrigation scheme	***Water use performance (tonnes/ha)***
Mgululu & Sihlase	1.4
Mampondweni	1.3
Ngcwaleni	1.3
Kutentela	1.03
Bamoyamunye	0.97
Matimavu	0.94
Weighted average	**1.16**

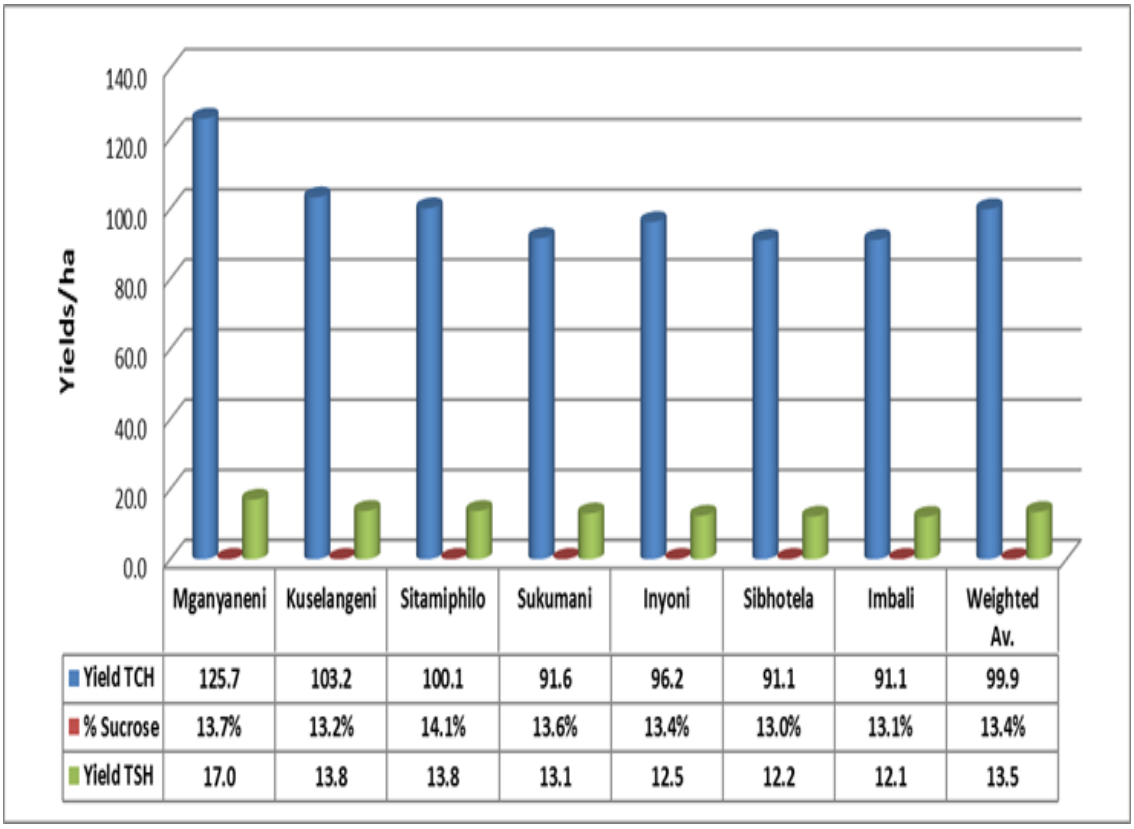
The findings of the field observation again were that lack of good management practices in relation to irrigation and employment of non-trained staff specifically for irrigation played a role in over irrigation in these irrigation schemes. The irrigation officers from irrigation schemes are community or family members who at all not trained in irrigation. This has been evident in that they were not able to respond on the annual water crop requirement.

The response of 1m³ of water in Ngcamphalala was higher as compared to Madlenya. From interviews the underlying reasons reported was the distance between the source and irrigated area and the poor reservoirs which are used to store water before being used for irrigation in the farm. The relative water use performance is high (1.16) for irrigation schemes in Ngcamphalala and less for irrigation schemes in Madlenya, which is 0.9 but this is not considered as a problem rather it improves the return per irrigation water for the scheme.

The study findings were to the effect that irrigation schemes within Madlenya water use performance is low and in Ngcamphalala there is over irrigation. This was mainly due poor irrigation management in the schemes. This can be associated with the lack of irrigation experience in the schemes. A large amount of water was lost due to ineffective technologies for irrigation and on the way to the field even though it was not easy to determine the amount that is lost.

5.3. Agricultural performance

The irrigation schemes in Madlenya were found to be within the Ubombo Mill's and Swaziland Sugar Association's threshold of 90 tonnes/ha in agricultural performance. The highest producers in terms of volumes (tonne/ha) were Mganyaneni, Kuselangeni and Sitamimphilo with 125.7 tonnes/ha, 103.2 tonnes/ha and 100.1 tonnes/ha on account of their acreages. However, the sucrose content did not follow the similar pattern. The finding was that their sucrose content was within range 13.51% required by the mill except Kuselangeni (13.2%), Inyoni (13.4%), Sibhotela (13%) and Imbali (13.1%). Figure 5.1 depicts the above findings.

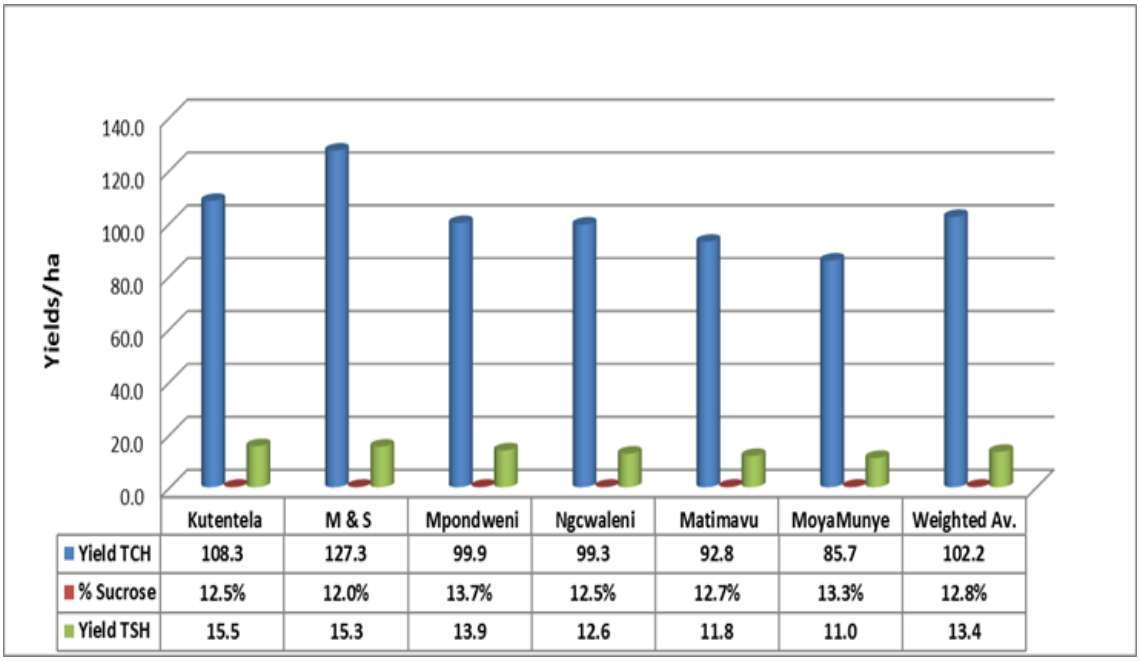


	Mganyaneni	Kuselangeni	Sitamiphilo	Sukumani	Inyoni	Sibhotela	Imbali	Weighted Av.
Yield TCH	125.7	103.2	100.1	91.6	96.2	91.1	91.1	99.9
% Sucrose	13.7%	13.2%	14.1%	13.6%	13.4%	13.0%	13.1%	13.4%
Yield TSH	17.0	13.8	13.8	13.1	12.5	12.2	12.1	13.5

Figure 5. 1: Agricultural yields per irrigation scheme in Madlenya

The poor performing irrigation schemes attributed their poor performance specifically on sucrose content to time that elapses after the sugar cane has been cut and the distance between the mill and the farm. When these irrigation schemes are compared, the ones with large proportion of irrigated area has large output in tonnes per hectare. However, it is not the same with sucrose content. Sucrose content is mainly the function of improved irrigation management in the schemes.

Smallholder irrigation schemes from Ngcamphalala were doing in yield performance except one, Moyamunye at 85.7 tonnes/ha. In Moyamunye irrigation scheme the challenge of input suppliers who delay to deliver inputs on time was on play and electricity hike also played a role. Only one irrigation scheme Mpondweni at 13.7% sucrose content could exceed the mill threshold (Figure 5.2).



	Kutentela	M & S	Mpondweni	Ngcwaleni	Matimavu	MoyaMunye	Weighted Av.
Yield TCH	108.3	127.3	99.9	99.3	92.8	85.7	102.2
% Sucrose	12.5%	12.0%	13.7%	12.5%	12.7%	13.3%	12.8%
Yield TSH	15.5	15.3	13.9	12.6	11.8	11.0	13.4

Figure 5. 2: Agricultural yields per scheme in Ngcamphalala chiefdom

The agricultural performance was at an average of 99.9 and 102.2 tonnes/ha for irrigation schemes under Madlenya and Ngcamphalala chiefdom respectively. These are harvested from 351.24ha and 476.1ha respectively. The average sucrose content was 13.08% for the irrigation schemes at Madlenya and 13.53 and13.45% for those at Ngcamphalala against 13.53% for mill group average. In these two chiefdoms, community members relied on rain-fed agriculture for food production. It was only for subsistence purposes before smallholder irrigation schemes' development. Mainly, they produced maize for food security and cotton as their only cash crop, none of the respondents was involved in sugar cane farming. So it was important to monitor and evaluate their agricultural performance.

5.4. Financial performance

5.4.1 General revenue

Annual revenue per hectare for irrigation schemes in Madlenya was doing well. Sibhotela had the highest revenue at US$4700 levels per hectare and Mganyaneni had the lowest at US$3207 per hectare. This was attributed to the better performance in sucrose content within these schemes (Figure 5.3).

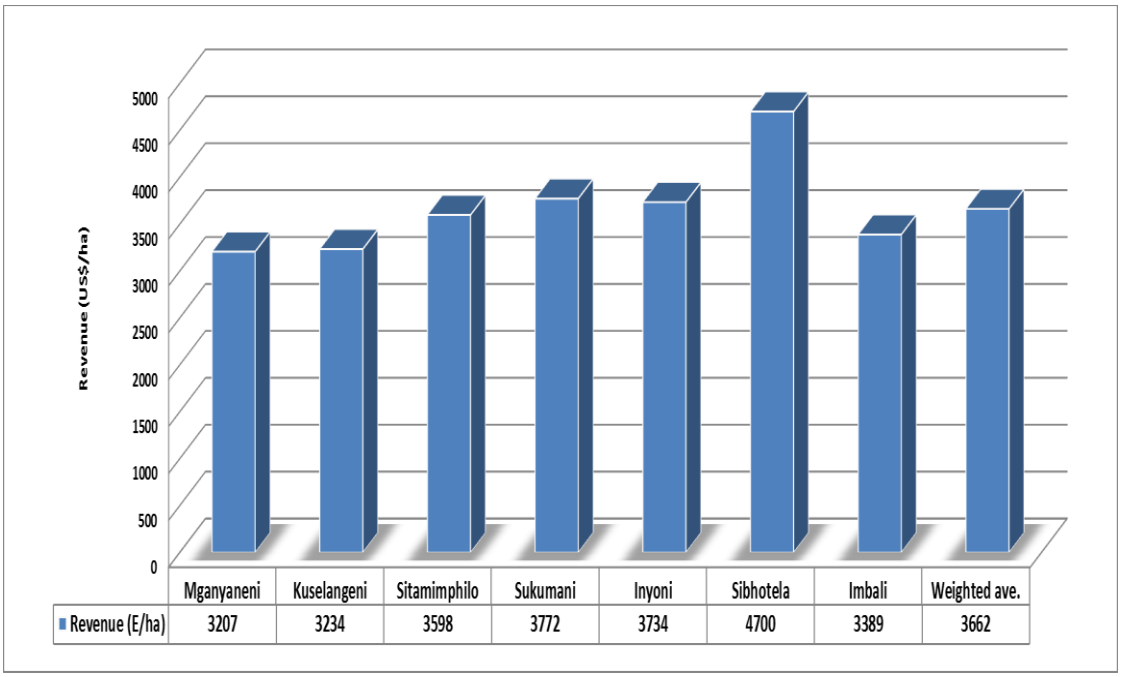


Figure 5. 3: Annual revenue per irrigation scheme in Madlenya

However the annual revenue is still not satisfactory as per the margins US$5500 per hectare projected at the initiation of the project. The farmers attributed low revenue to poor performance sucrose content and the exorbitantly high costs of infrastructure and electricity to pump irrigation water.

Annual revenue per hectare for irrigation schemes in Ngcamphalala was not doing well. Kutentela irrigation scheme had the highest revenue at US$4127 levels per hectare and Mgululu and Sihlase (M&S) had the lowest at US$3169 per hectare (Figure 5.4).

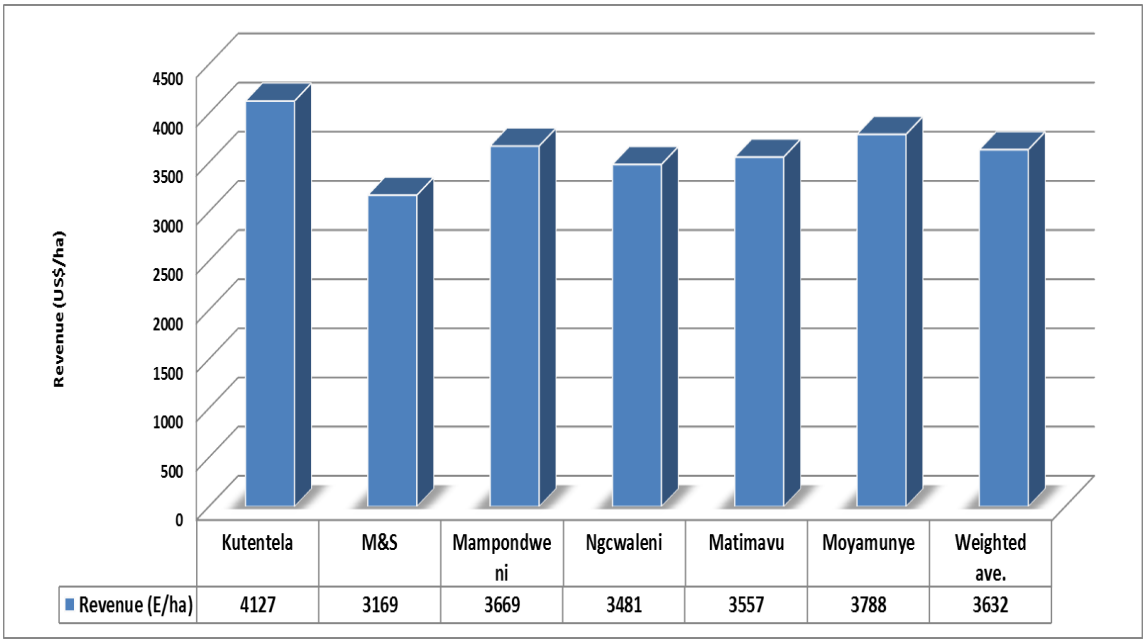


Figure 5. 4: Annual revenue per irrigation scheme in Ngcamphalala

The average revenue per hectare for Madlenya was US$3662/ha and US$3632/ha for Ngcamphalala (Fig.5.3 and 5.4) The three variables that explained and predicted sugar cane yield included distance from the farm to the mill, hand application fertilizer man days and labour strength. Respondents were complained about the distance from the farm to the mill which they attributed to the low average sucrose content.

5.4.2 Gross return on investment

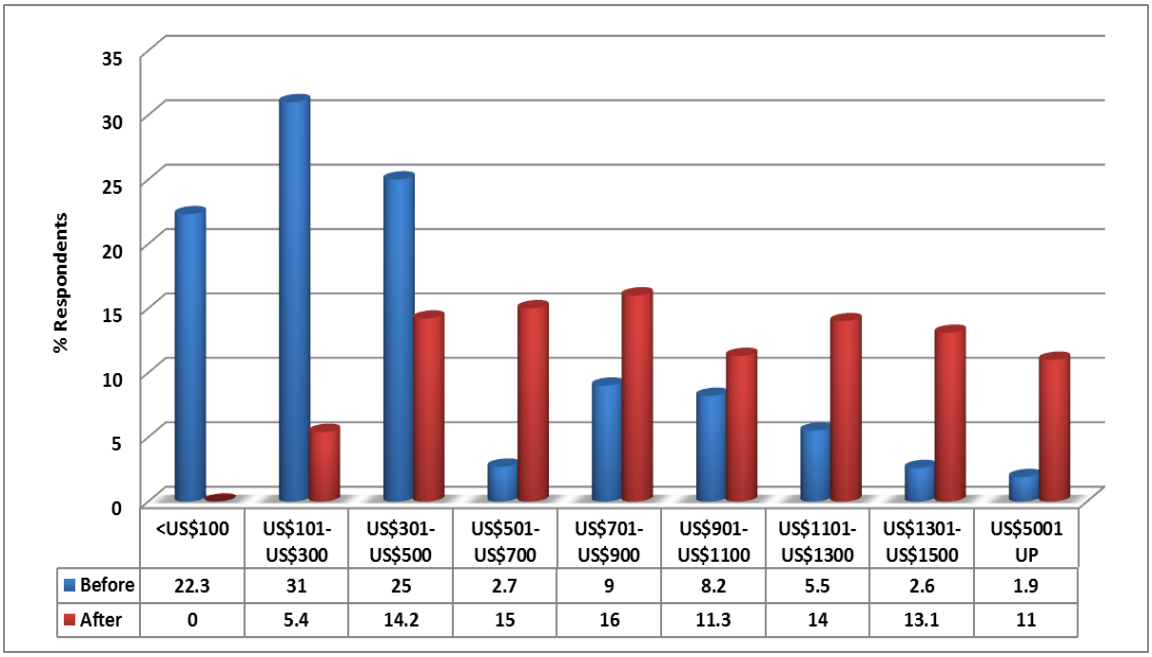
Gross return on investment considers the production and the total cost of infrastructure for the irrigation scheme. Initially the irrigation schemes had budgeted to sell their sucrose to the miller at US$181.00 per ton at planning. However, what emerged was that sucrose price at their first harvest was US$226.50, that is the gross revenue per hectare was US$636.50 above what was the budget. The key factors associated with higher rates of gross return on investment here included lower per hectare, market access, productivity and institutional design which encourages accountability and transparency within irrigation schemes.

Results noted that the gross return on investment for Ngcamphalala was better at 136% while that of Madlenya was struggling at 86%. This was mainly associated with high

infrastructure cost in Madlenya. The cost of infrastructure of Ngcamphalala and Madlenya was US$2,538,316.20 and US$2,619,457.10 respectively. The command area of Ngcamphalala was 490 ha while that of Madlenya was 385.10 ha. The cost of the infrastructure considered in this regard was the total expenditure for constructing all infrastructures found in the in scheme excluding the cost of the headwork.

5.4.3 Household income

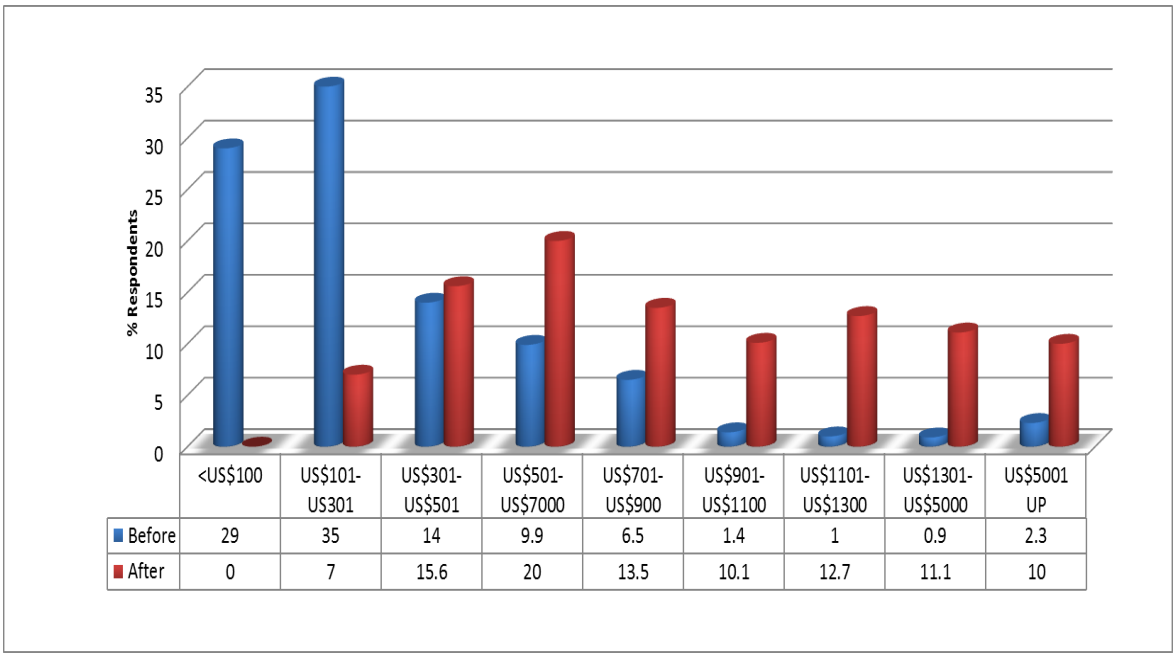
Better incomes have been reported by households among these irrigation schemes. Before the development of the irrigation schemes in Madlenya 22.3% of the household had an annual income of less than US$100 and 1.9 % had an annual income of above US$5001 as indicated in Figure 5.5.



	<US$100	US$101-US$300	US$301-US$500	US$501-US$700	US$701-US$900	US$901-US$1100	US$1101-US$1300	US$1301-US$1500	US$5001 UP
Before	22.3	31	25	2.7	9	8.2	5.5	2.6	1.9
After	0	5.4	14.2	15	16	11.3	14	13.1	11

Figure 5. 5: Shareholders' annual income per participating household in Madlenya

In Ngcamphalala relatively satisfying income after the development of smallholder irrigation schemes were reported. The households which had income less than US$100 was at 29% and 2.3% had an annual income of more than US$5001. However, after the introduction of smallholder irrigation schemes 10% of the households had their annual income of more than US$5001(Figure 5.6).



	<US$100	US$101-US301	US$301-US$501	US$501-US$7000	US$701-US$900	US$901-US$1100	US$1101-US$1300	US$1301-US$5000	US$5001 UP
Before	29	35	14	9.9	6.5	1.4	1	0.9	2.3
After	0	7	15.6	20	13.5	10.1	12.7	11.1	10

Figure 5. 6: Shareholders' annual income per participating household in Ngcamphalala

The study revealed that before the introduction of smallholder sugar cane irrigation schemes a majority of the households depended on cattle for income generation and not all of them owned cattle.

Annual revenue per household has improved since the kickoff of the project. This has been highlighted by the fact that 90% of the participants earned less than US$900.00 per annum before the start of the project. The earning bracket of US$900.00 per annum has decreased to 55 % with 45% now with an annual income of above US$901.00 per annum. The farmers reported that this was enough to help strengthen their food security. Thus irrigation schemes contributed in the improvement of their standard of living. Survey results indicate that 45% of the beneficiaries have the ability to buy food, 19% build decent homes and now they do not have to rely on handouts for a decent living. Figure 5.5 and 5.6 are a summary of the regular annual income before and after the development of the irrigation schemes in smallholder irrigation schemes in the two chiefdoms.

An appraisal of LUSIP by the African Development Bank (ADB) concluded that on average, net annual income of US$5,910.00 for each household was realised within these two chiefdoms as a result of the engagement of smallholder irrigation schemes as compared to the meager incomes of household incomes from various sources estimated at US$531.50 per annum before the irrigation schemes (SSA, 2012). The development of smallholder irrigation schemes played an important role in poverty reduction. This is

against the background that estimates indicate that two-thirds of the population in Swaziland lives below the poverty datum line of about US $1.25 per day.

5.4.4 Financial self-sufficiency

The ratio of financial self-sufficiency is the annual revenue from water user fees divided by total annual expenditures. It indicates the revenue from the irrigation over the expenditure for operation and maintenance. The financial self-sufficiency of fees (FSS) to cover management, operating and maintenance costs was found to be at an average of 0.53 which is not at an acceptable level. The effectiveness of fee collection (EFC) was found to be at 95% and this value is at a satisfactory level (Table 5.3).

Table 5. 3: Financial performance indicators

Season	*Collected fee (US$)*	*Total fee (US$)*	*Annual fee revenue (US$)*	*Total Annual expenditures (US$)*	*EFC (%)*	*FSS*	*SNA (persons/ha)*
2010/2011	2,708,194	2,888,534	2,708,194	5,157,774	94	0.53	0.160
2011/2012	3,017,781	3,128,360	3,017,781	5,733,587	96	0.53	0.360
Average	2,862,987	2,958,162	2,862,987	5,445,680	95	0.53	0.260

According to Yercan *et al*. (2004) 90%-98% and 1-2.6 are said to be at satisfactory level for EFC and FSS respectively for irrigation schemes. The average staffing number per unit area was about 0.260 persons per hectare. This is regarded as in an adequate level.

However, it is important to note that government covers the operation and maintenance of the schemes and it is considered as subsidy. There is no fee for water it is for free. Therefore it is not possible to compare these schemes based on financial self-sufficiency. The development of smallholder irrigation schemes can result in high incomes for the smallholder farmers compared with the non-irrigators. The major area of concern in general among the farming community is the availability of food at household level.

The study concluded that smallholder irrigation can lead to availability of food at household level through increased productivity, stable production and increased incomes as shown by the analysis of the two irrigation schemes. Both schemes offer some form of food security for the farmers and the surrounding communities.

5.6 Perceptions of factors influencing schemes agricultural and financial performance

The variation in the performance in these smallholder irrigation schemes as discussed above is a consequence from factors beyond the farmer's control. These among other factors include weather, pests, and timing of production practices, genetic variation to name but a few. The responses of respondents on their perceptions on some of the major factors influencing the performance of these smallholder irrigation schemes in failure to produce maximum yields are presented on figure 5.9. 38% expressed that failure to follow best management practices is the major factor contributing to the poor performance of these smallholder irrigation schemes. 20% attributed poor performance that lack of capital, 17% blamed poor services providers or inputs suppliers. 13% and 12% of the respondents attributed poor performance to system of land ownership and labour respectively. The failure to follow best management practices is closely linked to committee members colluding with services and inputs suppliers which will lead to some of the activities not executed on time as per the farming calendar dictates (Figure 5.7).

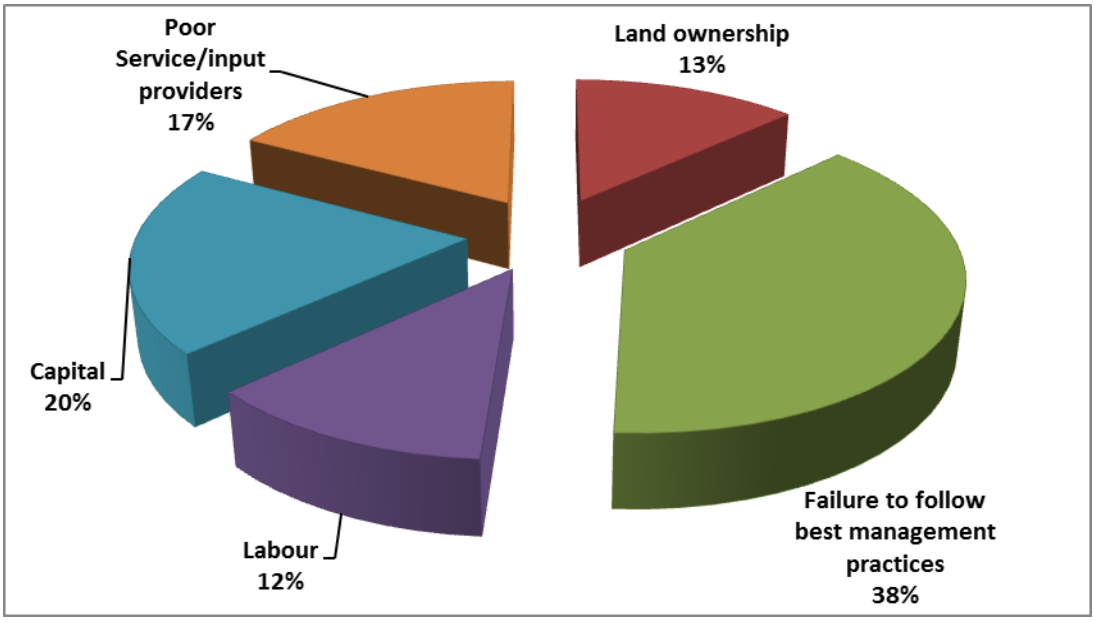


Figure 5. 7: Factors influencing schemes' performance

The results of the study are in line with the findings by Dlamini and Dlamini (2012) and Sifundza and Ntuli (2001) which highlighted that smallholder farmers do not have enough finance to adequately most of the farm sugar cane production inputs. They pointed out that suppliers have a tendency of supplying those farmers who buy in large quantities at the expense of smallholder farmers.

5.7 Perceptions of farmers on accountability and transparency in their irrigation schemes

Table 5.4 shows the perceptions of respondents on the accountability in their schemes. A majority (65%) responded to the affirmative on that committee existence is guided by committee legislation, and 12% recorded low, 46% recorded low on committee reporting to members. This shows that the committees were not executing their duties and responsibilities as per their guidelines.

Table 5. 4: Percentages of respondents and their scores for accountability for irrigation schemes in both chiefdoms

Parameter	***Score***		
	1= Low	**2= Medium**	**3=High**
Committee existence	12%	23%	65%
Committee meetings	10%	55%	35%
Committee re-election	13%	65%	22%
Committee level of reporting	46%	35%	19%
Contact on crisis	31%	40%	29%

Smallholder irrigation scheme members reported low or average levels related to transparency in both chiefdoms. For instance, on issue of committee meetings the schemes' respondents 35% reported that their committees were reluctant to hold meetings on the scheduled times. Furthermore, with respect to transparency 53% reported that they do not have information on regular income and expenditure related to their irrigation schemes and 63% report negatively on knowledge of record keeping (Table 5.5).

Table 5. 5: Percentages of respondents and their scores for transparency for irrigation schemes in both chiefdoms

Parameter	***Score***		
	1=Low	**2=Medium**	**3=High**
Existence of guidelines	2%	28%	70%
Quality of elections procedures	2%	18%	80%
Knowledge of roles and responsibilities	5%	35%	60%
Information on schemes' income and expenditure	53%	33%	14%
Knowledge of record keeping	63%	30%	7%

Lower levels of accountability and transparency were attributed to irrigation scheme members' lack of knowledge related to committee re-election and committee meeting

reports and updates. Most irrigation schemes' committees lacked clear channels of communication with membership. Weak irrigation schemes' committees and the lack of available parts to maintain irrigation schemes may also potentially limit performance as well as long-term irrigation schemes sustainability. Therefore, in this case, there is a strong relationship between the lack of accountability and transparency and their effect on the production performance of the irrigation schemes. However, it emerged during the Focus Group Discussions (FGDs) that the issue of good governance has to be further investigated because some committee members neglect to practice good governance when procuring farming inputs from suppliers.

The common response here was: "*The challenge is with corruption and collusion by farmers' committees and suppliers which has become rife. It is now threatening the profitability of the business. So we need to keep sharp eye on the issues of governance*."

From responses on the questions of accountability and transparency and the way these irrigation schemes performed in terms of yields and financial benefits, there is an indication that there are still a handful of issues on the aspect of governance that has to be tackled by these irrigation schemes committees and members.

5.8 Relationship between production performance and governance in smallholder irrigation schemes

Multicollinearity analysis was conducted to assess the relationship between accountability, transparency and performance of smallholder irrigation schemes. There are two measures which are often tested-variance inflation factor (VIF) for association among explanatory variables (Gujarati, 2003). Variance inflation factor was employed to assess the relationship between accountability, transparency and the way their irrigation schemes were performing. The results indicate that there is a positive relationship between the level of transparency and accountability and the performance of smallholder irrigation schemes as all the correlations exceed $p > .005$ and they are significant at $p < .001$ (Gujarati, 2003).

Table 5.6 shows that the relationship between transparency and production performance is explained by the value of correlation (r^2) at 0.642 on the question of the existence of committee, at 0.457 on committee meetings, at 0.282 on committee re-election and 0.429 on the question of the committee reporting back to the scheme members. The

relationship is a positive and moderate relationship and p-value is at 0.000 which indicates a significant relationship so the rejection of the H_o.

Table 5. 6: Correlation relationship between accountability and yield performance from the irrigation schemes

Parameter		*Existence of committee*	*Situation on committee re-election*	*Committee meetings*	*Committee Reporting*	*Contact times of crisis*
Yield (tons/ha)	r^2	0.642	0.282	0.457	0.429	

The correlation matrix shows that the associations are not a serious problem with our data set as shown in table, correlation between yields, accountability has the highest value of 0.6, which according to Gujarati (1998) falls below the threshold of 0.8 for serious multicollinearity. In this case correlation alone cannot entirely rule out multicollinearity problem (Gujarati, 1998).

Table 5.7 indicates that the relationship between transparency and production performance is explained by the value of correlation (r^2) at -0.354 question of the quality of procedures on committee election, a negative and moderate relationship and the p-value is at 0.002 which indicates an insignificant relationship so the reason not to reject H_0. The relationship between transparency and production performance is explained by the value of r^2 at 0.329 on committee level on the knowledge of roles and responsibilities. The relationship is also explained by r^2 at 0.418 on the question of the committee's knowledge of record keeping and explained at 0.265 on the question of information on regular income and expenditure related to the schemes. The relationship is a positive and moderate relationship and p-value is at 0.000 which indicates a significant relationship so the H_0.

Table 5. 7: Correlation relationship between transparency and yield performance in the irrigation schemes

Parameter		*Existence and functionality of guidelines*	*Quality of procedures on committee elections*	*Knowledge on roles and responsibilities*	*Information on regular income and expenditure*	*Practice on record keeping*
Yield (tons/ha)	r^2	0.429	-0.354	0.329	0.265	0.418

The study indicates that positive relationships have been observed between the agricultural and financial performance, transparency and accountability in these stallholder irrigation schemes in Madlenya and Ngcamphalala chiefdoms. The existence of the relationship between accountability, transparency and the performance of irrigation schemes was assessed by testing the correlation between the way in which these smallholder had performed and the indicators for assessing transparency and accountability (situation regarding committee existence and re-election in office; frequency of committee in convening meetings with members; information on regular expenditure and income related to the irrigation schemes; the existence and functionality of guidelines and bylaws; level of committee reporting to the members and the members' level of knowledge on their roles and responsibilities).

The study found that the irrigation schemes which scored low continue to experience good agricultural and financial performance. Irrigation scheme membership reported low levels related to committee reporting back to them and knowledge or adequate information on regular income and expenditure related to their irrigation schemes. The irrigation schemes which scored high in being accountable and transparent were also accumulating high yields and in some cases very poor yields. However, smallholder irrigation schemes cited low levels of accountability and transparency as the reason for some member farmers abandoning contributing in scheme operation and management and this has made the study to associate the low levels of accountability to poor yields and financial performance.

The overall conclusion with this regard there is no direct cause and effect relationship between smallholder irrigation schemes' performance and governance. In a study by Chibanda et al., (2009) reported that cases that were selected for the study did not display much variation with regard to governance variables thought to influence performance of smallholder agricultural cooperatives in KwaZulu-Natal.

Chapter 6 Conclusions and Recommendations

6.1 Introduction

This study was conducted to assess the relationship that might exist between a degree of accountability and transparency and the way smallholder irrigation schemes responds to agricultural and financial performance. This was conducted through the exploration of the schemes to identify and explain key issues on accountability and transparency that can be said are correlated to agricultural and financial performance.

6.2 Summary of findings

The study revealed that smallholder irrigation schemes in output per unit water consumed for Madlenya and Ngcamphalala is 1.16tons/m^3 and 0.98tons/m^3. The response of 1m^3 of water in Ngcamphalala was high as compared to Madlenya. The factors that affected the response of 1m^3 in terms of gross production water use were the exorbitantly high costs of maintenance and operating of the infrastructure and electricity to pump irrigation water.

In addition the findings were to the effect that small-scale irrigation schemes have a potential of addressing the challenge of low agricultural productivity in the country. The results showed that an average of 99.9 tonnes per hectare and 102.2 tonnes per hectare were harvested at Madlenya and Ngcamphalala irrigation schemes respectively. The average sucrose content was 13.53% for the irrigation schemes at Madlenya and and13.45% for those at Ngcamphalala. This was harvested from 351.24 ha and 476.1 ha respectively. However its ability is constrained by some sustainability factors such as land ownership, exorbitantly expensive farming inputs, corruption, and lack of access to market, labour water and credit was found to influence production options and total production and income.

This study also was able to describe the major factors influencing the performance of these smallholder irrigation schemes in failure to produce maximum yields. The respondents (38%) expressed that failure to follow best management practices is the major factor contributing to the poor performance of these smallholder irrigation schemes. 20% attributed poor performance that lack of capital, 17% blamed poor services providers or inputs suppliers. 13% and 12% of the respondents attributed poor performance to system of land ownership and labour respectively.

The study results indicated that the relationship between accountability and production performance is explained by the value of correlation (r^2) at 0.642 on the question of the existence of committee, at 0.457 and 0.429 on the question of the committee reporting back to the scheme members. The relationship is a positive and moderate relationship and p-value is at 0.000 which indicates a significant relationship so the H_0. On transparency the value of correlation (r^2) is at -0.354 question Of the quality of procedures on committee election, of the level of knowledge at committee level on roles and responsibilities, a negative and moderate relationship and the p-value is at 0.002 which indicates an insignificant relationship so the reason not to reject H_0. The correlation value (r^2) is at 0.418 on the question of the committee's knowledge of record keeping. The relationship is a positive and moderate relationship and p-value is at 0.000 which indicates a significant relationship so the H_0. However, the findings do not guarantee that there is a direct cause and effect relationship between smallholder irrigation schemes' performance and governance.

After the reviewing the responses on accountability and transparency, it was evident that more than 60% of the irrigation schemes scored very low. This was attributed to membership's lack of information on regular expenditure and income related to the schemes and the lack of committee reporting back to membership.

Furthermore, many farmers from these area are first time irrigators, and unfamiliar with the vagaries of the markets and the higher risks that come with irrigation. In some areas, irrigation systems are developed where water resources allow, but the land is used by unwilling farmers – such as pastoralists or middle-aged rain-fed farmers.

The decline in smallholder irrigation schemes' yields is sign of the weakness of some of the current models and management styles. Furthermore, most of the small-scale irrigation schemes are still in their infancy and time will determine their level of success. The biggest limitation is the huge finances needed to run these irrigation schemes. Except the lack of management skills, the financial plight of many smallholder irrigation schemes is such that success is limited because of cash constraints.

Water committees clearly noted that the trainings they received prior to and during the irrigation schemes development as being helpful. These trainings were on irrigation

schemes and systems management as well as some issues of governance on irrigation schemes.

6.3 Recommendations

It was noticed that among the important reasons for poor performance level in smallholder irrigation schemes is that more emphasis is focused on infrastructure assessment and management; in the process neglecting accountability and transparency. Therefore, accountability and transparency in management and operating smallholder irrigation schemes are of utmost importance on smallholder irrigation schemes' agenda.

There is still a need for follow-up trainings which may include informing actors in smallholder irrigation schemes of local and national water policies, but also provide an opportunity for them to voice concerns regarding their irrigation schemes and receive subsequent training on the phenomena of accountability and transparency for sustainability of these smallholder irrigation schemes.

To improve the gross production economic water use the economic and environmental performance of smallholder irrigation schemes institutional support (input supply, output and marketing facilities), training of farmers on improved crop and water management issues, regular supervision and monitoring of scheme activities are crucial.

For improved water use efficiency, it is suggested that introduction of water use fees be accelerated in order to help in the sustainability of the smallholder irrigation schemes.

The extension farming services provided by the government through the Ministry of Agriculture to small-scale irrigation farmers is relatively limited in terms of human resource availability and effectiveness. It has been gathered that if one is available the area that he/she is supposed to service is too stretched (one extension officer for more than 1500 farmers). There high need for government to provide extension services for sustainability of the irrigation schemes once SWADE had left the project area.

One of the most important reasons for not reaching the targeted performance level in irrigation systems is that it emphasizes the physical infrastructure, neglecting the social dimension on the other hand. Therefore governance measured by accountability and transparency in irrigation management needs to a priority on the agenda in operation of irrigation schemes and their systems.

It has been noted that a majority of the studies conducted on governance and performance in smallholder irrigation schemes were on participation and inclusiveness, hence neglecting the issues of accountability and transparency. There is a need for further research on issues of smallholder irrigation schemes' performance and accountability and transparency.

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8 Appendices

Appendix A

Scheme Governance Snapshot

A scheme governance snapshot is a tool used to capture how community governance systems are operating on WASH and other community IWRM structures. This snapshot probes into the issue of governance of IWRM-related initiatives at community level, and has been designed to allow aggregation of data in a simple and systematic way from community to regional levels.

What is a governance snapshot at small-scale irrigation scheme level?

The governance snapshot asks a set of questions that reveal issues around governance linked to IWRM structures, e.g., communal water points, small-scale community managed irrigation systems and/or schemes, etc. After initial background questions, there are ten questions in the snapshot which shed light on key issues like accountability and transparency.

Why is it useful?

The snapshot provides a quantitative and simple way of looking at local governance, an area of work which is a strategic objective and is pivotal to the success or failure of community IWRM initiatives in terms of the ability to run the systems in the short run, but also in terms of long term sustainability. The findings can alert implementers to any patterns of weaknesses which need addressing in the future and provide a mechanism to identify community IWRM systems which are facing problems. There is also room for qualitative comments/feedback on the quantitative scores given.

How will the data be collected and used?

The data can be recorded on the form itself and ideally translated into a local language. Sets of forms from each district should be analyzed using excel, from which graphs can be produced. The findings of the snapshot should be discussed internally and the district summaries shared in mid-year or annual reports.

For accountability and transparency purposes, it is best if the snapshot is done openly. For example, each of the ten questions could be translated and laminated on an A4-size paper that is displayed as people decide which of the three scores they will give to that question. The scoring could be done with pebbles or in some other visual participatory way, as well as recorded on paper. A copy of the scores given should also be left in the community where other written documentation of the initiative is kept.

Who should be interviewed?

The data are to be collected by mixed interest groups, including women and men, community members and committee leaders. It is recommended that at least 5 people are

involved in each interview. The interview process should ensure that the discussion is as participatory, transparent, and as inclusive as possible.

Face-to-face Interviews

Individual Framers

INSTRUCTIONS for Interviewer

1. Introduce yourself to the respondent
2. Explain the purpose of the study
3. Do not write the names of the respondents on the questionnaire
4. Please ensure that all the questions are answered
5. Please tick (√) the appropriate answers using the boxes provided and write the comments in the space provided
6. Assure the respondent that the information given will be treated as confidential
7. Thank the respondent at the end of each interview

A. Background Information

1. Name of Respondent…….

2. Age……..

3. Location

(a) Village ……..

4. Gender Male [ ] Female [ ]

5. Whether attended the formal school. Yes [ ] No [ ]

6. Level of education: - Adult education [ ] Primary [ ] Secondary [ ]

College [ ] University [ ]

7. What type of crops do you grow?

a) Sugarcane
b) Maize
c) Others
d) Specify…….

8. What type of farming system are you doing?

a) Irrigation
b) Rain-fed
c) Others

B. Specific information

1. Are all farmers getting equal proportional?

Yes [ ] No [ ]

2. If No question. 1 why?

a)
b)

3. How much water (abstracted) are you using per hectare (ha)?.....m^3

4. How many tons of sugarcane you usually get per hectare?.....kg/tonnes

5. What is the distance between the sources of water to your irrigated land?

6. Which factors most determines you productivity?

a) Land
b) Fertilizer
c) Water
d) Others, Specify……

7. What factors do you consider are the most important for you to achieve high productivity?

a) Land
b) Fertilizer
c) Water
d) Others, Specify……

8. Do you think the current irrigation water distribution support high sugarcane production per ha?

Yes [ ] No [ ]

9. If Yes question. 8, why?

a)
b)

10. If no. question 8. What should be done?

a)
b)

11. Are you satisfied with current water pricing system?

Yes [ ] No [ ]

12. If Yes to question. 11 why?

a)
b)

13. Who decide for the price of irrigation water?

……..

14. Have you been involved in decision making about irrigation water i.e. water price, schedule, and so on?

Yes [ ] No [ ]

15. If Yes in question. 12 in which way are you involved?

a) Through all farmers meeting with administration
b) Through farmer association representatives meeting with administration
c) Through individual consultation

16. Is there any kind of conflicts in irrigation water use?

Yes [ ] No [ ]

17. How does the management address them?

a) Through negotiation involving concerned parties
b) Only the management makes decision without involving stakeholders
c) No action is taken to address them

18. Is there a limit for abstraction?

Yes [ ] No [ ]

19. If yes, what factors makes you to have limited abstraction?

a) Water shortage/dryness
b) Environmental consideration (environmental flow)
c) It's a matter a of schedule

Access to other Services

1. a) Do you get market information about prices and demand conditions of agricultural inputs and out puts?

1 = No

2 = Yes,

1. b) If yes indicate the source of information…….

2. Did you use input for the last one cropping season?

1 = No

2 = yes

3. How far do you travel to get local market?……km

4. How far do you travel to get to the nearest school in your vicinity?.....Km

5. How far do you travel to get the services of all-weather roads? ……km

Extension services

1. a) Do you receive any sort of extension services available in your locality?

1 = No

2 = Yes

1. b) If yes, did you gain any knowledge from the extension agents that could help you to do things differently on the specific commodities?

1 = No

2 = Yes

1. c) If no, specify your reason(s)

……

……

18. What help do you need from the government or any organization on your irrigation farming?

……

Accountability Questions

	Questions	1	2	3
A1	What is the situation regarding the existence of Committee?	The scheme has no committees	The scheme has a designated committee but people are unsure	The scheme has a committee that meets and that others know about
A2	What is the situation regarding committee meetings?	Committee meetings have never been held	The committee held a few meetings in the past	The committee holds meetings regularly and the last one can be stated or better still minutes seen
A3	What is the procedure in case of committee re-election?	There is no agreed term of office	The situation is unclear	There are agreed terms of office, regular meetings to re-elect committee members and office bearers have occurred for older schemes, the last elections can be recalled
A4	How is the process of the committee reporting back to the membership?	There is no committee report back to the wider community	There is some committee report back to the wider community	There is a systematic and named system in place and being used for committee report back to the wider community
A5	Is there clear of knowledge on who to contact in cases of trouble beyond the local capacity?	The committee have no clear information about who to contact in case of any problem beyond the local capacity	The committee have some information on who to contact in case of any problem beyond the local capacity	The committee have clear information on who to contact in case of any problems beyond local capacity and have accessed this information to address the problem encountered

Transparency Questions

	Questions	1	2	3
T1	Are there guidelines and/or bylaws followed regarding the existence and functioning of the scheme?	The committee functions without bylaw or guidelines	The committee has bylaws or articles, etc. but they are not functional	The committee have bylaws or articles which can be quoted or shown if on paper and it follows these in named decision making
T2	What is the procedure on committee and office-bearers elections?	The committee and office bearers were selected not elected	It is unclear, mixture of selection and community voice	The committee and office bearers were elected by the community
T3	What is the level of knowledge about roles and responsibilities is there at membership and committee level?	Community members and committee members do not know their roles and responsibilities	Community members and the committee have some knowledge about their roles and responsibilities	Community members and committee know their roles and responsibilities and can explain these to others
T4	Is there information dissemination about regular income and expenditure (e.g. Operation and management) related to the scheme?	Members of the community have no information about the regular, e.g. monthly income and expenditure of the scheme	Members of the community have little or outdated information about the income and expenditure of the scheme	Members of the community have up-to-date information about the income and expenditure of the scheme (recall of date information shared and or overall status, even if approximate figures not remembered)
T5	How is the level of knowledge and practice of committee on regular record keeping?	The committee does not have the knowledge of how to keep records	The committee have some knowledge of record keeping but this is incomplete or not followed in practice	The committee have the knowledge and keeps records which have been seen

Appendix B

In-Depth Interviews

For Government officials in the SWADE/ Ministry of Agriculture

INSTRUCTIONS for Interviewer

1. Introduce yourself to the respondent
2. Explain the purpose of the study
3. Do not write the names of the respondents on the questionnaire
4. Please ensure that all the questions are answered

5. Please tick (√) the appropriate answers using the boxes provided and write the comments in the space provided
6. Assure the respondent that the information given will be treated as confidential
7. Thank the respondent at the end of each interview

1. Policies:

i. What policies, program and regulations exist regarding water provision for irrigation schemes?
ii. Are there policies on payment for irrigation water? (Who decides if people pay? Is there a maximum or minimum price that can be charged to the irrigation schemes?)

2. Responsibility for water:

i. Who is responsible for providing water for the irrigation schemes?
ii. What is the government's role with regards to water provision for these irrigation schemes?

3. Performance:

i. How do you see the performance of these irrigation schemes?
ii. How do you believe the government can help enhance the performance of irrigation schemes in the future?
iii. What does the government need to improve the sustainability of small-scale irrigation schemes?

4. Closing Questions: Improvements and Challenges

i. What do you perceive to be the biggest improvements in the past five years for irrigation water provision?
ii. What do you perceive to be the biggest challenges to providing irrigation water? What barriers exist? What solutions do you see to the problem?

Appendix C

Table 8. 1: Irrigation schemes' performance per unit water supply

Irrigation Scheme	Irrigated Area (ha)	Irrigable Area (ha)	Total Dev. Cost E	Production E		Water Supply (m³)
Ngcamphalala				2010/2011	2011/2012	
Mgulugulu & Sihlase	81.60	81.70	3,403,555.00	3,069,384.00	3,349,680.00	10,000
Matimavu	86.30	86.30	4,542,838.00	2,875,603.30	2,719,744.50	10,000
Kuhle kutentela	54.00	54.00	2,662,576.00	2,737,530.00	1,969,704.00	6,250
Ngcwaleni	111.10	115.00	6,446,742.00	3,963,603.60	3,846,504.20	10,000
Bamoyamunye	58.70	67.00	3,892,646.00	1,867,951.40	2,076,160.30	6,000
Mpondweni	84.40	86.00	4,290,941.00	2,870,022.00	3,179,938.80	10,000
Total	**476.10**	**490.00**	**25,239,298.00**	**17,384,094.30**	**17,141,731.80**	**52,250**
Madlenya						
Sibhotela	52.20	58.00	3,860,941.00	1,592,517.60	1,663,927.20	5,560
Inyoni	49.80	65.10	3,775,245.00	1,487,127,60	1,781,097.00	5,000
Imbali	55.98	58.70	3,391,119.00	1,508,325.12	1,800,428.76	6,000
Kuselangeni	55.98	57.40	3,834,216.00	1,805,299.02	2,099,194.02	6,000
Sitamimphilo	36.20	36.70	3,081,307.00	1,148,227.80	1,344,395.60	3,500
Mganyaneni	59.00	60.00	4,758,091.00	2,153,854.00	2,757,601.00	7,500
Sukumani	42.08	49.20	3,345,189.00	1,336,124.16	1,418,390.56	4,800
Total	**351.24**	**385.10**	**26,046,108.00**	**9,544,347.70**	**12,865,034.14**	**38,360**

Table 8. 2: Irrigation schemes' agricultural and financial performance from 2010-2012

2010/2011					2011/2012				
Yield TCH	% Sucrose	Yield TSH	Price/Ton	Rev/Ha	Yield TCH	%Sucrose	Yield TSH	Price/Ton	Rev/Ha
			E	E				E	E
133.63	12.5	16.7	2252	37615	127.28	11.95	15.2	2700	41040
108.8	13.6	14.8	2252	33321	92	12.69	11.67	2700	31509
166.02	13.56	22.51	2252	50695	108.26	12.48	13.51	2700	36477
118.94	13.32	15.84	2252	35676	102.98	12.45	12.82	2700	34614
98.82	14.3	14.13	2252	31822	98.94	13.24	13.1	2700	35370
115.27	13.1	15.1	2252	34005	101.82	13.71	13.95	2700	37665
123.58	**13.40**	**16.51**	**2252**	**37189**	**105.21**	**12.75**	**13.38**	**2700**	**36113**
105.84	12.8	13.55	2252	30508	91.08	12.96	11.81	2700	31887
93.33	12.82	11.96	2252	26944	91.14	13.07	11.91	2700	32157
103.6	12.8	13.26	2252	29862	98.81	13.41	13.25	2700	35775
105.3	13.6	14.32	2252	32249	103.23	13.45	13.89	2700	37503
98.5	14.3	14.09	2252	31719	97.76	14.07	13.75	2700	37125
119.2	13.6	16.21	2252	36506	126.79	13.65	17.31	2700	46737
100	14.1	14.1	2252	31752	91.6	13.63	12.48	2700	33696

Table 8. 3: Summary of the irrigation schemes up-to-date

	2010/2011	2011/2012	Total/Ave.
Gross Revenue (E)	29,227,449.12	73,975,694.21	103,203,143.33
Gross Revenue/Ha (E/ha)	35,201.92	36,537.16	35,869.54
Dividend/SH ((E/Ha)	6,708.91	5,211.15	5,960.03
Total Dividend (E)	3,871,649.75	5,804,170.00	9,675,819.75

Area harvested (Ha)	830.28	830.28	830.28
Tons cane produced	94,552.38	216,902.98	311455
Tons sucrose produced	12,548.93	27,694.05	40243
Tons Cane per Ha (TCH)	115.00	107.00	111
Tons Sucrose per Ha (TSH)	15.2	13.5	14
Area under cane (Ha)	880	2196	2196

Appendix D

Table 8. 4: Correlation on the relationship between accountability and performance of irrigation schemes

		Yield (tonnes/ha)	1	2	3	4	5
Yield (tonnes/ha)		1					
1	Pearson Corr. Sig. (2-tailed)	.642** .000	1				
2	Pearson Corr. Sig. (2-tailed)	.110 .350	.282* .015	1			
3	Pearson Corr. Sig. (2-tailed)	.034 .773	-.140 .234	-.083 .480	1		
4	Pearson Corr. Sig. (2-tailed)	.457** .000	.429** .000	.049 .679	.078 .506	1	
5	Pearson Corr. Sig. (2-tailed)	.112 .342	.036 .762	.100 .398	.028 .815	.004 .972	1
**. Correlation is significant at the 0.01 level (2-tailed).							
*. Correlation is significant at the 0.05 level (2-tailed).							

Key: 1= Existence of committee 2= situation regarding committee re-election 3= situation regarding committee meetings 4= committee reporting back to the membership 5= Knowledge on contacts in case of trouble related to services situation regarding the existence

Table 8. 5: Correlation on the relationship between transparency and performance of irrigation schemes

Yield (tonnes/ha)			1	2	3	4	5
Yield (tonnes/ha)		1					
1	Pearson Corr. Sig. (2-tailed)	-.008 .949	1				
2	Pearson Corr. Sig. (2-tailed)	.095 .422	-.044 .713	1			
3	Pearson Corr. Sig. (2-tailed)	.239* .041	.099 .400	-.354** .002	1		
4	Pearson Corr. Sig. (2-tailed)	.069 .559	-.020 .869	-.062 .600	.142 .229	1	
5	Pearson Corr. Sig. (2-tailed)	.265* .023	-.066 .574	-.211 .071	.418** .000	.294* .011	1

*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).

Key: 1= situation regarding the existence and functionality of bylaws and guidelines 2= procedure on committee and office-bearers elections 3= level of knowledge on roles and responsibilities 4= information about regular income and expenditure related to the scheme 5= situation regarding committee knowledge and practice of record keeping

Table 8. 6: Correlations

Information on regular income and expenditure related to the scheme			Value	Asymp. Std. Error[a]	Approx. T[c]	Approx. Sig.
have little or outdate information about expenditure and income	Interval by Interval	Pearson's R	1.000	.000[b]		
	Ordinal by Ordinal	Spearman Correlation	1.000	.000[b]		
	N of Valid Cases		2			
have up-to-date information about income and expenditure	Interval by Interval	Pearson's R	.640	.071	6.968	.000[b]
	Ordinal by Ordinal	Spearman Correlation	.737**	.065	9.133	.000[b]
	N of Valid Cases		72			

**. Correlation is significant at the .001 level (2-tailed).
*. Correlation is significant at the .005 level (2-tailed).