Factors Influencing The Success of Small-scale Irrigation Farmers In The Komati Down-stream Development Project (KDDP) In Swaziland

By

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DECLARATION

I, Sibusiso Benedict Nhlengethwa, declare that the dissertation, which I hereby submit for the degree MSc Agric(Agricultural Economics) at the University of Pretoria, is my work and has not previously been submitted by me for a degree at this or any other tertiary institution.

SIGNATURE:

DATE: September, 2012

DEDICATION

This work is dedicated to my late mother Liza Vumile Nhlengethwa; it has been ten years since the Lord God Almighty recalled you but your spirit lives on in me.

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Special thanks to my family for inspiring me and supporting me throughout my quest to earn this degree. Lastly, I am also grateful to my friends and colleagues for the steamy brainstorming sessions we had and also for the support they gave me throughout this chapter of my life.

ABSTRACT

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Degree: MSc Agric. (Agricultural Economics)
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The main aims of instituting the Komati Downstream Development Project (KDDP) by the Government of Swaziland were to overcome rural poverty and to increase the contribution of Communal Titled Land (CTL) towards the country's Gross Domestic Product (GDP). This was to be achieved through the intensification and commercialization of small-scale sugarcane irrigation farming in the rural areas. Subsistence farmers were encouraged to pool their resources and form farmers' association (FAs) or co-operatives. This enabled the farmers' associations and co-operatives to have access to financial assistance, technical assistance and quota contracts from the millers, government and partners. However, there are noted disparities in the success of the farmers' associations and co-operatives under KDDP because some of them were successful while others were not. In essence this implies that some of the farmers' associations and co-operatives were able to maximise their profits while others failed to attain that. The primary concern of this study was to identify the factors that cause these disparities and hence identify the factors that influence the success of small-scale sugarcane irrigated enterprises under KDDP in the process. It also encompassedidentifying the economic irrigation performance indicators influenced by these factors. Henceforth, it was imperative to analyse the degree/scale of the influence of these factors on the economic performance indicators.

The study found broad results redeemingthe hypotheses; the success of small-scale irrigation farmers in KDDP was inclined to intrinsic (leadership skills, group coherence, perceptions and needs of the membership) and extrinsic (education and experience level) factors. The correlation analysis found that education shows a high correlation to the economic performance indicators (93% to profits, 80% to sucrose value and 86% to asset value) while tertiary training was found to show an average correlation to the economic performance indicators (54% to profits, 61% to sucrose value and 52% to asset value). Experience shows a relatively low correlation to the economic performance indicators. This implies that both education and tertiary training are crucial to influencing the success of the farmers' associations. The OLS regression analysis established that all the factors are statistically significant at a 5% level of significance in explaining the success of the farmers' association and co-operatives. The leadership styles, coherence and the extrinsic factors explain 80%, 72% and 77% respectively of the variation of success of the farmers' associations and co-operatives. The results corroborated that the participative style of leadership was found to be superior to the other two styles (authoritative and delegative) hence it is the one recommended by SWADE to the farmers associations and co-operatives. These factors are therefore pivotal for the success of the farmers' associations and co-operatives; this is echoed by the statistically significant F-statistic at a 5% level of significance. The perceptions and needs of the membership of the organization were influenced by their education background; higher education levels assist in the cultivation of perceptions and needs that are aligned to the development of the project, thus supporting the strategic plan of the scheme.

Education level, profit and sucrose value were statistically significant at 5% in distinguishing between the participative and delegative styles of leadership. The profit and asset value were statistically significant at 10% in distinguishing between the participative and delegative styles and between the authoritative and delegative styles of leadership. Profit was found to be significant at 10% in distinguishing between authoritative and delegative styles of leadership. The sucrose value and profits were statistically significant at 5% in explaining the importance of coherence within a farmers' association. The results also

corroborated that only four farmers' association and co-operatives lacked unity (were not united) and this affirmed that lack of unity within the organizations has detrimental effects on their economic performance.

The logit regression analysis depicted the degree/scale of influence the extrinsic factors (education and experience level) have on the economic performance indicators. These results indicate that increasing a unit of tertiary training of the farm manager has a 49% chance of increasing profits/ha and an 87% chance of increasing the sucrose value/ha. A unit increase of the experience level of the farm manager has a 63% chance of increasing profits/ha and a 48% chance of increasing the sucrose value/ha of the business entity. The results also indicate that a unit increase of the education level of the Board of Governors has a 94% chance of increasing the asset value/ha and a 73% chance of increasing the asset-liability ratio (solvency). A unit increase of the experience level has a 70% chance of increasing the asset value and a 91% chance of increasing the asset-liability ratio (solvency) of the enterprise.

The study concludes that the success of small-scale sugarcane irrigated enterprises is greatly enhanced by hiring tertiary trained and well experienced farm managers and that it is also influenced by electing well educated and experienced members to the Board of Governors.From this study it can be deduced that the benefits of incorporating and practising the participative style of leadership offsets the benefits of using the other styles of leadership in the KDDP. Group coherence is also pivotal to the attainment of success for each and every farmers' association or co-operative.It also emphasises the importance of having a well-educated membership in order to cultivate perceptions and needs that are in line with the development of the project.

These findings are significant for policy-makers to draw up strategic plans to develop the commercialized small-scale sugarcane irrigation farming sector. These strategies should address: access to land titles, education programmes for the membership of the farmers' associations and co-operatives, harmonization of

the roles played by the government and partners and pertinent research on this sector of the sugar industry.

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Abbreviations and Acronyms

Abbreviation	Meaning
ADB	African Development Bank
CTL	Communal Tenured Land
CSO	Central Statistic Office
DFID	Department For International Development
ERS	Estimated Recoverable Sugar
EU	European Union
FA	Farmers' Association
FAO	Food and Agricultural Organization
FINCORP	Swaziland Development Financial Corporation
GDP	Gross Domestic Product
GNI	Gross National Income
Ha	Hectare
ISO	International Sugar Organization
IDE	International Development Enterprise
IMF	International Monetary Fund
IMT	Irrigation Management Transfer
KBDP	Komati Basin Development Project
KDDP	Komati Downstream Development Project
KOBWA	Komati Basin Water Authority
LDC	Lesser Developed Countries
LUSIP	Lower Usuthu Smallholder Irrigation Project
MEPD	Ministry of Economic Planning and Development
MOAC	Ministry of Agriculture and Co-operative
MNRE	Ministry of Natural Resources and Energy
NEPAD	New Partnership for Africa's Development
NDS	National Development Strategy
NRM	Natural Resource Management
OFDA	Office of the U.S. Foreign Disaster Assistance
RSA	Republic of South Africa
RSSC	Royal Swaziland Sugar Corporation
SADC	Southern Africa Development Community
SACU	Southern Africa Customs Union
SFDF	Swaziland Farmers Development Foundation
SIDC	Swaziland Industrial Development Company

SKPE	Swaziland Komati Project Enterprise
SME	Small and Medium Enterprise
SNL	Swazi Nation Land
SSA	Sub-Saharan Africa
SSA	Swaziland Sugar Association
SWADE	Swaziland Water and Agricultural Development
TDL	Title Deed Land
USAID	United States Agency of International Development
USDA	United States Department of Agriculture
VIF	Vuvulane Irrigation Farmers
WRI	World Resource Institute
WUA	Water Users Association

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND

This study examines the factors that influence the success of small-scale irrigation farmers in the Komati Down-stream Development Project in Swaziland.This project is one of the two major irrigation projects (the other one is the Lower Usuthu Smallholder Irrigation Project (LUSIP)) that were established by the Government of Swaziland through a twenty-five year National Development Strategy (NDS). The NDS guided the formulation of development plans that were specifically designed to alleviate poverty, create employment, and achieve gender equity, social integration and environmental protection. The main aim of the two projects was to provide irrigation to 17 500 hectares (ha) of land, thus helping local small-scale farmers shift from subsistence agriculture systems to cash-crop production, sugarcane in particular (EU & MEPD, 2009).

In Swaziland, agriculture continues to attract policy attention and this has culminated into various interventions to improve productivity amongst smallholder farmerssuch as KDDP and LUSIP (MOAC, 2008). Swaziland has embarked on a series of projects to curb the extensive effects of rural poverty; these projects are aimed at raising rural households' income, thus improving food security. One way to achieve these aims is through the process of commercialisation of subsistence farms. This process is enhanced through the adoption of irrigation technology on Customary Tenured Land (CTL) in the Lowveld of the country. This therefore implies that irrigation enhanced production of a commercial crop (i.e. sugarcane) has to be undertaken on Swazi Nation Land (SNL) (Terry, 2007).

Swaziland is food insecure; 40 percent of the total population lives in abject poverty (MOAC, 2008).Since70 percent of the population lives in rural areas where the

poverty scourge is rife their means of survival and livelihood islargely dependent on agriculture (Terry, 1997). Prior to 1999, the country's agriculture policy was to attain self-sufficiency in the production of the staple food (maize) especially in the rural areas (Terry and Ryder, 2007). The Swaziland National Development Strategy (1997) which came into effect after 1999 advocates the intensification and commercialization of farming on Communal Tenured Land (CTL) also known as Swazi Nation Land (SNL) as a means to overcome rural poverty (Terry, 1997).

Agricultural production is the cornerstone of Swaziland's economy since it contributes directly and indirectly towards the Gross Domestic Product (GDP), in essence it directly contribute 12.7%. Commercial agriculture in Swaziland is export oriented and it is characterised by the following industries: sugar, forestry, citrus and livestock. The sugar industry is the leading contributor (59%) to agricultural output, and it accounts for 18% of the country's GDP. Thirty-five percent of the agricultural wage employment, 18% of the manufacturing wage employment, 16% of the private sector wage employment and 10% of the formal sector employment is accounted for by the sugar industry. This industry earns the country 2.4 billion Emalangeni through exports (CSO, 2008).

Forestry is the second leading agricultural industry with a contribution of 11% to the GDP. It accounts for just above half a billion Emalangeni (SZL526 Million) and employs roughly 8000 people in all its sectors. Citrus is the third industry, with a contribution of 2.5% to the GDP. This accounts for 86 million Emalangeni and employs about 1200 people. The livestock industry is the last one in the pecking order;it is composed of two main sub-sectors; beef and poultry industries. Beef has a quota of 3360 tonnes to the European Union. Both industries earn the country roughly 50 million Emalangeni through exports, thus contributing 1.2% to the GDP of the country (CSO, 2008).

Agricultural economy in the country is largely dualistic, with commercial arable estates generating more than 81% of the value of all agricultural output while subsistence farming accounts for 11% of the value of agricultural output. The major

cash crops include sugarcane, timber, pineapples, citrus fruits and cotton. Livestock include cattle, goats, and sheep (DFID, 2002).

Terry (1997) states that the dualistic nature of agriculture is mainly due to the land tenure system of the country: subsistence farming on Swazi Nation Land (SNL) which takes about 70% of arable land and commercial agriculture on Title Deed Land covering the rest. Traditional smallholder agriculture on SNL consist of about 90 000 household operated farms with an average size of approximately 1.3 hectares (ha), rain-fed technology and over concentration on the production of the staple food (maize).

1.2 PROBLEM STATEMENT

The poor contribution of Swazi Nation Land (SNL) to the overall Gross Domestic Product (less than 5%) of the country has been a key problem for the Swazi Government before the country got its independence in 1968, and this is still the Achilles heel of the economy. Several rural development policies have attempted to increase productivity on Communal Tenured Land (CTL). However, most of these policies did not meet the expectation because they were either not endorsed by the traditional leaders or because most farmers pursued multi-livelihood strategies so that they could offset low farm revenue. The KDDP has however been more successful with respect to Government's initiatives to reduce poverty and unemployment. Sugarcane is referred to as the 'Swazi Gold' because it is the country's major export and thus a vital cog in earning foreign exchange. This therefore implies that before the sugar industry on SNL can contribute more to the overall GDP there is a need to find out why there are discrepancies on the successes of farmers associations that are accorded the same resources. This will help develop strategies that will assist farmers' associations to avoid failure.This research proposes to investigate the factors that influence the success of small-scale irrigation farmers under the Komati Downstream Development Project in Swaziland.

The KDDP was intended to increase production and also facilitate small-scale Swazi farmers to convert from primarily subsistence to commercial farming while concurrently encouraging community participation in the new enterprises. This irrigation scheme (KDDP) is meant to reduce poverty directly through increasing farm revenue, or indirectly through the multiplier effects that result from increased economic activity in the area. The increase in rural income is pivotal to rural development and also to increasing the contribution of Communal Titled Land (CTL) to the country's GDP. The major requirement of the scheme is that farmers group themselves to form farmers' associations so that they can pool resources. The organogram of the farmers' association is: the farmers who pool their land become shareholders and then elect a Board of Governors.Besides corporate governance the Board of Governors has a mandate to hire a farm manager who in turn hires the necessary technical and non-technical labour.

The pre-requisites of the farmers' associations, before they get production contracts from the Royal Swaziland Sugar Corporation (Mhlume Sugar Mill), and apart from pooling their land resources include the Board of Governors being trained in corporate governance by SWADE, technical production training from both the Swaziland Sugar Association and the Mhlume Sugar Mill, and lastly sourcing capital investment from commercial banks and other financial institutions. The aim of the farmers' associations is profit making attained through good governance, cost minimization and high production.

However, some of the farmers' associations, despite meeting the pre-requisites, still fail to attain their prime objective of profit making. These discrepancies between the farmers'association with respect to success can therefore not be attributed to the availability of resources andenvironmental loci. This is because all the farmers' associations are accorded the same resources (technical training, financial support and sucrose quota contracts) and are found in the same environmental locus.

It is thus imperative to further investigate these disparities so that they can eventually be curtailed. This will help improve production, enhance good governance and

consequently minimise costs. In a nutshell, this study will help devise strategies to enhance rural development within the country.

1.3 OBJECTIVES OF THE STUDY

The main objective of the study is to identify the pertinent intrinsic (human behaviour) and extrinsic (external resources) factors that influence success of farmers' associations under KDDP irrigation scheme.

The specific objectives are as follows;

- To determine the difference in profits per hectareand sucrose value per hectare between farmers' associations.
- To determine the difference in Asset-Liability Ratio and asset value between farmers' associations.
- To determine the intrinsic and extrinsic factors in group settings which influence the economic performance of a farmers' association or a co-operative.

1.4 HYPOTHESES OF THE STUDY

The basic literature that supports the formulation of the problem statement shows that all the farmers' associations and co-operatives in the KDDP were accorded the same extrinsic (resources) factors (technical training, extension services, financial assistance, irrigation system and sucrose quota contracts). This therefore leads to the postulation that the problem lies within the farmers' associations and co-operatives themselves, taking into account that they are all located in the same environmental loci.This does not totally eliminate some of the extrinsic factors because some of them are not accorded to the smallholder farmers by SWADE and its partners.

The discrepancies in success between the farmers' associations are hypothesised to be caused by both the internal disparities (within the control of the association) and external disparities. Internal disparities include governance/leadership styles, collective action/group coherence and perceptions, and the needs of the membership of associations while the external disparities include the education and the experience levelsof both the Board of Governors and the farm mangers. This is assumed to lead to farmers' associations defaulting on loan repayments, the shareholders not getting their dividends from the enterprise, and consequently poverty being perpetuated.

The research hypotheses of the study are as follows;

- Farmers'associations whosefarm managers have tertiary training and experience in the sugar industry tend to earn more financial profits and have higher yields/ha than those that are managed by farm managers without tertiary training in the sugar industry.
- Farmers' associations that are governed by educated Boards of Governors are better established (developed) than those that are governed by less educated Boards of Governors.
- The economic irrigation performance indicatorsare influenced by human behaviour factors.

1.5 JUSTIFICATION OF THE STUDY

Small-scale irrigation schemes have been used as development projects in rural settings of most countries all over the world. The World Bank has also endorsed this innovation and thus on numerous occasions it has funded small-scale irrigation projects in Least Developed Countries (LDCs). Swaziland has also fully embraced this innovation through the instigation of two major small-scale irrigation projects (KDDP and LUSIP).Besides environmental situations or circumstances other factors that cause failure of small-scale irrigation schemes have not been fully explored in the Southern Africa Development Community (SADC) region in particular. This paper therefore intends to bring these factors to light so that they are taken into

consideration when setting up small-scale irrigation developmental projects. In essence, the findings will end up constituting the template of requirements necessary for instigating successful small-scale irrigation schemes. This research will contribute to the existing literature on agricultural and rural finance with respect to lessons learnt from the factors as they influence successes of small-scale farmers from this case study.

1.6 RESEARCH METHODOLOGY

The study draws on the experiences and knowledge of Swaziland Water and Agriculture Development (SWADE) employees and that of the farmers'associations (FAs) or co-operatives in KDDP area.This study is to be carried out in the Hhohho region of Swaziland. The study area was purposely selected because it falls under KDDP which is facilitated by SWADE.The ten communities that were targeted for this study include; Nkambeni, Sihhoye, Mangweni, Mafucula, Mpofu, Nyakatfo, Sidvwashini, Madlangemphisi, Manjengeni and Nhlanguyavuka. The major reason for the choice of study area was that these small-scale farmers met all the pre-requisites set by SWADE. The required information was gathered using a well-constructed and structured questionnaire. The questions in the questionnaire were categorised into five sections that solicited the pertinent information to prove or disprove the hypotheses and in the process answer the objectives. The data collected was both qualitative and quantitative. The qualitative data includes the views of both the Board of Governors of each farmers' association or co-operative while the quantitative data includes all the financial records and asset registers. A list of seventeen farmers' associations and co-operatives was obtained from SWADE.This list had details of all the farmers' associations and co-operatives that produce sugarcane and also have sucrose quota contracts with Mhlume Sugar Mill. This was a census study because all the seventeen farmers associations and co-operatives were interviewed.

The research methodologies used in this study include descriptive statistics (correlation analysis) and inferential statistics(Ordinary Least Squares model analysis) and Individual Logit Model (ILM)). A comprehensive research methodology is given in Chapter Three.Descriptive statistics were pivotal in establishing

relationships between the farm managers' tertiary training level and experience against financial profits, sucrose value/yield and to establish trends between the Boards of Governors' educational and experience level against the enterprise's asset value and asset-liability ratio. These were also used to determine the factors in group dynamicsthat influenced the success of small-scale irrigation.The Individual Logit Model Analysis was used to estimate the degree of influence of extrinsic factors on the success of the farming enterprise.The data was analysed using Microsoft Excel and E-views and is presented in tableau and figure form (see Chapter 4, 5 and 6).

1.7 DELIMITATIONS

This study has a number of delimitations related to the context and constructs. With regards to the context, it will be limited to farmers'associations (FA) that are under KDDP's jurisdiction. This therefore implies that individual farmers and farmers' associations that are not under KDDP will not be under consideration. Amongst the farmers' associations under KDDP, only those that are commercially producing sugarcane will be considered.

With regards to the constructs, this study will look into the intrinsic factors that influence the small-scale irrigation farmers' success. This thus excludes the extrinsic factors i.e. land tenure, financial support, training and extension service provision.

1.8 ORGANIZATION OF THE STUDY

Chapter one gives a comprehensive overview of the country's agriculture sector and background. **Chapter two** of this thesis provides a review of the relevant literature. It consists of global trends on irrigation, African and Sub-Saharan content on small-scale irrigation and lastly, thematic summaries of studies that are related to this thesis.**Chapter three** presents the methodology which consists of the study area, sampling and data collection methods. There is also a description of the data analysing process. This chapter also provides an analytical framework.**Chapter four, five and six** provides the analysis of the data and results of the data analysis

process. It also presents detailed discussion of the results. **Chapter seven** of this thesis provides the conclusion and recommendations.

CHAPTER TWO

THE ECONOMIC PERFORMANCE OF SMALL-SCALE IRRIGATION SCHEMES IN AFRICA

2.1 INTRODUCTION

This chapter provides a comprehensive review of information with regards to irrigation technology as a critical factor in rural development through the commercialization of smallholder farm settings. This review in essence dwells on the economic performance of small-scale irrigation farmers. This chapter encompasses a brief review of the global changes in irrigation management, and then it proceeds to provide a succinct state of irrigation in Africa. Lastly, it provides a brief review of empirical studies on economic performance of small-scale irrigation schemes.

2.2 GLOBAL CHANGES IN MANAGEMENT OF IRRIGATION SCHEMES

The transfer of public companies and other state owned enterprises by governments of both developed and developing countries to private ownership has been going on for the past 30 years. This transfer was initially begun in the manufacturing and transportation industry, but outsourcing or rather privatisation has extended to most sectors of the economy including the provision of portable and irrigation water (Johnson, 2002 cited by Ntsonto, 2005:14).

State-owned and operated irrigation systems have yielded dismal performance such that governments have been forced to privatise the responsibilities of managing water and the allocation of rights to private organisations or autonomous entities. This has had positive results in that governments' expenses have deceased through budgets cuts on water management because this has been handed over to private bodies (Vermillion, 1997).

Governments all over the world have adopted the practice of transferring the management of irrigation systems to Water Boards or Water Users Association (WUA). The exercise called Irrigation Management Transfer (IMT) calls for state withdrawal and introductionof independent Water Boards to govern the rights and use of water in a country (Perret, 2002). The aim of the privatisation is to increase irrigation performance and cut down on state budget commitment (Perry, 2001 cited by Ntsonto, 2005:14). Kamara et al. (2001) acknowledges that IMT has indeed improved economic conditions within countries through the empowerment of local communities and enhancing the technical efficiency in the allocation of water rights and use while cutting down on governments' expenditures.

Vermillion (1997) argues that water should be treated as an economic entity and thus there should be property rights attached to it.Furthermorethe management of water should be decentralised and farmers are expected to have a crucial role in the management of water since they will purchase the right to use it. Ntsonto (2005:15) asserts, that for the property rights to beupheld there is a dire need for countries to enact policies that will enable the Water Boards to operate at their optimum and efficient capacity.

The success of the Green Revolution was well aided by irrigation projects but it was noted that irrigation schemes were relatively underperforming in Lesser Developed Countries (LDCs). This is despite the fact that the World Bank has invested handsomely in irrigation projects in LDCs with the aim to facilitate development in these countries. According to Ntsonto (2005:17) both the economic and social impacts of irrigation schemes are below the initial projections done during the planning phase. It is also worth noting that the failure rate of irrigation projects is relatively high (i.e. out of 200 projects funded by the World Bank 23% failed). The failure is due to not meeting projected agricultural production targets, poor management and maintenance of the irrigation equipment and water, and lower economic returns on investment.

2.3 THE CURRENT STATE OF IRRIGATION IN AFRICA

The role of irrigation in African agriculture is currently not significant; most of food production is still entirely dependent on rainfall. In Africa only 6% of the total cultivated land is under irrigation while in other continents like Asia and South America it is 37% and 14% respectively (FAOSTAT, 2009).It is also important to state that the distribution of water-managed areas in Africa is veryskewed; five countries (Egypt, Madagascar, Morocco, South Africa and Sudan) cover 19% of Africa's land surface. This land surface is tantamount to 60% of the total water-managed area of the continent. Each of the above mentioned countries have more than one million hectares of irrigated land. 80% of the total water-managed area in the continent is covered when countries like Nigeria, Algeria, Libya, Angola and Tunisia are included (Tafesse, 2003).

Africa is well endowed with water resources but these resources are not evenly dispersed throughout the continent. The underdevelopment state of irrigation institutions has hampered the management of this resource such that it is not usually available when needed the most(You, Ringler, Nelson, Wood-Sichra, Robertson, Wood, Guo, Zhu & Sun, 2010). Africa still has a large proportion of untapped ground water resources with the exception of Southern Africa and some parts of Northern Africa. When compared to the world, Africa uses a quarter of the global average of its water uses, and less than a quarter on irrigation (Svendsen, Ewing & Msangi, 2009).

Table 2.1below shows selected irrigation indicators for Africa by agro-ecological zones.

Table 2.1: Basic irrigationfeatures of Africa and the World

Region	Share of cultivated area equipped for irrigation	Agricultural water withdrawal as a share of total renewable water resources	Dam capacity as a share of total available surface water	Ground water pumped as a share of total renewable ground water	Value of irrigated output as a total share of agricultural output
Northern[1]	28.1	218.6	203.8	306.7	86.2
Sudano-Sahelian[2]	6.9	21.8	9.7	38.1	58.3
Eastern[3]	2.6	4.9	5.5	3.1	5.0
Gulf of Guinea[4]	1.5	1.2	47.1	0	6.3
Central[5]	0.7	0.1	1.7	0	7.3
Southern[6]	4.2	6.2	99	17.8	6.6
Indian Ocean Islands[7]	30.4	4.2	0.1	8.7	0
SSA's average	3.5	1.3	11.2	17.5	24.5
Africa's average	5.8	3.3	14.6	72.9	37.7
World's average	17.7	5.2	7.6	n/a	n/a

Source: Svendsen, Ewing & Mangi (2009)

The values indicated in Table 2.1 above show vast variations across sub-regions in Africa and the contrast in water use between Northern Africa and Sub-Saharan Africa (SSA). Only 4% of the cultivated land in SSA is equipped for irrigation while 28% of Northern African agriculture is under irrigation (Svendsen et al., 2009). You et al. (2010) emphasise that Northern Africa has almost exhausted its irrigation potential while SSA still has a significant potential to expand. This is asserted bythe fact that the north uses an unsustainable source of water (underground water) besides the Nile River in Egypt.

In Africa, particularly Sub-Saharan Africa the average rate of expansion of the irrigation area over the past 30 years has been 2.3%; hence it is worth noting that irrigated agriculture accounts for approximately 38% of the value of all agricultural output (Rosegrant, Ringler, Benson, Diao, Resnick, Thurlow, Terero & Orden, 2006).Irrigation is potentially of great economic importance in Africa.Some researchers suggest that the current irrigated area in Africa is around twelve million hectares and it can be expanded six fold (You et al., 2010). Svendsen et al. (2008)

[1]**Northern:** Algeria, Egypt, Libya, Morocco and Tunisia.
[2]**Sudano-Sahelian:** Burkina Faso, Cape Verde, Chad, Djibouti, Eritrea, Gambia, Mali, Mauritania, Niger, Senegal, Somalia and Sudan.
[3]**Eastern:** Burundi, Ethiopia, Kenya, Tanzania, Uganda and Rwanda
[4]**Gulf of Guinea:** Benin, Cote d'Ivoire, Ghana, Guinea, Guinea-Bissau, Liberia, Nigeria, Sierra Leone and Togo.
[5]**Central:** Angola, Cameroon, Central Africa Republic, Congo, Democratic Republic of Congo, Equatorial Guinea, Gabon, Sao Tome and Principe.
[6]**Southern:** Botswana, Lesotho, Malawi, Mozambique, Namibia, South Africa, Swaziland, Zambia and Zimbabwe
[7]**Indian Ocean Islands:** Comoros, Madagascar, Mauritius and Seychelles.

state that it is imperative that there be growth in irrigation development in SSA because of the massive existing water resources in order to counteract the plight of poverty.

In SSA there are a few countries that have developed a share of their irrigation potential (that is the area in which it would be beneficial and feasible to irrigate). South African for one has developed 100% of its irrigation potential by irrigating a tenth of its cultivated land area. The others are Cape Verde (89%), Madagascar (72%), Sudan (67%) and Swaziland (53%). The other countries in SSA have not developed more than a third of their potential to benefit from irrigation (You et al., 2010).

Both SSA and Africa as a whole have approximately one hectare (ha) of cultivated land per person. However, internal renewable water availability per hectare is less than two-thirds of the global internal renewable water availability. The alarming difference between Africa and the world at large is that African countries withdraw less than half as much water per capita as does the world in general. This shows that African countries irrigate only about 6% of their irrigable land compared to the world's average of 18%(Svendsen et al., 2009).

Figure 2.1below shows all the areas in Africa that are under irrigation and those that are potential irrigable areas. This is noted by the number of operational dams, rehabilitated dams and potential dams.

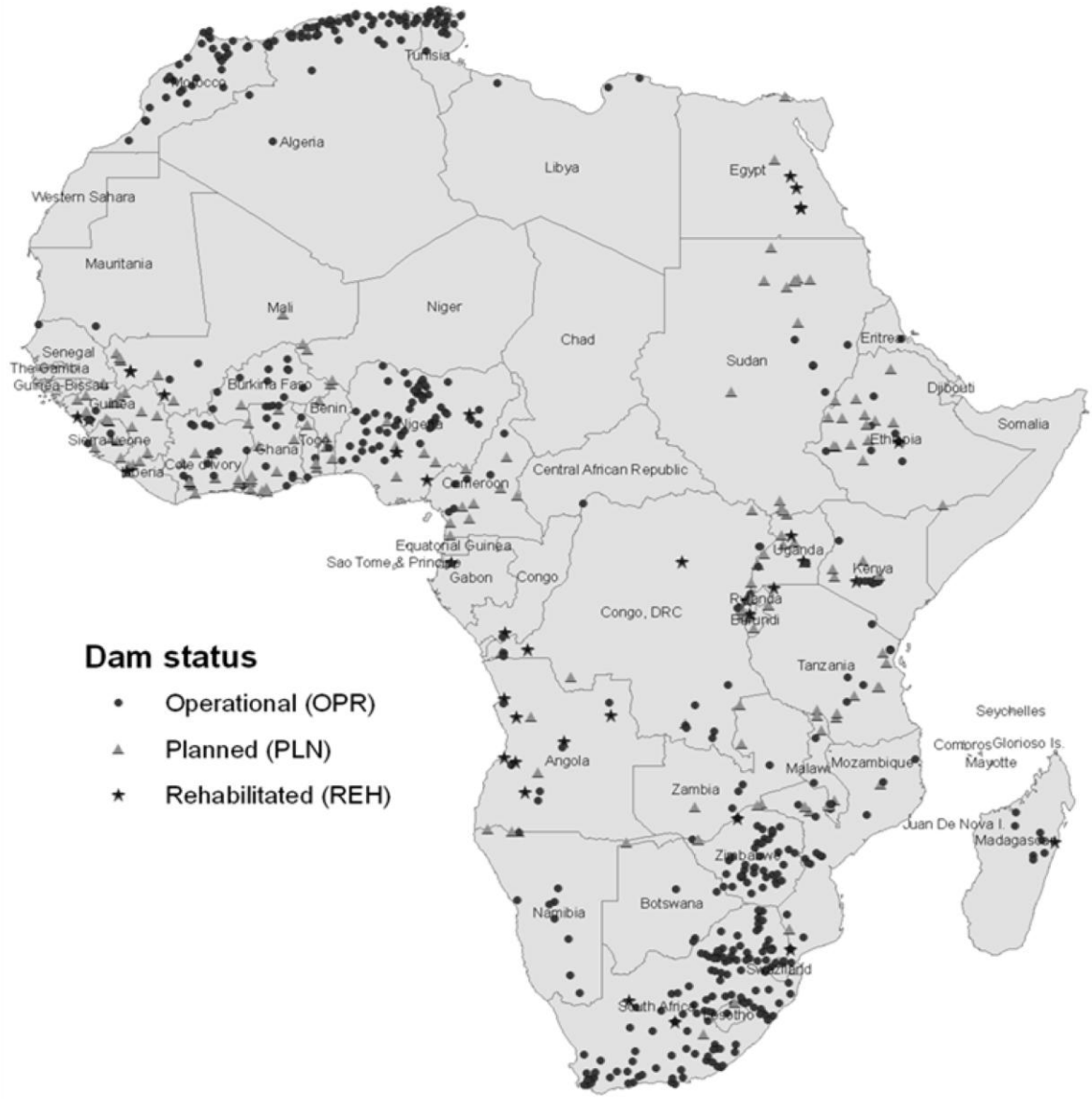

Figure 2.1: Areas under irrigation and those that planned to be irrigated

Source: You et al.(2010)

2.4 SMALL-SCALE IRRIGATION IN AFRICA

According to Tafesse (2003), small-scale irrigation is a development initiative which is undertaken by smallholder farmers who own and manage an individual plot or are part of a community managed irrigation scheme. This term fits a wide range of irrigation technology from bucket and drum kit with low cost drip lines to irrigation

schemes of several hundred hectares in which smallholder farmers participate as users.

Clarification is needed on the term smallholder because it means different things to different people. To some large irrigation schemes are deemed to be large because of size/area they cover despite the fact that they may be composed of many small farms i.e. a 50ha irrigation scheme composed of 50 smallholder farmers each with 1ha. However, it would have all the traits of a formal or large-scale irrigation scheme because of the way in which the water and other key agricultural services are organised (in most cases by government agents). For others, smallholder is the same as small-scale or informal irrigation i.e. small farms pooled together for better organization just like the case mentioned above (Kay, 2001). In the context of this study small-scale irrigation can be defined as small farms pooled together which typically befits the latter description.

Aberra (2004:2) states that the hope of increasing agricultural output has been solely dependent on large capital-intensive irrigation schemes especially in areas where rainfall is scarce and very erratic all year round. In recent times the hope and interest in large schemes has faded because of their inefficiency and also due to the fact that they are a ‘top-down’ approach mode of development (development imposed on rural settings). Adams (1990:8) postulated the reasons that lead to the failure of large irrigation schemes in SSA to include costs, institutional problems, policy environment, design issues, cultural factors and environmental problems.

The barrage of criticism levelled against African states for implementing the ‘top-down’ approach led to the shifting of attention from large-scale irrigation schemes to small-scale schemes. This new development was meant to find an interactive approach in which financial, cultural and social circumstances of the beneficiaries were taken into consideration (ISO, 2008). Since large-scale irrigation was substantially discredited as a development tool across Africa, small-scale irrigation was affirmed as the promising means to raise both agricultural productivity and employment in developing countries (Vaishnav, 1994:12).

With the exception of a minute number of countries in Northern Africa, South Africa and Madagascar the potential for irrigation development has not been effectively tapped in Africa. Only 3.7% of the 874 million hectares of arable land is under managed water and land development in the SSA (Svendsen et al., 2008). Privately developed and owned (small-scale) irrigation schemes in most SSA countries highlight that there is a business potential for private entrepreneurship involvement in irrigation. Hence, individual smallholder farmers are urged by both governments and other business agents to explore this avenue of business especially if the farmers commercialise their entities (Tafesse, 2003).

2.4.1 Economics of small-scale irrigation development in Africa

The subsistence need of rural households is the rationale used when allocating the 1 – 3 ha of land to each household by the traditional authorities in Africa (Rukuni, 1999). Bearing this in mind, the low-cost irrigation technology innovation opens up massive human and natural resource opportunities for small-scale farmers (African Development Bank, 2000). Consequently, small-scale farmers have come to a realisation that pooling their resources together is a vital economic factor to their success. This has enabled them to catch the attention of political decision makers who in turn have advocated for the farmers to get technical and financial services from both the public and private sector (International Development Enterprise, 2004).

The initiation of Water Users Associations (WUA) by policy makers has brought forth good water management practises. Banks and other financial institutions have designed new financial systems that would suit financial needs of small-scale irrigation farmers located on Communal Tenured Land (Rukuni, 1999). The aggregation of resources by the small-scale farmers has actually helped them to easily access markets and obtain sugarcane quotas from millers. Irrigation also comes with the notion of increased production, thus rendering the enterprises that use this technology more profitable than rain fed enterprises. There is also valuable evidence that the Internal Rate of Return on irrigation investment is higher, more

especially when the irrigation technology used is of low cost but bearing higher income streams (African Development Bank, 2000).

2.4.2 Socio-economic aspects ofsmall-scale irrigation development

Security of tenure is a favourable aspect in the development of underutilised land resources. Traditional tenure systems in Africa are the order of the day, thus arable land under this form of tenure is allocated to households for subsistence purposes. Traditional authorities are the ones responsible for allocating the land but grazing areas, water sources and forests remain under communal control (FAO, 2000).

In order to attain sustainable economic development in rural settings, it is widely perceived that issuing land titles to individual households/small-scale farmers would play a pivotal role. This line of thoughtaffirms that the title holders would have the freedom to make significant investment on the land without any fears of losing it in the future. In Africa it is worth noting that roughly 75% of all irrigated land is under Communal Tenured Land and this land is cultivated by small-scale farmers. This fact proves that the adoption of the irrigation technology innovation has not been reliant or rather has not been curtailed by the land tenure system (International Development Enterprise, 2004).

On the other hand granting farmers titles to their land is a valuable and significant way of creating effective irrigating communities. These communities have property rights thus they are able to safeguard their economic interests. In addition these farmers are able to access financial assistance/credit with the land title as their surety (African Development Bank, 2000).

2.5 SMALL-SCALE IRRIGATION SCHEMES IN SWAZILAND

Swaziland's agriculture is dualistic due to the two land tenure systems in the country: Title Deed Land (TDL) and Swazi Nation Land (SNL). TDL occupies 30% of the total area in the country and it is mainly composed of commercial medium to large-scale

enterprises (Manyatsi, 2005). It holds 97% of irrigated agriculture. SNL is composed of subsistence/smallholder farmers. Smallholder farmers contribute 70% of the country's total population and they account for only 10% of the total agricultural output (Lankford, 2001). Small-scale irrigation occupies 15% of the irrigable land of the country, with each smallholder family being allocated land averaging 1.9ha. The main crop grown in SNL is maize; it takes up 14 000ha of land.Vegetables are also grown in backyard gardens mainly for subsistence purposes. Besides KDDP and LUSIP there are other formal smallholder irrigation schemes in existence in the country; one being the Vuvulane Irrigation Farmers (VIF), where there are 302 farms ranging from 3.0-7.0ha. The others include some farmers who have organized themselves and received external assistance to develop small-scale irrigation systems to produce vegetables; they occupy 800-900ha (Terry, 2007).

It is worth noting that the number of smallholder farmers moving towards the production of commercial crops like sugarcane is increasing. The Swaziland Sugar Association together with the Government of Swaziland have been encouraging smallholder sugarcane production to conform to the National Development Strategy of 1997 (SSA, 2001). The two parties mentioned above have been heavily involved in the instigating the irrigation schemes hence using the institutions like SWADE to help the farmers to form co-operatives and associations.

The main irrigation systems used by the smallholder farmers are furrow (50%) and dragline (36%) systems. Manyatsi (2005) postulated that since commercialization of the schemes is on the increase, the irrigation technology embraced and used in these schemes will become more sophisticated.

Table 2.2 shows the different small-scale irrigation schemes in Swaziland.It shows were they are located within the country, the size of the land under irrigation and what they produce.

Table 2.2: Small-scale irrigation schemes in Swaziland

Type and unit size	Other names for Sector	Examples of typical sytems	Location in Swaziland	Approximate Numbers (and area, ha)
Smallholder sugarcane scheme (>1000 ha)	Formal smallholder Scheme	E.g. VIF, KDDP & LUSIP	Lowveld	Approx 300 farmers (approx 1500 ha)
Other sugarcane private Farmers (10 - 200 ha)	Small-scale Swazi farmers & private growers	Tshaneni, Lavumisa, Nsoko, Malkerns	Lowveld and Middleveld	Approx 30 farms (approx 2000 ha)
Non-sugar mixed cropping smallholder and micro systems (0.2 to 100 ha)	Rural irrigation Systems	E.g. Nkwene irrigation garden Matsapa	Middleveld	Approx 1000 households on (800 - 900 ha)
Mixed cropping watered plots and gardens (0.01 to 0.5 ha)	Individual Farmers	Nkomanti	Middleveld and Highveld (highly scattered)	Approx 4000 householders (250-500 ha)
Private growers using borehole water (< 10 ha)	Individual Farmers	Malkerns	Middleveld	Approx 100 (50-100ha)

Source: Lankford (2001:9)

The major sources of water in the country are rivers flowing from South Africa and the total water resources are estimated at 4.5 km^3/year or (4900 m^3 per capita). The four largest rivers are namely; the Komati, Mbuluzi, Great Usuthu, and the Ingwavuma. It should be noted that though the country is relatively well endowed with water resources these resources are committed between riparian states (Mozambique and South Africa) that share the river basins (Lankford, 2001:5)

Figure 2.2 below is a map of Swaziland depicting all the rivers in the country, the locations of all the major irrigations schemes and the main dams.

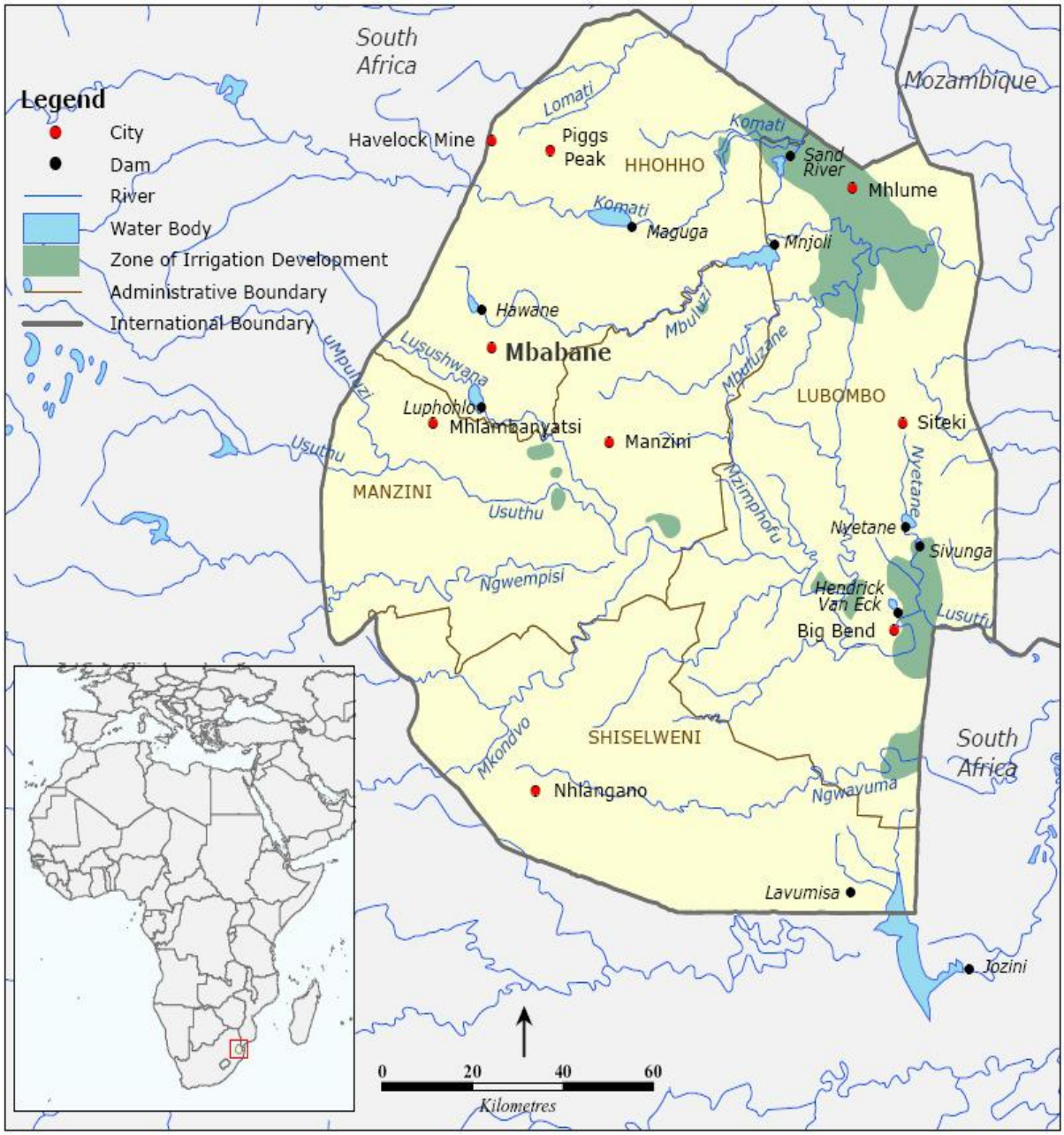

Figure 2.2: A map of Swaziland showing irrigation schemes and dams

Source: Manyatsi (2005)

2.6 EMPIRICAL STUDIES ON THE PERFORMANCE OF SMALL-SCALE IRRIGATION SCHEMES

There are quite a number of studies on the economic performance of small-scale irrigation schemes that have been carried out in Africa, and other developing countries outside the African continent. These studies critically looked at the above-mentioned issue in two spectrums; 1) evaluation of the economic performance of small-scale irrigation after Irrigation Management Transfer (IMT) from governments to private entities i.e. Water Users Associations (WUA) and 2) the factors that influence the success of small-scale irrigation.

2.6.1 Economic performance of small-scale irrigation schemes

Studies on this theme include the following:Economic performance of small-scale schemes: a case study in Zanyokwe, Eastern Cape, South Africa (Ntsonto, 2005), Adoption of irrigation scheduling methods in South Africa (Stevens, 2007), Commercialization of smallholder irrigation: economic and social impacts in semiarid areas of Eastern Kenya (Blank, Mutero& Murray-Rust, 2002) and Assessment of small-scale irrigation management turnover programme in Indonesia (Vermillion, Samad, Pusposutardjo, Arif & Rochdyanto, 2000).

The above-mentioned authors/researchers used different methods to analyse the economic performance of the small-scale irrigation schemes they were studying. For instance Ntsonto (2005) used the SMILE (Sustainable Management of Irrigated Land and Environment) and the SLF (Sustainable Livelihood Framework), Stevens (2007) used the Extended Case Study Method also known as Situational Analysis, and Vermillion et al. (2000) also used the Case Study Method while Blank et al. (2002) used both the Baseline and Market Survey Methods.

Despite the different methods of analysis, there were common economic performance indicators that were captured from these studies. These indicators include the following: institutional framework, water resource utilization, irrigation

area, irrigation technology, agricultural productivity and lastly, poverty and food security.

- *The institutional framework indicators:* look at the organization and governance within the scheme and the country at large. This includes policies and other structures that have a bearing on the success of the irrigation schemes.
- *The water utilization indicators:* help assess the impact of increased investment on irrigation and the efficiency in the use of water.
- *The irrigation area indicators* help in assessing irrigation development and its current value in the area.
- *The irrigation technology indicators:* look at the type of irrigation employed and its utilization potential in the area. They also assess the value of the irrigation investment versus applicability in the area.
- *The agricultural productivity indicators:* indicate the quality of the farming system coupled with the irrigation technology on the quality and quantity of the produce.
- *Poverty and food security indicators:* assess the impacts of the employed irrigation system on poverty and food security and consequently agricultural growth.

Ntsonto (2005) concentrated on livelihood strategies, land tenure and the productivity of the schemes. The first one is a food security and poverty indicator, the second one is an institutional framework indicator and the last one is an agricultural productivity indicator. Stevens (2007) investigated institutional support, group cohesion, type of irrigation system used, efficiency of the irrigation method used, technical design of the system, irrigation management capacity, choice of the crop produced, and marketing strategy. This shows that Stevens investigated institutional framework, water resource utilization, irrigation technology and agricultural productivityindicators. Vermillion et al. (2000) explored management efficiency of the irrigation scheme, and the agricultural performance of the irrigated area. These indicators are part of the institutional framework indicators and the irrigated area indicators. Blank et al. (2002)

surveyed the effects of pooling of resources by farmers, extension services accorded to small-scale irrigation farmers, market availability and food security.

In all the studies mentioned above the authors emphasised that these indicators are fundamental to measuring the success of the schemes, the development of the rural communities and also the increase of contribution of the rural settings to the GDP of the country.

In summary the findings of the above mentioned studies are as follows; Ntsonto (2005) found that the diversity of the land tenure systems had no influence on the farming style and the irrigation technology that was adopted in the irrigation scheme. Ntsonto (2005) also found that famers with lower education levels had difficulties in adopting new irrigation innovations and technology hence their productivity was low. Education level had a succinct bearing on the management practices and style of the farm. Vermillion et al (2000) found that collective action in communal settings where farmers have formed an irrigation scheme plays a very crucial role in enhancing productivity. The findings emphasise that the attitude and perceptions of small-scale irrigation farmers is imperative for the farmers to attain commercial status. Blank et al (2002) put emphasis on collective action as well but the study also went a step further to affirm the importance of intensive extension services because it plays a vital role in enhancing productivity. The creation of both internal and external markets was also found to be crucial for the farmers' success. Stevens (2007) explained that the performance of small-scale is greatly influenced by group cohesion, institutional support efficiency and the structure of the management committee. Weak institutional arrangements and lack of important skills such as leadership, organizational capacity and agribusiness management skills hamper the success of small-scale irrigation farmers.

2.6.2 Factors influencing the success of small-scale irrigation farmers

The studies reviewed in this theme include the following:Factors influencing the success of small-scale farmers irrigation farmers in Nkomazi, Mpumalanga, South Africa (Muleba, 2006), Collective action in the management of canal irrigation

schemes: the Doha Rice Scheme in Uganda (Sserunkuuma, Ochom & Ainembabazi, 2009), Revisiting the role of education for agricultural productivity (Reimers and Klasen, 2011) and Economic viability of irrigation systems in the context of state withdrawal: the Arabie scheme in the Northern Province of South Africa (Kamara, Van Koppen & Magingxa, 2001).

The four above-mentioned studies used different methodologies to investigate the factors that influence the success of small-scale irrigation farmers. Muleba (2006) used correlation, chi-square and multiple regression analysis to identify the pivotal factors. Sserunkuuma et al. (2009) used the Ordered Logit Model (OLM) to measure compliance/coherence within the scheme. Reimersand Klasen (2011) used the Cobb-Douglas production function for the regression analysis. Kamara et al. (2001) used a theoretical framework that has various levels of analysis which include regression analysis, production function analysis, benefit-cost analysis, budget enterprise analysis and linear programming.

Results from the analysis in all the studies came up with the following factors which were deemed to influence the success of farmers: education of the farmers, experience, management style, perceptions and needs, coherence, inputs, and irrigation practices. Muleba (2006) identified knowledge, needs and perceptions, management practices and environmental factors (resources usage) to be key factors that contribute to the success of an irrigation scheme. Sserunkuuma et al. (2009) recognized collective action (management style and group coherence/compliance) as an important factor in the success of farmers undertaking irrigation projects. Reimers and Klasen (2011) showed that education is very significant, and has a positive effect on agricultural productivity. Kamara et al. (2001) emphasise on the experience of the farmers, management of the environmental resources (through irrigation practices), and environmental factors (i.e. land ownership, market needs).

Muleba (2006) showed that education (knowledge), needs and perceptions had the highest prediction value ($P<0.0001$) of behaviour associated with production efficiency while the environmental factors had R^2 of 0.50 depicting that they

contributed significantly less to the variance of farming. These results show that managerial skills are highly dependent on these factors. Sserunkuuma et al. (2009) found that leadership attributes facilitate successful collective action (compliance to the by-laws) and also facilitate good group coherence. Reimers and Klasen (2011) found that distinguishing between the different levels of education showed that primary and secondary education has a significant positive impact on agricultural productivitycompared to tertiary education. Kamara et al. (2001) found that land ownership had a significantly positive relationship with the farm's performance. The experience of farmers was also found to be influential to the productivity. Good agricultural practices and management were also noted to be important to productivity. Secure output markets urge the farmers to produce more quality products but this can be offset by poor input markets.

2.7 SUMMARY

This chapter reveals that it is imperative for the governments of African States to transfer National Resource Management (NRM) or rather in this case to do what is called the Irrigation Management Transfer (IMT) to Water Users Associations (WUA). This is crucial because not only does it reduce government expenditure but it also curtails the top-down approach when it comes to the implementation of developmental projects. The devolution of IMT has made small-scale irrigation farmers take ownership of developmental projects in their areas, especially those that involve the adoption of irrigation technology.

Despite the gradual and continual increase in adoption of the small-scale irrigation in Africa, the role of irrigation in Africa is still not significant. Only 6% of the irrigable and cultivated land is under irrigation in Africa. Large-scale irrigation in Africa has been erratic, thus it has not brought forth the expected increase in agricultural output. The cost of implementing a large-scale irrigation project in Africa has been found to be higher than anywhere else in the world. Small-scale development has been thought to be pertinent to development because the technology used is easily adaptable to the local environment, thus increasing its adoption chances by farmers.

The description of different previous research studies concludes the chapter. The description is based on two pivotal themes: the evaluation of economic performance of small-scale irrigation schemes and the factors that influence the success of small-scale irrigation farmers. This part of the chapter is pivotal because it allows the researcher to make a comparison between the methodologies these studies used in order to devise an efficient methodology. It also allows the researcher to make comparison between the results attained by this study and those from the other studies.

The succeeding chapter describes in detail the methodology that was employed by this study to determine the factors influencing the success of small-scale irrigation in KDDP in Swaziland.

CHAPTER THREE

METHODOLOGY AND ANALYTICAL FRAMEWORK

3.1 INTRODUCTION

The aim of this chapter is to describe in-depth the methodology used to determine the factors that influence the success of small-scale irrigation farmers in KDDP. The previous chapter provided various methods to measure the economic performance of small-scale irrigation. This chapter provides the chronology of procedures or descriptions beginning with the type of investigation, the sampling procedure, data collection process and analysis. A summary concludes this chapter.

3.2 INQUIRY STRATEGY

The main aim of this research was to analyse the economic performance of the small-scale irrigation farmers in KDDP. This was achieved by determining the factors that influence the success of the small-scale irrigation farmers. A Stevens (2007) states that the small-scale irrigation farming is affected by three interlinking factors (a tripartite); Environmental factors, resources, (extrinsic factors) and human factors (intrinsic factors).

Figure 3.1 below shows the interrelationship between the three above-mentioned factors that affect small-scale irrigation farming.

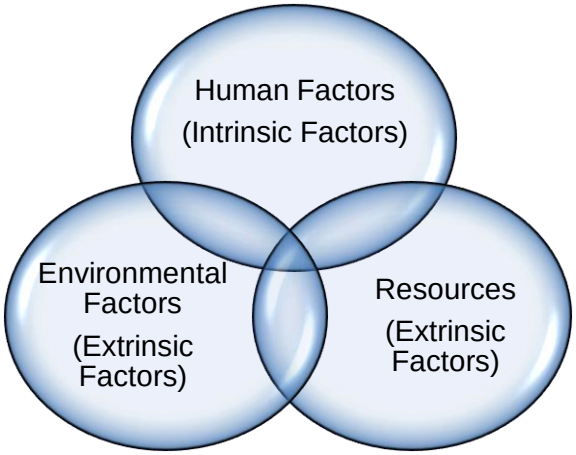

Figure 3.1: The Inter-relationship between intrinsic and extrinsic factors

Source: Stevens (2007)

The intrinsic (human behaviour) factors are also referred to as personal factors.These factors include leadership or management skills (this encompasses the styles of leadership/management), group coherence (unity within a group), perception and needs of the people. These factors are regarded as being the internal or personal traits of a person; these are factors that can be controlled by a person or in this case they are within the farmers' association or co-operatives' control. The extrinsic factors are two-fold (environmental and resource factors); these are not within the control of a person or a group of individuals. Environmental factors include policies, climate, culture and traditions,land tenure systems, water availability and quality, topography of the area and nutritional content and type of the soil.Resources include;land availability, production inputs and implements, irrigation technology, extension services (research information), infrastructure, education, training and experience.

Given the above, it is essential to determine the intrinsic and extrinsic factors that are critical to the success of small-scale irrigation in KDDP, hence this survey covered all the FAs and co-operatives in KDDP that produce sugarcane. This study involves interviewing the Boards of Governors and SWADE officials to acquire the necessary information on the relevant factors.

3.3 RESEARCH DESIGN

This study is a descriptive empirical research based on collection and analysis ofboth qualitative and quantitative primary data. It can also be referred to as a pure/fundamental research because its results are meant for academic purposes. This study is aimed at statistically testing the hypotheses on the intrinsic and extrinsic factors of success of small-scale irrigation farmers.

3.4 DATA COLLECTION METHODS

This was a census survey study since it was specifically dealing with all the KDDP small-scale farmers. The primary source of the data was from all the seventeen FAs and co-operatives producing sugarcane under KDDP and supplying the Mhlume mill. Primary data was collected through personal interviews with the Board of Directors of each FA or co-operative using well-constructed and structured questionnaires (see Appendix A).

Eighteen semi-structured interviews were conducted, seventeen of them with the Chairpersons of the Boards of Governors of the farmers' associations and co-operatives and the last one with the Agriculture Development Manager of SWADE. The questionnaires solicited both quantitative and qualitative information. The quantitative variables include the demographics, financial statements (income statement and balance sheet), and farm inventory statement. The demographics provided data on the education and experience level of both the members of the Boards of Governors and the farm managers. The financial statements provided data on profit/ha, sucrose value/ha and the asset-liability ratio. The farm inventory statement provided data on the asset value/ha. The qualitative variables include the initial condition and current condition of the project, the role of the key stakeholders, and the internal configuration of KDDP's institutional arrangement and functioning. These variables were pivotal in providing a thorough description of the project and the project area, they were also key to the identification of the factors that influenced the success of sugarcane farming and the pertinent economic irrigation performance

indicators. In essence this implies the identification of both the extrinsic and intrinsic factors and the economic performance indicators they influence.

3.5 DATA ANALYSIS

The quantitative data that was collected was analysed using Descriptive and Inferential Statistics (correlation analysis and Ordinary Least Square Analysis).For the qualitative data the LOGIT Model Analysis was used. The Descriptive statistics was used to analyse the demographics, and the inferential statistics was used toestablish the relationship between extrinsic and intrinsic factors and their influence on the economic performance indicators. This required establishing a correlation between education, experience level,leadership style, group coherence and perceptions and needs of the smallholder farmers. Thereafter this correlation was used to assess the influence of these factors on economic performance indicators (i.e. sucrose value/ha, profit/ha, asset value/ha and asset-liability ratio.The OLS analysis was used to establish the empirical relationship between the success of farmers' associations/co-operatives and extrinsic and intrinsic factors. The Logit Model analysis was used to estimate degree/scale of influence of the extrinsic factors on the economic performance indicators. This analysis involved regressing sucrose value/haand profit value/ha against a farm manager's tertiary education and experience level. It also involved regressing the asset value/ha and asset-liability ratio against the education and experience level of the Board of Governors.

3.6 ANALYTICAL FRAMEWORK

3.6.1 Ordinary least squares (OLS) regression model

The OLS was used to determine the relationship between the success of the farmers' association and factors (extrinsic and intrinsic factors) that influence the economic performance indicators. These indicators are used as the measure of success in this study. The measures of success are the economic performance indicators and these include the following; profit, sucrose value, asset value and the asset-liability ratio.

Table 3.1 shows the relationship between both the factors (extrinsic and intrinsic) and success.

Table 3.1: The relationship between success and factors (extrinsic and intrinsic)

Variable	Model	Objective	Expected Outcome
Y_i= Success β_1= Participative D_{2i}= Authoritative D_{3i}= Delegative	$\boldsymbol{Y_i = \beta_1 + \beta_2 D_{2i} + \beta_3 D_{3i}}$	2	All the leadership styles ≈ + influence on success
Y_i= Success b= Not Coherent c_i= Coherent	$\boldsymbol{Y_i = f(b + c_i)}$	2	b ≈ - influence on success c_i ≈ + influence on success
Y_i= Success α_{2i}= Education α_{3i}= Tertiary α_{4i}= Experience	$\boldsymbol{Y_i = \beta_1 + \beta_2 \alpha_{2i} + \beta_3 \alpha_{3i} + \beta_4 \alpha_{4i}}$	2	All extrinsic factors ≈ + influence on success

Source: Author (2011)

3.6.2 The Logit model

In this study of factors influencing the success of small-scale irrigation farmers, the dependent variable was: being successful, or not (success parameters are; financial profit, productivity, accrued assets and solvency) in relation to the farm manager's level of tertiary education and experience, level of education and experience of the Board of Governors.

In OLS the dependent variable (Y) is quantitative and that the independent variable(s) can be a mixture of quantitative and qualitative variables. However,with the logit model analysis we have a qualitative dependent variable with the categories being of a binary/dichotomous or even trichotomous and polychotomous nature. The objective of the OLS is to estimate the conditional expected value of Y: $E(Y_i|X_{1i},X_{2i.....}, X_{ki})$, however, the objective of the logit model analysis is to estimate the probability of something happening hence this model is called the probability model (Gujarati, 2009).

The Linear Probability Model depicts that:

$$P_i = E(Y=1|X_i) = \beta_1+\beta_2X_i \quad (1)$$

Where X is the level of tertiary training of the Farm Manager and Y=1 means earning a financial profit.

With the Logit model:

$$P_i = E(Y=1|X_i) = \frac{1}{1+Exp[-(\beta_1+\beta_2X_1} = \frac{1}{1+Exp\ (-Z)} \quad (2)$$

$Z_i = \beta_1+\beta_2X_i$

Equation (2) is known as the (cumulative) Logistic Distribution Function. Here Z_i ranges from -∞ to +∞; P_i ranges between 0 and 1; P_i is non-linearly related Z_i (i.e. X_i). This therefore satisfies two conditions required for a probability model.

The probability of making a financial profit (success) is given by:

$$P_i = \frac{1}{1+Exp\ (-Z)}$$

Then the probability of not making a financial profit is given by:

$$(1 - P_i) = \frac{1}{1+Exp\ (Z)}$$

Therefore:

$$\frac{P_i}{1-P_i} = \frac{1+Exp(Z_i)}{1+Exp(-Z_i)} \quad (3)$$

$\frac{P_i}{1-P_i}$ is the odds ratio in favour of being successful i.e. the ratio of the probability that an FA or co-operative will earn a financial profit to the probability that it will not make a financial profit.

Taking the log of equation (3) we will get

$$L_i = ln\left[{P_i}/{1 - P_i}\right] = Z_i = \beta_1 + \beta_2 X_1$$

Since the dependent variable is binary (Linear Probability Model) that is to say Y=1 with the probability P_i and Y=0 with probability 1 - P_i. This implies u_i also takes two values:

When Y_i=1, u_i = 1 - β_1 - $\beta_2 X_i$ = 1 - P_i

When Y_i=0, u_i = - β_1 - $\beta_2 X_i$ = -P_i

This therefore means u_i are Bernoulli, not normally distributed. However, the OLS estimators are still unbiased and asymptotically normal (Gujarati, 2009)

3.6.2.1 Estimating the Logit model

Corresponding to each tertiary education level there are N_i FAs or co-operatives among which n_i earn or make a financial profit, therefore:

$$\widehat{P_i} = {n_i}/{N_i}$$

This relative frequency is an estimate of the true P_i corresponding to each X_i. Using the estimated$\widehat{P_i}$, one can obtain the estimated Logit as:

$$\widehat{L_i} = ln\left[{\widehat{P_i}}/{(1 - \hat{P}_i)}\right] = Z_i = \hat{\beta}_1 + \hat{\beta}_2 X_i$$

Table 3.2 shows the relationship between the variables and the expected outcome.

Table 3.2: Relationship between the variables and the expected outcome

Variable	Model	Objective	Hypothesis	Expected Outcome
L = log of Odds of Profits Exper = Experience level of FM Tert = Tertiary training of FM	$\hat{L} = \hat{P}_i / 1 - \hat{P}_i$ $= \hat{\beta}_1 + \hat{\beta}_2 Exper + \hat{\beta}_3 Tert$	1	1	Exper ≈ + influence to profits Tert ≈ + influence to profits
L = log of Odds of Crop Value Exper = Experience level of FM Tert = Tertiary training of FM	$\hat{L} = \hat{P}_i / 1 - \hat{P}_i$ $= \hat{\beta}_1 + \hat{\beta}_2 Exper + \hat{\beta}_3 Tert$	1	1	Exper ≈ + influence to crop value Tert ≈ + influence to crop value
L = log of Odds of Asset Value Edu = Education level of BG Exper = Experience level of the BG	$\hat{L} = \hat{P}_i / 1 - \hat{P}_i$ $= \hat{\beta}_1 + \hat{\beta}_2 Edu + \hat{\beta}_3 Exper$	2	2	Edu ≈ + influence to Asset value Exper ≈ + influence to Asset value
L = log of Odds of Asset-Liability ratio Edu = Education level of BG Exper = Experience level of the BG	$\hat{L} = \hat{P}_i / 1 - \hat{P}_i$ $= \hat{\beta}_1 + \hat{\beta}_2 Edu + \hat{\beta}_3 Exper$	2	2	Edu ≈ + influence to Asset-Liability ratio Exper ≈ + influence to Asset-Liability ratio

Source: Author (2011)

3.6.2.2 Merits of a Logit model

1. Logit analysis produces statistically sound results. By allowing for the transformation of a dichotomous dependent variable ranging from -∞ to +∞, the problem of out of range estimates is avoided.
2. The Logit analysis provides results, which can be easily interpreted, and the method is simple to analyse.
3. It gives parameters which are asymptotically consistent, efficient and normal, so that the analogue of the regression *t*-test can be applied.

3.7 SUMMARY

This chapter described in detail the methodology used to carry out the determination of the economic performance factors. The enquiry strategy was discussed in-depth; it provided clarity on why this study dwelt onthe extrinsic and intrinsic (human) factors. The research design illustrates that this is a descriptive empirical research, which is basic/fundamental. This study used primary data to statistically test the postulation formulated at the study's conception. Data was collected using well-constructed and structured questionnaires. Boards of Governors and SWADE officials were interviewed on separate occasions. Data was analysed using descriptive statistics and a Logit Regression Model.

The succeeding chapter presents the results and findings obtained from the analysis. It also provides explanations and justifications of the results.

CHAPTER FOUR

DESCRIPTION AND OVERVIEW OF THE KDDP IRRIGATION SCHEME

4.1 INTRODUCTION

This chapter dissects KDDP in detail, from its conception to where it is thus far. This entails a discussion of all the stakeholders that played key roles in making KDDP what it is to date. The structure of the farmers' associations and co-operatives is discussed in detail, this also help to comprehend the nature and uniqueness of the KDDP.In conclusion, this chapter pays particular attention to exploring the economic performance indicators.These indicators are often referred to as the success indicators. The exploration of KDDP provides a clear picture of where it is with regards to achieving its objects through a comprehensive discussion of the indicators.

In Swaziland, prominence has beengiven to large-scale commercial irrigation enterprises operated by multinational companies. However, there have been a number of attempts by the government to develop smallholder irrigation schemes (Funnell 1994:7). Lankford (2001:8) echoes these sentiments by stating that cultivatable land in the country is approximately 200 000 ha yet 60% of this land is under the control of large-scale companies. Conversely, with reference to both land and water resources the irrigation development potential drops to 90 000 ha (40 – 65% of the total cultivatable land). 65 000 to 69 000 ha in the country is currently under irrigation most of which is taken up by sugarcane and citrus production. This land is typically found in the Lowveld where the three major sugar estates and mills (Mhlume, Simunye and Big Bend) are located. These three estates have a total catchment of 43 000 ha, nearly 85% of Swaziland's total irrigated land.

Change in policies through the National Development Strategy of 1997 allowed the country to initiate projects like the KDDP and LUSIP to tap into the irrigation potential

(which currently stands at 53%) of the country. The purpose was to increase the contribution of the rural setting to the country's GDP.

4.2 BACKGROUND OF KOMATI DOWN-STREAM DEVELOPMENT PROJECT

The Komati Basin Development Project (KBDP) was conceived in the early 1980s to control and store part of the peak flows of the Komati River, thus providing a reliable source of water for irrigation development in Swaziland and South Africa. The total area covered by KBDP is 75 000ha. Swaziland's contribution to this massive project includes:

a) The construction of Maguga Dam (the cost of construction of the dam was shared 60/40 between South Africa and Swaziland respectively).The construction was completed in 2001;

b) The initiation of the 7 400ha irrigation scheme called Komati Down-stream Development Project (KDDP);

c) The refurbishing and expanding the Mhlume Sugar Mill (owned by the Royal Swaziland Sugar Corporation (RSSC)) to cater for the increased sugar output in the area. The expansion was done with RSSC's own funds (Terry, 2007).

The African Development Bank (ADB) was the prime funder of the KBDP since it provided a loan of 80 million US Dollars (400 Million Emalangeni or 400 million Rands)[8] to the Government of Swaziland to resettle people, construct the dam and provide other necessary infrastructure. 70 million US Dollars (350 million Emalangeni or 350 million Rands) was acquired from the local banking institutions to develop the irrigation project (SWADE, 2005).

One of the pivotal aspects that prompted the Government of Swaziland to initiate this project was the highly skewed income distribution in the country. Approximately 40% of the rural inhabitants live in absolute poverty; on the same note the contribution of Swazi Nation Land (SNL) which is Customary Tenured Land (CTL) to the Gross Domestic Product (GDP) was found to be minimal (less than 5%). The Government

[8] SZL1.00 = ZAR1.00

of Swaziland through the National Development Strategy of 1997 planned to minimise the structural gap between Title Deed Land (TDL) and SNL by initiating projects to enable and encourage the commercialisation of small-scale agriculture or smallholder farmers (MOAC, 2008).

4.3 BRIEF DESCRIPTION OF CHARACTERISTIC OF THE PROJECT AREA (KDDP)

The Komati catchment area stretches through Swaziland, South Africa and Mozambique. The catchment consists of the Komati River system (including its tributary the Lomati River); it rises from the Drakensburg range near Carolina a town in the Mpumalanga Province of South Africa. It cuts through the Northern region of Swaziland before joining the Crocodile River in South Africa (Nkhomo and van der Zaag, 2004).

Location: The KDDP area is located on the lower side of the Komati River in the Northern part of the country (Hhohho region). This area is roughly 150km from the capital city Mbabane. The area covered by the project is in excess of 7400 ha and is situated at the following communities; Nkambeni, Sihhoye, Mangweni, Mpofu, Nyakatfo, Sidwashini Madlangemphisi, Manjengeni and Nhlanguyavuka (MOAC, 2008).

Climate: The area under which the project is undertaken is in the Lowveld, thus the annual temperature ranges from 5°C - 45°C, the annual mean rainfall ranges from 450 – 700mm and the mean annual evapo-transpiration is 2070m.

Vegetation: the area has sweet grass veld suitable for rearing livestock, and a thorny bushveld of mixed trees (basically a bush savannah) with mainly Acacia species. Forests and woodlands are also found in these areas.

Soils: The soils in the area are moderately well drained; to a certain extent shallow sandy clay soils composed of basalt and dolerite predominate. They have a medium

pH and the topography is moderately flat to slightly sloppy. They also have good water holding capacity and good infiltration rates.

Figure 4.1 below is a map of the study area (KDDP); it shows the location of each and every FA or co-operative. It also shows what is produced under KDDP besides sugarcane.

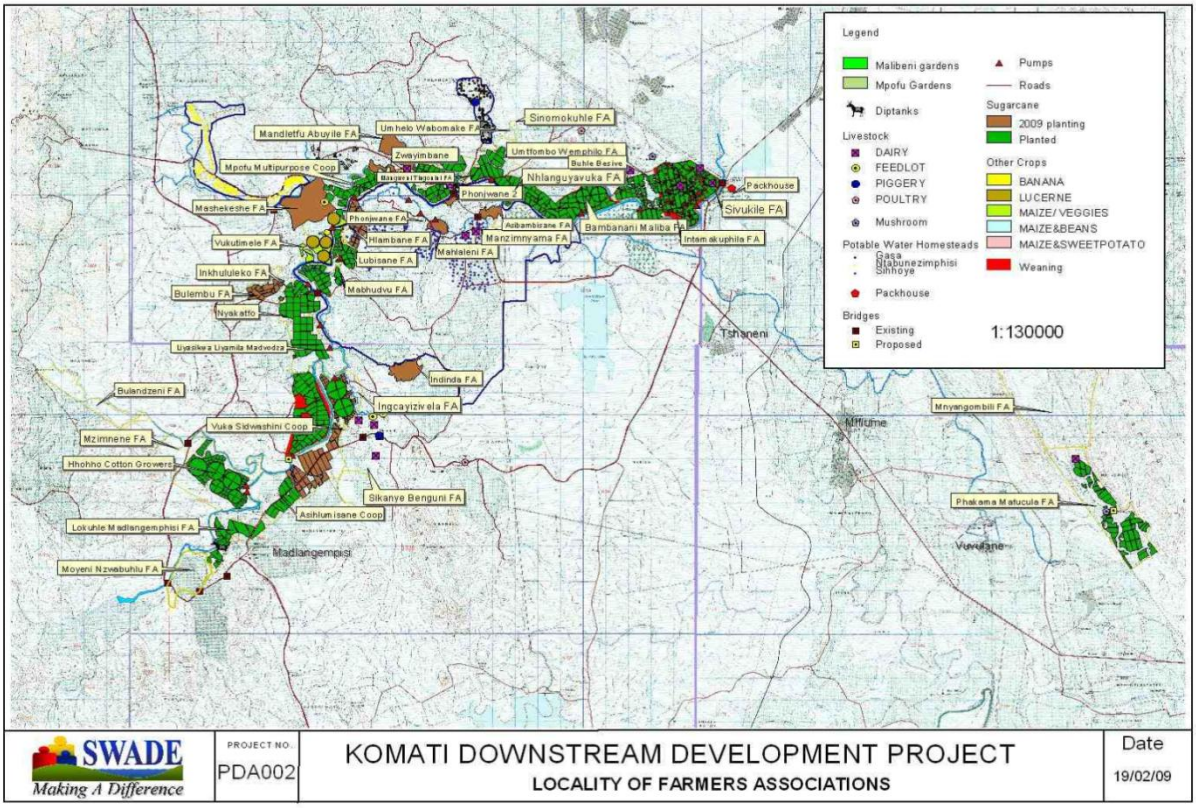

Figure 4.1: Map of KDDP

Source: SWADE (2009)

Project Beneficiaries: there are about 2600 families/households with approximately 15 300 people. The communities where these people come from are relatively poor with most of the youngable adults migrating to town and to the nearby sugar estate (Mhlume) for employment. About 20% of these farmers (head of households) are females (Terry and Ryder, 2007).

4.4 PRINCIPAL ACTORS INKDDP

There are various institutions that were and some are still involved in making KDDP achieve its objectives.These institutions were and are involved at different stages of the project. Below is a brief description of how each institution played or plays a role in KDDP.

4.4.1 The Government of Swaziland

Government ministries playeddifferent crucial roles in contributing to the success of KDDP. The Ministry of Agriculture and Co-operatives through the Department of Land Use Planning surveyed the land where the inhabitants of Maguga were to be resettled; they also did the land sustainability assessment. The Co-operatives Department was greatly involved in supporting the farmers to form farmers' associations and co-operatives. Training of these farmers was done by the Extension Services Department. The Ministry of Natural Resources and Energy was greatly involved in the construction of the dam and policy formulation on the use of the water resources. The Ministry of Public works built the houses, schools, roads and other necessary infrastructure for the resettled families (SWADE, 2005).

4.4.2 Swaziland Sugar Association (SSA)

The sugar industry is controlled by SSA through an Act of Parliament of 1967. It comprises of the millers and the Sugarcane Growers Association. SSA controls and regulates the marketing rights of raw sugar; it also promotes the interests of the industry. One of its duties is to award sucrose quota contracts to prospective sugarcane growers, the other major duty is that it makes recommendations to the Minister of Economic Planning, Enterprise and Employment on the millers that should receive their licences. With KDDP they provided all these plus extension services on irrigation engineering (SSA, 2001).

4.4.3 The Royal Swaziland Sugar Corporation (RSSC)

RSSC is the designated miller for all the sugarcane produced by the KDDP farmers' associations and co-operatives. It provided financial management assistance i.e. budget and cash-flow preparations, farm expenditure reviews and approvals. Another vital point is that it works hand in hand with financial institutions that provided loans to the farmers' associations and co-operatives to provide a stop-order payments-arrangement. Under this arrangement, RSSC is authorised by SSA (since SSA owns raw sugar) to deduct the due premiums from the sucrose quota sales of the farmers' associations and co-operatives and pay them to the banks (SWADE, 2007).

4.4.4 Credit providers

Credit providers for the farmer associations and co-operatives in KDDP include Banking Institutions (BI) i.e. Swazi Bank and Nedbank; Non-Bank Financial Institutions (NBFI) i.e. Swaziland Development Financial Corporation (FINCORP) and Non-Bank Development Financial Institutions (NBDFI) i.e. Swaziland Industrial Development Company (SIDC). They provided both the capital and operational loans to the farmers' associations and co-operatives (KOBWA, 2007).

4.4.5 Swaziland Water and Agriculture Development Enterprise (SWADE)

SWADE is a company that is wholly owned by the Swaziland Government; it is controlled and monitored as a public enterprise in terms of the Public Enterprise Control and Monitoring Act of 1989. The Minister of Agriculture appoints the Board of Directors whose mandate is to be responsible for the overall policy direction. The Government of Swaziland authorised SWADE to facilitate the planning and implementation of the KDDP and LUSIP (Lower Usuthu Smallholder Irrigation Project) and any other large water project that may be assigned from time to time by the Government.

The main role that is played by SWADE is to be the facilitator rather than being the manager of the projects that are implemented at community level.This ensures that these communities take full control and ownership of their projects. SWADE is composed of a multi-disciplinary team of advisors and trainers who enable beneficial national development and community integrity in the project development areas.

SWADE has two broad national objectives that it seeks to fulfil namely; (1) promoting participation of smallholder farmer organizations in integrated agriculture and development of other enterprises as part of poverty reduction programmes for rural areas; and (2) enhancing private sector development through the active participation of Small and Medium Enterprises (SMEs) in agricultural development (SWADE, 2009).

4.5 FARMERS' ASSOCIATIONS AND CO-OPERATIVES IN KDDP

Farmers' associations are non-governmental collective organizations that are formed to exploit production and managerial economies of scale, overcoming market entry barriers, reducing transaction costs and cultivating supply chain relationships. In KDDP, SWADE promotes the participation of smallholder farmers in the irrigation scheme by facilitating the formation of farmers' association. There are seventeen farmers' associations and co-operatives in KDDP namely; Mabhudvu, Sivukile, Ayandza, Umtfombo, Nhlanguyavuka, Bambanani, Lubisane, Mangweni, Inkhululeko, Ntamakuphila, Ingcayizivele, Mafucula and Madlangempisi (farmers' associations), Buhle Sesive, Mpofu, Vuka Sidvwashini, and Asihlumisane (co-operatives). Some of these farmers' associations and co-operatives have more land than that allocated for sugarcane, so they use the rest for other crop production i.e. maize, vegetables and fruits. In this study, farmers' association and co-operatives will be used interchangeably.

Table 4.1 below shows the main characteristics of the Boards of Governors (all members of the Board)as well as details of the farm manager and the land sizes. The diversity of their crops is not highlighted because the main crop in contention is

sugarcane. For ethical research reasons each farmers' association is allocated a number by the author to protect its identity.

Table 4.1: Farmers'associations, farm manager'squalifications andexperience level andland sizes

FA no	Land Size (ha)[9]	Yield: Sucrose value/ha (SZL)	BoG's average Education Level (yrs)	Farm Manager's Qualification	Farm Manager's Experience Level (yrs)
1	174.6	9,556.45	9.4	Junior	14
2	297.1	13,053.19	11.2	Senior	14
3	105.4	14,280.87	10.8	Senior	12
4	144.6	18,878.31	9.4	Junior	18
5	142.8	5,022.57	8.6	Junior	15
6	46.3	9,264.25	8.4	Junior	18
7	226.1	14,444.65	8.0	BSc degree + Senior	18
8	202.2	7,624.52	8.5	Junior	13
9	298.8	7,620.11	8.8	Junior	15
10	334.0	14,527.60	8.2	Diploma + Senior	22
11	194.4	5,890.13	7.6	Senior	16
12	162.4	16,395.17	8.4	Diploma + Senior	22
13	209.8	16,826.50	8.9	Senior	16
14	98.9	3,462.46	6.7	None	15
15	164.9	3,020.88	7.1	None	14
16	351.0	3,219.78	6.4	None	15
17	106.2	7,608.43	6.6	Junior	13

Source: Author (2011)

Theformation of farmers' associations was solely meant to attain collective action in the communities; that includes pooling of land, skills and labour for the purposes of meeting the members of the scheme's general needs. With the direct participation and co-operative efforts of farmers, their objectives include the following:

- To promote the farmers economic and social interest.
- To advance their intellectual and technical status.
- To increase their production and income (exploiting production and managerial economies of scale).
- To improve their living standards
- To develop the rural economy and social well-being of the farming community as a whole through the direct participation of the farmers.

[9] Land area under irrigated sugarcane production

The prime purpose of the farmers' associations and co-operatives is to operate irrigation farms as profitable businesses in the project area. Upon formation the farmers' associations and co-operatives acquired land from local chiefs; they are also holders of water rights. They are constituted under the laws of Swaziland as legal entities. The farmers' associations were formed in different ways, some were incorporated into a normal company such that all the members have equal shareholding, and some were formed into co-operatives. The sizes of the farmers' associations and co-operatives differ both in membership size and land size (ha). The land size allocated to them ranges from 100-400ha depending on the household numbers/farmers in each farmers' association or the hectares owned by each farmer in the farmers' association.

4.5.1 Board of Governors of a farmers'association

The Board of Governors is the highest authority of the farmers' associations and co-operatives. The Board is elected by the general assembly (all members) every two or three years depending on the constitution of the farmers' association or co-operative. The powers and duties of the Board include hiring a competent and qualified farm manager, screening membership applications, strategic planning, policy formulation, budgeting, internal auditing (with the help of SWADE officials), and annual reporting. They also look critically at environmental issues. The Board consists of the chairperson, vice-chairperson, secretary, vice-secretary, treasurer, two additional members and an environmental officer.The Board has two ex-officio Members: the farm manager and office clerk (SWADE, 2005). According to most of the constitutions of the farmers' associations and co-operatives, the Board must meet once every month.The members also get travelling and sitting allowances.

The demographics within the farmers' associations show that 88% of the membership is above 30 years of age. The general characteristics of the leadership of the seventeen farmers'associations and co-operatives in the study area are presented in table 4.2. The structure of the Board conforms to that used in Small-Medium Enterprises (SMEs) in Swaziland and other SADC countries (MOAC, 2008).

The Small Growers Associations or rather farmers associations that produce sugarcane in Kenya also use a similar structure (ISO, 2008).

Table 4.2: Board of Governors'characteristics of farmers'associations and co-operatives in KDDP

Characteristics of the Board	Average values (n=17) SD
Females (percentage)	40.6 % (1.34)
Males (percentage)	59.4% (1.20)
Female Chairpersons (%)	11.8% (2.67)
Female Vice-Chairpersons (%)	29.4% (1.95)
Age of the Board (years)	46.5 (2.54)
Education Level (years)	8.4 (1.34)
Experience Level (years)	12.8 (2.25)
Working Members (%)	65.3% (1.33)

Values in parenthesis are standard deviations.

Source: Author (2011)

From the seventeen farmers' associations and co-operatives, there are 170 Board members of which 40.6% are females. Approximately 12% of the farmers' associations and co-operatives are chaired by women, 29.4% of the farmers' associations and co-operatives have women as vice-chairpersons. There is also one female Farm Manager out of the seventeen surveyed. The sugar industry in Sub-Saharan Africa has been a male-dominated industry (ISO, 2008), this statement is echoed by the findings in both this study and that carried out by Swaziland Sugar Association (2008) where it was found that approximately 90% of smallholder farmers' associations and co-operatives were headed by men. It goes without saying that the slight increase in the involvement of women in the sugar industry is highly commended. The policy on SMEs in Swaziland also state that women must have equal opportunities to own or lead business enterprises (MEPD, 1997). Terry (2007), states that the ability of women to join farmers' associations and co-operatives is a major step forward in what has traditionally been a strongly patriarchal society. The involvement of women in agricultural business enterprises is vital, let alone allowing them to be at the helm of the business. Lankford (2001) noted that in other countries in Sub-Saharan African production increased by approximately 20% when women were included or involved in agriculture.

The mean education level of all members of the Boards of Governors was found to be 8.4 years.This is equivalent to the Swaziland Primary School Certificate because it takes seven years for a pupil to complete primary education (grade one to grade seven). This actually goes hand in hand with the statistics expressed by Lankford (2001); he states that Swaziland's illiteracy (as a percentage of the population above 15 years old) is 23% compared to the 42% of other Sub-Saharan African countries. The relatively low literacy level of the Boards of Governors might be a de-motivating factor for the adoption of new technology, let alone the comprehension of the technical training that is made available to them. The implication of the low level of education of the Board members can be noted through the jobs they are employed to do within the farmers' association or co-operative; a majority of those employed (65.3%) are labourers. The relative importance of education of the members of a Board of Governors is clearly stipulated in the National Development Strategy of the country (MEPD, 1997); where the minimum level of education of SME Boards is Secondary school education (12 years).

The average age of themembers of Boards of Governors is 46.5 years; at this age it becomes tougher to comprehend new and advanced innovations.This is also worsened by the fact that the level of education of the farmers does not meet the required level for an SME. This may have a huge bearing on the success of the farmers' association and co-operatives because the Boards of Governors have a tough time grasping what is taught to them by the RSSC and SWADE technical officers thus, they cannot implement everything optimally. However, it is worth noting that what the Boards lack when it comes to the sugarcane business enterprise they compensate for by the high level of experience they have in the field (12.8 years on average). This experience is drawn from the fact that KDDP is located in the Sugar belt of the country, so most of the board members were formerly employed by the large-scale sugarcane companies.

The provision of technical training to the Board of Governors is one of the vital pre-conditions towards establishing commercial sugarcane enterprises (Terry, 2007). This is also emphasised in the Swaziland National Development Strategy (MEPD, 1997). This training is aimed at improving production efficiency, business decision-

making and the Boards' ability to take well-calculated risks. All of these, when synchronised smoothly aid the farmers' association or co-operative to attain profit maximization which consequently results in the long-term success of the enterprise.

4.5.2 The farm manager of a farmers'association or co-operative

The farm manager is supposed to be a college graduate with at least a junior certificate in sugarcane production (seeTable 4.1). The manager is hired by the Board of Governors with the concurrence of SWADE. He/she is responsible to the Board of Governors for the operations and management of all business and service activities in accordance with the policy making body. The farm manager prepares monthly and annual service plans, budgets for the approval of the decision making bodies (the Board of Governors and membership) and is responsible for executing the resolutions made by these bodies.

The farm manager has the power and duties to hire and fire the working staff of the organization. The manager specifically deals with formulating operational plans from the strategic plans and then implementing them. Both the farmers' associations and co-operatives are governed by a constitution specifically drawn by the Board members in a general assembly with the assistance of SWADE officials (Terry, 2007). In previous settings, the farm manager was one of the community members and also part of the membership of the farmers' association. Most of them worked at RSSC as team leaders, therefore they had adequate experience in sugarcane production but they did not have the qualifications. SWADE facilitated for them to attend training in Durban (South Africa) so that they could acquire a junior certificate in sugarcane production. Some of these managers have gone a step further to also get a senior certificate in sugarcane production over the years. SWADE has changed the hiring policy of the farm managers over the past two years; the farm manager does not necessarily need to be a member of the association but he/she must have appropriate experience and at least a diploma in agriculture coupled with any other certificates in sugarcane production.

4.5.3 Technical training of the Board of Governors

The training that is provided by SWADE to all the farmers' associations and co-operatives aids them to understand and manage the biophysical, social and economic impacts that the development has on their lives. The training courses initially focused on communication skills, leadership roles, potential for sugarcane as a commercial enterprise, environmental awareness, business understanding and constitutional issues. However, both specific content and direction of the courses is determined by the needs of the communities. Training also includes agronomic training on sugarcane production and operations and management of the irrigation system. The sprinkler irrigation system is the one which is commonly used (about 95% of the farmers' associations and co-operatives use this system) (SWADE, 2007).

Figure 4.2 below shows the organogram of the farmers' association and co-operative in KDDP.

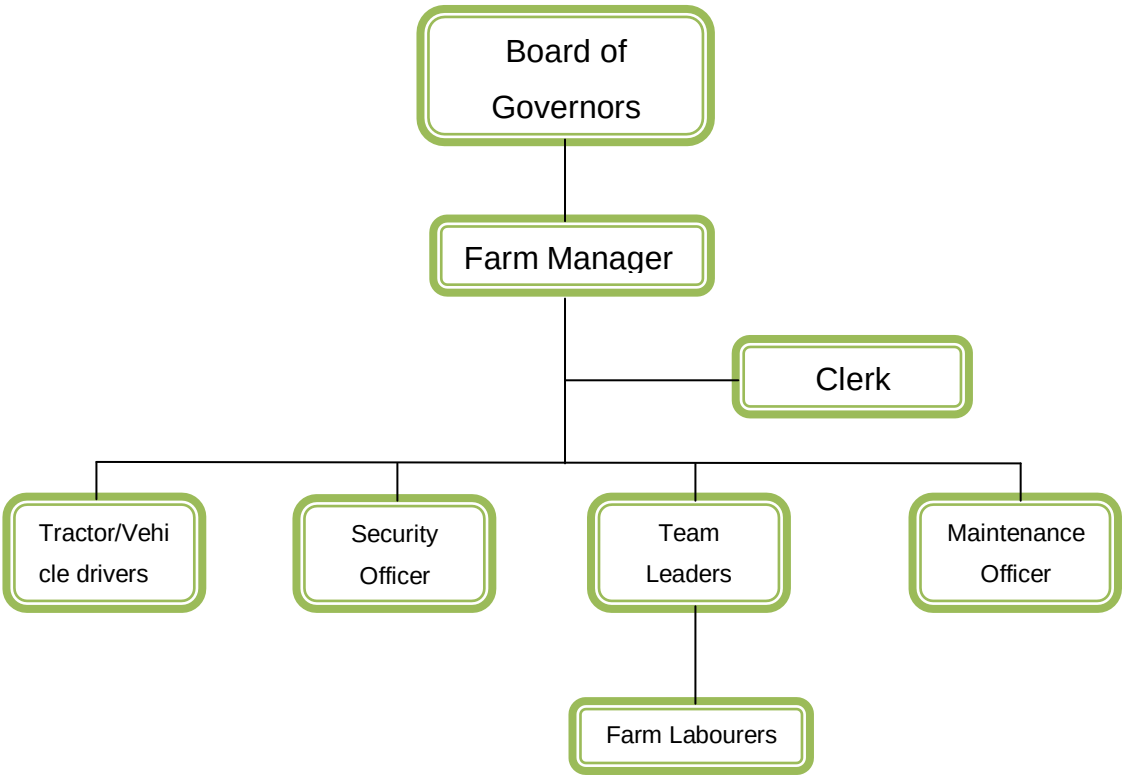

Figure 4.2: The structure of a farmers'association/co-operative

Source: SWADE (2005)

4.6 FACTORS INFLUENCING THE VIABILITY OF THE FARMERS' ASSOCIATIONS AND CO-OPERATIVES IN KDDP

When an enterprise is able to meet its financial and operational obligations it is said to be a viable enterprise because it can sustain itself. There are quite a number of factors that influenced the viability of the scheme and these include investment cost, market factors, operational costs, production levels and turnaround time.

4.6.1 Investment costs

The investment costs consist of development cost and the cost of financing. The development costs comprise land preparation and irrigation technology installations. Since the farmers' associations and co-operatives use different irrigation systems (i.e. dragline, semi-permanent and centre pivot systems) this implies that they need high pressure water for efficiency hence they need to invest in pumping equipment. The finances are provided by the financial institutions listed in sub-section 4.4.4. The interest rates charged are linked to the prime rate, with some charging up to a 3.5% premium above the prime rate because of a lack of collateral (SWADE, 2009).

4.6.2 Market

KDDP farmers' associations and co-operatives have a ready market in Mhlume Mill (one of the two RSSC Sugar Mills) but there are factors associated with the market that influence business viability i.e. the distance from the miller and the sucrose price.All the farmers' associations and co-operatives in KDDP are within a 50km radius from the mill. A distance of less than 60km is considered a viable distance from the mill and the mill subsidises the cost of hauling cane beyond this distance. In the free market, market forces determine the price butin the sugarcane industry the buyer sets the price.Currently the price of sucrose stands at SZL1 900 and it is forecast to increase (SSA, 2007).

4.6.3 Operationalcosts

The major operational costs in the production of sugarcane are labour, electricity, fertilizer, haulage and harvesting. In 2010 the cost of production/ha stood at SZL22 000. Harvesting and haulage are the major costs of production accounting for 35% of the total operational cost.Fertilizer takes 21%, and electricity takes 17% but these are expected to rise as high as 25% in the next couple of years. Labour islowest cost factor accounting for 12% (SWADE, 2009).

4.6.4 Production levels

Sugarcane production requires high yields in order for a business to cover all its costs. On average the KDDP farmers' associations attain yields ranging from 98 to 104 tons cane/ha (TCH) and 13.62% to 14.7% sucrose. This is significantly higher than the large-scale enterprises whose average yields are 93 to 98 tons cane/ha (TCH) and 12.33% to 13.58%.

4.6.5 Management team capacity

The aim of the scheme is to empower the shareholders with business management skills. Most of the smallholder farmers had no sugarcane husbandry skills save for the ones who worked at RSSC. SWADE empowered these farmers through technical training. The farm managers also did not have sugarcane husbandry qualifications but were trained and mentored by SWADE and were also sent to South Africa for evaluation and more training.

4.6.6 Turnaround time

A comprehensive number of farmers' associations and co-operatives were developed in phases. Some of them had to delay planting which resulted in foregone revenues.

This impacted negatively on the cash-flows of the farmers' association and co-operatives, thus influencing their viability negatively.

4.7 SOCIO-ECONOMIC PROFILE KDDP

4.7.1 Demographics

The Project Development Area extends over 27 000ha and is home to 22 000 people with 15 300 of them being direct participants in the project. The farmers' associations and co-operatives under KDDP are composed of 2600 households. 61% of these homesteads are male-headed households and the rest are headed by females. This area is predominantly Swazi Nation Land (rural area). The area consists of the following rural communities: Nkambeni, Sihhoye, Mangweni, Mafucula, Mpofu, Nyakatfo, Sidwvashini, Madlangempisi, Manjengeni and Nhlanguyavuka (SWADE, 2009). The area is characterised by high rates of urban migration especially for the young-able adults (18 – 35 years). The migration is perpetuated amongst other factors by poor education facilities and job opportunities in these communities (CSO, 2008). In these communities there are two extremes when it comes to the age groups found: there are children (0 – 16 years), these account for 28% of the population and then there are adults (38 and above) accounting for 63% of the population (CSO, 2008).

4.7.2 Economic production in KDDP

The main economic sector in this area is agriculture; it contributes 80% to the GDP of the area with the remaining 20% coming from remittances from family members working in the urban areas of the country (SWADE, 2009). The agriculture sector is mainly supported by the irrigation scheme, which in turn is the main contributor to employment (Terry, 2007). Terry and Ryder (2007) emphasised that irrigated agriculture (irrigated sugarcane production) is the economic pillar for the area, 85% of the irrigation water is allocated to sugarcane production and the rest is apportioned

between maize and vegetables. The commercial transition of these subsistence farmers came at a price because most homesteads became food insecure. This prompted SWADE to encourage each homestead to set aside 0.5ha for the production of both maize and vegetables. This innovation has prompted 80% of the homesteads to grow vegetables and fruits compared to 20% before the commencement of the scheme. Fifty-two percent of the farmersproduce two crops of maize per year with 19% producing three crops. Twenty-five percent more farmers are now self-sufficient in maize than before the project started (SWADE, 2009).

The sugarcane produced by all the farmers' associations and co-operatives is taken up by the Mhlume Sugar Mill (owned by the Royal Swaziland Sugar Association). The fruits and vegetables are sold to local markets and the two main cities (Mbabane and Manzini). Surplus maize is sold to the Swaziland National Maize Corporation.

4.7.3 Economic performance indicators of the KDDP irrigation scheme

There are six thematic indicators of importance to assess the economic performance of small-scale irrigation in KDDP. These indicators include the following: institutional framework, water resource utilization, irrigation area, irrigation technology, agricultural productivity, and lastly poverty and food security. Discussion of the indicators ensues below, with each being dissected both at country and KDDP level.

4.7.3.1 Institutional framework indicators

Before 2003, Swaziland had quite a number of water policies that governed the management and use of water:the Fresh Water Act of 1938, the Water Act of 1967 and the Komati River Basin Water Resources Development Act of 1992. These Acts operated concurrently up until the Water Act of 2003 was passed by Parliament (Manyatsi, 2005). This Act allowed the appointment of a Water Appointment Board which in turn facilitated water management organizations like Swaziland Water and Agricultural Development Enterprise (SWADE). SWADE is a specialised agency for water level managementin the Komati basin and Usuthu basin. This agency

facilitates in part the management of Maguga and Libovu Dams (SWADE, 2007). The country also has an irrigation strategy derived from the National Development Strategyof 1997, this translated into an action plan which encompassed the initiation of irrigation projects like KDDP and LUSIP.

Within KDDP the formation of farmers' associations and co-operatives depicts the rolling out of the action plan into an operational plan. These farmers' associations and co-operatives elected Boards of Governors whose duties include strategic leadership and governance. These farmers' associations and co-operatives are supported by the local political leadership of chiefs and local royal councils (SWADE, 2005).

4.7.3.2 Water resource utilization indicators

In Swazilandthe total water withdrawals as a percentage of the total actual renewable water resources is 23.1% and 97% of this water is used for irrigation purposes. This indicates that irrigation is used in this country as a development tool (Svendsen et al., 2009). In KDDP water use efficiency amongst farmers' associationshas been increasing throughout the years.In 2010 it was found to range between 88% - 92%. 98% of this water is used for sugarcane production and the rest to irrigate other crops (SWADE, 2009).

4.7.3.3 Irrigation area indicators

The total irrigation equipped area/cultivated area in the country is 26% (Svendsen et al., 2009) while that of the KDDP is 68% (SWADE, 2009). The irrigation equipped area that is actually irrigated in the country is 90% while it is 100% for KDDP. The average rate of irrigation growth in Swaziland has been4% in the past decade (2000 – 2010) while for KDDP it has been steady at 20%. In the KDDP area, the asset value in each of the farmers' associations and co-operatives has been accruing and the asset-liability ration has been increasing as well. This therefore depicts that irrigation has impacted the area positively.

4.7.3.4 Irrigation technology indicators

In Swaziland, the area equipped for pressurised irrigation is 48% with local irrigation taking a share of 6%, sprinkler irrigation a share of 42% and surface irrigation taking 52%. In KDDP the area equipped with pressurized irrigation is 100%, local irrigation takes a share of 0.2%, sprinkler irrigation takes a 98% share and surface irrigation takes 1.8%. There are two farmers' associations that have adopted the use of centre pivot irrigation, this goes to show that they are advancing in the technology they are using (SWADE, 2009).

4.7.3.5 Agricultural productivity indicators

The value of irrigated output as a share of total agricultural output in Swaziland is 76% whilst in the KDDP it is 100%. The ratio of the value of irrigated output to rain-fed output is 2.52 (Svendsen et al., 2009). In the project area there is no rain-fed production. The yields of the farmers' associations have been increasing notably hence their profits have also been increasing. The quality of the farming system at KDDP has been increasing over the years because of the efficiency in the use of the irrigation technology. The quality of the products is very high because the millers set the quality standards to be cross-cutting for all producers contracted to them. The yields attained by the farmers' associations and co-operatives have been found to be higher than those of large-scale growers (98 – 104 tonnes cane/ha (TCH), 13.6 – 14.7% of sucrose).

4.7.3.6 Poverty and food security

Poverty head-count ratio at national level is 69% and rural poverty head-count ratio is 75% (Svendsen et al., 2009). With the launching of the KDDP irrigation scheme, poverty has plummeted from 75% to less than 40%. The economically active population in agriculture in the country is 32% while in KDDP it is 90%. The agricultural value to national GDP stands at 18% while value to the local (KDDP)

GDP is 85%. Annual agricultural growth stands at 7% at national level whilein KDDP it stands above 60%. In KDDP 80% of the families in the irrigation schemes are food secure compared to the 20% that it was before the commencement of the scheme (SWADE, 2009).

4.8 SUMMARY

KDDP was conceived by the Government of Swaziland to reverse the skewed income distribution in the country. The aim was to increase the contribution of the rural settings to the GDP of country through the commercialisation of smallholder irrigated agriculture production. Consequently this would lead to improved food security for the project area. 7400ha of land was set aside for the irrigation project sourcing water from the Maguga Dam. This dam was constructed in a 60/40 partnership with the Government of the Republic of South Africa.

About 2600 families (22 000 people) live in the project area. There are 15 300 people directly involved in the project. There are several institutions that were greatly involved in the project and these include; the Government of Swaziland through the variousMinistries, Swaziland Sugar Association (SSA), Royal Swaziland Sugar Corporation (RSSC), credit providers and SWADE. The smallholder farmers in the project area pooled their resources and formed farmers' associations and co-operatives through the guidance of SWADE. Their prime objective was to improve the standard of living of the membership of the farmers' association and co-operatives by running profit-making enterprises. Each farmers' association and co-operative was required to democratically elect the Board of Governors that would govern and strategically lead the organization.

The socio-economic profile of the project shows that the average age is above 30 years mainly because of urban migration of the young-able bodied adults. This is also reflected on the average age of the Board of Governors which is 46.5 years. The main economic sector in the area is irrigated agriculture; it contributes 80% to the GDP of the area. The main thriving enterprise is commercial sugarcane production.

The economic performance indicators of the irrigation scheme include the institutional framework of the country and project area, water utilization, irrigation technology, agricultural productivity and lastly, poverty and food security.The dissection of the economic performance indicators leads to the full comprehension of where the Komati Downstream Development Project is at with regards to attaining its intended aims and objectives.

The succeeding chapter dwelled in detail on the disparities on the indicators amongst the farmers'associations and co-operatives, analysing relationship between success and the factors influencing the economic performance indicators.

CHAPTER FIVE

FACTORS THAT IMPACT THE ECONOMIC PERFORMANCE INDICATORS OF SMALL-SCALE IRRIGATION IN KDDP

5.1 INTRODUCTION

According to Stevens (2007) there are three interlinking dynamics that affect small-scale irrigation farming; environmental factors, resources and human behaviour (these are described in Chapter 3 section 3.2). Both the environmental factors and resources fall under extrinsic factors while human behaviour falls under intrinsic factors. Intrinsic factors are the ones that are within the control of the farmers' associations while the extrinsic factors that cannot be controlled by the farmers' associations. This chapter discusses the above-mentioned factors in detail and it also scrutinizes the relations between these factors and the economic performance indicators.

In the context of the Komati Downstream Development Project it is imperative to state that not all the discussed factors influence the disparities amongst the farmers' associations and co-operatives. This therefore implies that the detailed analysis of the relationship between these factors and success will be narrowed down to the factors that differ amongst the farmers' associations or co-operatives. The analysis will encompass a correlation test (between the factors and the economic performance indicators) and the Ordinary Least Squares regression analysis to deduce the relationship between the success of some of the farmers' associations and the identified factors.

5.2 SUCCESS FACTORS FOR THE COMMERCIALISATION OF FARMERS' ASSOCIATIONS

Table 5.1 depicts all the factors that influence the commercialisation of farmers' association and co-operatives in KDDP.

Table 5.1: Extrinsic and intrinsic factors impacting on the performance of farmers' associations

Extrinsic Factors		Intrinsic Factors
Environmental	Resources	
Land tenure Local politics Culture/tradition Topography Soil texture and structure	Irrigation technology Water use license Land area (hectares) Financial support Extension services Technical training Sucrose quota Production inputs Infrastructure Education (tertiary education) Experience	Leadership skills (management styles) Group coherence Perceptions and needs

Source: Author (2011)

5.2.1 Environmental factors

The environmental factors that impact small-scale irrigation in KDDP are listed as follows: land tenure, local politics (leadership structures), topography, nutritional content and type of the soil, and culture.

KDDP is on Swazi Nation Land.Under this tenure the land is under the control of hereditary chiefs. It is often referred to as Customary Tenured Land (CTL). This land is held in trust for the nation by His Majesty King Mswati III and managed by the chiefs. With this type of land tenure the smallholder farmers do not have title to the land they are allocated. All the farmers' association are subject to this tenure.Despite the fact that they do not hold title to the land they were able to acquire all the support structures to commercialise their enterprises. The chiefs have royal councils that help them to govern the land bestowed on them. The customs and culture of the area is the same across the country, the people follow the spirit of "Ubuntu". The terrain is relatively flat to gently sloping with moderately well drained soils. The soil is composed of basalt and dolerite.

It worth stating that all the environmental factors discussed above are cross-cutting to all the farmers' associations and co-operatives because they are all located in the

same environmental loci. This means that they impact the farmers' associations and co-operatives in relatively the same way. This nullifies or minimises the chances of discrepancies in success being caused by variation in these factors.

5.2.2 External resources factors

The resources available and accorded to the farmers' associations include the following: irrigation technology, water use licence, land area, financial assistance, extension services, technical services, sucrose quota, production inputs, infrastructure, education and experience.

The formation of the irrigation scheme allowed the farmers' associations to access some of the resources through the aid of SWADE. These resources include the following: technical training from Swaziland Sugar Association, SWADE and RSSC, financial assistance from Swazi Bank, Nedbank, FINCORP and SIDC, extension services from MOAC, SSA and RSSC, and water licenses and irrigation technology from SWADE. The land area accorded to all the farmers' associations and co-operatives is in accordance to the membership size. Education and experience is attained individually. This therefore implies that the smallholder farmers have varying degrees of education and experience levels.

Since all the resources except education and experience accorded to the farmers' associations and co-operatives are similar,this implies that they cannot be the cause of the major discrepancies in the success of the farmers' associations and co-operatives. In retrospect, it is imperative to note that education and experience can have an influence on some of indicators of economic performance of the farmers' associations and co-operatives.

5.2.3 Human behaviour factors

The human behaviour factors encompass the leadership style (management style) of the Board of Governors, group coherence within the farmers' association and

perception and needs of the membership of each farmers' association. These factors are dissected in detail below.

5.2.3.1 Leadership (management) styles

There are three major styles of leadership that were identified at KDDP; Authoritarian (autocratic) leadership, Participative (democratic) leadership and Delegative leadership. It is worth noting that these styles are greatly influenced by two aspects, culture of the country and the style of leadership recommended by SWADE.

Swaziland is a very traditional country.The governance system in the country is called the Tinkhundla System.It is blended with a western model of governance. This system is culturally imbedded, the King (His Majesty King Mswati III) is the head of state and he appoints the cabinet including the Prime Minister. The Members of Parliament are elected by the nation to represent the 52 constituencies in the country (ADB, 2005). The type of leadership exhibited in the country has often been referred to as autocratic because Swaziland is the only remaining absolute monarchy in Africa.

SWADE provides management training to each newly elected Board of Governors of each and every farmers' association and co-operative in the KDDP. The management style they teach the Boards of Governors is the 'Democratic style of leadership'. The basis of this is written into the constitution of each of the farmers associations and co-operatives. This is quite the contrast to the traditional/cultural style that these farmers are accustomed to. It seems that the farmers' associations and co-operatives are adopting the new style in a profound way because most of the successful ones use it.

Table 5.2below shows the observed relationship between intrinsic and extrinsic factors and the economic performance indicators.

Table 5.2:The observed relationship betweenthe extrinsic, intrinsic factors and the economic performance indicators

FA no	Leadership Style	Farm Manager's Education level*	Farm Manager's Experience Level (years)	Average Education Level (years)	Profit/ha (SZL)	Sucrose Value/ha (SZL)	Value of Assets/ha (SZL)	Asset-Liability Ratio
1	Participative (democratic)	Junior	14	9.4	11,414.57	9 556.45	9,282.09	1.90
6		Junior	18	8.4	9,694.49	18,878.31	9,633.54	1.67
2		Senior	14	11.2	13,811.01	13,053.19	11,528.23	9.19
4		Senior	12	9.4	13,450.80	14,280.87	10,743.25	3.12
8		BSc degree + Senior	18	8.5	5,291.82	14,444.65	10,429.91	3.35
5		Junior	18	8.6	9,661.23	9,264.25	3,973.51	2.85
7		Junior	15	8.0	8,186.14	5,022.57	4,584.27	14.20
3		Junior	13	10.8	6,946.23	7,624.52	16,130.72	6.23
13	Authoritarian (autocratic)	None	14	8.9	2,590.84	3,020.88	12,952.57	7.51
11		Senior	16	7.6	6,571.06	5,890.13	4,153.74	3.19
14		Diploma + Senior	22	6.7	4,282.38	16,395.17	1,905.15	1.23
9		Junior	15	8.8	6,529.31	7,620.11	7,090.22	1.78
12		Senior	16	8.4	9,672.82	16,826.50	6,708.63	4.01
10		Diploma + Senior	22	8.2	7,412.59	14,527.60	4,957.60	3.92
15		None	15	7.1	2,665.80	3,462.46	3,108.21	1.03
16	Delegative	None	15	6.4	1,631.61	3,219.78	2,010.72	1.48
17		Junior	13	6.6	1,443.86	7,608.43	2,713.70	1.63

Source: Author (2011)
*Junior & Senior Sugarcane Production Certificate

Authoritarian (autocratic) leadership style:table 5.2 shows that there were seven farmers' association that used this style of leadership.The Board of Governors made independent decisions pertaining to the welfare and progress of the farmers' association. The general membership reported to SWADE that they were not consulted on most of the vital decisions taken by the board. Members of one farmers' association lodged a complaint that they were not consulted on the hiring of a new farm manager who in turn hired other staff members. Cases reported to SWADE illustratedthat members of farmers' association who were also employees of their associations complained that the Boards of Governors were increasing their sitting and increasing allowances while cutting down on the number of employees.

SWADE officials reported that the reason why someof the farmers' associations exhibit this style of leadership is because of the education gap between the membership and the Board of Governors is wide. As a result the Board of Governors felt that they were better equipped to make these vital decisions without consulting the members. The officials also emphasised that culture had a huge influence on why some of the Board of Governors resorted to this style of leadership.

Participative (democratic) leadership style: forty-seven percent of the farmers associations adopted this style of leadership solely because it is the system that was taught and recommended to them by SWADE. The constitution of each and every farmers' association and co-operatives stipulated that the governance of the organization should be democratic hence the membership should be consulted at all times when major decisions are taken. SWADE officials stated that in some rare cases there are differences of opinions between the Board and members hence they advised the farmers' association to include a clause in their constitution that states that in such cases, the Board retain power to have the final say on the matter. Nevertheless the membership takes full ownership of their organization in these cases, productivity was found to be 20% higher than the for other farmers' association (SWADE, 2009)

This has been deemed the conducive style of leadership by SWADE hence most of the successful farmers' associations and co-operatives use it.

Delegative leadership style:only two co-operatives were found to be using this style. These co-operatives were led by Board of Governors that were less experienced and have lower literacy levels. There were no clear roles assigned to the membership or the Board of Governors. This rendered these co-operatives less productive hence less successful. This style of management does not suit institutions that have lower levels of literacy and tertiary training since it requires each person to know how to carry out his/her role in the organization.

5.2.3.2 Group coherence

Table 5.3 depicts the orientation of the farmers' associations and their traits with regards to the group coherence factor. This simply shows what was observed at ground level before any analysis was carried out.

Table 5.3: The observed relationship between coherence and the economic performance indicators

FA no	State of Coherence	Sucrose Value/ha (SZL)	Profit/ha (SZL)	Asset Value/ha (SZL)
13	United	16,862.50	9,672.82	12,952.52
4		18,878.31	9,694.49	10,743.25
2		13,053.19	13,811.01	11,528.23
7		14,444.65	5,291.82	4,584.27
10		14,527.60	7,412.59	4,957.60
1		9,556.45	11,414.57	9,282.09
8		7,624.52	6,946.23	10,429.91
12		16,395.17	4,282.38	6,708.63
6		9,264.25	9,661.23	9,633.54
3		14,280.87	13,450.80	16,130.72
9		7,620.11	6,529.31	7,090.22
17		7,608.43	1,443.86	2,713.70
11		6,571.06	5,890.13	4,153.74
14	Not united	3,462.46	2,665.80	1,905.15
5		5,022.52	8,186.14	3,973.51
15		3,020.88	2,590.13	3,108.21
16		3,219.78	1,631.61	2,010.72

Source: Author (2011)

There are several forces that act on members to retain membership of a group and hence keep that group strongly weaved together. In the case of the farmers' association and co-operatives in KDDP there were two forces that were identified. The first one is the desire for interpersonal interaction with the other members of the farmers' association or co-operative and the second one is the benefit the members accrue from being part of the farmers' association or co-operative.

Within each and every farmers' association or co-operative there are families that are blood related, friends and neighbours. These interpersonal social relationships were there even before the commencement of the project. In most if not all the cases these relationships were strengthened after the inception of the project because of the benefits that are associated with the project. These were communities that were tightly knit together by culture and their desire to curb poverty in the area.

The cohesiveness within some of the farmers' associations and co-operatives plays a pivotal role towards their success because they work harmoniously together. With that being said, there were quite a few farmers' associations that did not operate as a unit. There were four cases that were reported to SWADE and one to the Royal Swaziland Police. The case that was reported to the police involved two families that

were involved in a fracas such that a case of arson was opened. The other cases were reports of insolence from some of the farm workers towards the farm manager, and by membership towards the Board of Governors.

Lack of cohesion within these farmers' associations and co-operatives resulted in lower yields and poor workmanship. This consequently hampered the success of these farmers' association and co-operatives. It is estimated to reduce productivity by 10-15% per annum (SWADE, 2007).

5.2.3.3 Perceptions and needs of the membership

The common perception amongst the smallholder farmers was that after the first harvest they would have enough dividends to be food secure and also develop themselves and their families. This is not usually the case in the sugarcane production industry because sugarcane production is a capital-intensive enterprise. It takes a relatively long time to repay the loans hence lower dividends were shared amongst farmers in the initial stages of the project. Most of the farmers' associations and co-operatives began realising higher margins on their dividends after three to five years (SWADE, 2009).

The general need of the membership of every farmers' association or co-operative is to be food secure and also have surplus money to carry out basic amenities. The Government of Swaziland's objective for instituting this project was to commercialise small-scale farmers. There is therefore a conflict of interest between the two parties because as a result smallholder families were food insecure. This prompted SWADE to introduce food security programmes like backyard gardening. Out of the seventeen farmers' associations and co-operatives there are eight that have taken major strides towards being fully-fledged commercial entities.

Since the general membership is the labour force as well, sometimes they become a law unto themselves. For instance, four farm managers have complained that during the marula traditional brew season the workers disappear from work and go drinking. This affects the productivity of the farmers' associations and co-operatives. The lack

of discipline emanates from the fact that these workers believe that they own the enterprise since they are shareholders.

The low literacy level of the general membership plays a pivotal role in most of the farmers' associations and co-operatives' failure to progress to fully fledged commercial entities. Education is very important in the adoption of advanced policies and technologies.

5.3 THE INFLUENCE OF THE EXTRINSIC AND INTRINSIC FACTORSON ECONOMIC PERFORMANCE INDICATORS

There are notable relationships between both sets of factors that are critical in the analysis of influence on the economic performance indicators.In KDDP, the education and experience level seemed to have an influence on the leadership style. Education level also had a bearing on the perception and needs of the membership of farmers' association.Kamara et al. (2001) and Perret (2002) also affirmed that the education of farmers influenced their management style. Reimers and Klasen (2011) stated that with higher education the level of integration also increases, thus enhancing the taste of the farmers. This implies that the needs of the farmers become more sophisticated and their perceptions become refined.

5.3.1 The influence of the extrinsic factors on the economic performance indicators

Table 5.4 below shows the relationships (correlations) between extrinsic factors (education level, tertiary training) and economic performance indicators (profits, sucrose value, asset value and the asset-liability ratio).

Table 5.4: Correlation between the extrinsic factors and economic performance indicators

	EDU	TERT	EXPER	PROFIT	SUCROSE	ASSET	RATIO
EDU	1.0000	0.1548	0.5189	0.9392	0.8032	0.8610	0.6016
TERT	0.1548	1.0000	0.2697	0.5442	0.6134	0.5199	0.5788
EXPER	0.5189	0.2697	1.0000	0.5465	0.5179	0.4707	0.3627
PROFIT	0.9392	0.5442	0.5465	1.0000	0.6471	0.8520	0.7542
SUCROSE	0.8032	0.6134	0.5179	0.6471	1.0000	0.6961	0.6849
ASSET	0.8610	0.5199	0.4707	0.8520	0.6961	1.0000	0.6118
RATIO	0.6016	0.5788	0.3627	0.7542	0.6849	0.6118	1.0000

Source: Author (2011)

Table 5.4 indicates that education highly correlated to profits (93%), sucrose value (80%) and the asset value (86%). Tertiary training is also fairly closely associated with profits (54%), sucrose value (61%), asset value (52%) and asset-liability ratio (58%). These statistics aligned with the results that Reimers and Klasen (2011) found in their study. They found that basic education is much more influential to success of farmers than their tertiary training. Increasing both the education level and tertiary training level has a positive bearing on the economic performance indicators.

This table (Table 5.4) also shows that experience is less associated with the economic performance indicators. There is also correlation amongst the performance indicators because the sucrose value has a positive bearing on profits; profits are used to purchase more assets hence the asset-liability ratio is influenced as well.

5.3.2 The empirical relationship between the success of the farmers' associations and the leadership styles

The measures of success are the economic performance indicators, these indicators are the ones demarcating the different styles of leadership. In order for one style of leadership to be deemed superior over the others it must have significantly higher values of the economic performance indicators.

The relationship between success and the leadership styles is expressed in this form:

$$Y_i = \beta_1 + \beta_2 D_{2i} + \beta_3 D_{3i}$$

Where:

Y_i = Success of farmers' association in KDDP

D_{2i}= 1 indicate that it is the authoritative style of leadership

= 0 otherwise

D_{3i}= 1 indicates that it is the delegative style of leadership

= 0 otherwise

The purpose of the dummy variables (D_{2i} and D_{3i}) in the regression:
These dummy variables are essentially a device to classify the data into mutually exclusive categories which are the authoritative and delegative style with participative style (D_{1i}) being the benchmark. Therefore D_{2i} and D_{3i} are incorporated in the regression just to quantify the data.

Table 5.5 shows the statistical linkages that exist between leadership styles and success.

Table 5.5:The statistical interrelations between the leadership styles and success

Item	t-statistic	p-value
D_{2i}	-2.9267**	0.0110
D_{3i}	-3.8343***	0.0018
F(statistic)	9.0502***	0.0030

Source: Author (2011)

R^2 = 0.80

* Significant at 10% level

** Significant at 5% level

*** Significant at 1% level

$$Y_i = 9807 - 4142D_{2i} - 8269D_{3i}$$

The leadership styles are statistically significant at 5% level of significance in explaining the success of farmers' associations since their p-values are smaller than 0.05. The leadership styles explain 80% (R^2 = 0.80) of the variation of success of the farmers associations. The F-statistic is significant at 1% level of significance because p-values 0.003. This indicates that good leadership is critical for the attainment of success by farmers' associations and co-operatives.

It is important to stress that leadership/governance/management is important hence it has an 80% influence on the success of the farmers' associations and co-operatives. Table 5.5 illustrates that the participative style of leadership was the benchmark; the negative coefficients of the other two dummy variables (authoritative and delegative styles of leadership) affirm that the participative style is superior to other the two. This is reflected by the coefficient of β_1= 9807. The regression equation verifies that it is imperative for all the farmers' associations and co-operatives to adopt the participative style of leadership.

5.3.2.1 The empirical relationship between the Board of Governors' leadership styles, their education level, asset value and asset-liability ratio

Table 5.6 shows the statistical linkages that exist between leadership style, education level, asset value and asset-liability ratio.

H_0: the variables (education level, asset value and asset-liability ratio) are significant in distinguishing between the different leadership styles.

H_1: the variables (education level, asset value and asset-liability ratio) are not significant in distinguishing between the different leadership styles.

Table 5.6: The statistical relationship between the leadership styles, education level, asset value and asset-liability ratio

Education Level				
*	Calculated *t-values*	Tabular *t-values*		Conclusions
		5%	*10%*	
t_{12}	0.997	2.160	1.771	H_0 is rejected: t_{12}<2.160 & 1.771
t_{13}	2.814	2.305	1.860	H_0 cannot be rejected: t_{13}>2.305
t_{23}	1.756	2.365	1.895	H_0 is rejected: t_{23}<2.365 & 1.895
Asset Value				
t_{12}	0.764	2.160	1.771	H_0 is rejected: t_{12}<2.160 & 1.771
t_{13}	1.960	2.305	1.860	H_0 cannot be rejected: t_{13}>1.860
t_{23}	1.071	2.365	1.895	H_0 is rejected: t_{23}<2.365 & 1.895
Asset-Liability Ratio				
t_{12}	0.450	2.160	1.771	H_0 is rejected: t_{12}<2.160 & 1.771
t_{13}	0.915	2.305	1.860	H_0 is rejected: t_{13}<2.305 & 1.860
t_{23}	0.785	2.365	1.895	H_0 is rejected: t_{23}<2.365 & 1.895

Source: Author (2011)

*1: Participative style 2: Authoritative style 3: Delegative style

T-test calculation

$$t = \frac{\bar{X}_1 - \bar{X}_2}{S_{X_1 X_2} \cdot \sqrt{\frac{2}{n}}}$$

Education level:

Economic interpretation:

The education level is statistically significant in distinguishing between the participative and the delegative styles of leadership but it not statistically significant in distinguishing between the participative and authoritative styles of leadership.

Asset value:

Economic interpretation:

The asset value is statistically significant in distinguishing between the participative and the delegative style of leadership.It is also statistically significant in distinguishing between the authoritative and the delegative style of leadership.

Asset-Liability ratio

Economic interpretation:

The asset-liability ratio is not statistically significant in distinguishing between the different styles of leadership.

5.3.2.2 The empirical relationship between the Board of Governors' leadership styles, their experience level, profit and sucrose

Table 5.7 shows the relationship between the leadership style, education and experience level of the farm manager and their influence on profit and crop value.

H_0: the variables (experience level, profit and sucrose value) are significant in distinguishing between the different leadership styles.

H_1: the variables (experience level, profit and sucrose value) are significant in distinguishing between the different leadership styles.

T-test calculation

$$t = \frac{\bar{X}_1 - \bar{X}_2}{S_{X_1 X_2} \cdot \sqrt{\frac{2}{n}}}$$

Table 5.7: The statistical relationship between the leadership style and experience level, the profit and sucrose value

Experience Level				
*	Calculated *t-values*	Tabular *t-values*		Conclusions
		5%	*10%*	
t_{12}	0.514	2.160	1.771	H_0 is rejected: t_{12}<2.160 & 1.771
t_{13}	0.400	2.305	1.860	H_0 is rejected: t_{13}<2.305& 1.860
t_{23}	0.909	2.365	1.895	H_0 is rejected: t_{23}<2.365 & 1.895
Profit				
t_{12}	1.814	2.160	1.771	H_0 cannot be rejected: t_{12}>1.771
t_{13}	2.941	2.305	1.860	H_0 cannot be rejected: t_{13}>2.305
t_{23}	1.906	2.365	1.895	H_0 cannot be rejected: t_{23}>1.895
Sucrose value				
t_{12}	0.263	2.160	1.771	H_0 is rejected: t_{12}<2.160 & 1.771
t_{13}	2.941	2.305	1.860	H_0 cannot be rejected: t_{13}>2.305
t_{23}	1.093	2.365	1.895	H_0 is rejected: t_{23}<2.365 & 1.895

Source: Author (2011)

*1: Participative style 2: Authoritative style 3: Delegative style

Experience level

Economic interpretation:

The experience level is not statistically significant in distinguishing between the different styles of leadership.

Profit/ha

Economic interpretation:

Profit is statistically significant in distinguishing between all three different styles of leadership in KDDP.

Sucrose value/ha

Economic interpretation:

The sucrose value is statistically significant in distinguishing between the participative and the delegative style of leadership.It is also statistically significant in distinguishing between the authoritative and the delegative style of leadership.

5.3.3 The empirical relationship between the success of the farmers' associations and the coherence

The relationship between success and coherence is expressed in this form:

$$Y_i = f(b + c_i)$$

Where:

Y_i = Success of farmers' association in KDDP

c_i = 1 indicate coherence within the farmers' association

= 0 otherwise

Table 5.8 shows the statistical linkages that exist between group coherence and success.

Table 5.8: The statistical interrelations between group coherence and success

Item	t-statistic	p-value
c_i	3.8950***	0.0014
b	1.9587	0.0690
F(statistic)	15.1708***	0.0014

Source: Author (2011)

R^2 = 0.72

* Significant at 10% level

** Significant at 5% level

*** Significant at 1% level

The group coherence is statistically significant at 1% level of significance in explaining the success of farmers' associations since their p-values are smaller than 0.01. The group coherence explains 72% (R^2 = 0.72) of the variation of success of the farmers' associations. The F-statistic is significant at 1% level of significant because p-values are 0.0014. This indicates that coherence within the farmers' associations and co-operatives is crucial for the attainment of success by farmers' associations and co-operatives.

Coherence within the farmers' associations and co-operatives is pivotal because it has a 72% influence on the success of the farmers' association and co-operatives.

The regression analysis also amplifies the demarcation between united farmers associations and those that are not. The farmers' associations that are not united are the benchmark in this case the coefficient of $b<c_i$. The coefficient of c_i represents the united farmers' associations and co-operatives.

KDDP has been a success story partly because of the unity that prevails amongst the members of each farmers' association. This is despite the fact that there were a few cases of scuffles reported to SWADE. Unity is pivotal for the successful implementation of the strategic plan, operational plan and other contingency plans because the work ethic amongst these farmers/members is conducive to success. In the case of KDDP, culture and traditions play a major role in unifying the communities. The community leaders are very influential in inculcating a hostility free environment.

The state of coherence is the reflection of the number of cases of major disputes that were reported to SWADE. There were four cases that were reported.It is critical to state that the farmers' associations and co-operatives that recorded lower yields (sucrose values), profits and asset values were the ones that had disputes. This is a reflection of the gravity of these disputes and their dire consequences on farmers' association or co-operative's performance.

5.3.3.1 The empirical relationship between coherence and sucrose, profit, and asset value

Table 5.9 shows how coherence with each farmers' association affects productivity, the profit generated and the assets accrued by the farmers' association or co-operative. The smallholder farmers are either united or they are not united within each farmers' association.

H_0: the variables (sucrose value, profit and asset value) are significant in explaining coherence.

H_1: the variables (sucrose value, profit and asset value) are not significant in explaining coherence.

T-test Calculation

$$t = \frac{\bar{X}_1 - \bar{X}_2}{S_{X_1 X_2} \cdot \sqrt{\frac{2}{n}}}$$

Table 5.9:The statistical relationship between the coherence, sucrose value, profit and asset value

Sucrose Value				
*	Calculated *t-values*	Tabular *t-values*		Conclusions
		5%	*10%*	
t_{12}	2.381	2.131	1.753	H_0 cannot be rejected: t_{12}>2.131
Profit				
t_{12}	1.758	2.131	1.753	H_0 cannot be rejected: t_{12}>1.753
Asset Value				
t_{12}	4.514	2.131	1.753	H_0 cannot be rejected: t_{12}>4.514

Source: Author (2011)

*1: Coherent 2: Not coherent

Sucrose value

Economic interpretation:

The sucrose value is significant in explaining the importance of coherence within a farmers' association or co-operative.

Profit

Economic interpretation:

Profit is significant in explaining the importance of coherence within a farmers' association or co-operative.

Asset value

Economic interpretation:

The asset value is significant in explaining the importance of coherence within a farmers' association or co-operative.

The table above (Table 5.9) portrays that united farmers' associations and co-operatives had higher yields (sucrose value/ha); earned more profits and accrued more assets than those that were not united. This is based on the significant margins between mean values of the two groups; they are very high hence they indicate that coherence is very significant to success.

5.3.4 The empirical relationship between the success of the farmers' associations and the extrinsic factors

The relationship between success and the extrinsic factors is expressed in this form:

$$Y_i = \beta_1 + \beta_2 \alpha_{2i} + \beta_3 \alpha_{3i} + \beta_4 \alpha_{4i}$$

Where:

Y_i = Success of farmers' association in KDDP

α_{2i} = Education level of the Board of Governors

α_{3i} = Tertiary training of the farm managers

α_{4i} = Experience level of the farm managers

Table 5.10 shows the statistical linkages that exist between the extrinsic factors and success.

Table 5.10: The statistical interrelations between the extrinsic factors and success

Item	t-statistic	p-value
Education	3.0830***	0.0087
Tertiary	3.3033***	0.0057
Experience	-0.7065**	0.0492
F(statistic)	8.1975***	0.0026

Source: Author (2011)

R^2 = 0.77

* Significant at 10% level

** Significant at 5% level

*** Significant at 1% level

The extrinsic factors are statistically significant at 5% level of significance in explaining the success of farmers' associations since their p-values are smaller than 0.05. The extrinsic factors explain 77% (R^2 = 0.77) of the variation of success of the farmers' associations. The F-statistic is significant at 1% level of significance because p-values are 0.0026. This indicates that education, tertiary training and experience are essential for the farmers' associations to be successful.

In theory, Muleba (2006) and Reimers and Klasen (2011) agree that education is expected to improve productivity in all spheres of activities including agriculture. They go on to state that a positive return on education arises, for example because

educated farmers are better managers, they adopt more modern farm inputs and prefer risky (high return) production technologies. It is therefore worth noting that the farmers in KDDP were exploiting the technical training they were getting from SWADE hence this was evident when the asset registries of the farmers association were scrutinized.Some farmers' associations have adopted the centre pivot irrigation technology which is quite advanced compared to the dragline system.

Reimers and Klasen (2011) stated that, for smallholder farmers to be entrepreneurs with parameters that determine the scope of their enterprise in the rural settings, they must be knowledgeable on the principles of business economics, record keeping and have proficient managerial skills, hence education and training are crucial. Muleba (2006) found that technical training is effective if the people it is provided to have a reasonably high level of integration of innovations. Furthermore, Muleba (2006) stated that technical training enhances the ability of the farmers to adopt very good practices; these good production practices have a significant positive correlation to the gross yield attained and consequently on the net farm income.

5.4 SUMMARY

This chapter identified the key factors that influence the success of small-scale irrigation in the project area (KDDP). The factors identified were education, experience (extrinsic factors), leadership style, group coherence and perceptions and needs (intrinsic factors). Furthermore, this chapter analyses the influence these factors have on success (herein referred to as the economic performance indicators).

The correlation between education and the economic performance indicators was found to be very high while the correlation between tertiary training and the economic performance indicators was found to be fairly high. This asserted that these factors are pivotal for the success of farmers' associations and co-operatives.

It was established that the styles of leadership have an 80% influence in explaining the success of farmers' association and that the participative style of leadership is

superior to the other two (authoritative and delegative styles) hence it is recommended. Coherence was found to have a 72% influence in explaining the success of farmers' associations. The extrinsic factors (education, tertiary training and experience) have a 77% influence in explaining the success of the farmers' associations and co-operatives. All the above-mentioned factors (both intrinsic and extrinsic factors) were found to be significant at 5% level of significance.

It was established that there is a close association between education, experience and leadership styles. The participative style of leadership is associated with higher education levels, tertiary training and experience levels. These associations were consequently found to enhance yields (sucrose value), profits, asset value and asset-liability ratio. The autocratic and delegative styles of leadership led to significantly lower economic performance indicators than the participative style of leadership.

Coherence within each farmers' association was also found to be critical to yields (sucrose value), profits, asset value and asset-liability ratio. United farmers' association and co-operatives had higher values of the performance indicators. Perceptions and needs of smallholder farmers are influenced by their education level. Higher education levels invoke sophisticated needs that lead to the growth of the organization.

The succeeding chapter analyses the degree of influence of the extrinsic factors on the economic performance indicators. In essence, this chapter quantifies the extent of influence each of the extrinsic factors has on the performance indicators. The basis for this analysis will portray the impact of each factor on the performance indicators.

CHAPTER SIX

THE INFLUENCE OF EXTRINSIC FACTORS ON THE ECONOMIC PERFORMANCE INDICATORS

6.1 INTRODUCTION

It is now apparent that farmers' associations and co-operatives are in the same environmental loci and are accorded the same external support (resources) but they are performing differently. This means that some farmers' associations and co-operatives have a competitive advantage over others. The two extrinsic factors under contention in this chapter are education(including tertiary training) and experience of the Board of Governors and farm managers and their degree of influence on the yield (sucrose value), profit, asset value and asset-liability ration.

The analysis of the degree of influence of these extrinsic factors on the economic performance indicators is done using an individual Logit model. The degree of influence is expressed as a percentage.

6.2 THE INFLUENCE OF TERTIARY TRAINING AND EXPERIENCE ON PROFIT AND CROP VALUE

Model:

$$\hat{L} = \widehat{P_i} \Big/ 1 - \widehat{P_i} = \hat{\beta}_1 + \hat{\beta}_2 Exper + \hat{\beta}_3 Tert$$

Where:

L = log of Odds of Profits/Sucrose Value
Exper = Experience level of the farm manager
Tert = Tertiary training of the farm manager

6.2.1 The influence of the farm manager's tertiary training and experience level on financial profits

Table 6.1 below is the Logit analysis table for profits, and the farm manager's tertiary training and experience level.

Table 6.1: Maximum Likelihood analysis table of profits

Dependent Variable: PROFIT Method: ML - Binary Logit Included observations: 17				
Variable	**Coefficient**	**Std. Error**	**z-Statistic**	**Prob.**
EXPER	0.512364	0.803000	0.638062	0.0524
TERT	-0.035177	0.431644	-0.081496	0.0935
C	-8.789295	10.98008	-0.800476	0.4234
Mean dependent var	0.117647	S.D. dependent var		0.332106
S.E. of regression	0.352327	Akaike info criterion		1.035083
Sum squared resid	1.737883	Schwarz criterion		1.182121
Log likelihood	-5.798208	Hannan-Quinn criter.		1.049699
Restr. log likelihood	-6.157579	Avg. log likelihood		-0.341071
LR statistic (2 df)	0.718742	McFadden R-squared		0.058362
Probability(LR stat)	0.698115			
Obs with Dep=0	15	Total observation		17
Obs with Dep=1	2			

Source: Author (2011)

Both experience and tertiary training are statistically significant at 10% level of significance in explaining profits since their p-values are smaller than 0.1.

From the analysis table above (Table 6.1) it can be deduced that for every additional year of experience of the farm manager, other things being equal, the predicted log odds of having profit increase by 0.51 thus the odds are 1.67 (taking the antilog of 0.51 = $e^{0.51}$)

So $\widehat{P}_i \Big/ 1 - \widehat{P}_i = 1.67$

$$\widehat{P}_i = \frac{1.67}{2.67} = 0.63$$

The regression analysis shows that an additional year of experience, other things being equal,has a 63% chance of increasing financial profits.The number of years a farm manager has been involved in sugarcane farming is a proxy of the duration of the relationship between the manager and the Miller, SWADE and financial

institutions.The number of years has been found to have an influence on the managers' management skills (Ntsonto, 2005). The level of experience has a positive connotation towards increasing the sucrose level of the yield rather than simply increasing the yield (ISO, 2008). Studies by Muleba (2006) and Vermillion (2000) found that experience provides increased knowledge about the environment in which decisions must be made. Thus experience may serve as a substitute for information or at least may modify the decision set for which information is sought. Muleba (2006); and Stevens (2007), affirmed that longer farming experience positively affects adoption of new technology. This therefore justifies the 63% influence that a farm managers' experience has on profit.

It can also be observed from Table 6.1 that for every additional year of tertiary training of the farm manager, other things being equal, the predicted log odds of having profit decrease by -0.035 thus the odds are 0.97 (taking the antilog of -0.035 = $e^{-0.035}$).

So $\widehat{P}_i \big/ 1 - \widehat{P}_i = 0.97$

$$\widehat{P}_i = \frac{0.97}{1.97} = 0.49$$

The regression analysis also shows than an additional year of tertiary training, other things being equal, has a 49% chance of increasing financial profits. Muleba (2006) state that relatively inexperienced but educated farm managers have greater planning horizons thus they can invest in new technologies but the implementation process comes with trials and errors because they are finding their feet on the ground. Reimers and Klasen (2011), states that highly educated farm managers can more easily acquire technical information as their capacity to digest information from various sources is larger.

In most developing countries, administrators i.e. farm managers are not obliged to attend periodical refreshment courses to update their knowledge of the changes in agricultural conditions and technology. The links between agricultural research and technology transfer in these countries are generally recognized as a major bottleneck in agricultural technology systems and have received inadequate attention in the past

(Lankford, 2001). This gap in most cases is bridged by extension officers but even then it requires that the farm managers have technical training to easily adopt the skills provided to them. With this in mind it is worth acknowledging the importance of tertiary training for the farm managers.

6.2.2 The influence of the farm manager's tertiary training and experience level on the crop value (sucrose value)

Table 6.2 below is the Logit analysis table for sucrose value, and the farm manager's tertiary training and experience level.

Table 6.2: Maximum Likelihood analysis table of sucrose value

Dependent Variable: SUCROSE Method: ML - Binary Logit Included observations: 17				
Variable	**Coefficient**	**Std. Error**	**z-Statistic**	**Prob.**
EXPER	-0.080087	0.373851	-0.214222	0.0834
TERT	1.861483	1.123178	1.657336	0.0975
C	-0.004136	5.690501	-0.000727	0.9994
Mean dependent var	0.705882	S.D. dependent var		0.469668
S.E. of regression	0.395142	Akaike info criterion		1.196879
Sum squared resid	2.185920	Schwarz criterion		1.343916
Log likelihood	-7.173470	Hannan-Quinn criter.		1.211495
Restr. log likelihood	-10.29856	Avg. log likelihood		-0.421969
LR statistic (2 df)	6.250175	McFadden R-squared		0.303449
Probability(LR stat)	0.043933			
Obs with Dep=0	5	Total observation		17
Obs with Dep=1	12			

Source: Author (2011)

Both experience and tertiary training are statistically significant at a 10% level of significance in explaining crop value since their p-values are smaller than 0.1.

From the analysis table above (Table 6.2) can be noted that for every additional year of experience of the farm manager, other things being equal, the predicted log odds of having a higher sucrose value decreases by -0.08 thus the odds are 0.92 (taking the antilog of -0.08 = $e^{-0.08}$).

So $\widehat{P}_i \Big/ 1 - \widehat{P}_i = 0.92$

$$\widehat{P}_i = \frac{0.92}{1.92} = 0.48$$

From the analysis table above (Table 6.2)it can be observed that for every additional year of tertiary training level of the farm manager, other things being equal, the predicted log odds of having higher sucrose values increases by 1.86 so the odds are 6.42 (taking the antilog of 1.86 = $e^{1.86}$).

Thus $\widehat{P}_i \Big/ 1 - \widehat{P}_i = 6.42$

$$\widehat{P}_i = \frac{6.42}{7.42} = 0.87$$

With regards to the sucrose value, the regression analysis shows that an additional year of experience of the farmer manager, other things being equal has a 48% chance of increasing the sucrose value and it also shows that an additional year of tertiary training of the farm manager, other things being equal, has an 87% chance of increasing the sucrose value/yield.

The farm managers in the KDDP are relatively experienced but experience alone cannot be the sole factor that drives productivity higher, tertiary training is crucial as well. Ntsonto (2005) and Muleba (2006), show that Farm Managers with longer experience in production are highly motivated to make their enterprises work out and survive in the industry but the experience in itself has no bearing on the adoptability of new technology and innovations. This proves the point that longer experience levels invoke loyalty to certain production methods and systems.

Terry and Ryder (2007) state that education raises the level of awareness and increase knowledge, which therefore leads to increased rates of innovation adoption. Agriculture development implies the shift from traditional methods of production to new science-based methods of production that include new technological components, new varieties and farming systems. For farm managers to adopt these new production technologies successfully, they must first learn about them and then learn how to use them appropriately in their farming systems. Vermillion (1997) states that education (in particular formal training) is a very important factor in determining the adoption rate of innovations and new technology by farmers. He further stated

thatan overwhelming majority of studies found a statistically significant positive relationship between education and the adoption behaviour of farmers.

6.3 THEINFLUENCE OF EDUCATION AND EXPERIENCE ON ASSET VALUE AND ASSET-LIABILITY RATIO

Model:

$$\hat{L} = \widehat{P_i} \Big/ 1 - \widehat{P_i} = \hat{\beta}_1 + \hat{\beta}_2 Edu + \hat{\beta}_3 \, Exper$$

Where:

L = log of Odds of Asset Value/Asset-Liability Ratio

Edu= Education level of the Board of Governors

Exper = Experience level of the Board of Governors

6.3.1 The influence of the Board of Governor's education and experience level on asset value

Table 6.3 below is the Logit analysis table for asset value, and the Board of Governors' education level and experience level.

Table 6.3: Maximum Likelihood analysis table of asset value

Dependent Variable: ASSET Method: ML - Binary Logit Included observations: 17				
Variable	**Coefficient**	**Std. Error**	**z-Statistic**	**Prob.**
EDU	2.806883	1.779622	1.577235	0.0147
EXPER	0.841401	1.039965	0.809066	0.0485
C	-36.88474	25.00829	-1.474901	0.1402
Mean dependent var	0.294118	S.D. dependent var		0.469668
S.E. of regression	0.342380	Akaike info criterion		0.941201
Sum squared resid	1.641134	Schwarz criterion		1.088239
Log likelihood	-5.000213	Hannan-Quinn criter.		0.955817
Restr. log likelihood	-10.29856	Avg. log likelihood		-0.294130
LR statistic (2 df)	10.59669	McFadden R-squared		0.514474
Probability(LR stat)	0.005000			
Obs with Dep=0	12	Total observation		17
Obs with Dep=1	5			

Source: Author (2011)

Both experience and education are statistically significant at a 5% level of significance in explaining asset value since their p-values are smaller than 0.05.

From the analysis table above (Table 6.3) it can be deduced that for every additional level/year of education of the Board of Governors, other things being equal, the predicted log odds of having higher asset value increase by 2.81 thus the odds increase by 16.61 (taking the antilog of 2.81 = $e^{2.81}$).

Thus $\widehat{P}_i \Big/ 1 - \widehat{P}_i = 16.61$

$$\widehat{P}_i = \frac{16.61}{17.61} = 0.94$$

It can also be deduced from Table 6.3 that an additional year of experience of the Board of Governors, other things being equal, the predicted log odds of having higher asset values increases by 0.84 and so the odds increase by 2.32 (taking the antilog of 0.84 = $e^{0.84}$).

Thus $\widehat{P}_i \Big/ 1 - \widehat{P}_i = 2.32$

$$\widehat{P}_i = \frac{2.32}{3.32} = 0.70$$

The regression analysis shows that an additional year of education of the Board of Governors, other things being equal, has a 94% chance of increasing the asset value and it also shows that an additional year of experience, other things being equal, has a 70% chance of increasing the asset value.On average, studies have found that an increase in production output attained from having four years of formal education was 8.7 % in Sub-Saharan Africa and in Latin America it was 10.5%. This increase in production output leads to high profits earned; consequently assets/new technologies are purchased (Muleba, 2006).

The level of education of the Board brings about awareness of the need to have new technology that would in essence help their enterprises to with stand both agronomic and economic shocks. The Board of Governors in the case of Swaziland are not that well educated because they do not meet the minimum requirement of secondary education (high school certificate) to comprehend the dynamics of the evolving industry and economy.

It is worth noting that Swazi farmers have faced frequently changing input and output prices due to the unstable financial and economic climate in the country and the world over (SWADE, 2007). In addition, unpredictable weather, pests and crop diseases all contribute to an environment in which farmers' associations and co-operatives must adapt frequently in order to survive. Consequently, there is an efficiency advantage for farmers' associations and co-operatives that have Boards of Governors who are better prepared to anticipate and cope with the disequilibria. Therefore, even in the absence of innovations, farm productivity may be enhanced by investment in education (SSA, 2008).

It is essential to have a Board of Governors that has the necessary experience because they need to guide the farm manager and also reduce the chances of having an obstinate manager who would be do as he/she pleases. Farm managers more or less play the role of Chief Executive Officers in the enterprises, thus the Boards of Governors have to play their role adequately for the enterprise to forge its way forward.

6.3.2 The influence of the Board of Governor's education and experience levelon the asset-liability ratio

Table 6.4 below is the Logit analysis table for asset-liability ratio, and the Board of Governors' education level and experience level.

Table 6.4: Maximum Likelihood analysis table of asset-liability ratio

Dependent Variable: SOLVENCY Method: ML - Binary Logit Sample: 1 17				
Variable	**Coefficient**	**Std. Error**	**z-Statistic**	**Prob.**
EDU	0.978920	0.946013	1.034785	0.0308
EXPER	2.306871	1.387166	1.663009	0.0963
C	-38.91390	21.82837	-1.782721	0.0746
Mean dependent var	0.529412	S.D. dependent var		0.514496
S.E. of regression	0.394448	Akaike info criterion		1.087629
Sum squared resid	2.178248	Schwarz criterion		1.234666
Log likelihood	-6.244844	Hannan-Quinn criter.		1.102245
Restr. log likelihood	-11.75407	Avg. log likelihood		-0.367344
LR statistic (2 df)	11.01846	McFadden R-squared		0.468708
Probability(LR stat)	0.004049			
Obs with Dep=0	8	Total observation		17
Obs with Dep=1	9			

Source: Author (2011)

Education is statistically significant at a 5% level of significance in explaining solvency/asset-liability ratio since its p-value is smaller than 0.05. Experience is statistically significant at a 10% level of significance in explaining solvency/asset-liability ratio since its p-value is smaller than 0.1.

From the analysis table above (Table 6.4) it can be deduced that for every additional year/level of education of the Board of Governors, other things being equal, the predicted log odds of having solvency increase by 0.98 thus the odds are 2.66 (taking the antilog of 0.98 = $e^{0.98}$).

So $\widehat{P}_i / 1 - \widehat{P}_i = 2.66$

$$\widehat{P}_i = \frac{2.66}{3.66} = 0.73$$

It can also be deduced that an additional year of experience of the Board of Governors, other things being equal, the predicted log odds of having solvency increase by 2.31 thus the odds are 10.07 (taking the antilog of 2.31 = $e^{2.31}$).

Thus $\widehat{P}_i / 1 - \widehat{P}_i = 10.07$

$$\widehat{P}_i = \frac{10.07}{11.07} = 0.91$$

The regression analysis shows that an additional year of education of the Board of Governors, other things being equal, has a 73% chance of increasing the asset-liability ratio of the farmers' association or co-operative and an additional year of experience of the Board of Governors, other things being equal, has a 91% chance of increasing the asset-liability ratio of a farmers' association or co-operative. Ntsonto (2005) states that education may enhance farm productivity directly by improving the quality of labour, by increasing the ability to adjust to the disequilibria and through its effect upon the propensity to successfully adopt innovations.

A higher education level ensures that the Boards of Governors attain comprehensive management skills; on that same note the Boards of Governors may easily acquire technical information because their capacity to digest information from various sources is larger. The education level helps them to take risks judiciously on new agronomy technology packages that have very rewarding financial attributes. This therefore implies that they adopt new technologies that increase their asset base while also increasing the revenue generated. The higher the revenue generated the more liquid the enterprise becomes.

Education has been found to be most important to farm production in a rapidly changing technological and economic environment (Muleba, 2006). Indeed, this is irrespective of the fact that the acceptance of new technology appears to depend on a host of socio-economic factors as well as on agronomic ones. The technical training administered to the Boards of Governors is comprehensively understood and applied if the base education level is high enough.

At the heart of the transformation of smallholder agriculture from sub-commercial to commercial status is a complex interaction of economic, environmental and social improvements. It takes experience to sway these interactions towards a profound goal of profit maximization. With the assistance of excellent technical training, the experience of the Boards of Governors is vital in helping the Farm Manager to choose farming systems that have both allocative efficiency and technical efficiency

of resources. Bearing this in mind, the asset – liability ratio is therefore significantly enhanced.

6.4 SUMMARY

The results show that the influence of education that was illustrated in the previous chapter (chapter five) has a significantimpact on agricultural productivity with the support of adequate and efficient irrigation technology. Education assists both the Boards of Governors and farmer managers to adjust rapidly and more readily to new opportunities and innovations.Increasing tertiary training has a 49% chance of increasing profit and an 87% chance of increasing the sucrose value. Education has a 94% chance of increasing the asset value and a 70% chance of increasing the solvency state of a farmers' association or co-operative.

The technical training that is provided by SWADE to the Boards of Governors can be fully comprehended only when the Boards members have a high school education level. This therefore connotes that the smallholder farmers need to upgrade their education level. Most of the farm managers have tertiary training thus there isa discrepancy in the education level between the farm managers and the Board of Governors. This discrepancy leads to different management styles between the two.

The experience level of both the Board of Governors and the farm managers has been noted to be vital in increasing allocative and production efficiency.A unit increase in farm manager's experience has a 63% chance of increasing profit and a 48% chance of increasing the sucrose value. A unit increase in the Board of Governors' experience has a 70% chance of increasing the asset value and a 91% chance of increasing the asset-liability ratio (solvency). Leaders with experience are essential for the development of the farmers' associations and co-operatives. The experience level compensates for the negative repercussions of low education levels amongst smallholder farmers. However, it is worth emphasising that both factors are pivotal and should co-exist because they work very well concurrently. This therefore implies that it is critical to elect members to the Boards of Governors who are educated and experienced because they enhance the economic performance indicators.

CHAPTER SEVEN

SUMMARY, CONCLUSION AND RECOMMENDATIONS

7.1 SUMMARY

The purpose of this study was to determine the factors that influence the success of small-scale irrigation farmers in KDDP, Swaziland. KDDP was designed by the Government of Swaziland through the National Development Strategy of 1997. The main aim of this project was to increase the overall contribution of the rural settings to the GDP of the country. The aim was to achieve this through the transformation of subsistence smallholder farmers into commercial farmers using irrigation technology to produce sugarcane. Consequently, this would reduce the scourge of poverty and enhance food security in the rural areas. The implementation of this project required that the smallholder farmers in the project area pool their resources and form farmers' associations and co-operatives. This would also enable to them to get more land, financial assistance, technical assistance and training. However, there have been noted disparities between the farmers' associations and co-operatives with respect to their success. These disparities are illustrated by the significant margins between the farmers' associations and co-operatives' economic performance indicators. This study therefore sought to identify the factors that influenced the success of other farmers' associations and co-operatives over others.

The study identified the following factors to be ones pivotal to the success of small-scale irrigation in KDDP: intrinsic factors (leadership style, group coherence, perceptions and needs of the smallholder farmers) and extrinsic factors (education, tertiary training and experience level). The key economic performance indicators that were identified to be influenced by the above-mentioned factors include; sucrose value per hectare, financial profits per hectare, asset value per hectare and the asset-liability ratio.The correlation analysis found that education is highly correlated

to the economic performance indicators while tertiary training was found to be averagely correlated to the economic performance indicators. Experience is relatively low correlated to the economicperformance indicators. This implies that both education and tertiary training are crucial in influencing the success of the farmers' associations. The OLS regression analysis established all the factors are statistically significant at a 5% level of significance in explaining the success of the farmers association and co-operatives. The leadership styles, coherence and the extrinsic factors explain 80%, 72% and 77% respectively of the variation of success of the farmers' associations and co-operatives. These factors are therefore pivotal for the success of the farmers' associations and co-operatives; this is echoed by the statistically significantF-statistic at 5% level of significance.

Education level, profit and sucrose value were statistically significant at 5% in distinguishing between the participative and delegative styles of leadership. The profit and asset value were statistically significant at 10% in distinguishing between the participative and delegative styles and between the authoritative and delegative styles of leadership. Profit was found to be significant at 10% in distinguishing between authoritative and delegative styles of leadership. The sucrose value and profits were statistically significant at 5% in explaining the importance of coherence within a farmers' association.

The logit regression analysis results depicted that a unit increase of tertiary training of farm managers has a 49% chance of increasing profit and an 87% chance of increasing the sucrose value. A unit increase in the experience level of the farm manager has a 63% chance of increasing profit and a 48% chance of increasing sucrose value. The results also show that a unit increase of the education level of the Board of Governors has a 94% chance of increasing the asset value and a 70% chance of increasing the asset-liability ratio (solvency). A unit increase in the experience level has a 70% chance of increasing the asset value and a 91% chance of increasing the asset-liability ratio (solvency).

7.2 CONCLUSION

Agriculture is the cornerstone of Swaziland's economy since it contributes directly and indirectly towards the Gross Domestic Product (GDP). The sugar industry contributes 18% towards the national GDP and 45% of the agricultural contribution towards the GDP comes from the sugar industry. The sugar industry has thus far proven to be the safe heaven for the country's economy, because of its financial attractiveness.The Government initiated rural development projects i.e. KDDP and LUSIP centred sugarcane commercial enterprises. Not only is this industry financially attractive but the country is also vaunted as the lowest cost producing country of sugar amongst developing countries. Under KDDP farmers were urged to pool their resources and form farmers' associations and or co-operatives. This would help them transcend from subsistence to commercial farming.

Despite the formation and fulfilment of all the necessary requirements by the farmers' associations and co-operatives, some of them were not successful in maximizing their profits. This implies that some of them are successful while others are not. The critical aspect is the identification of the factors that forge the disparities amongst the farmers' associations and co-operatives. The other vital aspect is to also identify the economic performance indicators that are influenced by these factors. Analysing the effects of these factors has the potential to influence productivity and profitability and consequently enhance the socio-economic benefits of irrigation schemes in other less developed areas and for future irrigation development projects.

The results and findings illustrate that the success of farmers' associations and co-operatives in KDDP can firmly be accredited to the following factors:the leadership style of both the Board of Governors and the farm managers, coherence within the farmers' association or co-operative, and the perception and needs of the membership of a farmers' association or co-operative. These are often referred to as the intrinsic factors. The extrinsic factors include the following:the tertiary training of the farm managers and education level of the Boards of Governors, and the experience level of both the Board of Governors and farm manager. The above-

mentioned factors critically influence the sucrose value (yield), financial profit, asset value and the solvency state of the farmers' associations. These factors also help in broadening the planning horizon of the farmers' associations or co-operative both at strategic and operational level. This implies that the returns of hiring a tertiary trained and experienced farm manager contrast with those of hiring one with neither trait. Another implication is that returns of electing well educated and experienced Boards of Governors into office contrast with the ones of a Board of Governors that lack both characteristics. It is also critical to acknowledge that the leadership styles, coherence, perceptions and needs also play a critical role in the economic performance of the farmers' associations and co-operatives. Successful commercial farmers' associations and co-operatives were notably the ones that were led democratically (participatively) by the Board of Governors and farm managers, and were solidly united. The smallholder farmers who are also shareholders and form the membership needed to have more insight in the goals and aspirations of the farmers' association or co-operative in order to identify the way their needs were to be met by the enterprise.

The postulations of the study were all proven true and thus the study successfully determined and analysed all the objectives. It is worth noting that the predictions of the regression model showed that education, tertiary training and experience function in association with the intrinsic factors, especially the leadership styles.The intrinsic factors are very important because theydetermine the attitude of the smallholder farmers towards commercialising their farmers' associations and co-operatives. Consequently the farmers'attitude determines the altitude of their success in the industry.

This study proves that farmers' associations and co-operatives require the extrinsic factors: resources (land, technical training, production contract, education, experience and finance) and environment (political climate, culture and traditions, land tenure systems, water availability and quality, topography of the area and nutritional content and type of the soil) to develop viable sugarcane enterprise but they need the intrinsic factors (leadership skills, group coherence, perceptions and

need of the membership) to turn viable enterprises into successful ones under this challenging economic climate.

7.3 RECOMMENDATIONS

Since most of the extrinsic factors necessary for successful instigating small-scale sugarcane irrigation enterprises are continually provided by the Government and the private sector, the major task at hand is to solve the weaknesses that are faced by the farmers' associations and co-operatives so that they can thrive in this line of business. From these weaknesses it is recommended that;

- Small-scale farmers be accorded title to their land.They need to own their land so that they can use it as surety when seeking loans and also when diversifying to other business enterprises to avoid "putting all their eggs in one basket".
- The general membership of each and every FA or Co-operative needs formal education.This will help increase the pool of candidates for governance members and also improve the quality of labour.
- There is a need for the formation of formal liaison structures between all role players i.e. SWADE, SSA, RSSC and MOAC so that the problem of double dipping is curbed and resources are channelled properly to the FAs and Co-operatives.
- There is a dire need for continuous research to be done on small-scale sugarcane irrigation enterprises so that timely and pertinent information can be delivered to the farmers' associations and co-operatives.

Another critical aspect that has to be carefully looked into is the one of coming up with a concise template that will explicitly show all the requirements necessary for initiating successful small-scale sugarcane irrigation schemes.

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APPENDIX A

- Data Collection Instrument -

Factors Influencing The Success of Small-scale Irrigation Farmers In The Komati Down-stream Development Project (KDDP) In Swaziland

CANDIDATE: NHLENGETHWA SIBUSISO BENEDICT

YEAR OF STUDY: 2011

FARMERS' ASSOCIATION/CO-OPERATIVE:

VILLAGE:

CONSTITUENCY:

FARM MANAGER:

MEMBERSHIP:

DATE OF INTERVIEW:

RECORD 1: DEMOGRAPHICS

No	Name	Age	Sex	Position in the Committee	Highest Level of Education	Level of Experience	Employment Status

RECORD 2: FARM INVENTORY

No	ITEM/IMPLEMENT/PROPERTY	QUANTITY	MODEL	CONDITION	VALUE (ZAR)
	Land (in ha)				
	Motor Vehicles				
	Van				
	Pick-up truck				
	Haulage truck				
	Machinery				
	Tractor				
	Crane				
	Trailer				
	Plough				
	Harrows				
	Ridger				
	Fertigator				
	Booster pump				
	Water pump				
	Buindings				
	Office				
	Shed				
	Equipment				
	Pipes				
	Sprinklers				
	Canals				
	Tools				

RECORD 3: FINANCIAL STATEMENTS TEMPLATE

Income statement

Sales

Gross farm income	Rand	%
Sugar-cane		
Toppings		
VAT claimed		
Total gross farm income		
Direct allocatable costs		

External factor costs	Rand	%
Interest Over draft		
Interest term loans		
Total external factor costs		
Interest earned on assets		
Farm profit/loss		

Operating Expenses

Land preparation (ploughing, harrowing and ridging)		
Planting		
Seed		
Fertilizer		
Herbicides		
Insecticides		
Irrigation equipment		
Transport		
Salaries for Farm Manager		
Salaries for Accountant		
Wages (men & women)		
Repairs & maintenance		
Fuel & oil		
Tyres		
Postage & telephone		
General transport		
Total direct expenditures		
Total farm gross margin		
Overhead costs		

Bank cost		
Insurance (Short term)		
Capital expenditure		
Electricity		
Depreciation		
Total overhead costs		
Net Farm Income		

Balance sheet

	2009	2010
	Assets	**Assets**
Long term	**Rand**	**Rand**
First bond 1		
First bond 2		
Second bond		
Land & irrigation equipment		
Subtotal Long Term		
Medium term		
Vehicles		
Tractors		
Implements & equipment		
Subtotal MT		
Short term		
Bank account		
Subtotal ST		
Assets total		

	2009	2010
	Liabilities	**Liabilities**
Long term debt	**Rand**	**Rand**
Farm loan		
Subtotal LT		
Medium term debt		
Van		
Tractor		
Truck		
Subtotal MT		
Short term debt		
Creditors		
Bank overdraft		
Subtotal ST		
Total liabilities (debt)		
Net worth		
Liabilities & net worth		

RECORD 4: BOARD OF GOVERNORS (INTERVIEW QUESTIONNAIRE)

1. Are you satisfied with the technical support and extension service you get from SWADE and RSSC?
   I. Yes ☐
   II. No ☐
   III. If no, what is it that is lacking?……
   .....
   .....

2. Which financial institute did you acquire a loan from?
   I. SIDC ☐
   II. FINCORP ☐
   III. Swazi Bank ☐

3. Are u content with the financial packages you are getting from your financial service provider?.....
   ……
   ……

4. What are the aspirations of the FA or co-operatives (the general line of direction the firm is taking)?.....
   .....
   .....

5. What are the factors that prevent the Board of Governors from managing/governing the FA/co-operative?.....
   .....
   .....
   .....

6. What is the level of training of the Farm Manager?
   I. Degree in Agriculture ☐
   II. Diploma in Agriculture ☐
   III. Certificate in sugarcane production ☐

7. What is the level of experience that the Farm Manager has on managing a sugarcane enterprise?
   I. 0 to 5 years ☐
   II. 6 to 10 years ☐
   III. 11 to 15 years ☐
   IV. 16 years and above ☐

8. Is the technical training on governance and management paying dividend on the running of the FA or Co-op?
   I. Yes ☐
   II. No ☐
   III. If no, where does the problem lie?.....
   .....
   .....
   .....

9. How is the relationship between the Board of Governors and Traditional authorities?
   I. Good ☐
   II. Not good ☐
   III. If not good, what seems to be the problem.....
   .....
   .....
   .....

10. How is the working relationship between the members of the Board of Governors?
   I. Good ☐
   II. Not good ☐
   III. If not good, what is the cause of the problem?.....
   .....
   .....
   .....

11. How is the working relationship between the Farm Manager and the Board of Governors?
   I. Good ☐
   II. Not good ☐
   III. If it is not good, why is the relationship sour?.....
   .....
   .....
   .....

12. How is the relationship between the Board of Governors and the membership?
   I. Membership has full confidence on the board ☐
   II. Membership has lost confidence on the board ☐
   III. If the membership has lost confidence why is that so?.....
   .....
   .....
   .....

RECORD 5: SWADE (INTERVIEW QUESTIONNAIRE)

1. What effect does the level of education of the Board of Governors of an FA or Co-operative have on its success?.....
.....
.....
.....
.....

2. Is the constitution or by-laws of each FA or co-operative adhered to by all the members including the Board of Governors and Farm Managers?.....
.....
.....
.....

3. What is the attitude of the Board of Governors towards the commercialisation of their entities? That is besides fulfilling the subsistence needs of the membership of the FA or co-operative.....
.....
.....
.....

4. Are the general members satisfied with the leadership and management style of their Board of Governors?.....
.....
.....
.....

5. Is SWADE content with the progress of the FAs and Co-operatives that are commercially producing sugar under KDDP?.....
.....
.....
.....

APPENDIX B

- Informed Consent Form -

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA
Faculty of Natural and
Agricultural Sciences

Informed consent for participation in an academic research study

Dept. of Agricultural Economics, Extension and Rural Development

Factors Influencing The Success Of Small-scale Irrigation Farmers In The Komati Down-stream Development Project (KDDP) In Swaziland

Research conducted by:
Mr. S.B. Nhlengethwa (23096952)
Cell: 0728847649

Dear Respondent

You are invited to participate in an academic research study conducted by Sibusiso Benedict Nhlengethwa a Masters student from the Department of Agricultural Economics, Extension and Rural Development at the University of Pretoria.

The purpose of the study is to investigate the intrinsic causes of discrepancies that have been noted to exist between Farmer Associations or Co-operatives that have been accorded the same resources i.e. technical training, capital availability and corporate governance training

Please note the following:

- This study involves an anonymous survey. Your name will not appear on the questionnaire and the answers you give will be treated as strictly confidential. You cannot be identified in person based on the answers you give.
- Your participation in this study is very important to us. You may, however, choose not to participate and you may also stop participating at any time without any negative consequences.
- Please answer the questions in the attached questionnaire as completely and honestly as possible. This should not take more than 10 minutes of your time
- The results of the study will be used for academic purposes only and may be published in an academic journal. We will provide you with a summary of our findings on request.
- Please contact my supervisor, Dr. L. Rugube Cell number: +27785184065 E-mail: loverugube@yahoo.com if you have any questions or comments regarding the study.

Please sign the form to indicate that:

- You have read and understand the information provided above.
- You give your consent to participate in the study on a voluntary basis.

Respondent's signature **Date**