ANALYZING THE IMPACT OF EU TRADE POLICY REFORM ON THE SUSTAINABILITY OF SMALLHOLDERS SUGARCANE FARMING IN SWAZILAND

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Submitted in accordance with the requirements for the degree

MASTER OF SCIENCE IN AGRICULTURAL ECONOMICS

in the

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JANUARY 2014

FACULTY OF NATURAL AND AGRICULTURAL SCIENCES

DEPARTMENT OF AGRICULTURAL ECONOMICS

UNIVERSITY OF THE FREE STATE

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ACKNOWLEDGEMENTS

I would like to express my sincere and deep appreciation to Dr. Abiodun Ogundeji my Supervisor, whose overall contribution is the basis for this work. Gratitude also goes to Dr. Henry Jordaan, the co-Promoter for this Thesis for his intellectual leadership, support, and motivation. I am also very grateful to the Swaziland Water and Agricultural Development Enterprise (SWADE), especially Mr. Moses Vilakati, the Project Manager at Komati Downstream Development Project (KDDP), who released his staff from their daily work to assist me with data.

A special note of thanks to my soul mate, my wife, Pinky, for her dedication, love and immortal emotional support. Words fail to express my appreciation for her dedication and persistent confidence in me. I owe her for unselfishly setting aside her passions and ambitions to support me complete my study work. A special dedication to my two boys, Muhlumuti (8 years) and Lindokuhle (1 year). They have provided me with the needed inspiration to do better and succeed. I thank all my friends, as well as expressing my apology that I could not mention them personally one by one.

Lastly, I thank my loving mother, whose prayers have provided me with all the strength, because with the Almighty God, everything is possible.

ABSTRACT

This study seeks to determine the impact of EU trade policy on the sustainability of smallholder sugarcane farming in Swaziland. Using the policy analysis matrix, the study analysed impacts of policy change on the profitability of smallholder sugar cane farmers of the Komati region in Swaziland. It also measured the level of government intervention in the area.

Agriculture plays a major role in the lives of the majority of Swazis since most households rely on this sector as a major source of income, either as smallholder producers or as recipients of income from employment on medium and large-scale farms, and estates. Most rural Swazis participate in the sugar industry where they grow sugarcane, either as smallholder or medium-scale commercial farmers. The sugar industry is the largest in the agriculture sector in terms of income generation. Recent developments indicate that sustainability of the sugar industry in Swaziland is under threat due to developments in the world sugar market. Specifically, the European Union (EU) is reforming its sugar trade regime to conform to its obligation in the World Trade Organization. Such reforms will result in removal of all preferential trade agreements with all its trading partners including Swaziland, and this paints a bleak future for Swaziland smallholder sugarcane farmers who benefit from the high prices received from this market.

Impacts of the EU sugar sector reforms on the sustainability of smallholder sugarcane farmers of Swaziland were investigated using the policy analysis matrix (PAM). Three PAMs were constructed; one analyzing the base case scenario; the second and third providing sensitivity analysis taking into account price changes. The results of the PAM base case scenario indicate that farmers were generally competitive (positive private profitability) and had potential for growing the industry. However, farmers were discovered to be inefficient (negative social profitability), indicating that there existed wastages in terms of resource use. The positive net policy transfers suggested heavy presence of government support, as a result; farmers made positive private profits. The other incentive indicators; subsidy ratio to producers (SRP), effective protection coefficient (EPC), nominal

protection coefficient on inputs (NPCI) and nominal protection coefficient on output (NPCO) are positive, also confirm that farmers received some incentives from government to produce sugar cane during the year under review.

The second and the third PAM, analyzing future impact of the EU reforms both show devastating consequences of the reforms. Both predict negative private and social profits. This is an indication that smallholder sugarcane farming in the Komati region will be unsustainable after the EU reforms. In fact, the second and third PAMs indicate that smallholder farmers of KDDP will not be able to survive without government support. Therefore, considering the contribution that smallholder sugarcane farming makes in the economy of Swaziland, and direct intervention in poverty reduction, it is important that Government consider various ways that can be employed to keep smallholder sugarcane farming viable in this area. Considering the fact that preferential trade with the European Union is coming to an end soon, it is imperative that Government explore alternative markets where Swaziland sugar can be sold at favorable prices. Smallholder farmers must also be assisted to improve efficiency so as to reduce production costs and improve revenue.

Key words: trade, reform, sustainability, profitability, efficiency, competitiveness, policy analysis matrix, divergences, sugarcane, smallholder, Swaziland.

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ACRONYMS AND ABBREVIATIONS

AIDS	Acquired Immune Deficiency Syndrome
ACP	African, Caribbean, and Pacific
AGOA	Africa Growth and Opportunity Act
CAP	Common Agricultural Policy
CDC	Commonwealth Development Corporation
CGE	Computable General Equilibrium
CTA	Technical Centre for Agricultural and Rural Cooperation
CQ	Complementary Quantity
DFIs	Development Finance Institutions
DRC	Domestic Resource Cost
EBA	Everything But Arms
EPAs	Economic Partnership Agreements
EPC	Effective Protection Coefficient
EU	European Union
EU27	European Union (27 member states)
EUR	Euro
FAO	Food and Agricultural Organization
FAR	Fiscal Adjustment Roadmap
FDI	Foreign Direct Investment
GAIN	Global Agricultural Information Network
GDP	Gross Domestic Product
HDI	Human Development Index
KDDP	Komati Downstream Development Project
LDC	Least Developed Country

MDGs	Millennium Development Goals
NAS	National Adaptation Strategy
NPC	Nominal Protection Coefficient
NPCI	Nominal Protection Coefficient on Input
NPCO	Nominal Protection Coefficient on Output
OECD	Organization for Economic Co-operation and Development
OVC	Orphans and Vulnerable Children
PAM	Policy Analysis Matrix
PC	Profitability Coefficient
PCR	Private Cost Ratio
PRSAP	Poverty Reduction Strategy and Action Plan
R	South African Rand
SACU	Southern African Customs Union
SBYB	Swaziland Business Year Book
SNL	Swazi Nation Land
SP	Protocol on Sugar
SRP	Subsidy Ratio to Producers
SSA	Swaziland Sugar Association
SWADE	Swaziland Water and Agricultural Development Enterprise
SZL	Swaziland Lilangeni
TDL	Title Deed Land
USA	United State of America
USD	United States Dollar
USDA	United States Department of Agriculture
WTO	World Trade Organization

CHAPTER ONE
INTRODUCTION

1.1. BACKGROUND

The economy of Swaziland enjoyed strong growth during the 1970s and 1980s, even though it was volatile. Over the last decade, growth began to weaken as a result of a number of factors, including: perennial drought, shocks in the market environment for exports, poor foreign direct investment, a delicate macro-economic climate (Fiscal Adjustment Roadmap, 2011) and the impact of the financial and economic meltdown of 2008, all of which translated to a reduction in government revenue by more than half between 2010 and 2012. Responding to the overwhelming state of poverty engendered by various factors, including most importantly HIV/AIDS and high unemployment, Swaziland, an agricultural economy, put in place policies and strategies to develop irrigation agriculture. Contributions to securing rural employment and generation of income, and improving national food security have been the backbone of various policies put in place by the government to develop the sub-sector. The development of irrigation infrastructure and irrigation schemes, in essence, formed the major foundations of public investment committed to the development of irrigation agriculture. To enhance the steady development of irrigation agriculture, government also put in place accompanying measures which included the establishment of a public enterprise: SWADE (Swaziland Water and Agricultural Development Enterprise). SWADE is a national agency tasked with the development of irrigation infrastructure (which includes the construction of reservoirs, canals, etc) and downstream development comprising the establishment and management of irrigation schemes. Development finance institutions (DFIs) were also established to provide funding for commercial agriculture.

Swaziland is a small country with an open economy and a population of plus or minus one million people. The small population has meant that Swaziland had to take up partisanship in a number of regional economic and monetary alliances so as to access larger and more valuable markets and to get protection from external shocks. The economy of Swaziland is export led and relatively diversified, and is predominantly dependent on agriculture (Central Bank of Swaziland, 2011). According to Thompson (2011), the agriculture sector plays a

key role in the lives of the majority of Swazis given that most households rely on this sector as the main source of income, either as smallholder producers or as recipients of income from employment on medium and large-scale farms and estates. Most rural Swazis participate in the sugar industry where they grow sugarcane, either as smallholder or medium-scale commercial farmers. The sugar industry is the largest in the agriculture sector in terms of income generation. It involves growing sugarcane and processing it into sugar and its by-products. Confirmed by the Swaziland Sugar Association (SSA) 2012, the industry is of great importance to the Swazi economy as it represents 59 % of agricultural output, 35 % of agricultural wage employment and about 18 % of Swaziland's gross domestic product (GDP). According to the National Adaptation Strategy (NAS) 2006, Swaziland can manufacture sugar sustainably for a long time because it is a low-cost producer. The country also enjoys preferential market access (at higher prices) for its sugar, especially in the European Union (EU), which makes sugar such a doable enterprise.

Relying on the success of the sugar industry over the years, government took a policy decision to promote the development of smallholder irrigation schemes for sugarcane farming, in a drive to eradicate poverty. Machethe *et al*. (2004), cited by Dlamini and Masuku (2012), say that smallholder agriculture is vital to employment creation, human well-being and political stability in sub-Saharan Africa. They argue that smallholder agriculture can slow down rural migration, create growth connections and broaden the market for industrial goods (Dlamini and Masuku, 2012). Smallholder sugarcane farming is now the endeavor for several rural households in Swaziland, especially those living in the poverty-stricken areas of the Lowveld. Sugar affords them an excellent opportunity to get employment, increase incomes and move out of poverty. With the country currently challenged by high levels of poverty and lack of employment, the sugar industry has provided a meaningful vehicle to combating these challenges. However, recent developments point out that the sustainability of smallholder sugarcane farming is under threat due to numerous challenges. Most important has been the strengthening of the local currency (which has reduced total revenue), and the on-going process of transformation of the European Union's Common Agricultural Policy (CAP), which is threatening Swaziland's preferential market access to European markets.

The aim of the CAP reform is to bring about an essential reconfiguration of the basis on which the sector interacts with the worldwide economy in the period of agricultural trade liberalization, so as to set up a sustainable and beneficial basis for its future operation (Nordic Africa Institute, 2009:5). The Swaziland Sugar Association (SSA) 2012, claims that the basis of the present challenges lies in the history of Swaziland's trade connection with the European Union (EU). For many years, though the EU took about 30 % of Swaziland's sugar exports with prices of three to four times the world market prices, revenues from sales to the EU were the main source of industry income. However, with the European Union sugar sector reforms, this is bound to change.

According to the Swaziland Sugar Association (SSA, 2006), the first reduction in revenues from the European Union (EU) market were realized during the period of the strengthening of the Lilangeni (SZL[1]), which is linked to the South African Rand (ZAR), when the value of the Euro against the South African Rand started to drop considerably. Between 2002 and 2005, for every Euro earned on sales of sugar in the European Union, 37 % less Lilangeni was received. This contributed to a 21 % decline in the price of sucrose paid to smallholder farmers between 2002 and 2005. This has resulted in severe difficulties in the sugar industry. If the EU price further reduces due to the on-going reforms, it will make matters worse for smallholder farmers and the industry as a whole. Investigations by Richardson (2012) on the impact of EU sugar policy and the experience of Swaziland revealed that the effects of the 2006 reform were felt by three groups: (a) existing small-scale cane growers, who saw the price of sugar lag behind rapidly, inflating costs and who therefore were unable to pay off their debts; (b) workers, who saw their jobs retrenched, outsourced and 'casualised' as the sugar mills reduced labour costs; and (c) local communities, who relied on social amenities like health care and education facilities provided by the mills, which were also cut as part of the companies' restructuring strategies.

In conclusion, smallholder sugarcane farming has provided a vehicle for poverty reduction in the rural parts of Swaziland and sustaining these irrigation schemes is of utmost importance to the Swaziland government. Substantial amounts of public funds have been

[1] 'SZL' stands for Swaziland Lilangeni, the national currency of Swaziland. It is pegged 1 : 1 with the South African Rand (R)

invested in the development of this sub-sector. As a result, keeping them competitive and economically efficient will enhance government's endeavor to pull rural Swazis out of poverty.

1.2. PROBLEM STATEMENT

The sustainability of smallholder sugarcane farming in Swaziland is under threat because of changes in trade policy within the European Union (EU) market. The European Union, under pressure from the World Trade Organization (WTO), is introducing reforms in its sugar market and these will result in preferential trade agreements with African, Caribbean and Pacific (ACP[2]) countries being removed in the near future. The EU sugar regime allows for duty-free or for reduced duty on imports for both raw and white sugar from ACP countries (Zoungrana, 2009:3). The Swaziland sugar industry currently benefits from these special preferential arrangements for market access into the European market, where it also receives a sugar price higher than the world market price. When these reforms come to completion, Swaziland sugar will lose its preferential market access into the EU and it will furthermore no longer enjoy the high price it currently receives. This means that Swazi sugar will now compete with the rest of the world for the EU market at open market prices. Moreover, the reforms advocate for removal of sugar beet quotas for European sugar producers, and this may increase sugar production in that region. With increased supply of sugar, prices are expected to reduce further. This may spell disaster for smallholder sugarcane farmers who rely on this high price to sustain their sugarcane enterprises. Smallholder sugarcane farmers may be negatively affected by the on-going reforms in the European Union since the envisaged reduction in sugar price per ton will result in reduced revenues. With continued increases in inputs prices, reduced revenues may force them out of business unless some form of support is put in place. Smallholder sugarcane farmers could be the most affected simply because of their operating capacity; they do not possess the economies of scale necessary to deal with reduced total revenues and input price increases.

[2]ACP member states: Barbados, Belize, Congo, Côte d'Ivoire, Fiji, Guyana, Jamaica, Kenya, Madagascar, Malawi, Mauritius, Mozambique, St. Kitts and Nevis, Swaziland, Tanzania, Tobago, Zambia and Zimbabwe.

The issue of the EU reforms has been investigated worldwide as to how it is going to affect the Africa, Caribbean and Pacific (ACP) countries benefiting from the preferential trade arrangement. The Nordic Africa Institute and the Technical Centre for Agricultural and Rural Cooperation (CTA) (2009) investigated the effects of the Common Agriculture Policy (CAP) reform on Africa-EU Trade. Sandrey, Vink and Jensen (2009) also examined the effects of liberalization of the EU sugar market, focusing on South Africa and Swaziland. Both studies concluded that liberalization of the EU sugar market will have negative effects on poor people in these countries. Goodison (2007) agrees that erosion of all preference for ACP countries would have a considerable impact on some nations within the ACP. His study concludes that reducing preferences for ACP exports will result in losses for most of these countries, since higher production costs mean that these nations and regions can only sell profitably to a protected market.

Most of the literature available analysed the effects of the initial reforms of the EU sugar regime, whereby only the guaranteed price was reduced by 36 % over four years from 2006 to 2010. However, the transformation process is on-going since the EU also plans to abolish all preferential trade agreements to fully liberalise its sugar trade by 2020. Few studies have made reference to Swaziland's situation post the reforms, and they show a rather shallow focus in terms of looking at the impact of full liberalization of trade on smallholders. There is a common assumption that small-scale farmers are the most vulnerable to price shocks simply because they are not big enough in size to absorb such shocks. The obvious result of the reforms is a reduction in the guaranteed price of sugar which Swaziland receives. In fact, prices could drop to world market levels. This emphasizes the need to carry out this study so as to contribute to shedding light on the impacts of the reforms in the Swaziland sugar industry.

1.3. OBJECTIVES OF THE STUDY

The general objective of this study is to analyse the potential impact of trade policy changes within the European Union (EU) market on the sustainability of smallholder sugarcane farming in Swaziland. Such a research is critical to all stakeholders in the Swaziland sugar industry because it will contribute information on what the European Union sugar market changes bring and further assist stakeholders in gearing up for possible negative impacts.

The main objective will be achieved through the following objectives:

a) To analyse the competitiveness or private profitability of the farmers' enterprises.
In the context of this study, competitiveness, as measured by private profits means that the farm system is able to make positive profit under current economic conditions plus the effects of all policies and market failures. In measuring competitiveness, the effects of policy changes from the EU, translating to changes in the market condition for domestic sugar to the EU, will be considered and the outcome will indicate how the reforms will affect local smallholders.

b) To analyse the economic or input efficiency of the farmers' enterprises.
Input efficiency, as measured by social profits, indicates whether resources employed on the farm are used in activities that create the highest levels of output and income. A positive social profit indicates that the farm uses resources (labour, water, etc) efficiently. It is believed in many cases that smallholder farmers lack efficiency in their farming practices. Measuring efficiency will contribute information that will determine if farmers' losses are a result of own inefficiency, or a result of other factors such as the policy changes discussed in this study.

c) To analyse the effects of divergences, or policies on the farmers' enterprises
Divergences measure the level of government involvement in an agricultural system. Government involves itself through subsidies and taxes. These policy instruments may cause distortions in the market, which may result in farmers recording negative profits or abnormal profits. Measuring divergences will contribute in the analysis of how the

smallholder farmers of Komati are affected by government as well as European Union policy.

1.4. ORGANIZATION OF THE THESIS

The thesis consists of five chapters including the introduction (**Chapter 1**) and the summary, conclusions and recommendations (**Chapter 5**).

Chapter 2 provides an overview of Swaziland's economy and the agriculture sector in the European Union sugar sector reforms, and research that was conducted on the topic of the impacts of policy reforms. The literature review aims to gather knowledge on the subject studied and to identify what methodology can be used for this study. **Chapter 3** describes the methodology that was used in this study, including data and procedure. **Chapter 4** presents results of the study with an explanation of the implications of the results, and lastly **Chapter 5** presents conclusions and recommendations.

CHAPTER TWO
REVIEW OF LITERATURE

2.1. INTRODUCTION

The literature review aims to identify what other researchers have done to analyse the impact of policy on small-scale farmers, so as to learn how best to approach this research. Besides this, the literature review will investigate the origins of the European Union sugar sector reforms so as to bring the reader up to date regarding the problem at hand. Moreover, it will review the socio-economic status of Swaziland as well as the global sugar industry and provide additional information that pertains to this study.

2.2. SWAZILAND SOCIO-ECONOMIC OVERVIEW

Swaziland's economy enjoyed strong albeit capricious growth in the 1970s and 1980s, but growth has deteriorated over the past decade. Gross Domestic Product (GDP) declined from 2.9 % in 2003 to 2.2 % in 2005. Recovery was experienced in 2007, when growth picked up to 3.5 % due to the completion of the Lower Usuthu Smallholder Irrigation Project (LUSIP). In 2009, the global financial and economic crisis hit the economy, and recorded growth during the period was 1.2 %. Growth thus averaged 2.4 % during the period 2003 to 2009, which was 2.6 percentage points short of the national minimum growth rate[3] required for poverty reduction. The lethargic economic development over the current period is a result of a combination of factors that include: perennial drought, shocks in the market environment for the country's exports, poor levels of foreign direct investment (FDI), a complicated macro-economic climate and the impact of the financial and economic meltdown of 2008. The agriculture sector has traditionally been the mainstay of the Swazi economy, as well as the main support for the mostly agro-based manufacturing sector, which is now the major contributor to GDP. On the other hand, the agriculture sector is currently facing challenges of over-reliance on a few commodities (e.g. sugar and pulp), some of which are already facing stiff international competition. Production has been on a declining trend, worsened by the high cost of farm inputs and unreliable rainfall in recent years. The exorbitant prices of

[3]Government's vision (see the National Development Plan (NDP), Vision 2022) to reduce poverty rate by 50% by 2015 requires an annual growth rate of 5%.

farm inputs have also exposed subsistence maize farming, distressing the most vulnerable groups and threatening their livelihoods. The escalation in costs of production inputs has also negatively affected the agro-industrial sector (Fiscal Adjustment Roadmap, 2010:5).

In spite of the historical achievement with economic reform, which elevated Swaziland to a low-middle-income-country status, about 69 % of the population lives below the poverty line and food poverty stands at 37 %. In 2007, Swaziland's Human Development Index (HDI) stood at 0.572, placing the country at 142 out of 182 countries. The country's life expectancy is one of the lowest in the world (45.3 years), mainly because of HIV/AIDS, which is the greatest threat to the country's sustained socioeconomic development (Fiscal Adjustment Roadmap 2010:6). It is reported in the Government Development Plan of 2009 that the impact of HIV/AIDS is becoming noticeable through growing numbers of patients suffering from AIDS opportunistic infections, an increase in the mortality rates, and a fast increasing population of orphans and vulnerable children (OVC). The rising mortality has resulted in an increase in levels of dependency, as the deaths of many adults have left behind a youthful population in Swaziland, with about 46 % of the population below 15 years old. The AIDS epidemic in the country has resulted in a decline in the number of economically active persons relative to the numbers of children and the elderly, thus increasing the dependency ratio (National Development Plan 2009:47).

The societal structure has altered, with more child-headed households emerging as parents have succumbed to the plague, or with grandparents taking the place of parents. Very low economic growth rates in recent years have caused high unemployment. According to the Fiscal Adjustment Roadmap (FAR, 2010), the official unemployment rate stands at 30 % (40 % for the youth) and is not expected to recover soon because of the 2008 global downturn and its ramifications for Swaziland's domestic economy (Fiscal Adjustment Roadmap, 2010:6). The Ministry of Economic Planning and Development (2011), estimates that the richest 20 % of the population controls about 56 % of total income, while the poorest 20 % of the population controls only 4.3 %.

2.2.1. SWAZILAND AGRO-ECOLOGICAL BACKGROUND

The Kingdom of Swaziland is a small, open economy bordered by Mozambique and South Africa. According to the Ministry of Agriculture (2012), the country has a total land area of 17 364 square kilometers, divided into two major types of land ownership. There is Swazi Nation Land (SNL) and Title Deed Land (TDL), with SNL communal and held in trust for the nation by the King through Chiefs, who allocate usufruct rights to individual Swazi families. Agriculture on Swazi Nation Land is basically subsistence in nature. Title Deed Land comprises commercial farms, estates and ranches that are freehold or on concession agreements. Agriculture on the TDL is mainly commercial.

The country is divided into four agro-ecological zones, which run longitudinally north to south. Located west to east is the Highveld and the Middleveld, which is further divided into wet and dry Middleveld due to the amount of precipitation received by the sub-zones: then there is the Lowveld and Lubombo Plateau to the extreme east of the country. The Highveld has a land area covering about 5 029.5 square kilometers and lies along the western border of the country. It has an average elevation of between 910 and 1 830 meters above sea level and is characterized by a humid to near temperate climate. The type of climate is conducive for the growing of a variety of crops and high yields are usually obtained due to the high rainfall and moderate temperatures (Ministry of Agriculture, 2012).

The Ministry of Agriculture (2012) furthers states that the major constraint to increased productivity is excessive leaching of nutrients, high soil acidity and low soil fertility. Maize grown as a monocrop (cropping system) is the dominant crop. Other crops that can be grown include sweet potato and a variety of legumes. The Highveld provides good quality grazing during summer, but during winter it is very low in feed value. The Middleveld climate is sub-tropical with a rainfall average of between 762 and 1 193 mm per annum, of which between 610 and 994 mm falls during summer. The soils are deep and mostly red clay to clay loamy soils characterized by low soil fertility, high soil acidity and deficiencies in molybdenum. The Middleveld climate is suited for the production of a variety of agricultural crops including maize, beans, cowpeas, groundnuts, pineapples and sweet potato. Drought tolerant crops such as cassava, sorghum and cotton are recommended for

the dry Middleveld. The Middleveld is characterised by a mixed veld, i.e., it is intermediate between palatable and unpalatable grass species. Livestock require supplementation for 3 to 4 months in winter in order to prevent severe weight loss.

The Lowveld is about 6 416.2 square kilometers in land area and is gently undulating, with an altitude range of between 60 and 730 m above sea level. The annual rainfall is between 508 and 890 mm. The Lowveld has a semi-arid to arid climate which is very prone to drought. The soils in this region range from the red soil found in the Middleveld to the deep, very fertile black vertisols, that crack heavily when dry and are very sticky when wet. Saline soils and saline sodic soils, which are characterised by high soluble salts of sodium and sulphate are very common in this region. The most widely grown crops in the Lowveld are drought-tolerant crops such as cotton, and citrus and sugarcane are grown under irrigation. The Lowveld has sweet grass species. These grasses are mostly palatable and nutritious in summer; they remain fairly palatable even in winter. Consequently, they can support livestock throughout the year without the need for supplements, provided the land is not overstocked.

The Lubombo plateau has a climate similar to the Middleveld and covers a land area of about 1 321.2 square kilometers and has an average altitude of 700 m above sea level. It lies to the extreme east of the country, along the border with Mozambique. The soils are deep red and medium to heavy textured. The main crops grown in the region include maize, a number of grain food legumes sorghum, sweet potato, cassava and cotton (Ministry of Agriculture, 2012).

2.3. SWAZILAND SUGAR INDUSTRY OVERVIEW

Production of sugar in Swaziland has been the mainstay of the economy since the mid-1950s, and output has risen considerably over the years. Production was estimated at 165 000 tons annually during independence in 1968, and today the industry's yearly output is about 630 000 tons per year. The industry is made up of three mills and over 400 farmers (including farmers' associations with a membership of several hundreds) and it remains the mainstay of the Swaziland economy (Swaziland Business Year Book, 2011). The sugar

industry has received substantial support from the government in the form of investments in: irrigation infrastructure, roads and agriculture skills enhancement. According to the Swaziland Sugar Association (2012), the estimated economic contribution of the sugar industry is as follows:

- 59 % of agricultural production
- 18 % of gross domestic product (GDP)
- 24 % of manufacturing output
- 35 % of agricultural wage employment
- 18 % of manufacturing wage employment
- 16 % of private sector wage employment
- 10 % of formal sector employment
- 7 % of total export revenue
- 58 % of total Swazi exports to the European Union (EU).

Besides contributing significantly to the overall Swazi economy, the sugar industry also makes a very important direct and indirect contribution to the provision of health care, housing, education, public utilities and social services within the sugar producing areas. Moreover, the importance of the sugar industry can also be identified through its generous input to government income through the sugar levy and corporate and income taxes charged on the industry. The Swaziland Sugar Association (2012) estimates annual transfers to the government at over SZL 100 million – adequate to support many health and education amenities each year. Considering the significance of this contribution, it is clear that the problems currently facing the sugar sector will have a direct impact on government tax revenues, with the most evident area of loss being under the 'sugar levy'. The levy payments alone amount to about SZL 28 million annually. With corporate earnings declining drastically, so will the tax income from company taxation. These challenges will certainly force some firms to reorganise and in the process retrench some of the labour force, therefore personal income tax will fall.

In addition, the potential failure to continue producing sugar at adequate levels might hamper the operation of local manufacturing businesses that are adding value to the product.

This could trigger a chain reaction, resulting in a direct decline of corporate and related taxes, including value added tax (VAT). This loss of government earnings will manifest at a period when the burden on government to take over the administration of health, education, and public utilities provision within the sugar belt is rising. This also comes at a time when the obligation of government in public service provision is stressed due to newly created social safety nets and the problems of high unemployment, HIV/AIDS and poverty. This will have a direct blow on the provision of education, health and public utility services within the sugar belt, with services and quality likely to depreciate in the medium to long-term, or else substitute models for the sustainable administration and financing of these services can be found (Swaziland Sugar Association, 2012).

2.3.1. THE STRUCTURE OF THE SUGAR INDUSTRY

The present sugar industry in Swaziland can be traced back to irrigation schemes instigated in the mid 1950s in the Big-Bend area of the Lowveld. The establishment of a second mill at Mhlume in the northern part of Swaziland, and the opening of Simunye Sugar Mill around the same area, followed thereafter. Production of sugar in Swaziland has conventionally been on estates (large-scale growers with more than 1 000 hectares of area under cane), however in 1962, the first smallholder sugarcane scheme was established at Vuvulane along the same Mhlume corridor with the assistance of the Commonwealth Development Corporation (CDC). More smallholder sugarcane schemes have since been developed, with a sizeable increase from the mid 1990s. This was because of the key contribution which smallholder sugarcane production can make to the upliftment and the struggle against poverty and lack of employment in the rural areas. This was made possible through the founding of special sucrose quotas, the provision of technical and financial assistance by the industry players, and by government support (Swaziland Sugar Association, 2011).

Presently, the sugar sector is made up of four components: miller-cum- planters and estates (77 % of production); large growers (17 %); medium sized growers (5 %) and small growers (1 %). The interests of these stakeholders are brought together within the framework of the Swaziland Sugar Association (SSA). Through a Council (consisting of Millers and Growers) SSA regulates the industry. The largest number of growers falls under small and medium

growers, although their share of total production is small. The category of small and medium growers is undergoing rapid expansion through the development of two large irrigation schemes; the Swaziland Komati Downstream Development Project (KDDP) and the Lower Usuthu Smallholder Irrigation Project (LUSIP). At the conception of these two projects it was estimated that smallholder sugarcane growing would increase to around 250 000 tons of sucrose by 2014. Recent developments in the world market of sugar could however jeopardise these chances for expansion. These constraints not only face the current industry players, but also the viability of new comers into the industry whose capital establishment costs are high, in the face of plummeting prices and proceeds (Swaziland Sugar Association, 2011).

2.3.2. LEGAL, INSTITUTIONAL AND MARKETING ARRANGEMENT FOR THE SUGAR INDUSTRY IN SWAZILAND

2.3.2.1. Cane-growing

A new entrant in the sugarcane farming industry requires a quota or license. The license ensures that the millers can manage cane crushing, in other words, they are not overloaded or underfed with cane. It also ensures that the grower has adequate water for irrigation, has land or the right to use land, and finally, that the grower is well acquainted with the rules of cane growing and the relevant legal requirements. The quota is therefore not a restriction to production, it is essentially an agreement between the miller and the grower that the grower will produce so much cane for the miller, and the miller will buy the specific quantity of cane at a specific harvesting period from the grower. This is done to optimise the capacity of the millers and to prevent lose of value of the grower's cane due to delays in processing of the cane. Millers also require a license, which is issued by the Minister of Enterprise and Employment after a recommendation by Swaziland Sugar Association (SSA), to manufacture sugar. The sugar industry is well organised such that there is no spot-market; contracts are signed between growers and millers through the quota system, such that volumes of cane produced are known before hand (Masuku *et al*., 2007:74). Swaziland Sugar Association buys the sugar from all the millers and sells it locally and internationally. The price of sugar paid to millers and price farmers get for their cane (sucrose) is

determined by the Swaziland Sugar Association through a formula that considers international market prices.

2.3.2.2. Marketing

The Swaziland Sugar Association buys sugar and its by-products, except for bagasse which is used by the millers to fire their boilers, from the millers and sell it locally and abroad According to SSA (2013), sugar is sold into four main markets namely: the European Union (EU), the United States of America (USA), Southern African Customs Union (SACU) and the regional/world market.

EU: Sales to the EU benefit from preferential market access under the terms of the ACP-EU Protocol on Sugar (SP) and the Complementary Quantity (CQ). Sugar sales to the EU amount to about 150 000 tons per year, with 120 000 tons sold under the Protocol on Sugar.

USA: Sales into the US benefit from the Tariff Rate Quota (TRQ), which permits entrée on preferential terms. Total sales to the United States amount to about 16 000 tons annually.

SACU: Sales into the Southern African Customs Union market comprise sugar destined for the local market. SACU sales make up roughly one-half of the total SSA sugar sales.

Sales into the regional and world markets are mostly representative of left-overs from sales into the four main markets mentioned above, where the excess sugar is sold. This market is typified by commonly low prices.

Swaziland's sugar exports by region are shown in Table 2.1 below. The Southern African Customs Union (SACU), comprising; Botswana, Lesotho, Namibia, South Africa, and Swaziland, constitutes the bulk of total sugar exports. EU markets are second largest, however prices per unit in this region are higher compared to the rest of the Swazi sugar market, according to the Swaziland Sugar Association (2011). Concerning total sales, it is noted that there is a decline from 2005/06 to 2009/10 financial year. Of course, 2006, was the beginning of the first phase of the EU sugar sector reform; which reduced the guaranteed

price by 36 % over a four-year period. According to SSA (2012), estimates for 2010/11 indicate improvement in total revenue.

Table 2.1: Swaziland sugar exports: SZL 1 000: 2005 to 2011

Period	SACU Market	Regional Market	EU Market	USA	World Market	Total Sales
2005/06	316 455	138 256	152 201	27 756	1 999	**636 667**
2006/07	318 202	121 771	153 251	19 813	25 000	**638 037**
2007/08	307 232	90 352	188 220	15 935	25 000	**626 739**
2008/09	319 716	99 554	182 897	16 123	---	**618 290**
2009/10	325 000	27 260	276 317	---	---	**628 577**
2010/11* Asterisk (*) means forecast	333 125	6 348	278 686	15 700	---	**633 859**

Source: SSA, 2013

2.4. THE EUROPEAN UNION SUGAR SECTOR REFORMS PERSPECTIVE

Sugar production is of great importance in the development of Swaziland, and it plays a multifaceted role in the overall economy (National Adaptation Strategy, 2006:ii). Besides significantly contributing to Gross Domestic Product (GDP), it directly contributes to poverty reduction, simply because poor subsistence rural farmers are converted to commercial smallholder sugarcane farmers, and earn some income. Like most developing countries, Swaziland exports typically semi-finished agricultural commodities to the developed world through trade agreements that offer preferential treatment to its exports. For example, Swaziland has been benefiting through the Africa Growth and Opportunity Act (AGOA), where it sells mostly textiles to the United States of America (USA) through liberal market access; the African Caribbean and Pacific-European Union (ACP-EU) Protocol on Sugar (SP) and the Complementary Quantity (CQ) where Swaziland enjoys preferential market access for its sugar to Europe.

However, the world has been on a trend of trade liberalization, meaning that, trade preferences will soon be a thing of the past. Markets are being liberalised and soon developed and developing economies will compete for the same markets. Krabbe and Vink (2000), agree that multilateral negotiations supported by the World Trade Organisation (WTO), and rising number of regional trade blocks set the world market for agricultural products on a greater trend for liberalization. According to Dorward *et al* (2004:612), agricultural trade liberalization policies came about as a result of failures of government interventions in the sector, which resulted to expensive, poor and late services to farmers, and grave costs to the economy. New policies consequently called upon the control, motivation, and resources of private market systems and players to take on these functions more successfully and proficiently, and to take action to demand from smallholder farmers for services. The general long-term outcomes for commercial farmers involve increased exposure to a freer world market. In November 2005 the European Union (EU) sugar trade policy experienced reform for the first time in forty years. One of the reasons for transformation was a World Trade Organisation (WTO) dispute finding, which discovered that the EU sugar policy was contravening its WTO obligations.

According to the South Centre (2007:1), Brazil, Thailand, and Australia, the most efficient sugar producers of the world, lodged a complaint with the WTO against the European Union in 2003, criticising the EU for subsidising sugar exports beyond the levels agreed to in the Uruguay Round World Trade Organisation negotiations. These nations were also restricted by high tariff barriers in the EU market. They disputed measures included in the subsidisation of the export of 1.6 million tons of sugar from African, Caribbean and Pacific (ACP) and Indian origin, which the EU used to export at subsidised rates due to the oversupply of its domestic market. A WTO board and the Appellate Body ruled in favour of the complainants, compelling the EU to bring its domestic market policy into compliance with its WTO commitments. The transformation included a reduction in the EU sugar price by 36 % over a four-year period beginning 2005, along with a voluntary transformation system which provided motivation for the European Union's least efficient sugar manufacturers and sugar beet farmers to exit the industry.

The African Caribbean and Pacific-European Union (ACP-EU) Technical Centre for Agricultural and Rural Cooperation (2010) points out that the reform has resulted in a steady reduction in European Union self-sufficiency for sugar, and that consequently the EU has become a growing net sugar importer. This has brought benefits to developing countries who sell their sugar on the open market; however, ACP countries under the Sugar Protocol (SP) experienced drops in their guaranteed export prices of 36 %. ACP countries that signed Economic Partnership Agreements (EPAs) with the EU benefit from duty-free, quota-free access for their sugar (subject to a special safeguard mechanism setting a ceiling on total ACP/LDC exports of 3.5 million tons of white sugar equivalent, up to and including the 2015/16 season).

Developments with respect to international agricultural policies, which have resulted in the on-going restructuring of the European Union sugar market, will undoubtedly reshape the environment in which the Swaziland sugar industry operates. The European Commission (2012), reports that by 30 September 2015 there will be free market access for least developed countries under (Everything But Arms), subject only to an automatic Economic Partnership Agreement (EPA) safeguard clause for ACPs that are not least developed countries. By 1 October 2015, there will be free market access for all ACP countries under EPAs, subject only to the general EPA safeguard clause. The objective of the European Union sugar sector reforms is to facilitate added and enhanced market access for developing countries in the EU sugar market, and more market access for the least developed countries under Everything But Arms (EBA).

The EU also wants free market access for all ACPs (including sugar protocol countries) proposed in the EPA negotiations (ACP-EU, 2010). Sugar has played an important economic, environmental and social role in a number of Sugar Protocol (SP) countries (including Swaziland) and the new EU rules present a major challenge in that the ACPs that have been benefiting from higher prices will now have to accept even lower prices, hence reduced revenues.

The European Union (EU) is the biggest market for Swaziland's sugar in terms of earnings. The on-going changes within the EU sugar sector will further exacerbate the plight of the Swaziland economy, which is already experiencing a host of other economic quandaries, ranging from low economic growth to high levels of unemployment and poverty. According to the Swaziland Ministry of Economic Planning and Development (2006), the more direct impact of the reforms will be on revenues obtainable from sales to the EU market. The price adjustment that was implemented by the EU beginning 2006 to 2009 has already caused serious job losses along the sugar belt when the sugar companies re-organised to minimise costs due to falling revenue. Smallholder sugarcane farming has provided a means for lifting rural Swazis out of poverty, and government has already made substantial investment in developing the sector.

The unfolding conditions in the global sugar market poses both threats, and opportunities for Swaziland farmers. The fall of tariff barriers and export quotas especially for African, Caribbean and Pacific (ACP) countries means that efficient sugar producers can now take advantage of free unregulated access to the EU market. On the other hand, those countries that are not so efficient and have been benefiting from high guaranteed prices will face difficulties when the EU frees its market. Swaziland is ranked amongst the most efficient producers of sugar in the world. However, Swaziland smallholder sugarcane farmers will be the most affected by the EU reforms since a fall in the current price of sugar will drastically reduce their total revenue. In this sense, they may not be able to cover costs and therefore be forced out of the industry. To sustain smallholder farmers, government will need to intervene. It needs to seriously consider the future of the industry, post the reforms. Policies to keep the industry playing its role need to be explored.

2.5. POLICY IN GENERAL

Policy is described by Halcrow (1984:1) as a planned course of action, as opposed to a haphazard or capricious type of activity, followed by a private firm, family, public body, or individual. It includes planning based on a certain philosophy, goals, and values, taking into consideration the resources that may be available for achieving the goals and benefits and costs of utilising one plan or another. On the other hand, agricultural policy, which is

regarded as an important area of public policy, may be defined as a course of public action directed primarily but exclusively towards the farm and agribusiness sectors of society. Broadly speaking, it involves the full range of public decisions that influence individuals and firms to decide what products shall be produced, and for whom.

2.5.1. RATIONALE FOR AGRICULTURAL POLICY INTERVENTION

Ahmed and Martin (2000:1) state that, before 1960, industrialisation was thought to be the key to development, but that, as the Todaro model predicts, both the agricultural and industrial sectors have to be in balance in order to sustain growth and ultimately development. Eicher and Staaz (1998:9) argue that most Western development economists of the 1950s did not see agriculture as an essential contributor to economic development. They say that growth was often associated with the structural transformation of the economy, that is, with a decrease in agriculture's relative share of the national output and of the labour force. However, Ahmed and Martin (2000:1) found that the industry-first strategy had problems in developing countries. They state that the markets for developing countries lacked intensity, so new firms had to compete with international firms which were often more competent. In addition, developing countries lacked excess labour, so labour was enticed away from the agricultural sector and this caused agricultural output to fall, thus upsetting the balance necessary for development. As a result, governments opted to protect new firms, although this had its own problems.

Governments always try to impose policies to rectify market failures, e.g. supply of public goods, adjustment for imperfect markets like rural credit, and other externalities. In addition to these efficiency corrections, governments will always intervene for normative issues like income distribution and price stabilisation. In the case of agriculture, where food is concerned, this issue is even more serious (Ahmed and Martin, 2000:1). Monke and Pearson (1989:2) provide more clarity for the case of government intervention. They point out that governments enforce policies on their agricultural sector because they believe that involvement can hasten the rate of income generation. Investment policies and the provision of public goods such as the research and development of new technology and infrastructural development (schools, roads, health facilities, etc) are examples of public goods sector

involvements necessary for accelerated economic growth. Monke and Pearson (1989) explain that on correction of market imperfections, market failures, if present, distort the prices of goods or services such that they (goods and services) do not reflect their true scarcity values, hence the need for government to come in since the private sector cannot regulate the market on its own for efficient functioning. They say that rural credit markets, for instance, may be affected by lack of information on different lending and borrowing options available in other regions, or by the lack of formal lending establishments that can organise savings.

Monke and Pearson (1989:3) argue that economic policies will be used whenever government is not happy with the outcome of income maximisation, in addition to imposing policies for establishing competitive economy and the maximisation of collective aggregate earnings. They say that on some occasions, policy interventions are forced by society, but most frequently they are a result of special interest groups outside or within agriculture. Furthermore, Monke and Pearson (1989:3) state that correction of market failure and provision of public goods is important in developing countries, but promotion of non-efficiency objectives is most common. Topping the list of non-efficiency intentions is income distribution, followed by stabilisation of prices. Government would also intervene to promote food security and self reliance.

2.5.2. DEVELOPMENT POLICY IN SWAZILAND

Agriculture still plays a significant role in the lives of the majority of the population of Swaziland. The bulk of households depend on agricultural production for food security and to generate income; either as smallholder producers or earners of income from medium or large-scale farms. Nonetheless, the contribution of agriculture to GDP has continued to decline over recent years even though the sector is still a primary employer. It is on this basis that government developed a number of policies to provide institutional frameworks within which implementation of national agricultural programmes will be guided (National Development Plan, 2009:48). According to Monke and Pearson (1989:190), governments have wide-ranging objectives that they wish to achieve through involvement in the agriculture sector. The most common three are efficiency (the allotment of resources to

effect optimal national output), income distribution (the allocation of the benefits of agricultural production to preferred groups or regions), and food security (the short-run stability of food prices at levels reasonable to consumers, and the long-run assurance of sufficient human nutrition).

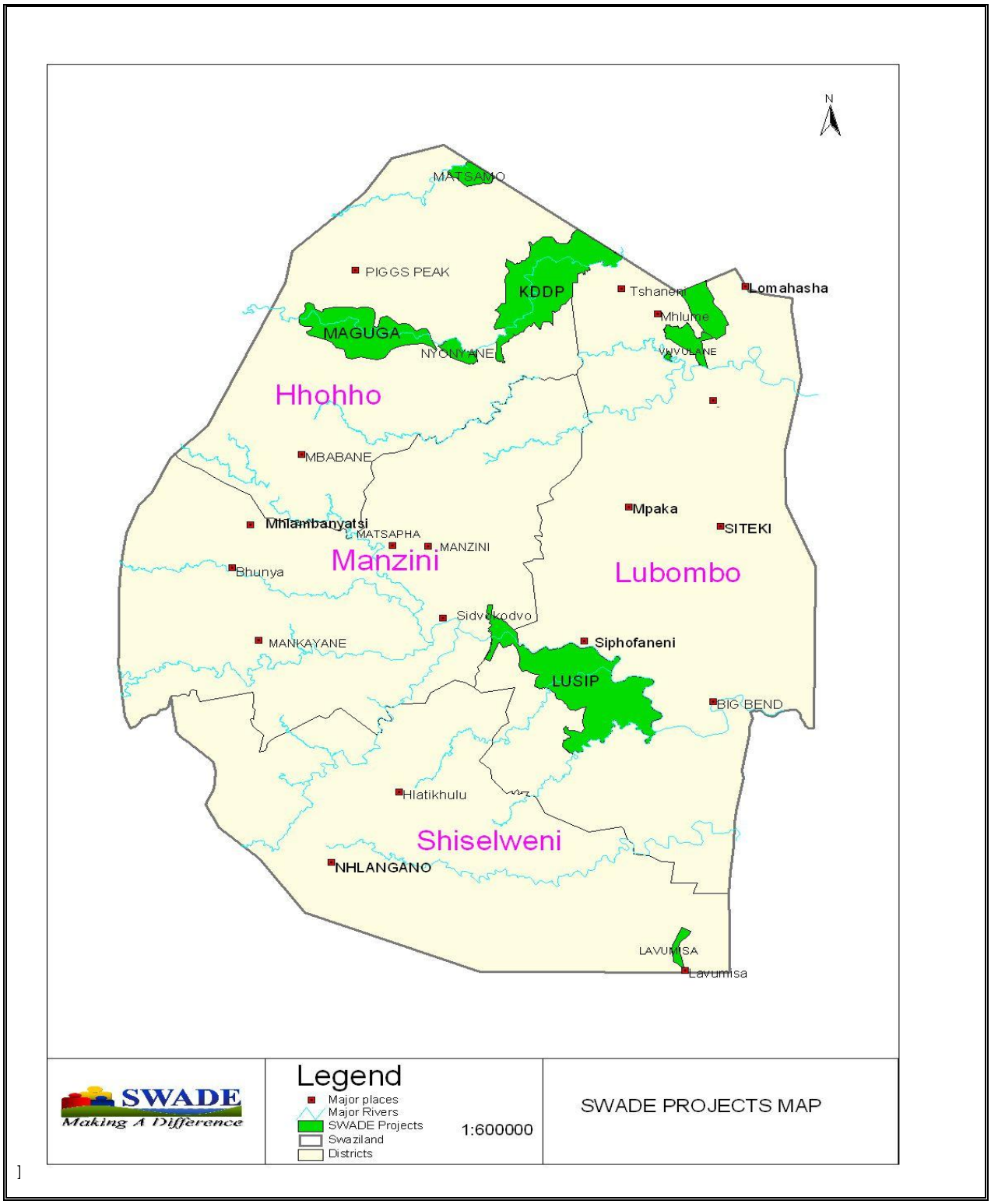
To address the development challenges facing the country, the Government of Swaziland prepared the National Development Strategy (NDS) in 1997, sometimes referred to as 'Vision 2022', whose main objective is to move Swaziland to the top 10 % of the medium human development group of countries by 2022, established on sustainable economic development, social justice and political stability. To operationalise the NDS, government prepared the Poverty Reduction Strategy and Action Plan (PRSAP) in 2006, whose general objective is to halve the prevalence of poverty in Swaziland from the present level of above 60 % to 30 % by 2015 and ultimately to eradicate poverty by 2022, in line with the UN's Millennium Development Goals (MDGs). In the PRSAP are a number of solid projects and programmes designed to produce income and generate employment, fight the HIV/AIDS plague and minimise vulnerability to it, and improve agricultural production and food security. One of the key outputs of the PRSAP is the Komati Downstream Development Project (KDDP), where smallholder sugarcane irrigation schemes are mostly benefiting.

2.5.2.1. KOMATI DOWNSTREAM DEVELOPMENT PROJECT (KDDP)

The Komati Downstream Development Project (KDDP) was envisioned in the early 1980s to provide irrigation water for farm development in the Republic of South Africa and the Kingdom of Swaziland. In Swaziland the project comprises three parts: (1) the construction of the Maguga Dam, costing around SZL 900 million, which was shared by the two governments of South Africa and Swaziland on a 60:40 ratio, (2) the development of 7 400 hectares of irrigated farms downstream. The costs of developing irrigated farms were borne by the Swaziland government and the participating smallholder farmers through finance arranged with government assistance, (3) the expansion of the Mhlume sugar mill to accommodate an additional 80 000 tons of sugar annually. The cost of this development was borne by the private sector. Government has so far invested about SZL 2 billion into this project, which includes construction of the Maguga Dam that supplies the smallholder

farmers with irrigation water, off-farm infrastructural development that transfers water to the project area, and actually preparing the land for agriculture, that is, bush clearing, etc.

The project commenced in July 1999 and was originally expected to be complete by 2006, whereby 6 000 hectares of land would have been developed, 29 farmers' associations established and the prospect unleashed to create income from feasible business enterprises. According to the Swaziland Water and Agricultural Development Enterprise (SWADE), the project has established desirable success in getting farmer organisations to diversify and vertically integrate their commercial production. A total of 239 homestead garden businesses have been established. Other business ventures created include poultry, dairy, beef feedlot, bee/honey production, haulage and water usage monitoring (SWADE, 2012). The implementing agency for this project is the Swaziland Water and Agricultural Development Enterprise (SWADE), a company owned by the Government of Swaziland. Figure 1 below is a map of Swaziland showing the four political zones, Hhohho, Manzini, Lubombo and Shiselweni, and the location of the Komati Downstream Development Project.



Source: Swaziland Water and Agricultural Development Enterprise

2.6. SUGAR – THE GLOBAL VIEW

According to Illovo, sugar production is the oldest amongst agriculturally based industries, producing roughly 179 million tons of sugar in the 2011/12 international sugar season (Illovo, 2012:36). Besides the many challenges impacting worldwide production each year, the industry's strong hold is based on a sustained worldwide growth in sugar consumption, estimated by Illovo 2012, at 2 % annually. Illovo also state that Africa has great prospects to contribute towards the output required to satisfy the increasing demand because it is favoured in the production of cane sugar by its agronomic conditions. Over one hundred countries spread across the world produce sugar, roughly 78 % of which is made from cane grown mainly in the tropical and sub-tropical zones of the southern hemisphere. The balance is produced from sugar beet, which is primarily grown in the temperate zones of the northern hemisphere (Illovo, 2012:36). Sandrey (2011:2) says that producing sugar from beet is costly compared to producing sugar from cane. In comparing countries by cost of producing sugar, Sandrey (2012) found that the highest cost of production by a considerable margin is Japanese cane sugar, followed by beet in China, Ukraine and Russia, ahead of cane in the United States and China and then beet in France. The lowest cost producers are Malawi and Brazil, followed closely Swaziland, South Africa and Zambia. This bodes well for southern African producers, as well as Australia and Thailand, which are both major exporters. Illovo (2013:36) says that the top three producers of sugar in the world are Brazil, India and the European Union (EU), and top five sugar exporters are Brazil, Thailand, Australia, India and the European Union.

Table 2.2 below shows global sugarcane production for the period 2000 to 2011. Brazil's production is the largest by far compared to the rest of the world. Brazil owes its success in sugarcane production to the flexibility of its milling companies, which can switch milling capacity between ethanol and sugar. It is the only exporting nation that can achieve this. This suppleness should help Brazil guarantee sugar production and export availabilities when relative prices regularly favour sugar over ethanol production. Brazil also enjoys relatively low production costs, according to OECD/FAO (2011:126).

Of note on global sugar production is the percentage changes over the decade. Brazilian production increased by over 100 % whilst Thailand and China both recorded above 50 %. Other countries such as Australia, the United States of America, South Africa and Cuba realised contraction. Swaziland also expanded its sugarcane production over the same period.

Table 2.2: Global sugarcane production, tonnes, 2000 to 2011

Country	2000	2009	2010	2011	% Change 2000–2011
Brazil	327 705 000	691 606 000	717 464 000	734 006 000	**124.0**
India	299 324 000	285 029 000	292 302 000	342 382 000	**14.4**
China	69 298 730	116 251 272	111 501 483	115 123 560	**66.1**
Thailand	54 052 100	66 816 400	68 807 800	95 950 400	**77.5**
Pakistan	46 332 600	50 045 400	49 372 900	55 308 500	**19.4**
Mexico	44 100 000	49 492 700	50 421 600	49 735 300	**12.8**
Colombia	35 000 000	38 500 000	20 272 600	22 727 800	**−35.0**
Australia	38 164 700	30 284 000	31 457 000	25 181 800	**−34.0**
Argentina	18 400 000	25 580 000	25 000 000	25 000 000	**35.9**
Indonesia	23 900 000	26 400 000	26 600 000	24 000 000	**0.4**
Guatemala	16 552 400	20 690 700	22 216 700	18 951 800	**14.5**
Philippines	24 491 000	32 500 000	34 000 000	34 000 000	**38.8**
United States	36 114 000	27 607 500	24 820 600	26 655 800	**−26.2**
South Africa	23 876 200	18 655 100	16 015 600	16 800 000	**−29.6**
Vietnam	15 044 300	15 608 300	16 161 700	17 465 200	**16.1**
Egypt	15 705 800	15 482 200	15 708 900	15 765 200	**0.4**
Cuba	36 400 000	14 700 000	11 500 000	15 800 000	**−56.6**
Venezuela	8 831 520	8 907 670	8 907 670	8 907 670	**0.9**
Peru	7 535 150	9 936 950	9 660 900	9 884 940	**31.2**
Swaziland	**3 884 600**	**5 000 000**	**5 000 000**	**5 000 000**	**28.7**

Source: FAOSTAT 2013

Global trade in sugar is shown in the next two tables. Table 2.3 shows the main global exporters from 2000 to 2010, while Table 4 illustrates the importers. Brazil leads the list of sugar exporters and its exports increased by approximately 900 %. India, another world sugarcane producer increased its exports by almost 800 %, whereas Thailand expanded by 239 %. The European Union, the destination for most of Africa, Caribbean, and Pacific sugar exports through preferential trade agreements, leads the world on imports of raw sugar, according to Table 2.4, followed by the Russian Federation and the United States respectively. Thailand is another significant exporter of raw sugar, according to Table 2.3. Swaziland's exports of raw sugar increased by roughly 70 % over the period, owing to government policy on smallholder sugarcane development. As seen in Table 2.3, Egypt, Nigeria and Algeria are some of the leading African nations in importing raw sugar.

Table 2.3: World raw sugar exports, USD 1 000

Country	2000	2007	2008	2009	2010	% Change 2000–2010
World	8 861 293	18 239 691	18 843 496	21 952 371	29 839 637	237
EU	2 864 870	4 408 822	4 889 678	4 802 446	5 311 277	85
Brazil	1 99 425	5 100 530	5 483 037	8 377 829	12 761 405	964
Thailand	643 959	1 258 908	1 431 983	1 803 403	2 184 843	239
Cuba	448 432	194 148	223 690	216 998	280 389	−37
South Africa	260 210	280 302	221 044	371 592	247 658	−5
Mauritius	211 150	296 349	291 910	216 717	251 640	19
Colombia	194 055	261 297	155 754	381 789	450 327	132
Guatemala	190 791	358 128	378 059	507 708	725 240	280
UAE	135 000	276 745	157 237	250 044	234 334	74
Fiji	110 437	115 234	156 678	95 859	37 130	−66
Swaziland	**97 791**	**164 607**	**165 751**	**142 929**	**165 351**	**69**
India	96 238	1 310 564	1 027 964	21 359	857 553	791
Belarus	79 575	127 008	163 790	236 847	358 151	350
Mexico	50 828	94 126	403 180	507 866	682 539	1 243
Croatia	601	203 910	172 289	122 536	125 822	20 835

Source: FAOSTAT, 2013

Table 2.4: World raw sugar imports (USD 1 000)

COUNTRY	2000	2007	2008	2009	2010	%Change 2000–2010
World	4 888 497	9 703 765	10 117 200	11 517 211	16 252 845	**233**
EU	885 496	1 435 449	1 666 044	1 395 493	1 224 413	**67**
Russian Fed	690 244	1 106 621	940 920	504 694	1 158 735	**68**
USA	510 025	754 886	710 804	836 912	1 306 844	**156**
Japan	302 195	436 484	471 432	501 530	694 804	**130**
Korea Rep.	292 345	437 340	529 264	613 885	856 459	**193**
Malaysia	253 629	443 594	413 626	594 865	787 557	**211**
Iran	235 507	440 980	223 591	197 682	758 939	**222**
Canada	191 680	288 820	409 243	398 783	717 838	**274**
China	160 109	299 206	308 314	480 154	875 451	**447**
Indonesia	86 237	272 474	225 664	57 128	801 478	**829**
Saudi Arabia	76 502	279 590	387 491	367 401	691 193	**803**
Egypt	57 200	213 352	345 857	252 008	540 695	**845**
Nigeria	14 000	357 500	433 000	405 400	410 000	**2 829**
Algeria	12 354	258 861	263 084	337 562	555 379	**4 396**
Bangladesh	5 700	250 087	238 184	459 580	475 074	**8 235**

Source: FAOSTAT, 2013

2.6.1. EU PRICES OF SUGAR IMPORTED FROM ACPS

The average prices for raw and white sugar from ACP countries into the EU from 2006 to 2012 are shown in Figure 2. As can be seen in Figure 2, prices in 2006 and 2007 averaged 800 Euros per ton, although prices began to fall from there onwards, and maintaining a steady path to 2012. Between 2005 and 2006, prices reached record highest. According to the European Commission (2009), this was caused by diminishing stocks and new demand for sugar for the production of bioethanol. Between 2008 and 2012, prices averaged 550 Euros per ton and were generally steady, although there was an upward trend from 2010 onwards.

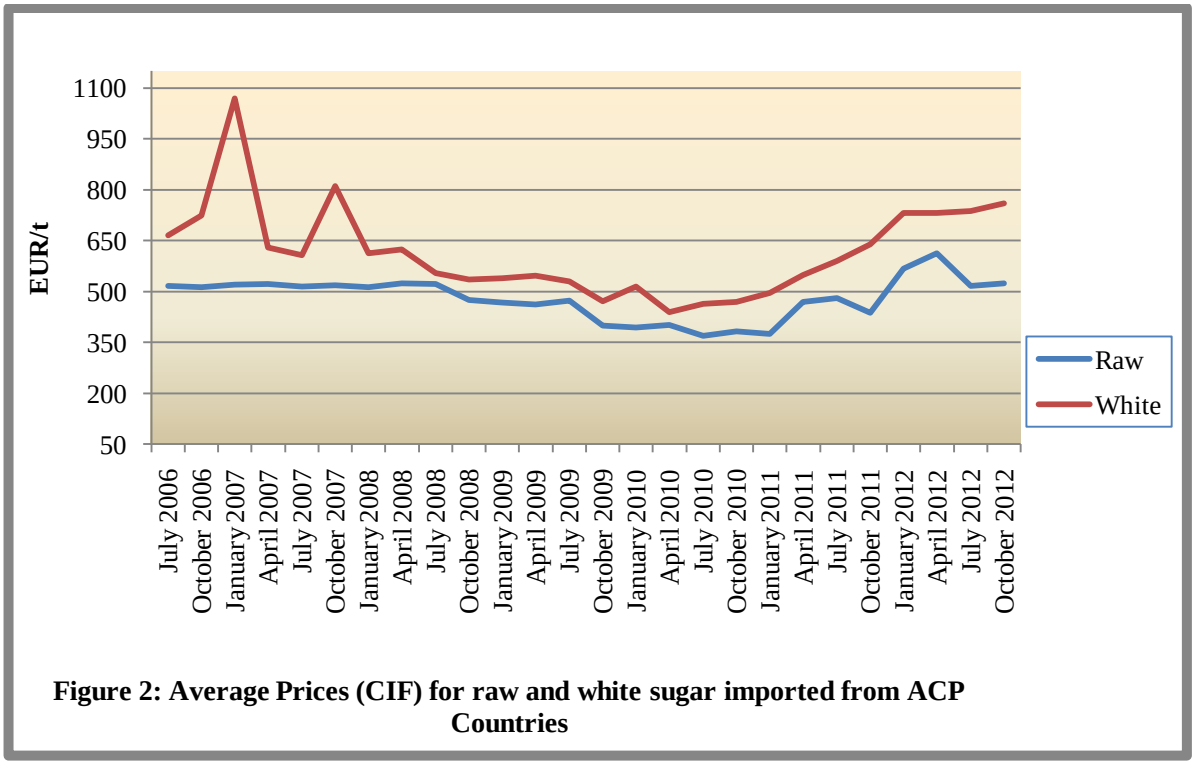


Figure 2: Average Prices (CIF) for raw and white sugar imported from ACP Countries

Source: European Commission, 2013

2.6.2. WORLD PRICE PROJECTION HIGHLIGHTS

Figure 3 below indicates world raw and white sugar prices from 2000 to 2021. The raw sugar price (Intercontinental Exchange No.11 contract nearby futures) is projected in nominal terms at USD 483/t (USD 22 cts/lb) in 2021/2022. While slightly lower than at the beginning of the projection period, sugar prices are envisaged to stay on an elevated plateau and to average higher over the projection period than in the last ten years in both nominal and real terms (when adjusted for inflation). Prices of white sugar (Euronet, Liffe Futures Contract No. 407, London) track a similar trend to raw sugar prices and they are forecast to be at USD 556/t (USD 26 cts/lb.) in 2021/2022. A relatively large white sugar premium at the outset is expected to narrow over the course of the outlook period, averaging around USD 82/t, as additional white sugar supplies come on stream from new refineries (OECD-FAO, 2012:146).

In the European Union (EU27), production quotas are assumed to expire in September 2015[4] (end of the 2014/15 crop year) in line with existing legislative proposals, with beet production for sugar unrestricted thereafter. As a result, internal prices will likely decline and further adjustments will occur in national industries of member states within the European Union in response to changing price incentives, including the conversion of some former non-quota beet production destined for ethanol to higher value sugar output (OECD-FAO, 2012:153).

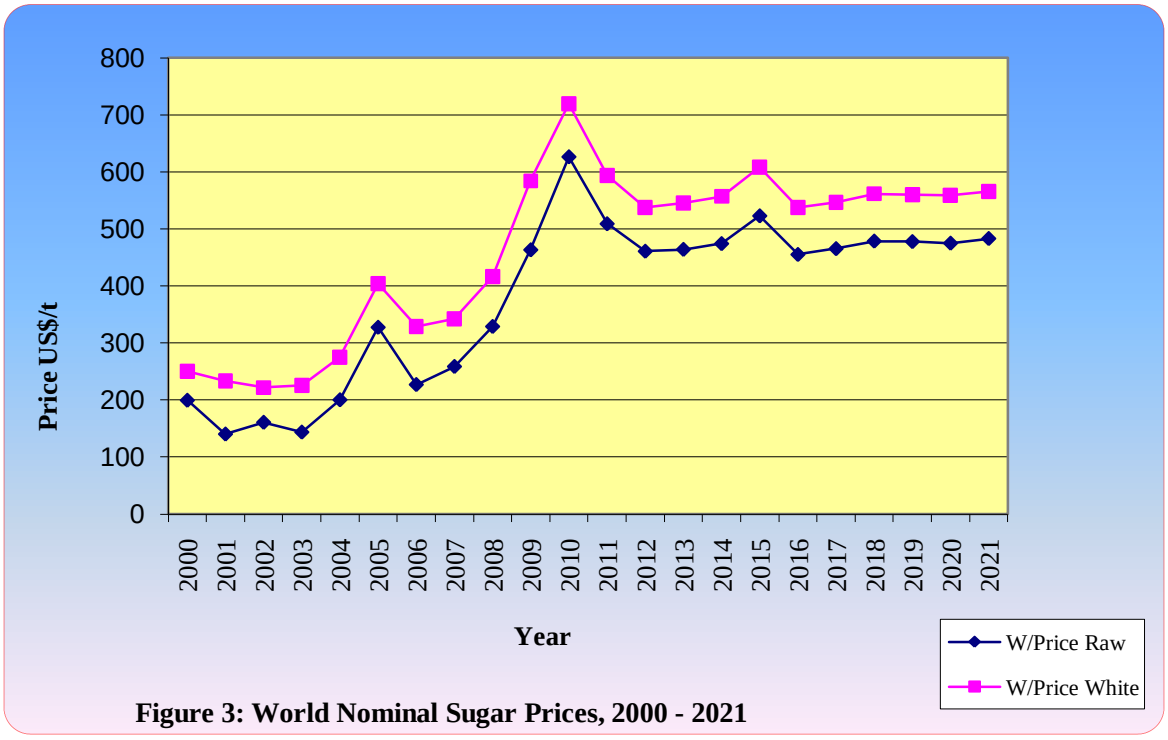


Figure 3: World Nominal Sugar Prices, 2000 - 2021

Source: OECD Data, 2013

[4] The CAP reform debate about the end of the EU sugar production quota is entering its decisive negotiation phase, with the three EU institutions divided on the issue because of recent years' supply problems (USDA, GAIN Report Number: E80016, 4/17/2013).

2.7. SUGAR - THE AFRICAN PICTURE

Africa is characterised by plentiful natural assets, such as lush soil and water resources and fairly high temperatures for cultivating sugarcane, which is the major raw material in the sugar industry (Hassan, 2008). The sugar business in Africa is one of the key industries that contributes in generating jobs for the increasing unemployment as well as being influential in rural upliftment, says Hassan (2008). According to Hassan (2008), Africa has been recognised for sugar production, and Egypt is amongst the oldest African nations known for sugar manufacturing. Table 2.5 below presents African sugarcane production from 2000 to 2011, with changes in production over the decade. The Republic of South Africa, although its overall production decreased by about thirty percent over the years, leads production in Africa, followed by Egypt, the oldest sugar producer in the continent. Swaziland, South Africa, and Mauritius, the only three African states within the top ten exporters of raw sugar in the world, also fall in the top ten producers of Africa. Total African sugarcane production declined over the decade and its percentage share of the world indicates a decline. This may be a result of the significant expansion noted in Thailand, China, the Philippines and Brazil, whilst Africa's largest producers in South Africa and Egypt recorded negative and 0.4 % growth respectively.

Table 2.5: African sugarcane production, tonnes, 2000 to 2011

Country	2000	2009	2010	2011	% Change 2000–2011
World	1 257 458 710	1 687 026 938	1 694 505 010	1 794 359 190	**42.7**
Africa	86 139 567	93 112 539	89 665 534	83 454 969	**−3.1**
RSA	23 876 200	18 655 100	16 015 600	16 800 000	**−29.6**
Egypt	15 705 800	15 482 200	15 708 900	15 765 200	**0.4**
Mauritius	5 109 500	4 667 240	4 365 830	4 230 170	**−17.2**
Sudan (former)	4 981 780	7 526 700	6 728 000	Not Available	**N/A**
Zimbabwe	4 227 500	3 100 000	3 100 000	3 100 000	**−26.7**
Kenya	3 941 520	5 610 700	5 709 590	5 338 560	**35.4**
Swaziland	**3 884 600**	**5 000 000**	**5 000 000**	**5 000 000**	**28.7**
Ethiopia	2 176 570	2 450 000	2 400 000	2 400 000	**10.3**
Malawi	2 100 000	2 500 000	2 500 000	2 500 000	**19.1**
DRC	1 669 000	1 827 140	1 950 000	1 950 000	**16.8**
Zambia	1 600 000	3 200 000	3 500 000	3 500 000	**118.8**
Uganda	1 476 220	3 300 000	2 400 000	2 400 000	**62.6**
Mozambique	397 276	2 207 000	2 800 000	2 800 000	**604.8**
Angola	350 000	500 000	500 000	510 000	**45.7**
Burundi	159 616	132 769	131 730	164 490	**3.1**
Rwanda	40 000	100 663	115 304	115 000	**187.5**
Africa % World	6.9	5.5	5.3	4.7	**−7.3**

Source: FAOSTAT, 2013

2.8. REVIEW OF PREVIOUS STUDIES ON THE IMPACT OF EU REFORMS

A number of studies have looked at the impact of the European Union (EU) sugar sector policy reforms, which came about as a result of external pressure. According to Busse and Jerosch (2006:105), external pressure was put on the European Union (EU) because of international commitments within the World Trade Organisation (WTO) and because the EU's sugar strategy influences other exporting countries, such that non-EU countries and other countries did not have access into the EU market due to high tariffs. Countries that did not enjoy special trade preferences with the EU fiercely supported the transformation of the EU sugar sector policy because that would allow them better access as well as lessen EU exports through elimination of export subsidies within the EU. Most of these studies focused on global and regional impacts. All these researchers come to a similar conclusion, that those countries that currently benefit from preferential trade with the EU will be adversely affected by these reforms, since removal of trade agreements with these countries would mean that all preferences such as price and quantity guarantees that they currently enjoy will fall away. At present, the EU price is twice as high as the world market price because of the protective sugar policy. Chaplin and Matthews (2005:1) conclude that the EU sugar policy review will lead to a reduction in European Union sugar production, benefiting competitive sugar exporters such as Brazil, however, will negatively affect those developing countries which presently gain from preferential import access to the EU's high-priced sugar market, at the same time diminishing the benefits of those least developed countries to which duty-free and quota free access has been promised after July 2009. According to Kerkelä and Huan-Niemi (2004:1), with total liberalization of the EU sugar sector market, only a few efficient producers will be winners.

Nolte *et al*. (2011:1) draw a slightly different conclusion from most of these researchers in that their findings indicate that the abolishing of production quotas within the EU would result in an increase in production in the EU, and that preferential imports will decrease as a result. The OECD (2007:11) reach a similar conclusion, namely that removal of all sugar policy distortions would result in a diminutive increase in world production and consumption, but more significantly an increase in world prices of refined and raw sugar.

2.9. REVIEW OF STUDIES ON THE IMPACT OF POLICY REFORM

A variety of studies on the impact of policy utilising different models is available in the literature. Happe *et al*. (2006), for example, combined agent-based modelling of structural change with agricultural policy analysis. Applying the agent-based model AgriPolis (Agricultural Policy Simulator), they investigated the effects of a regime change in agricultural policy on structural transformation under different framework conditions in the Hohenlohe region in Germany. This area was suitable for the AgriPolis because it is characterised by diverse agriculture with intensive livestock farming, e.g., hog finishing, sows for breeding, and turkeys. In particular, they were concerned with the degree of the effects under differing model parameters that represent key determinants of structural change. According to Happe *et al*. (2006), AgriPolis can be used to analyse the effects of a regime change on structural change considering different framework environments. This model is alleged by Happe *et al*. (2006) to be useful in agricultural policy analysis because it is able to capture heterogeneity and dynamics between farms. Because farms are heterogeneous, they react differently to changing framework conditions, and the model AgriPolis is able to handle this modelling challenge in policy analysis (Happe *et al*., 2006:2).

Ajibefun (2002) analysed the determinants of technical efficiency of small-scale farmers in Nigeria and the effect of policy changes on technical efficiency, using the stochastic frontier methodology. According to Ajibefun (2002), the stochastic frontier production function model allows concurrent estimation of individual technical efficiency of the respondent farmers as well as determinants of technical efficiency. Using the stochastic frontier methodology, Ajibefun (2002) was able to simulate changes in policy, for instance, simulating a policy change that increases level of education to determine how level of education affected technical efficiency. Other variables included in the model were farm size, age of the farmer, farming experience, and family size. These variables were included as determinants of technical efficiency and were used to analyse how farmers' characteristics affected technical efficiency. This would then be used to make recommendations on how government policy could be used to influence farmer characteristics so as to improve technical efficiency.

Morrissey and Zgovu (2009) investigated the impact of Economic Partnership Agreements (EPAs) on Africa, Caribbean, and Pacific (ACP) agriculture imports and welfare using the partial equilibrium analytical framework. They estimated the impact on a sample of 36 ACP countries of eliminating tariffs on agricultural imports from the European Union (EU) under Economic Partnership Agreements (EPAs), considering trade, welfare and revenue effects. According to Morrissey and Zgovu (2009:6), partial equilibrium methods are limited and restrictive, but they offer a number of advantages over alternative computable general equilibrium (CGE) approaches. This is because the data required is relatively simple; all they required was import data for a representative year disaggregated by source and product, whereas computable general equilibrium analysis requires a model of the structure of the economy. Compared to CGE, which requires aggregation by sector, the partial equilibrium method performs analysis at high level of product disaggregation enabling analysis by product, hence identify sensitive products. Lastly results are easy to interpret and very useful for negotiations and policy formulation. The biggest limitation of the model as stated by Morrissey and Zgovu (2009:7) is that it is restricted to static trade effects, and that any changes for instance in factor markets or by domestic producers cannot be factored in. Considering these effects would require CGE.

The sugar industry has undergone extensive analysis by various researchers, simply because the sector is undergoing transformation in terms of trade. Studies that have analysed the impacts of policy within the sugar industry include the cost of Indonesian sugar policy, a policy analysis matrix approach (Nelson and Panggabean, 2011). The study applied a policy analysis matrix (PAM) to analyse the impact of four policy instruments that affected the sugar sector directly in Indonesia, namely, prices of both consumer and producer set above world prices, farmers compelled by government to plant sugarcane, subsidies on fertiliser and chemical inputs, and farmers' credit subsidy. Findings from this PAM analysis indicated that farmers compelled to produce sugarcane on irrigated land received negative private profit and the Indonesian economy lost because the social cost of cane production was much higher than its social value. In addition, by paying subsidies for fertiliser and credit, the government lost economically.

Abidin and Ismono (2004) investigated the impact of government policy on the competitiveness of sugarcane farming in Lampung province of Indonesia, the biggest sugar producing province outside Java. This province was protected by government policy that regulated imports of sugar into Indonesia. Licences were limited to selected state plantations and private firms. The PAM results revealed that by protecting production of sugar in this region, farmers' profits greatly increased, on the other hand, the same policy caused consumer prices for sugar to double. Other studies considered policy reform in the Philippine sugar industry (Nelson, 1991) and a PAM analysis of possible comparative advantage in commercial sugarcane production in South Africa (Krabbe and Vink, 2000).

This review of studies on the impact of policy reveals that various methods are available for the analysis of policy at different levels of focus, such as sector, regional, national, or global. The literature reveals that methodologies for policy impact analysis may not all be suitable for different scenarios. For example, the computable general equilibrium method, although it can be applied at lower levels, it is more commonly used in country level analysis since it includes households, firms and markets. Partial equilibrium analyses can also be applied at country level, but they differ from general equilibrium analysis in that they provide thorough descriptions of agricultural markets and agricultural policies, but are criticised for not taking into account inter-sectoral effects. General equilibrium models consider the inter-sectoral effects and provide better methods of estimating welfare changes, but they often lack the agricultural market detail of the partial equilibrium models, as suggested by Stout III (1991). The PAM on the other hand has been applied at sector level and it provides concise analysis of policy impact at this level. This methodology has been used in a number of studies within the sugar industry across the continents in sugar producing countries. According to Nelson and Panggabean (2011:711), the policy analysis matrix (PAM) is a framework that measures the costs and benefits of policy instruments imposed on diverse market players and on the economy. The results of a PAM are simple and straightforward and can be presented swiftly and efficiently.

2.10. THE POLICY ANALYSIS MATRIX (PAM)

The policy analysis matrix (PAM) is a computational framework developed by Monke and Pearson (1989) and augmented by Masters and Winter-Nelson (1995), for measuring input use efficiency in production, competitiveness, and the degree of government interventions. It is defined as a collection of numbers that follows two rules of accounting. One defines relationships across the columns of the matrix, the other defines relationships down the rows of the matrix. The relationship across columns measures profitability and the one down the rows measures divergences. These are the two accounting identities of the policy analysis matrix. The PAM assists policy makers deal with three key issues in agricultural policy analysis. One is whether agricultural systems are competitive under current prices and technologies; the second is investigating the impact of new public investment in infrastructure on the efficiency of agricultural systems, and third is the impact of new public investment in research on the efficiency of agricultural systems (Pearson *et al.*, 2003:16).

To carry out policy analysis, an accounting matrix is created for individual agricultural product schemes. An agricultural product scheme comprises of farm technology for producing a product (or set of products) in a given agroclimatic zone, a way of transporting the harvest from the farm to a processing site, a technology for processing the harvest into saleable products, and a way of moving the commodities to wholesale markets (Monke and Pearson 1989:193). Table 2.6 below shows the structure of the policy analysis matrix.

Table 2.6: Policy Analysis Matrix

	Revenue	Cost		Profit
		Tradable inputs	Domestic factors	
Private Prices	A	B	C	D
Social Prices	E	F	G	H
Policy effects/Divergences	I	J	K	L

Source: Monke and Pearson 1989

The first row, labeled private prices, measures private profitability (D). Private profitability is the difference between observed costs and revenue. Observed costs and revenue are the prices received or paid by farmers, merchants, or processors. They reflect actual market prices and incorporate the underlying economic valuations and costs as well as the effects of all policies and market distortions. The private profitability calculations indicate the competitiveness of an agricultural system given present technologies, product values, input costs, and policy transfers. If private profitability is positive, it means that the system is competitive and that there is room for expansion, if negative, it means the system is earning a subnormal rate of return and operators can be expected to abandon the activity (Monke and Pearson 1989:12).

The second row in the matrix (social prices) measures social profitability (H), which indicates comparative advantage or input use efficiency in an agricultural commodity system. Social profitability is measured the same way as private profitability, i.e., social revenue less social costs. Social prices are estimated by removing all policy effects from the private prices, such that the values then reflect scarcity values or social opportunity costs. They could also be the costs or prices of commodities at the border. If social profitability is positive, it means the agricultural system is efficient, if negative, the system is wasting resources that could have been used profitably in another system. In other words, this means it is cheaper to import than to produce domestically. This also suggests that the system cannot survive without government support.

The last row of the PAM measures policy effects or divergences. This is the difference between private and social valuations of income, costs, and profits. For each entry in the matrix measured vertically, any difference between the observed actual market prices and the estimated social price must be explained by effects of a policy, or by existence of market failures (Monke and Pearson 1989). If, for example, price support is offered by government to farmers, it is expected that private revenue will be higher than social revenue, hence the government subsidy on prices causes divergence between the private and social revenue.

The policy analysis matrix framework is also useful in estimating some important ratio indicators that can be utilised for policy analysis. These are:

- **The nominal protection coefficient**

The nominal protection coefficient (NPC) indicates incentives or disincentives in place. It is defined as the ratio of domestic price to a comparable world (social) price (Mohanty *et al.*, 2002:6). NPC can be calculated for both output (NPCO), defined as A ÷ E, indicating the degree of output transfer; and input (NPCI), defined as B ÷ F, showing the degree of tradable input transfer. An NPCI of less than one (1) shows that policies are reducing input costs, whilst an NPCO of greater than one (1) indicates that policies are increasing market price (Monke and Pearson 1989:17).

- **The effective protection coefficient**

The effective protection coefficient (EPC), another indicator of incentives, is the ratio of value added in private prices (A − B) to value added in world prices (E − F), or EPC = (A − B) ÷ (E − F) (Monke and Pearson 1989:17). An EPC of greater than one (1) suggests that government policies provide positive incentives to producers while values less than one (1) indicate that producers are not protected through policy incentives (Mohanty *et al*., 2002:6).

- **The profitability coefficient**

The profitability coefficient (PC) measures the incentive effects of all policies and thus serves as a proxy for the net policy transfer, since L = (D − H). Its usefulness is restricted when private or social profits are negative, since the signs of both entries must be known to allow clear interpretation.

- **The subsidy ratio to producers**

A final incentive indicator is the subsidy ratio to producers (SRP), the net policy transfer as a proportion of total social revenues or SRP = L ÷ E = (D − H) ÷ E. The SRP shows the proportion of revenues in world prices that would be required if a single subsidy or tax were substituted for the entire set of commodity and macroeconomic policies. The SRP permits

comparisons of the extent to which all policy subsidises agricultural systems (Monke and Pearson 1989:17).

- **Domestic resource cost ratio**

The domestic resource cost (DRC) is a very useful indicator amongst the group. It is used to compare the relative efficiency or comparative advantage among agricultural commodities and is defined as the shadow value of non-tradable factor inputs used in an activity per unit of tradable value added ($G \div (E - F)$). The DRC indicates whether the use of domestic factors is socially profitable ($DRC < 1$) or not ($DRC > 1$) (Monke and Pearson 1989:17).

- **Private cost ratio**

The private cost ratio (PCR) is the ratio of domestic costs to value added in private costs. It is an indication of how much a system can afford to pay for domestic resources, including a normal return on capital and still remain competitive. This ratio must be as low as possible to maximise profit (Monke and Pearson 1989).

2.11. CONCLUSION

The international trade environment is undergoing economic transformation whereby a free market trade regime is favoured, as opposed to bilateral or multilateral agreements between nations. This is presenting opportunities for some countries but serious challenges for others, especially the poor and developing countries in Africa, Asia, and the Caribbean. Most of these poor and developing countries have been benefiting from bilateral trade agreements with the developed nations, whereby goods from this group of countries enjoy preferential access. A typical example of this arrangement is that between the European Union (EU) and the African, Caribbean and Pacific (ACP) countries, where sugar from the ACPs to the EU market enjoys preferential treatment. Due to pressure from the rest of the world, the EU is reforming its sugar sector policy with the aim of opening up its market to the rest of the world. This spells disaster for ACP countries since they will no longer enjoy preferential treatment, and will now have to compete with the rest of the world for the EU market. Inefficient producers may be driven out of the sugar industry as sugar prices fall due to removal of preferences. Swaziland is amongst the countries that will be affected by these

reforms, especially the smallholder farmers who may not cope with reduced prices because of their capacity. With the cancellation of the current agreement (which grants free access of Swazi sugar into the EU) and the possibility of the high EU price dropping to world market price levels, smallholder sugarcane farmers of Swaziland may be driven out of business. This would spell disaster for the government as rural unemployment would escalate.

A number of studies have been undertaken across the globe to estimate the impact of the reforms of the European Union (EU) sugar sector\ on the rest of the world. Most of them predict a bleak future for most poor and developing countries, especially those with high production costs. According to the literature, various methodologies can be applied to investigate the impact of policy changes. For the purpose of this analysis, the policy analysis matrix (PAM) methodology appeals as the most appropriate because it allows disaggregation of farms according to their attributes. Farms can be disaggregated according to size, product, climatic zone, ownership etc. The results are also simple and easy to explain to policy makers. This is the strength of the PAM over other methodologies.

CHAPTER THREE
METHODOLOGY

3.1. INTRODUCTION

This chapter introduces the reader to the procedure that was followed in order to accomplish the stated objectives. It will also give a brief description of the area under study. In order to analyse the potential impact of policy reform in the European Union on the sustainability of the smallholder sugarcane farmers of Komati, a policy analysis tool is needed which is flexible and clear in presentation of results to policy makers and economists. The policy analysis matrix, discussed in Chapter 2, was found to be well suited to this task.

3.2. STUDY AREA

The study was carried out in the lower Komati River Basin, which is part of the 27 000 ha area extending either side of the Komati River from near Mandlangemphisi in the south-west to the border with the Republic of South Africa in the north-east. It lies within the Lowveld climatic region, the largest of the four climatic zones of Swaziland, covering about 40 % of the country (Thompson, 2012). This region is sub-tropical and semi-arid with a mean rainfall of about 780 mm. Summer rains occur between October and March with maximum temperatures of 34.8 degrees Celsius. Cold dry winters occur from May to August with temperatures reaching a minimum of 10 degrees Celsius. Elevation in the area ranges between 250 to 400 meters above sea level (African Development Bank, 2002). This area is drought prone but sugarcane is successfully grown commercially under irrigation. Soils in the area are categorised into four groups by their geology. There are sandy and loam soils over sandy-clay loams, very well drained deep medium-coarse sands, shallow, well drained sandy and clay loam soils, and moderate-poorly drained soils (African Development Bank, 2002).

The area has about 22 000 people with 1 800 homesteads who are direct beneficiaries of the Komati Downstream Development Project (KDDP).[5] Most of these households used to sustain their livelihood through subsistence agriculture. The KDDP aimed at developing 6 000 ha of land for sugarcane farming under irrigation, and to date 3 700 ha has been put under sugarcane farming, with 22 farmers' associations (FAs) established. Membership of the FAs averages 90, with the lowest at 29 and highest 376 individuals (SWADE, 2013).

3.3. SAMPLING DESIGN

The study targeted smallholder sugarcane farmers of the KDDP area. The area comprises 22 Farmers Associations, however, 18 out of the 22 were fully operational at the time of data collection and the rest were at preliminary stages. Due to the small manageable number of farmers, all of them were included in the study. The study sourced secondary data (farm budgets) for all 18 FAs from the Swaziland Water and Agricultural Development Enterprise (SWADE). One on one interviews were conducted with SWADE, where individual FAs' farm budget were sourced. The data was collected in the form presented in Appendix B. It was then categorised into Intermediate Inputs, Labour, Contractor, and Fixed Inputs as shown in Appendix A. Intermediate inputs comprise tradable inputs such as fertilisers, electricity, herbicides etc. Tradable inputs have a tax levy of 14 percent; accordingly, these were adjusted to estimate social values. Labour includes the non-tradable inputs such as harvesting, hand weeding, environmental management, etc. These values were also adjusted as shown in Appendix A to remove policy effects and estimate social values. Contract items comprise ripening, tractor hire for hauling cane from fields, and transport costs from farm to the millers. Accordingly, policy effects such as VAT were removed to estimate social values. Fixed inputs, comprising interest on capital, interest of operational loans, and bank charges were also adjusted to remove policy effects and estimate their social values. The full illustration of this process is shown in Appendix A.

[5] See section 2.5.2.1

3.4. ANALYTICAL FRAMEWORK

3.4.1. THE POLICY ANALYSIS MATRIX

The primary purpose of constructing a PAM is to measure the impact of government policy on the private profitability of agricultural systems and on the efficiency of resource utilisation (Monke and Pearson, 1989). The basic format of the PAM is presented in Table 3.1. The PAM consists of private and social profits in the first and second rows, and a measure of divergences in the third row. The rows define one identity of the PAM, that is the profitability identity, and the columns define the second identity of the PAM, the divergences identity. These are the two identities of the PAM.

Table 3.1: The Policy Analysis Matrix

	Revenue	Cost		Profit
		Tradable inputs	Non Tradable Inputs	
Private Prices	A	B	C	D
Social Prices	E	F	G	H
Policy effect/Divergences	I	J	K	L

Source: Monke and Pearson, 1989

The symbols (A to L) in Table 3.1 are defined by Monke and Pearson (1989) as follows:

A Revenue measured in private prices (prevailing market prices/accounting prices)

B Costs of tradable inputs (fertilisers, pesticides, seed, etc.) in private prices.

C Costs of domestic factors (such as labour, capital, etc.) in private prices.

D Private Profit = (A – B − C): competitiveness measure (incorporate prevailing economic conditions including policy effects)

E Revenue measured in social prices; that is, prices reflecting efficiency values of output.

F Costs of tradable inputs such as (fertilisers, herbicides, etc.) in social prices.

G Costs of domestic factors such as labour, capital, etc.) in social prices

H Social Profit = (E – F − G): economic efficiency measure (excludes all policy effects)

I Output Transfers = (A − E): measures of all policy effects on output

J Input Transfers = (B − F): measures all policy effects on tradable inputs

K Factor Transfers = (C − G): measures all policy effects on factors of production (labour, capital, etc.)

L Net Policy Transfers = (D − H): sums all policy effects that cause private profit to differ from social profit.

3.4.2. TOOLS FOR MEASURING COMPARATIVE ADVANTAGE, EFFICIENCY AND DISTORTIONS

In addition to profitability, efficiency and divergences, the PAM also produces various ratios that can be used by analysts to evaluate the viability of agricultural schemes. The ratios presented in Table 3.2 below will be used to analyse comparative advantage, efficiency, and level of distortions in the Komati sugarcane farming scheme.

Table 3.2: Economic Indicators derived from PAM

Ratio	Description	Formula
NPCO	Nominal protection coefficient on output	A ÷ E
NPCI	Nominal protection coefficient on input	B ÷ F
EPC	Effective protection coefficient	(A − B) ÷ (E − F)
PC	Profitability coefficient	(D ÷ H)
SRP	Subsidy ratio to producers	L ÷ E = (D − H) ÷ E
DRC	Domestic resource cost	G ÷ (E − F)
PCR	Private cost ratio	C ÷ (A − B)

Source: Monke and Pearson, 1989

The nominal protection coefficient on output indicates the degree of policy transfers on output whilst the nominal protection coefficient on input shows the level of policy support on inputs. These transfers could be in the form of subsidies or taxes. The effective protection coefficient ratio is another indicator of incentives to producers.

The subsidy ratio to producers shows the extent to which all policy subsidises an agricultural system whilst the profitability coefficient sums up the effects of all policies on the system. The domestic resource cost ratio indicates comparative advantage and is useful as it tells whether domestic factors of production are used efficiently. Lastly, the private cost ratio is used to determine if the system can afford to pay for domestic resources and still remain competitive (Monke and Pearson, 1989).

3.5. PROCEDURE

To carry out this analysis, three PAMs were constructed. The first PAM was used to analyse the current situation, providing the Base Case scenario. The other two (Scenario 1 and Scenario 2) were used for sensitivity analysis to simulate the effects of changes in policy on the Base Case. Scenario 1 analysed the performance of the farmers without EU supported prices. It considered a number of issues that may arise which can affect the sugar price when the EU market opens up to the rest of the world. Scenario 2 assumed that the EU completely liberalises its sugar market in the period 2012 to 2020, and that prices fall to levels representing open market. In this scenario, prices are assumed to be driven by pure supply and demand forces rather than deliberate policy intervention.

3.5.1. BASE CASE

- **Estimating private profitability**

Private profitability measures competitiveness of the farming system using prevailing market prices, that is, the price farmers pay for production inputs, and the price farmers receive for their produce at the market. Private profitability is D in Table 3.1, where D = A – B – C, that is, private revenue minus tradable inputs minus non-tradable inputs. To measure private profitability, no alterations were made to the data. Revenue and cost values were used as they were.

- **Estimating social profitability**

To calculate social profitability, world prices for inputs and produce are required. If unavailable, prices at the border are used. In the case of Swaziland, almost all agricultural

inputs are imported from the Republic of South Africa. The Government of Swaziland imposes 14 % value added tax (VAT) on all imports of goods and some services from South Africa and the rest of Southern African Customs Union (SACU) region. Apart from this, there are no other policies within Swaziland that affect tradable inputs. Domestic inputs as well are subject to 14 % VAT. To estimate the social values for these inputs, the 14 % VAT was removed on all items.

- **Estimating social values for selected items**

Revenue

The sucrose price that sugarcane farmers receive is a function of the European Union sugar price, which is the highest price for Swaziland sugar. Other factors such as the SACU and world market prices also contribute. The final revenue that farmers get for their sugarcane is estimated by the sucrose content of their sugarcane and total volume. Thus the higher the content of sucrose in the cane, the higher the price a farmer gets. Therefore, farmers have an incentive to improve technical efficiency so as to achieve high sucrose content to get the high price. According to SWADE (2012), smallholder farmers on average achieve lower sucrose content on their cane compared to the large scale farms run by the Millers. This suggests lower levels of technical efficiency.

The average price for EU raw sugar imported from ACP for the 2012 production season was 551 EUR/t, but the world market price for raw sugar was 350 EUR/t (GAIN Report Number: E80016, 4/17/2013).

The EU-ACP price is therefore about 1.57 times higher than the world market price. To estimate the social value for revenue, the private value for 2012 revenue was adjusted 1.57 times downwards to represent total sales at world prices.

Labour

Workers are paid according to the minimum wage for labour as stipulated by government. To estimate the social value for labour, the commercial rate paid by the sugar estates was used since it is higher than what the workers at Komati are paid.

Government policy requires that employers pay 5 % more than the total wage of a worker, which is contributed into the employee's pension fund. Values for labour were adjusted accordingly to estimate the efficiency value for labour.

Smallholder farmers enjoy a pay as you earn income tax waiver on their wages. Pay as you earn income tax is at 33 %. To estimate social value for labor, wages were adjusted 33 % upwards to include the pay as you earn income tax.

Electricity

Smallholder sugarcane irrigation schemes' electricity is subsidised. They pay 18 % lower than the large-scale commercial irrigation schemes. The private value for electricity was adjusted 18 % upwards to estimate the social value.

3.5.2. SCENARIO 1

The following alterations were made on the Base Case to create Scenario 1. Production costs were inflated by 10 %. During the past decade, the highest inflation rate (overall, including food, transport and other) experienced was between 10 and 15 % in 2009 only, otherwise it averaged 5 % (Central Bank of Swaziland, 2011). Assuming a worst case, 10 % inflation was used to project future production costs.

Secondly, revenue was adjusted after considering a number of issues resulting from the on-going reforms. One was that European Union (EU) sugar prices will fall in the period 2012 to 2020 due to a number of factors. For example, if the European Union (EU) opens up to the rest of the world, efficient sugar producers like Brazil, Australia and Thailand, which are currently restricted access into the EU market by high tariff barriers, will take advantage of the open market and increase their supply to this market.

In addition, other efficient countries within the Africa, Caribbean and Pacific zones, which are currently restricted by quotas, will also take advantage of the new development and increase their sugar supply to the EU market, further bringing down the price. The assumption here is that the EU price will drop but not below the world market price.

Furthermore, changes within the European Union (EU) sugar market will not only affect the EU region; the world market is also expected to be shaken. With major sugar producers such as Brazil[6] shifting their supply to the EU market, the world supply of sugar may shrink in the short to medium term. Accordingly, the shrink in world supply is expected to push up world prices within the period. Therefore, as EU prices drop, the world market price is expected to rise.

Considering the issues discussed above, an assumption was made that the two prices, EU market and world market, will converge at some point such that there is one price for sugar for all markets. This price will be higher than the world projections presented in Figure 3, in Section 2.5.2. Due to the absence of EU price projections in literature, probably because of over protection of the zone, the OECD-FAO projections[7] for world market price for raw sugar for 2012 to 2021 were used to estimate the price, taking on board the issues discussed above. Therefore, a 10 % increase was applied on the world price projections.

Illustration of price estimation:

2012 EU price = EUR 551/t
OECD – FAO (2013) world price projection 2012-2021 = USD 476/t = EUR 357/t
10 % hike: EUR 357/t x 1.10 = EUR 392.7/t

=› There is a drop of 29 % from the EU price of EUR 551 in 2012 to the new open market price of EUR 393. Private revenue in 2012 was thus reduced by 29 % to estimate private and social revenue for Scenario 1.[8]

[6]Brazil accounts for almost 50 % of world sugar exports (FAOSTAT, 2013); As a result, Brazil is considered a price leader in the world market.
[7] See Figure 3.
[8] Note: Since assumptions for prices beyond 2012 predict one price for all markets, private revenue is the same as social revenue.

3.5.3. SCENARIO 2

Scenario 2 assumes that if the European Union reforms its sugar sector policy completely, such that its market takes the form of the world market, then prices will follow the world market trend. The OECD-FAO (2013) projections of world market raw sugar prices between 2012 and 2021 averages USD 476/t, equivalent to EUR 357/t. In 2012, the EU regulated price was EUR 551/t. There is a drop of 35 % to the new open market price. Therefore, private revenue in 2012 was adjusted 35 % down to estimate social and private revenue for Scenario 2. The 10 % inflation adjustment on costs applied in Scenario 2 was maintained.

3.6. SUMMARY

This chapter provided a description of the geography of the area under study, also providing information on livelihood setup. The area has just over 22 000 individuals who basically existed through subsistence farming before the sugarcane project. The methodology for analysis was also outlined, and it includes sampling design, the procedure for constructing a policy analysis matrix (PAM), and sensitivity analysis. Secondary data for all operating farmers' associations was collected and used to construct the PAM, with the primary purpose to measure the impact of government policy on private profitability, efficiency of resource use and distortions in the Komati smallholder sugarcane farming system. Because of the static nature of results from the PAM, the sensitivity analysis was included to analyse the effects of future price changes, whereby two scenarios were developed from the Base Case. Scenario 1 considered prices below current European Union regulated prices, but above world projected prices. Scenario 2 used world projected prices.

CHAPTER FOUR
RESULTS

4.1 INTRODUCTION

The analysis of the impact of policy on smallholder sugarcane farmers of Komati was done under three scenario; (a) The Base Case Scenario (2012), (b) Scenario 1 when the European Union (EU) sugar sector reforms completely, and the European Union (EU) and world market prices converge to one open market price, and (c) Scenario 2 when the EU reforms completely, and the price of sugar in the EU is the same as world market price.

4.2 POLICY ANALYSIS MATRIX FOR THE BASE CASE

The result of the policy analysis matrix for the base analysis is presented in Table 4.1. The result will be discussed making reference to the competitiveness, efficiency and level of divergences in the Komati Region sugar industry.

Table 4.1: Policy Analysis Matrix for Komati Sugar Farmers – Base Case

Farmer Associations	Private profit R'000	Social profit R'000	Net policy transfers	PCR	DRC	SRP	PC	EPC	NPCO	NPCI
Average	7.14	−3.79	10.93	0.61	1.14	0.57	−1.88	2.78	1.57	1.22

Source: Own calculations

4.2.1 MEASURES OF COMPETITIVENESS

4.2.1.1 PRIVATE PROFITABILITY

Private profitability, measured by subtracting private costs from private revenue, indicates the level of competitiveness of an agricultural scheme under current prices, input costs, and technologies. Private profit must be positive for a system to be competitive, otherwise negative profit is an indication that prevailing conditions are not conducive to continued operation. In Table 4.1, private profit was R 7 140/ha. This indicates that under current conditions farmers were able to produce positive private profits. This suggests that the

Komati agricultural system was competitive and that room for expanding production was available.

4.2.1.2 PRIVATE COST RATIO

The private cost ratio (PCR) tells us how much a system can afford to pay for domestic resources while maintaining a normal return on capital yet remaining competitive. The PCR must be as low as possible to maximise profits, therefore farmers should strive to hold down production costs to achieve a low PCR. From Table 4.1, the PCR is 0.61. Although less than 1, it is not as low as is necessary to maximise profit. However, it still indicates that farmers made excess profits and that they were competitive.

4.2.2 MEASURES OF EFFICIENCY

4.2.2.1 SOCIAL PROFITABILITY

Efficiency is measured by social profit, calculated by subtracting social costs from social revenue. Efficiency determines whether resources employed in the production system are utilised in activities that create maximum output and income. It is common with rural smallholder schemes that efficiency in resource use is a problem. Labour, for example, is usually plentiful and as a result it is not necessarily utilised efficiently. Efficiency of resource use is critical if a system is to realise profits and remain competitive. Social profit must be positive for a system to be efficient, otherwise, negative social profit indicates that resources are being wasted that could otherwise be utilised efficiently somewhere else. Social profit in Table 4.1 is negative, indicating that farmers were inefficient. The positive private profit but negative social profit therefore suggests that smallholder farmers of Komati received incentives to continue producing sugarcane, otherwise without the support, they would not be sustaining their enterprises.

4.2.2.2 DOMESTIC RESOURCE COST RATIO (DRC)

The DRC is a very useful indicator of relative efficiency or comparative advantage among agricultural commodities. It indicates whether the use of domestic factors is socially profitable. A DRC must be less than 1, so that the system can make social profit, thus

minimising the DRC maximises social profitability. If the DRC is above 1, social profit is negative. The DRC for Komati sugar farmers in Table 4.1 is 1.14, an indication that farmers were making negative social profit. This means that farmers of Komati were inefficient and lacked comparative advantage. Therefore, under these conditions, it would be unsustainable to continue production.

4.2.3 MEASURES OF DIVERGENCES

4.2.3.1 NOMINAL PROTECTION COEFFICIENT ON OUTPUT

The nominal protection coefficient on output (NPCO) compares the observed (private) price received by local farmers to its social or world market price. It measures level of divergences between the two prices. Simply put, it estimates the level of support from government policy to output price. This support can be in the form of price subsidies whereby the government deliberately sets the price above market levels to encourage local production. Government may also want to support small to medium enterprises by setting prices above market level. Divergences between output prices can also be caused by market imperfections; however, where market imperfections are not available, divergences between the two can be explained by government policy interventions. An NPCO that is greater than 1 indicates implicit subsidy on production whilst that less than 1 indicates implicit tax on production. In this study, the NPCO is 1.57 as presented in Table 4.1. This means that the domestic sugar price is 57 % higher than the world market price. Therefore, government policy increases the price that farmers receive and this is the reason why private profit is positive.

4.2.3.2 NOMINAL PROTECTION COEFFICIENT ON INPUT

The nominal protection coefficient on input (NPCI) is similar in a sense to the NPCO in meaning, only that it measures divergences between tradable inputs. An NPCI of less than 1 show that policies reduce input costs (an implicit subsidy), whilst on the other hand, an NPCI of greater than 1 indicates that policies increase input costs. Market imperfections may also cause divergences between domestic input prices and world market input prices. For the year under review (2012), the NPCI shown in Table 4.1 is 1.22; meaning that policies increased the cost of tradable inputs by 22 % above world prices. Therefore

government policies and/or market imperfections increased the domestic price for tradable inputs, hence the higher cost of production.

4.2.3.3 EFFECTIVE PROTECTION COEFFICIENT

The effective protection coefficient (EPC) measures the total effects of policy intervention in both output and input markets. It is the ratio of value added on domestic prices to the value added on border/world prices. An EPC that is greater than 1 means that government policies provide positive incentives to producers, and that less than 1 indicates that government does not provide protection to farmers through policies. From Table 4.1, farmers at Komati region had an EPC of 2.78. This means that government policy had a net positive impact on smallholder sugarcane farming at Komati. This therefore means that farmers were supported in the form of subsidies to produce sugarcane.

4.2.3.4 PROFITABILITY COEFFICIENT

The profitability coefficient (PC) indicates the extent to which private profits exceed social profits. It measures the incentive effects of all policies and thus serves as a proxy for the net policy transfer. Usefulness of the PC is limited when private or social profit is negative, since signs of both entries must be the same to allow clear interpretation. The PC for this study in Table 4.1 is negative (–1.88) because social profit is negative, but private profit is positive. Therefore, this result cannot explain correctly the extent to which private profit exceeds social profit. Under such circumstances, the net policy transfer (NPT) can be used instead. The NPT from Table 4.1 is 10.93, indicating a high level of transfers to farmers through policy intervention. This is the reason why farmers made positive private profits, but negative social profit.

4.2.3.5 SUBSIDY RATIO TO PRODUCERS

The subsidy ratio to producers (SRP) shows part of the profit in social prices, which will be needed if a single subsidy or tax is received for all commodities and macro-economic policies. Its purpose is to show the level of transfers from divergences as a proportion of the undistorted value of the system revenues.

In cases where market imperfections are not present, this ratio shows the extent to which a system's revenues are increased or decreased by government policy interventions. The SRP for Komati farmers was 0.57 as seen in Table 4.1. This is an indication that policies increased farmers' revenue by 57 %.

4.2.4 SUMMARY

This section analysed the private profitability or competitiveness and social profitability or efficiency of smallholder sugarcane farmers of Komati considering prevailing conditions in the year 2012. It also measured the impact of government policy on the farmers, as indicated by divergences between private and social values in the PAM. The results show that farmers at Komati were competitive, as indicated by the positive private profit, however, in terms of resource use; farmers were inefficient. This was indicated by the negative social profit, which therefore means that production of sugarcane was unsustainable and it depended on government intervention. The measures of incentives, also indicating divergences, and level of government involvement in the system further imply that farmers at Komati sustained their enterprises through government support. In this regard, it can be concluded that the main source of competitiveness in sugarcane production in this area emanated from the price support for Swazi sugar to the European Union market. Thus it is expected that changes according to Scenarios 1 and 2 will result in even worse outcome for sugarcane farmers from Swaziland. The sensitivity analysis that is discussed next will show the impact of expected policy changes on the competitiveness and efficiency of sugarcane farming in Swaziland.

4.3 SENSITIVITY ANALYSIS

Sensitivity analysis was conducted to test how the results of the Base Case would be altered if conditions changed. The European Union (EU) sugar regime reform is expected to change the conditions prevailing in 2012, hence the need for analyzing its impact on the smallholder farmers. Two scenarios were developed for this purpose, with the primary purpose of analysing how price changes would affect competitiveness and efficiency of the farmers. The results are presented in Table 4.2 below; comparing the results of the sensitivity analysis to the Base Case scenario.

Table 4.2: Sensitivity Analysis Results

Farmer Associations	Private Profit R'000	Social Profit R'000	Net Policy Transfers	PCR	DRC	SRP	PC	EPC	NPC	NPI
Base Case	7.14	−3.79	10.93	0.61	1.14	0.57	−1.88	2.78	1.57	1.22
Scenario 1	−2.26	−2.43	0.18	1.64	1.53	0.00	0.93	0.84	1.00	1.14
Scenario 2	−2.71	−2.90	0.15	1.94	1.78	−0.01	0.93	0.94	1.00	1.13

Source: Own calculations

4.3.1 MEASURES OF COMPETITIVENESS

4.3.1.1 PRIVATE PROFITABILITY

The results of the Base Case scenario show positive private profits, meaning that the farmers were competitive under existing conditions. However, as seen in Table 4.2, both scenarios of the sensitivity analysis indicate that farmers will not be competitive when changes are effected to the conditions in 2012. Private profit goes down from 7.14 to −2.26 and −2.71 in Scenarios 1 and 2 respectively. The price reduction effected in the two scenarios resulted in negative private profit, suggesting that any changes in the EU sugar regime that reduces the price will drastically affect smallholder sugarcane farmers. If prices fall to world market levels, the situation will become worse as predicted by Scenario 2. As a result, farmers will be forced out of production.

4.3.1.2 PRIVATE COST RATIO

The private cost ratio (PCR) as seen in Table 4.2 has increased from 0.61 in the Base Case scenario to 1.64 and 1.94 in Scenarios 1 and 2 respectively. Being greater than 1.0, the ratios confirm that farmers would make negative private profit if prices fell from current levels, consequently putting farmers out of business.

4.3.2 MEASURES OF EFFICIENCY

4.3.2.1 SOCIAL PROFITABILITY

From Table 4.2, in both Scenarios 1 and 2, social profitability is negative, suggesting the presence of inefficiencies. However, a minimal improvement is observed moving from the Base Case to Scenario 1, but as prices fall to world market level the position becomes worse. This is an indication that sugarcane farming will not be sustainable in the Komati region. However, the drop in prices does improve level of efficiency when compared to the Base Case.

4.3.2.2 DOMESTIC RESOURCE COST

Referring to Table 4.2, the DRC increases from 1.14 in the Base Case to 1.64 and 1.78 in Scenarios 1 and 2 respectively. This implies that as price drops; efficiency in domestic resource utilisation or comparative advantage also reduces, thus rendering the scheme unprofitable.

4.3.3 MEASURES OF DIVERGENCES

In Table 4.2, the nominal protection coefficient on output (NPCO) is 1 in both Scenarios 1 and 2, meaning that there are no transfers between farmers and government.

The nominal protection coefficient on input drops from Base case 1.22 to 1.14 and 1.13 in Scenarios 1 and 2 respectively, as the price of sugar is reduced. Therefore, the drop in sugar prices also results in government relaxation of policies that otherwise increase the cost of inputs. The effective protection coefficient (EPC) drops from 2.78 in the Base Case to 0.93 and 0.94 in Scenarios 1 and 2 respectively. The EPC of less than 1 indicates that government reduces its overall intervention and farmers do not receive any form of protection from the government. Since private and social profits are negative, the profitability coefficient (PC) is irrelevant and the net policy transfer (NPT) provides useful information instead. In this case, the NPT drops from 10.93 in the Base Case to 0.18 and 0.15 in Scenarios 1 and 2 respectively. Since a larger proportion of government support is on the price, it is expected that this ratio will drop drastically when the price is reduced.

The profitability coefficient (PC) indicates the extent to which private profits exceed social profits. It measures the incentive effects of all policies and thus serves as a proxy for the net policy transfer. In this study, both private and social profits are negative. Therefore, this result has no meaning.

4.3.4 SUMMARY

The sensitivity analysis provided a snapshot of possible impacts of the European Union sugar sector reforms on smallholder sugarcane farmers of Swaziland. From the results, it can be concluded that smallholder sugarcane growers face a bleak future if the European Union decides to open up its market. The sensitivity analysis predicts that farmers will make negative private and social profits, as such, and will be uncompetitive and inefficient such that they will be forced out of business.

4.4 SUMMARY OF RESULTS

The study utilised the PAM methodology to analyse the competitiveness and efficiency of smallholder sugarcane farmers of Komati, in addition to assessing the level of government intervention in the sugarcane business.

The Base Case indicates that farmers were able to achieve positive private profitability; therefore, they were competitive under prevailing conditions. This also suggests that scope for expanding production was available. On the other hand, farmers made negative social profits, suggesting that inefficiency existed. The measures of divergences indicated a high level of government intervention in the production of sugarcane in the area. The negative social profit further suggests that farmers received significant support from the state so as to be able to make positive private profit.

The sensitivity analysis provided a preview of the future of smallholder farmers of Komati, taking into account the on-going European Union (EU) sugar sector reforms. The measures of profitability indicate that farmers will not be able to make profits, either social or private. This therefore means that farmers will not be able to sustain their businesses and will be forced to close down, or shift resources to more productive enterprises. If they are to

continue in the sugarcane business, government would need to intensify its support to the sector.

CHAPTER FIVE
CONCLUSION AND RECOMMENDATIONS

5.1 SUMMARY

The economy of Swaziland enjoyed strong economic growth during the 1980s; however, in the last decade, growth became weak as a result of various factors including most importantly global warming, which resulted in perennial drought. Agriculture, which was the driving force for this growth, has been drastically affected. Outputs started to dwindle as a result of lack of water. Periodic shocks in Swaziland's international markets affected exports, poor foreign direct investment affected the manufacturing sector, and the advent of HIV/AIDS affected labour productivity. The most recent (2008) economic and financial meltdown further exacerbated the plight of Swaziland's economy. Responding to the weakened growth, the Government of the Kingdom of Swaziland put in place policies that would revive the economy. The National Development Strategy (NDS) was enacted in 1997 with an objective to drive Swaziland to the top 10 % of the medium human development group of countries by 2022. To operationalise this policy, the Poverty Reduction Strategy and Action Plan (PRSAP) was prepared in 2006. This document presents a number of solid programmes designed to produce income and generate employment, including improving agricultural production and food security. Agriculture, being the source of livelihood for the majority of Swazis, was identified as key in reviving the economy of Swaziland.

Within the agriculture sector, development of smallholder farming was realised as one vehicle that could drive poor Swazis out of poverty. The sugar industry; being well structured and organised was identified for introduction in the rural areas of the country where about 70 % of the poor reside. As a result, government introduced a number of projects to develop the sugar sector; including constructing large dams for collecting irrigation water, and assisting rural people establish smallholder sugarcane farms. A number of these smallholder sugarcane farmers emerged in the late 1990s and early 2000s. The sugar industry thrived as a result, but it was enhanced more by Swaziland's favourable relationship with the European Union.

Swaziland's sugar enjoys preferential treatment into the European Union (EU) markets such that prices received are way above those of the rest of the world markets. This has proved to be highly beneficial to the sugar industry over the years. From about 2006, conditions in the European Union market changed, however, such that preferential treatment was reduced. The prices offered for Swaziland sugar were dropped, but still remained significantly higher compared the rest of the world market. Changes in the EU market were brought about by other countries that do not enjoy preferential treatment for their sugar in the European Union. Their sugar is subject to high tariffs on the EU market such that it is expensive for them to sell to the EU. These countries lodged formal complaints to the World Trade Organisation (WTO), and the WTO ruled in their favour. As a result, the EU has been forced to open up its borders to the rest of the world. The EU is therefore implementing reforms in its sugar market and these reforms will result in loss of preferential treatment for Swaziland sugar. Opening up of the EU market means that there will no longer be controlled prices; prices may drop to levels equal to world market prices.

These changes are expected to drastically affect the sugar industry in Swaziland, especially for smallholder sugarcane farmers. Smallholder sugarcane farmers have been benefiting from the high EU price; as a result, a drop will reduce their revenue and they may not able to service their loans with financial institutions. This could drive some of them out of business, and this will not be good for government's endeavour to lift people out of poverty. The reforms within the EU are expected to be complete by 2015, by which time the market will be open to the rest of the world. For that reason, this study analyses the likely impacts of these changes on the smallholder sugarcane farmers of Swaziland.

Various methodologies can be used in policy impact analysis, such as the computable general equilibrium model, the partial equilibrium model or the stochastic frontier method, but the policy analysis matrix appealed as the most appropriated methodology for this analysis. This is because it is easily applicable at sectoral level and even at lower levels. The data required for analysis is very simple – only prices are needed.

The area under study is small, with about 22 000 people in 1 800 homesteads, organised into farmers' associations and all practising smallholder sugarcane farming. It lies within the Lowveld climatic region, with sub-tropical and semi-arid conditions. The mean annual rainfall is about 780 mm occurring in summer between October and March. The area is drought prone, but overall, conditions favour sugarcane farming, although under irrigation.

Due to the small and manageable number of farmers' associations, 18 fully operational out of 22, all of them were included in the analysis. The study sourced secondary data (farm budgets) from the Swaziland Water and Agricultural Development Enterprise (SWADE). One-on-one interviews were conducted with members of SWADE where individual farmers' association's budget were discussed. Data was collected in the form presented in Appendix B. It was categorised into Intermediate Inputs, Labour, Contractor, and Fixed Inputs, as shown in Appendix A. Using the policy analysis matrix, the study was able to analyse the competitiveness and economic efficiency of the Komati smallholder sugarcane farmers. The study also analysed the level of government intervention in the Komati farming system.

The competitiveness of a farming system is measured in the policy analysis matrix by private profitability, and economic efficiency is measured by social profitability. The level of government intervention is measured by divergences between private and social valuations of income, costs and profits. Apart from these measures, the PAM also produces various ratios that can be used to add value to viability analysis for agricultural schemes. These are: the Nominal Protection Coefficient on Output (indicates degree of policy transfers on output), the Nominal Protection Coefficient on Input (indicates level of policy support on inputs), the Effective Protection Coefficient (indicates overall level of incentives provided to producers), the Subsidy Ratio to Producers (indicates extent to which policy subsidises an agricultural system), the Domestic Resource Cost (indicates comparative advantage), and the Private Cost Ratio determines if the system can afford to pay for domestic resources whilst remaining competitive.

Three PAMs were constructed to conduct the analysis, namely, the Base Case depicting the current situation, Scenario 1, and Scenario 2, which provided sensitivity analysis. The Base Case used prevailing prices to calculate profitability and to measure divergences. In Scenario 1, costs were inflated by 10 % to project future production costs, and revenue was reduced by 29 %, assuming that prices in the European Union Market will drop, but not below world market prices. For Scenario 2, costs were maintained at Scenario 1 level, but revenue was reduced by 35 % to match a drop in the European Union's price such that it equals world market prices.

The Base Case indicates that farmers are competitive, suggesting scope for expansion, whilst the negative social profitability indicates lack of economic efficiency. The analysis further suggests that there is significant involvement of government in the farming system in the form of price support. Both Scenarios 1 and 2 indicate that smallholder farmers will not make positive private and social profits.

5.2 CONCLUSION

The general objective of the study was to analyse the potential impact of the European Union (EU) sugar trade policy reform on the sustainability of smallholder sugarcane farmers in the Komati region in Swaziland. In doing so, the study analysed the competitiveness and economic efficiency of the farmers considering changes in the EU sugar market policy. The study also analysed the level of government intervention in the Komati farming system, along with other important indicators in the analysis of agricultural policy, such as; private cost ratio (PCR), domestic resource cost (DRC), subsidy ratio to producers (SRP), profitability coefficient (PC), effective protection coefficient (EPC), nominal protection coefficient on outputs (NPCO), and nominal protection coefficient on inputs (NPCI) using the policy analysis matrix methodology. Three policy analysis matrices (PAMs) were constructed, one representing the Base Case scenario, and the other two scenarios providing sensitivity analysis with changes in prices of sugar as a result of policy reform.

Results from the Base Case scenario indicate that farmers of Komati are profitable under current prices and policies, suggesting also that the potential for expansion of operations is

available. However, according to the PAM analysis, although making positive private profits, farmers were not efficient, as indicated by the negative social profit. The results suggest that in order for farmers to have made positive private profit in 2012, they received substantial support from the government. Such support can be seen in the price received for Swazi sugar, which is far above that of the world market. This is demonstrated by the high level of net policy transfer in the PAM. The second and third PAMs, analysing conditions after the abolishment of European Union trade preferences with Swaziland, predict disastrous outcomes. Both indicate that smallholder sugarcane farming in the KDDP will not be profitable.

A general conclusion that can be drawn from this study is that Komati Downstream Development Project farmers are economically inefficient. They will not be able to continue producing sugarcane if the European Union sugar sector reforms result in sugar prices dropping to world market levels. Even though world market prices are projected to improve in the future, growing sugarcane in this area would be unsustainable since farmers would be earning negative profits.

5.3 RECOMMENDATIONS

The recommendations listed below are based on the results and observations made when carrying out the study: Looking into the future; it is inevitable that the price received by farmers for their cane, from millers will reduce as a result of the European Union (EU) sugar sector reforms. Consequently, this will reduce farmers' overall revenue and cause them to make negative profits. In this sense, the recommendations made are aimed at improving the domestic conditions under which smallholder sugarcane farmers operate because these can be readily controlled.

5.3.1. RECOMMENDATIONS TO FARMERS

Improve farmers' efficiency

The results of this study indicate that there are significant inefficiencies among the farmers; therefore, it is recommended that:

- Business management training to these farmers is intensified as it proved to be lacking in most of the farmers' associations (FAs). Farmers' books are currently maintained by SWADE, suggesting lack of capacity within the FAs. Farmers lack basic business management skills such as bookkeeping. As a result, they are unable to track cash flows, such that they end up overspending. Farmers tend to spend all revenue so that they require operational loans every season. This increases their debt burden.

- Improve/enhance technical efficiency. Compared to some medium and large-scale growers within the same region, smallholder farmers produce lower levels of sucrose in their cane; hence they receive lower prices for their cane and earn less revenue than they possibly could. In this sense, if farmers were assisted more with the technical management of their crop to achieve a higher sucrose content, they could improve revenues and increase their profits.

5.3.2. RECOMMENDATIONS TO GOVERNMENT

Review government policy on smallholder farmers

- The results of the PAM indicate that smallholder farmers are exposed to high costs of inputs due to government taxation policy. Therefore government should carefully review taxation policy on smallholder sugarcane farmers to ensure that farmers are not burdened by high costs of agricultural inputs. Future increases in oil prices will further worsen the situation for these farmers and this needs government intervention to contain domestic prices within affordability.

- Monitor the development of the EU's sugar sector policy to take advantage of new opportunities that can emerge so as to advise the industry accordingly. For example, sales to the EU will now be open with no quota restrictions. In the short term, farmers can benefit from unrestricted sales volumes to the EU if they can be assisted in terms of boosting production volumes.

- Explore the rest of the world to identify new lucrative markets for Swaziland's sugar.

- Improve support to smallholder sugarcane growers in the form of affordable capital as it is quite costly to establish a sugarcane farm. Capital loans are proving to be a burden to farmers.

- Lastly, considering the fact that smallholder sugarcane farming has provided a viable source of income in this area over the years, it is imperative that government policy makers explore various ways of supporting the farmers in a way that does not violate World Trade Organisation principles, to keep sugarcane farming sustainable after the EU reforms.

5.4 AREAS FOR FURTHER RESEARCH

Agriculture plays a pivotal role in the economy of Swaziland and smallholder sugarcane farming is used as a vehicle for lifting poor subsistence farmers out of poverty, especially in the rural areas. Over a billion Emalangeni has been invested in smallholder sugarcane farming in the Komati region. However, the results of the study suggest that sugarcane farming will no longer be viable in this region if the EU reforms go ahead as planned. As a result, return on this investment will be lost. The domestic resource cost ratio indicates that there is poor utilisation of domestic resources, suggesting significant inefficiencies. It would be useful to conduct a study that focuses on the technical efficiency of the Komati farmers, so as to ascertain exactly what the causes are. This would go a long way to addressing the otherwise high costs of production, and hence improve farmers' productivity.

This study focused on a segment of the sugar industry of Swaziland; however, reforms in the EU will affect the whole economy as well as the sugar industry, especially because sugar is the major export and foreign revenue earner for Swaziland. The primary weakness of the PAM is that it focuses only on a specific sector or system, and does not capture linkages of that sector with other influencing segments. Also, this study focused on Komati farmers and therefore does not give a complete picture of the impacts of the EU reforms on the economy

of Swaziland. A study that would provide an overall picture would better determine policy options for dealing with these changes.

REFERENCES

ACP-EU Technical Centre for Agricultural and Rural Development (2010) *Sugar*: *Trade issues for the ACP*. Available from: http://www.acpsugar.org/old/protocols.htm#SugarProtocol [Accessed 12 October 2012].

Adesina, A. and Coulibaly, N.O. (2008) *Policy and competitiveness of agroforestry-based technologies for maize production in Cameroon*: An application of policy analysis matrix. p. 5-6.

African Development Bank (2002) *Komati Downstream Development Project, Appraisal Report to the Government of the Kingdom of Swaziland*, Mbabane, Swaziland. p. 12-13.

Ahmed, S. and Martin, R.P. (2000) *Agricultural policy analysis in Pakistan: Illustration in the use of the Policy Analysis Matrix*, CMER Working Paper Series, Working Paper No. 00-27.

Ajibefun, I.A. (2002) *Analysis of policy issues in technical efficiency of small scale farmers using the stochastic frontier production function*: *With application to Nigerian farmers*. Department of Agricultural Economics & Extension, Federal University of Technology, P.M.B. 704, Akure, Ondo State, Nigeria.

Asogwa, B.C., Umeh, J.C. and Penda, S.T. (2011) Analysis of Economic Efficiency of Nigerian Small Scale Farmers: A Parametric Frontier Approach. *Journal of Economics*, 2(2): Benue State, Nigeria.

Busse, M. and Jerosch, F. (2006) Reform of the EU Sugar Market. *Intereconomics*. March 2006, 41(2): 104-107.

Delegation of the European Union in Swaziland (2012), ACP sugar protocol programme. Available from: http://eeas.europa.eu/delegations/swaziland/press_corner/all_news/news/2012/20120328 01en.htm, [Accessed 28 March 2012].

Dlamini, M.B. and Masuku, M.B. (2012) Profitability of Smallholder Sugarcane Farming in Swaziland: The Case of Komati Downstream Development Programme (KDDP) Sugar Farmers' Associations, 2005-2011. *Sustainable Agriculture Research*, 2(1).

Dorward, A., Fan S., Kydd J., Lofgren, H., Morrison, J., Poulton, C., Rao, N., Smith, L., Tchale, H., Thorat, S., Urey, I. and Wobst, P. (2004) Institutions and policies for pro-poor agricultural growth. *Development Policy Review*, 22(6): 612.

Eicher, C. and Staatz J. (1998) International Agricultural Development, 3rd Edition, John Hopkins University Press.

Ellis, F. (1992) Agricultural policies in developing countries. Cambridge, Cambridge University Press.

European Commission (2009) Sugar price reporting. Available from: http://ec.europa.eu/index_en.htm, [Accessed 02 June 2013].

European Commission (2012) *Prospects for agricultural markets and income in the EU*, 2012-2020.

European Commission (2013) Sugar price reporting. Available from: http://ec.europa.eu/index_en.htm, [Accessed 02 June 2013].

Gittinger, P.J. (1982) *Economic Analysis of Agricultural Projects*, 2nd ed. Baltimore: John Hopkins University Press, 1982.

Goodison, P. (2007) The ACP Experience of Preferences: Erosion in Banana and Sugar Sectors, Paper No 7. p. vii.

Goodison, P. (2009) *Policy Notes, The Impact of Common Agricultural Policy (CAP) Reform on Africa-EU Trade in Food and Agricultural Products*. The Nordic Africa Institute, CTA-Technical Centre for Agricultural and Rural Cooperation. Issue Paper No.133.

Halcrow, G.H. (1984) *Agricultural Policy Analysis*. McGraw-Hill, Inc, United States of America.

Happe, K., Konrad, K. and Alfons, B. (2006) Agent-based analysis of agricultural policies: an illustration of the agricultural policy simulator AgriPoliS, its adaptation and behaviour. Ecology and Society. Available from: http://www.ecologyandsociety.org/vol11/iss1/art49/ [Accessed 5 May 2012].

Hassan, S.F. (2008) Development of Sugar industry in Africa, Cairo, Egypt.

Kerkelä, L. and Huan-Niemi, E. (2004) Trade preferences in the EU sugar sector: Winners and Losers. Available from: http://www.vatt.fi/file/vatt_publication_pdf/k358.pdf [Accessed 17 March, 2013].

Kingdom of Swaziland. Central Bank of Swaziland (2011) Central Bank of Swaziland Annual Report, Mbabane, Swaziland. p.15.

Kingdom of Swaziland. Government of the Kingdom of Swaziland (2010) *Fiscal Adjustment Road Map*, Mbabane, Swaziland.

Kingdom of Swaziland. Ministry of Agriculture (2012) *Vision of the Ministry of Agriculture*. Available from: http://www.gov.sz/index.php, [Accessed 24 August 2012].

Kingdom of Swaziland. Ministry of Economic Planning and Development (2009) *National Development Plan*, Mbabane, Swaziland.

Kingdom of Swaziland. Ministry of Economic Planning and Development (2006) *National Adaptation Strategy*. Mbabane, Swaziland.

Kingdom of Swaziland. Ministry of Economic Planning and Development (2007) *Swaziland Economic Background Paper*, Mbabane, Swaziland.

Kingdom of Swaziland. Ministry of Economic Planning and Development (2011) *Economic Review and Outlook 2011*, Mbabane, Swaziland.

Kingdom of Swaziland. Ministry of Finance (2010) *Fiscal Adjustment Roadmap*, Mbabane, Swaziland.

Kingdom of Swaziland. Royal Swaziland Sugar Corporation (2011) *Royal Swaziland Sugar Corporation Annual Report*, Simunye, Swaziland.

Kingdom of Swaziland. Swaziland Review (2012) *An overview of the kingdom of Swaziland's Economy*. Swazi Review of Commerce and Industry. Manzini, Swaziland.

Kingdom of Swaziland. Swaziland Sugar Association (2011). *Swaziland Sugar Association Annual Report*, Mbabane, Swaziland.

Kingdom of Swaziland. Swaziland Sugar Association (2012) *Importance of the Sugar Sector in Swaziland*. Available from: http://www.ssa.co.sz, [Accessed 08 October 2012].

Kingdom of Swaziland. Swaziland Water and Agricultural Development Enterprise: *KDDP Overview 2012*. Available at: http://www.swade.co.sz/kddp.html [Accessed 11 December 2013].

Krabbe, E. and Vink, N. (2000) *Searching for comparative advantage in commercial sugarcane production in South Africa*: A PAM analysis.

Latruffe, L. (2010) *Competitiveness, Productivity and Efficiency in the Agricultural and Agri-Food Sectors*, OECD Food, Agriculture and Fisheries Working Papers, No. 30, OECD Publishing. p. 5, 19-21.

Masuku, M.B., Kirsten, J.F. and Owen, R. (2007) A Conceptual Analysis of Relational Contracts in Agribusiness Supply Chains: The Case of the Sugar Industry in Swaziland, Agrekon: Agricultural Economics Research, Policy and Practice in Southern Africa, pp. 46.

Mohanty, S., Fang, C. and Chaudhary, J. (2002) *Assessing the competitiveness of Indian Cotton Production: A policy analysis matrix approach*. Working Paper 02-WP 301, Center for Agricultural and Rural Development, Iowa, State University.

Monke, E.A. and Pearson, S.R. (1989) The Policy Analysis Matrix for Agricultural Development, Cornell University Press, Ithaca, New York.

Morrissey, O. and Zgovu, E. (2009) *The impact of Economic Partnership Agreements on ACP agriculture imports and welfare.* Centre for Research in Economic Development and International Trade, University of Nottingham.

Nolte, S. Buysse, J. and Van Huylenbroeck, G. (2011) *Modeling the effects of an abolition of EU sugar quota on internal prices, production and imports*. European Review of Agricultural Economics Vol. 39 (1) (2012). p. 75-94,

OECD/FAO (2011) *Agricultural Outlook, 2011-2020*.

OECD/FAO (2012) *Agricultural Outlook, 2012-2021*.

Panggabean, M. and Nelson C.G. (1991) The Costs of Indonesian Sugar Policy: A Policy Analysis Matrix Approach, *American Journal of Agricultural Economics*, 73(3): 703-708.

Pearson, R.S., Gotsch, C. and Bahri, S. (2004) *Application of the policy analysis matrix in Indonesian agriculture*, 1st edn. Development Alternatives Inc., Yayasan Obor Indonesia. p. 19-20.

Reig-Martínez, E., Picazo-Tadeo, A.J. and Estruch, V. (2008) The policy analysis matrix with profit-efficient data: Evaluating profitability in rice cultivation. *Spanish Journal of Agricultural Research*, 6(3): 309-318.

Organization for Economic Cooperation and Development (2007) *Sugar Policy Reform in the European Union and in World Sugar Markets*, OECD Publishing. doi: 10.1787/9789264040212-en

Illovo (2012) Illovo Integrated Annual Report 2012. South Africa.

Richardson, B. (2012) EU sugar policy and the experience of Swaziland, Trade, aid and rural development. Discussion Paper No. 133, University of Warwick. p. 5.

Sandrey, R., Vink, N. and Jensen, H.G. (2011) The implication of trade liberalization for east and southern Africa, Tralac Working Paper, No.D11 WP05/2011.

South Centre (2007) *The Reform of the EU sugar sector: Implications for ACP Countries and EPA negotiations*, Analytical note, SC/AN/TDP/MA/3, Geneva, Switzerland p. 1.

Stout III, V. (1991) *Direct Comparison of general equilibrium and partial equilibrium models in agriculture*. Agriculture and Trade Analysis Division, Economic Research Service, U.S. Department of Agriculture, Technical Bulletin No.1799. Washington DC 20005 – 4788. p.1

Thompson, C.F. (2011) *Swaziland Business Year Book*, 20th Edition, Mbabane, Swaziland.

Thompson, C.F. (2012) *Swaziland Business Year Book*, 21st Edition, Mbabane, Swaziland.

USDA Foreign Agricultural Service (2013) GAIN Report Number, E80016, 4/17/2013.

USDA (2013) *World Raw Sugar Prices; The influence of Brazilian cost of production and World Surplus/Deficit Measures.*

Zainal, A. and Ismono, H. (2004) The impact of government policy on the competitiveness sugarcane farming in Lampung Province, p. 6-11.

Zoungrana, L.K. (2009). An analysis of the impact of the EU sugar policy reform on ACP countries: A quota market framework, University of Ouagadougou, 2001. MS. Louisiana State University.

APPENDIX A

PAM CALCULATIONS: Estimating private and social values

Annual private revenue (R/ha/annum): **R 30.01**

Social revenue: **R 19.11**

	Tradable inputs R/ha)	Non-tradable inputs (R/ha)	Total (R/ha)	Cancel Policy out (Taxes)	Total without Taxes (R/ha)	Cancel Policy Out		Social Values Tradable Inputs (R/ha)	Social Values Non-Tradables (R/ha)	Social Values Total (R/ha)
Intermediate inputs:										
Herbicides	R 2 302.24		R 2 302.24	–14 %	R 2 019.51			R 2 019.51		R 2 019.51
Ripeners	R 137.56		R 137.56	–14 %	R 120.67			R 120.67		R 120.67
Repairs			R 0.00	–14 %	R 0.00			R 0.00		R 0.00
Fertilisers	R 3 529.12		R 3 529.12	–14 %	R 3 095.72			R 3 095.72		R 3 095.72
Electricity		R 4 654.68	R 4 654.68	–14 %	R 4 083.05		18 %	R 4 979.33		R 4 979.33
Maintenance	R 700.84		R 700.84	–14 %	R 614.77			R 614.77		R 614.77
Water		R 80.23	R 80.23		R 80.23				R 80.23	R 80.23
Other	R 550.40	R 99.59	R 649.99	–14 %	R 582.40			R 482.81	R 99.59	R 582.40
Protective clothing	R 179.67		R 179.67	–14 %	R 157.61			R 157.61		R 157.61
Cane insurance			R 0.00		R 0.00				R 0.00	R 0.00
Seed cane	R 19.40	R 172.48	R 191.88	–14 %	R 189.50			17.02	R 172.48	R 189.50
Labour										
Harvesting		R 166.48	R 166.48	33 %	R 248.48	–5 %			R 236.65	R 236.65
Trash management		R 79.94	R 79.94	33 %	R 119.31	–5 %			R 113.63	R 113.63
Fertiliser application		R 57.92	R 57.92	33 %	R 86.44	–5 %			R 82.33	R 82.33
Hand weeding		R 127.89	R 127.89	33 %	R 190.88	–5 %			R 181.79	R 181.79
Irrigation		R 857.04	R 857.04	33 %	R 1 279.17	–5 %			R 1 218.25	R 1 218.25
Herbicide application		R 73.02	R 73.02	33 %	R 108.98	–5 %			R 103.79	R 103.79
Pest & disease controllers		R 63.95	R 63.95	33 %	R 95.44	–5 %			R 90.90	R 90.90
Administration cost		R 1 239.45	R 1 239.45	33 %	R 1 849.93	–5 %			R 1 761.84	R 1 761.84
Environmental manager		R 51.21	R 51.21	33 %	R 76.43	–5 %			R 72.79	R 72.79
Fencing		R 60.90	R 60.90	33 %	R 90.90	–5 %			R 86.57	R 86.57
Insurance		R 154.00	R 154.00	33 %	R 229.85				R 229.85	R 229.85

	Tradable inputs R/ha)	Non-tradable inputs (R/ha)	Total (R/ha)	Cancel Policy out (Taxes)	Total without Taxes (R/ha)	Cancel Policy Out		Social Values Tradable Inputs (R/ha)	Social Values Non-Tradables (R/ha)	Social Values Total (R/ha)
Gapping		R 16.54	R 16.54	33 %	R 24.69				R 24.69	R 24.69
Other		R 365.27	R 365.27	33 %	R 545.18				R 545.18	R 545.18
Contractor										
Ripening	R 506.19		R 506.19	–14 %	R 444.03			R 444.03		R 444.03
Tractor hire			R 0.00	–14 %	R 0.00			R 0.00		R 0.00
Harvesting	R 8 461.05		R 8 461.05	–14 %	R 7 421.97			R 7 421.97		R 7 421.97
Fixed inputs:										
Interest on capital			R 0.00		R 0.00		9 %			R 0.00
Interest on operational loan			R 0.00		R 0.00		9 %			R 0.00
Bank Charges		R 77.00	R 77.00		R 77.00					R 77.00
Total	**R 16 386.47**	**R 8 397.58**	**R 24 784.05**		**R 23 832.12**			**R 19 353.43**	**R 5 100.54**	**R 24 530.97**

	Costs	Private value	Social value
Farm Value	Labour	R 3 313.60	R 4 748.24
	Capital	R 77.00	R 0.00
	Tradable inputs	R 16 386.47	R 19 353.43
	Revenue	R 30 015.00	R 19 117.83

POLICY ANALYSIS MATRIX

	Revenue	Cost		Profit
		Tradable inputs	Domestic factors	
Private Prices	A **R 30 015.00**	B **R 16 386.47**	C **R 3 390.60**	D **R 10 237.93**
Social Prices	E **R 19 117.83**	F **R 19 353.43**	G **R 4 748.24**	H **-R 4 983.84**
Policy effect	I (A – E) **R 10 897.17**	J (B – F) **-R 2 966.96**	K (C – G) **-R 1 357.64**	L (D – H) **R 15 221.77**

RATIO INDICATORS

Private cost ratio (PCR)

$$PCR = \frac{C}{(A - B)}$$

$$0.25$$

Domestic resource cost ration (DRC)

$$DRC = \frac{G}{(E - F)}$$

$$-20.15$$

Nominal protection coefficient (NPC)

- on tradable outputs (NPCO)

- on tradable inputs (NPCI)

$$NPCO = \frac{A}{E}$$

$$1.57$$

$$NPCI = \frac{B}{F}$$

$$0.85$$

Effective protection coefficient (EPC)

$$EPC = \frac{(A - B) \div (E - F)}{-57.85}$$

Profitability coefficient (PC)

$$PC = \frac{}{-2.05}$$

Subsidy ration to producers (SRP)

$$SRP = \frac{}{0.80}$$

APPENDIX B

SAMPLE FARM BUDGET

194.8 ha

OPERATION	Costs/Ha	TOTAL	April	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR
HARVESTING	8 794.96	**1 713 259.13**	229 947.55	345 869.36	208 788.86	266 826.49	264 473.61	234 670.51	160 162.74	2 520.00	–	–	–	–
TRASH MANAGEMENT	116.89	**22 770.61**	2 546.58	3 385.86	3 002.19	3 593.68	3 569.70	3 265.97	2 506.62	900.00	–	–	–	–
FERTILISER	3 608.98	**703 028.73**	58 585.83	88 447.54	74 796.48	143 611.25	119 289.16	115 319.46	57 133.25	27 304.52	18 541.25	–	–	–
WEED HANDLING	175.89	**34 263.37**	–	1 811.67	–	4 546.76	2 312.95	5 698.84	5 250.32	5 566.92	4 705.06	2 603.17	1 767.69	–
HERBICIDE APPLICATION	2 402.67	**468 039.68**	23 797.58	35 927.42	30 382.35	62 734.01	68 048.50	58 355.35	26 538.48	66 734.32	27 560.62	67 961.05	–	–
RIPENING	655.92	**127 774.15**	36 594.00	23 289.18	6 239.28	–	12 416.78	–	–	–	–	7 868.80	11 803.65	29 562.48
IRRIGATION	1 115.95	**217 387.18**	31 339.25	16 292.45	16 164.65	16 238.45	16 477.85	17 010.65	17 372.45	17 372.45	17 372.45	17 372.45	17 372.45	17 001.65
PESTS & DISEASES	84.90	**16 538.52**	–	–	2 194.67	1 116.44	3 625.23	2 534.27	2 687.09	2 271.08	1 256.52	853.25	–	–
ELECTRICITY COST	4 401.39	**857 391.37**	58 911.62	57 796.85	54 752.65	56 510.57	62 213.08	74 904.37	83 522.45	83 522.45	83 522.45	83 522.45	83 522.45	74 689.99
ADMINISTRATION	1 235.16	**240 609.56**	19 733.96	20 506.97	19 733.96	20 506.97	19 733.96	20 506.97	19 334.34	20 070.54	19 733.96	20 506.97	19 733.96	20 506.97
ENVIRONMENT	51.21	**9 975.42**	831.29	831.29	831.29	831.29	831.29	831.29	831.29	831.29	831.29	831.29	831.29	831.29
MAINTENANCE	663.88	**129 324.00**	20 152.00	7 652.00	7 652.00	7 652.00	17 652.00	10 152.00	7 652.00	7 652.00	17 652.00	10 152.00	7 652.00	7 652.00
OTHER COSTS	703.80	**137 100.00**	71 450.00	7 850.00	6 950.00	6 350.00	6 350.00	5 450.00	5 450.00	5 450.00	5 450.00	5 450.00	5 450.00	5 450.00
PROTECTIVE CLOTHES	179.67	**35 000.00**	–	–	4 500.00	–	5 240.00	–	5 260.00	–	–	3 000.00	–	17 000.00
INSURANCE	241.27	**47 000.00**	47 000.00	–	–	–	–	–	–	–	–	–	–	–
AUDIT	56.47	**11 000.00**	11 000.00	–	–	–	–	–	–	–	–	–	–	–

OPERATION	Costs/Ha	TOTAL	April	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR
GAPPING	5 056.17	**42 471.83**	–	–	–	42 471.83	–	–	–	–	–	–	–	–
TOTALS	**24 489.02**	**4 812 933.54**	**611 889.67**	**609 660.59**	**435 988.37**	**632 989.73**	**602 234.10**	**548 699.66**	**393 701.01**	**240 195.55**	**196 625.58**	**220 121.42**	**148 133.49**	**172 694.37**
BANK CHARGES	**77.00**	**15 000.00**	1 250.00	1 250.00	1 250.00	1 250.00	1 250.00	1 250.00	1 250.00	1 250.00	1 250.00	1 250.00	1 250.00	1 250.00
TOTAL	**24 784.05**	**4 827 933.54**												