

**POTENTIAL SOCIO-ECONOMIC IMPLICATIONS OF ETHANOL PRODUCTION AS
A GREEN ECONOMIC INITIATIVE IN CRADOCK, EASTERN CAPE**

by

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DECLARATION

I, **Thulisa Jebe**, declare that the contents of this dissertation/thesis represent my own unaided work, and that the dissertation/thesis has not previously been submitted for academic examination towards any qualification. Furthermore, it represents my own opinions and not necessarily those of the Cape Peninsula University of Technology.

Signed

Date

LIST OF ABBREVIATIONS AND ACRONYMS

ARDA	Agrarian Research Development Agency
BCEA	Basic Condition Employment Act
CEF	Central Energy Fund
CBNRMs	Community Based Natural Resource Management
CO ₂	Carbon Dioxide
CV	Curriculum vitae
DBSA	Development Bank of Southern Africa
DEA	Department of Environmental Affairs
DETR	Department of Employment, Training & Rehabilitation
DoA	Department of Agriculture
DRDLR	Department of Rural Development and Land Reform
ECRDA	Eastern Cape Research Development Agency
EIA	Environmental Impact Assessment
GBEP	Global Bio-Energy Partnership
GDP	Gross Domestic Product
GE	Green Economy
GEC	Green Economy Coalition
GEGI	Global Green Growth Institute
GHGs	Greenhouse gases
GNESD	Global Network on Energy for Sustainable Development
ICCPR	International Covenant on Civil and Political Right
IDC	Industrial Development Cooperation
ILO	International Labour Organisation
IUCN	International Union for Conservation of Nature
LED	Local Economic Development
NBS	National Building Society
NDP	National Development Plan
NGOs	Non-Government Organisations
NO _x	Nitrogen oxides
OECD	Organisation for Economic Cooperation and Development
PCPs	Participatory Conservation Project
PM ₁₀	Particulate matter 10
PP	Public Participation
SAGI	South African Government Information

SANBI	South African National Biodiversity Institute
SBU	Strategic Business Unit
SD	Sustainable Development
SoNA	State of the Nation Address
StatsSA	Statistics South Africa
SWS	Second World War
UK	United Kingdom
UN	United Nations
UNCTAD	United Nations Environment Conference on Trade and Development
UNDESA	United Nations Department of Economic and Social Affairs
UNDP	United Nations Development Programme
UNEP	United Nations Environmental Programme
UNICEF	United Nations International Children's Emergency Fund
VOCs	Volatile Organic Compounds
WCED	World Conference Environment Development
WDR	World Development Report

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ABSTRACT

South Africa is taking a continental lead towards the transition of the green economy, and the energy sector has been identified as one of the cornerstones integral in this transition. This transition pays attention to alternative energy sources to gradually replace fossil fuels. Recently, the production of ethanol is seen as an energy source that is an integral player in achieving a green economy. The ethanol production project is linked to the improvement of the economy, and social well-being concomitant with the enhancement of the environmental quality tenets embodied by the green economy. Scholars have noted that these projects tend to ignore socio-economic realities of under privileged people especially in rural areas and small towns. While the green energy is often presented by the state there is, however, no evidence of the positive as well as negative impacts of ethanol projects on improving the livelihoods of the local communities or contributing to the substance of the local economies while protecting the quality of the environment.

This thesis explored the subject of ethanol projects as green economic models in the context of the ethanol project in Cradock. The thesis investigated the socio-economic implications of the ethanol project in Cradock as a green economic model. The research study argues that the inclusion of the local people in decision making for the ethanol project is crucial to securing their benefits from the project. This means that local people should be involved early in the decision making process. Failure to engage the local residents in the initial stages of decision making, may create a lack of sense of ownership resulting in a lack of socio-economic benefits for the residents. The research study adopted a qualitative research design and an inductive approach. The ethanol project in Cradock was used as a case study for the research, and two sampling techniques, purposive sampling and random sampling were used. Interviews, questionnaires and observations were used to collect data from the residents of Cradock, the business sector (hospitality, tourism and agricultural retail), the emerging farmers, the farm workers, the Agrarian Research Development Agency, and Government Departments (Local Economic Development, Department of Agriculture, Department of Rural Development and Land Reform).

The findings illustrate that the ethanol project in Cradock is not consistent with the tenets of a green economic model. The results suggested that the project does not improve the livelihood of the community or contribute to the sustenance of the local economies while protecting the quality of the environment. From an environmental perspective, while the ethanol project regarding providing ethanol fuel contributes positively to the global green agenda, it deteriorates the quality

of the local environment. The project pollutes the local environment which is a source of livelihood for the local people and the economy. Therefore, the adverse effect of the project on the local environment contributes to a negative effect on the local economy and livelihood of the residents. The results also revealed that the project stakeholders, particularly the residents of Cradock and the emerging farmers, were not involved in the early stages of the project where the benefits were determined. As a result, the stakeholders do not have a sense of ownership of the project, and there are uncertainties about the sustainability of their socio-economic benefits. The ethanol project introduces a shift from the traditional commercial agriculture to the production of biofuel feedstock. This causes an effect on the local economy and livelihood because traditional commercial agriculture has sustained the town for more than 200 years. The thesis raises questions about the notion that ethanol projects are green economic models.

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CHAPTER ONE

INTRODUCTION

1.1 INTRODUCTION

The main aim of the study was to investigate the potential socio-economic implications of ethanol projects as a green economic model with specific reference to Cradock Town, located in the Midland Central Karoo, Eastern Cape. The establishment of ethanol production project entails the construction of a plant to produce ethanol using raw materials such as sorghum and sugar beet. Over the last 20 years, the ethanol project has been increasingly presented as an idea that the green economic model aims to improve the quality of the natural environment while contributing to economic development. For instance UNEP (2011) defines green economy is an economic system that results in an improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities. It is thus from this context that ethanol projects such as green economic initiatives are said to refashion the green economy. Currently, it is assumed that the green economy is a panacea for solving environmental challenges to achieve the sustainable development vision (DEA, 2012a). However, there is a concern, as Diyar *et al.* (2014) noted, that “green economic projects tend to ignore socio-economic realities of underprivileged people, especially in rural areas and small towns”.

In transitioning towards a green economy, South Africa identified the energy sector as one of the cornerstones of addressing environmental problems. Therefore, ethanol production emerged out of this initiative to stimulate economic growth while addressing social and ecological challenges. The project will produce ethanol using feedstock from the agricultural component of the project as well as feedstock from farmers throughout the country (see EIA report, 2009). The project was established as part of the initiative to provide socio-economic benefits to the local people, in particular, those who are residing in the township of Cradock. In the context of Cradock, the project has been widely sold to the people as a green economic project, an initiative that would culminate in the production of green fuel with minimum adverse effects on the environment. While the project has noble environmental objectives, the study seeks to understand whether or not these cutting edge environmental projects are indeed benefiting the local people in marginal areas or towns such as Cradock. The study broadly employed the concept of sustainability to interrogate the extent to which the green economic projects such as ethanol, are in line with the principles of sustainability. In doing so, the study argues that the involvement of the local people in all levels of decision-making determines the benefits attained. Thus the early participation of the local residents results in more benefits and improved well-being.

1.2 STATEMENT OF THE RESEARCH PROBLEM

Ethanol projects are increasingly gaining popular support from different governments and NGOs around the world (Deenanath *et al.*, 2012). This is because these projects are viewed as a deterrent to contemporary environmental problems and socio-economic challenges besetting the world, especially the developing countries. As projects which epitomise green economic model, ethanol projects are linked to the improvement of the economy, and social well-being concomitant with the enhancement of environmental quality (Brand, 2012). Ethanol projects are energy related projects framed within the broader concept of clean production with a specific focus on the production of ethanol (fuel) by fermenting various feedstocks such as sugarcane, corn, sugar beet, sorghum and other biomass to produce energy. Unlike fossil fuels, which are based on non-renewable sources, ethanol is a form of renewable energy because it is processed from biomass which can be reproduced from time to time through farming. Therefore, this research project is based on ethanol production from sugar beet and sorghum as renewable resources. While the ethanol project in Cradock, Eastern Cape, is viewed as an alternative development, there is little evidence of this project's socio-economic effects. Currently, various interest groups, especially green and environmental civil society, argue that the Cradock project will contribute to climate protection by reducing the reliance on oil and fossil fuels. However, the socio-economic effects related to the introduction of this project are yet to be discovered. Therefore, this is critical because a large number of these projects are located in rural areas and small towns. It would be enlightening to learn how these regions' economies would be impacted upon following the introduction of ethanol production in former agrarian areas.

Furthermore, there is a fierce debate on whether or not these projects achieve their desired outcomes. For instance, research conducted by Sulle and Nelson (2009) indicates that ethanol projects are not always successful at achieving the goals they set out to achieve. There is very little information on how such projects impact on the socio-economic implications of small towns such as Cradock in the Eastern Cape, South Africa. While this green economic initiative is presented as an ideal Local Economic Development project in the town, there is a concern that the nature of the production will undermine the already ailing agrarian economy which has sustained this town's economy for more than 200 years. Apart from that, agriculture is one of the highest employment providers in the town with 25% of the population from the townships employed in this sector (Chris Hani District Municipality Integrated Development Plan, 2014-2015). From an ecological point of view, the town of Cradock is situated in the Karoo region or semi-arid region widely known as a dry area with clean air. This area also attracts tourists from

around the world. As a result, there is a growing concern, particularly from the tourists or holiday operators, that the introduction of an ethanol production plant in Cradock will affect the air quality which will, in turn, affect the eco-tourism industry. Therefore, the primary focus of this research is to explore the socio-economic implications of ethanol production in Cradock, Eastern Cape, as a green economic model.

1.3 RESEARCH BACKGROUND TO THE STUDY AREA

The research’s study area was the ethanol production plant that is located in Cradock known as one of the least developed towns in the Eastern Cape, South Africa. The project is located within the Inxuba Yethemba Local Municipality in the Chris Hani District Municipality, Eastern Cape (See Figure 1.1 below modified from the Department of Agriculture (DoA)).

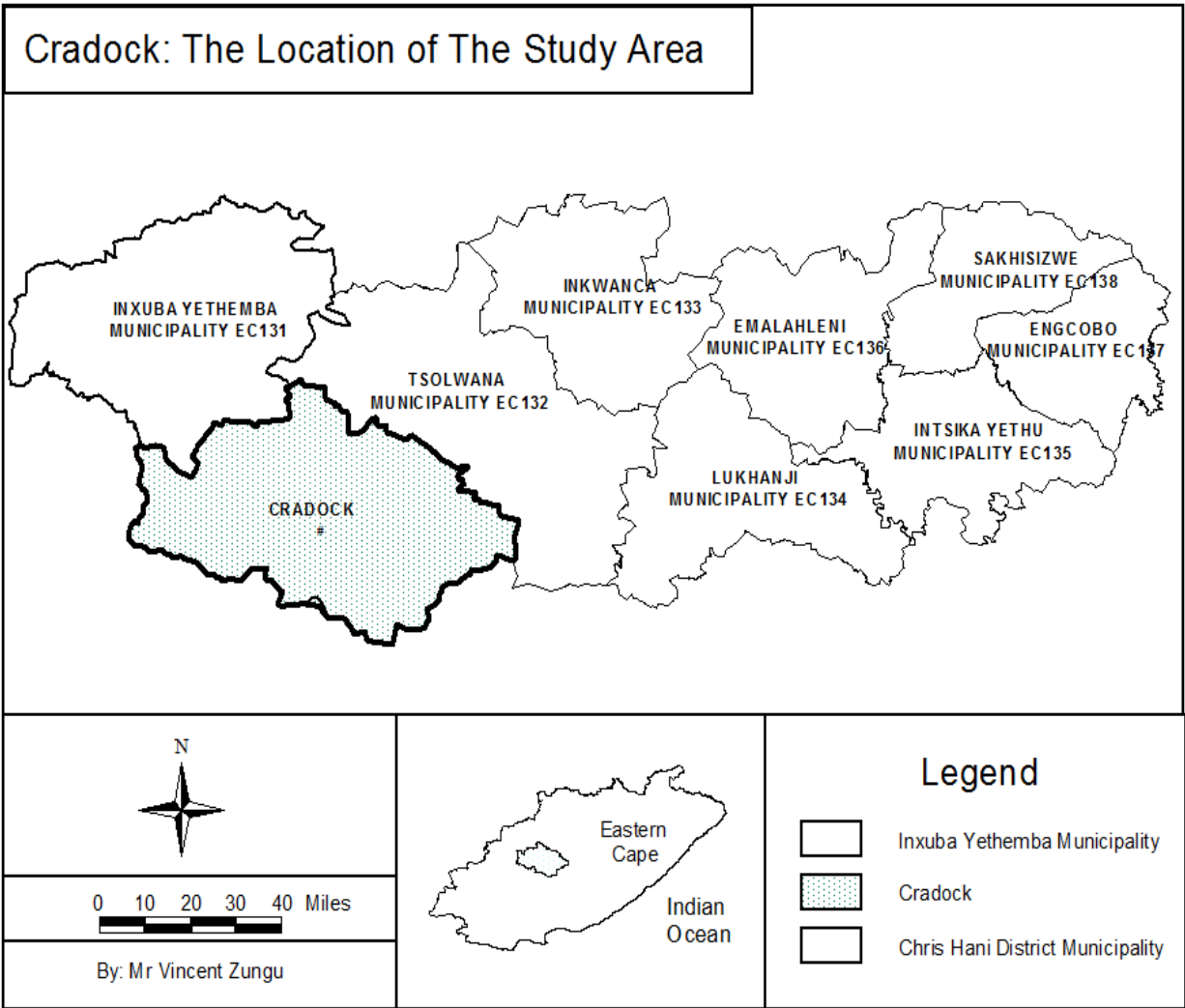


Figure 1.1: Location of Cradock within the Local Municipality (Modified from DoA, 2017).

Cradock is an agrarian town established in 1814 following the expansion of commercial agriculture. It has become the agricultural centre for the Karoo Heartland Route. For over 200 years, the town's economy and its populace relied on traditional commercial agriculture; as a result, the agricultural community specialises in the production of livestock, wool and mohair. The agriculture in the town provides the residents with housing, food and employment. The area consists of the town centre of Cradock and township settlements namely Lingelihle, Michausdal, farm dwellings and low-cost housing (see Figure 1.2). In 2015, the population of the town was approximately 35 000, boasting of diversity regarding its racial makeup. Black Africans make up the largest population with 61.8%, Coloureds are at 25.4%, Indians, Whites and other races make up 0.4%, 11.4% and 0.5% respectively. The most dominant language in Cradock is Xhosa with 55.9%, followed by Afrikaans with 38.2%, 3.5% for English and 2.4% for other languages (Chris Hani District Municipality Integrated Development Plan 2014-2015).

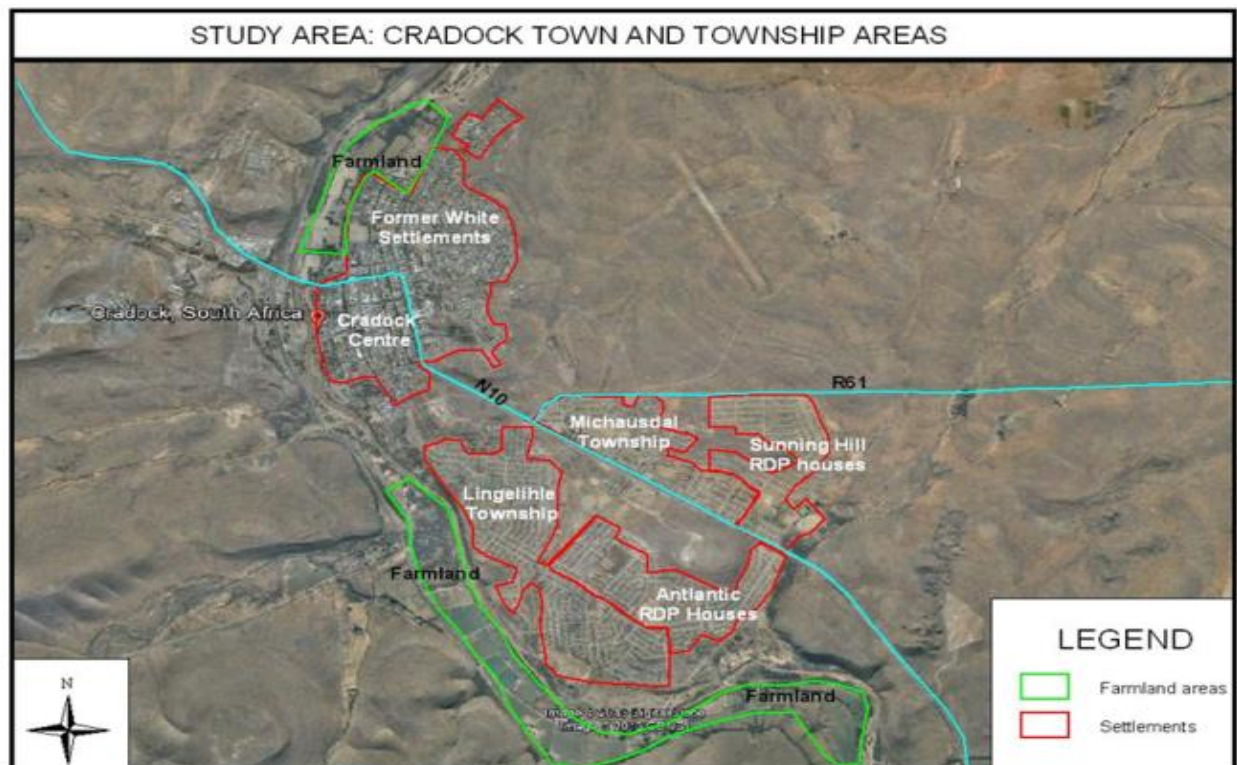


Figure 1.2: Cradock town and township areas (Modified from Google Earth, 2014).

As mentioned above, Cradock is known as a town that emerged from agricultural activities. As a result, agriculture employs the largest population percentage. However, even with the provision of employment by agriculture, unemployment is still very high at a rate of 43.2% (Chris Hani District Municipality Integrated Development Plan 2014-2015). To exacerbate the problem of

unemployment, the town is characterised by low percentages of skilled and educated people which translate to low household income. In the Inxuba Yethemba Local Municipality, 71.1%.1% of families earn an income of less than R1 600 per month whereas 16.9% have no formal income. The government has identified this area to be in need of social, economic development and upliftment (Chris Hani District Municipality Integrated Development Plan 2014-2015).

1.3.1 Background to the ethanol project

The ethanol production project was introduced in 2007. In 2008, an internal bankable feasibility study was conducted followed by an Environmental Impact Assessment (EIA) for the proposed project by Africa Geo-Environmental Services in 2009. Initially, the project was a joint venture between the Agrarian Research and Development Agency (ARDA), the Industrial Development Corporation (IDC) and the Central Energy Fund (CEF). However, lately, the CEF is no longer involved in the project (Nasterlack, 2013). The project is one of the first bioethanol projects in the country. It is seen as a demonstration model for future bioethanol projects. Findings from this project will be used to draw recommendations to improve other projects of this nature within the country. The ethanol project in Cradock consists of two components; the agricultural component and the plant component. Under the agricultural component, the Department of Rural Development and Land Reform acquired 25 farms from commercial farmers worth R346 Million and handed them to black emerging farmers (Nasterlack, 2013). These farms, given to emerging farmers, consist of irrigated land, grazing areas and infrastructure. The farms are in state ownership, and the farmers are given the farms in the form of lease contracts. Sugar beet will be used as the main feedstock for ethanol production and will be exclusively grown locally while sorghum, the supplementary feedstock, will be grown locally and purchased from farmers. Only 30% of the biofuel feedstock will come from the emerging farmers; the rest will be from commercial farmers.

As part of the plant component, the site set aside for the development of the bioethanol processing plant is 550 hectares and is expected to cost approximately R1.1 billion to build. The plant will produce 90 million litres of bioethanol a year to contribute to the Department of Energy's target of 2% penetration level of biofuels in the national liquid fuels supply. The project has two phases; the first phase will import 22500 tonnes of grain sorghum from farmers around the country. The second phase will use 7500 tonnes of grain sorghum from the emerging farmers involved in the

project. Once the fuel is produced, it will then be exported via rail from Cradock. The construction of the plant is expected to create 1000 temporary jobs and 1 000 indirect jobs, while the day to day operations of the plant are projected to create 167 jobs. The majority of the day to day operations of the plant will be highly skilled jobs which, according to the stakeholders, will be outsourced from various parts of the country. The EIA indicates that the highly skilled individuals will mentor and transfer the necessary skills to the people of Cradock. Once the local people have gained the adequate skills to run the plant, they will take over the operations.

1.4 AIM AND OBJECTIVES OF THE RESEARCH

Aim: To investigate the extent to which ethanol production in Cradock, Eastern Cape, complies with the stipulations of a green economic initiative, with a focus on social and economic implications.

Objectives:

- To determine the economic implications of the ethanol project on the local people of Cradock.
- To determine the social implications of the ethanol project on the local people of Cradock.
- To determine ecological implications of the ethanol project on the local people of Cradock.
- To investigate the sustainability of the ethanol project in Cradock.

1.5 RESEARCH QUESTIONS

The key research questions in this study are:

- I. What are the general economic implications of the ethanol project on the residents of Cradock?
- II. What are the social implications of the ethanol project on the local people of Cradock?
- III. What are the ecological implications associated with the ethanol project in Cradock?
- IV. What are the views of the residents of Cradock on the sustainability of the project?

1.6 DELINEATION OF THE RESEARCH

Green economic projects are known to improve the local economy, improve the well-being of the people, reduce inequality and reduce detrimental effects on the environment. This study only looked at whether the ethanol production project in Cradock, Eastern Cape, improves the local economy, improves human well-being, reduces social and economic inequalities and reduces the detrimental effects on the environment.

1.7 SIGNIFICANCE OF THE RESEARCH

The green energy sector in South Africa is still in its infancy. As such, there is no evidence of positive as well as negative impact of green energy projects on the socio-economic livelihoods of local people and the betterment of social welfare. This study provides an understanding on the implications of the ethanol production, with specific reference to how these projects improve the quality of life of communities or contribute to the sustenance of the local economies while protecting the quality of the environment. It also highlights ways in which similar projects can be structured to qualify as green projects. Furthermore, it contributes significantly to the existing body of knowledge especially in the field of environmental resource economics, environmental management, rural economic development and the provision of renewable energy.

1.8 STUDY LAYOUT

Chapter One: Introduction

This chapter introduces the research study on the ethanol project located in Cradock, Eastern Cape. The chapter provides a detailed background to the study which includes the background to the study area as well as the background to the ethanol project in Cradock. Also included is a specific problem statement which shows that there is a problem to be researched. Research questions, aim and objectives are provided in this chapter together with the delineation of the study. Further, the significance of this study on the ethanol project in Cradock as a green economic initiative is presented.

Chapter Two: Literature review

This chapter provides the literature review for the research study. It first traces the origins of ethanol production; that is biofuel. Furthermore, it provides a historical context to unpack the dynamics and circumstances that led to the origin of biofuel production during the industrial epoch of the early 1800s. The chapter further unpacks the changing public discourse or narrative of biofuel production. The chapter highlights problems associated with the use of fossil fuels in mainstream economies as well as the effects of energy on the environment. The chapter provides an in-depth understanding of the concept of sustainable development. This includes the definition of the concept and the characteristics and the principles that make up sustainable development. The chapter highlights the relationship between bioenergy and sustainable development.

Chapter Three: Theoretical debate on green economy

This chapter sought to contextualise the study within the theoretical debate on the green economy. The chapter presents the basic theoretical assumptions of green economy as held in the policy discourse at both national and global scale. It presents the nature and significance of the green economy. Furthermore, it shows how a neoliberal market-based approach, expressed in the name of green economy, is portrayed as a panacea for environmental and social challenges besetting the contemporary world. In this chapter, green economy is exposed not as an alternative economy, but as an elitist economy that leads to the exclusion of the poor and vulnerable local people.

Chapter Four: Research methodology

This chapter provides a detailed description and motivation for the research methodology used in this study. The chapter also includes a detailed description and motivation for the research philosophy and approach utilised in this study. It provides details of the data collection employed in this study. Furthermore, it addresses the ethical considerations of the study, the strengths and limitations of the study and the reliability and validity of the study. Finally, the chapter describes how the analysis of collected data was carried out.

Chapter Five: Research findings

This chapter presents the findings as collected during the field work on the ethanol project in Cradock, Eastern Cape. The results presented in this chapter address the research questions about the potential socio-economic implications of the ethanol project in Cradock as a green economic initiative. The chapter outlines the four phases of the ethanol project in Cradock as; acquiring of land, the allocation of land to beneficiaries, the construction of the plant, and the production of ethanol. It is noted in this chapter that even though the plant is not yet built (thus phase 3 and phase 4 have not yet commenced), other phases of the ethanol project have been implemented. It is thus from this context that the chapter reports on the socio-economic impacts of the first two phases and the potential (perceived) socio-economic implications of the remaining two phases of the project.

Chapter Six: Data analysis and discussion

Chapter six presents the research findings' analysis and discussion to address the research questions about the potential socio-economic implications of the ethanol project in Cradock as a green economic initiative. In this chapter, the findings are analysed analytically and discussed in detail to provide a clear picture of the ethanol project in Cradock and its potential socio-economic implications as a green economic initiative. The chapter disseminates the socioeconomic

implications of the ethanol project in Cradock with the view of the green economy and sustainable development.

Chapter Seven: Conclusion and recommendations

This chapter provides a conclusion on the socio-economic implications of the ethanol project in Cradock as a green economy initiative. This chapter concludes based on the analysis and discussion of the project and determines whether or not the ethanol project in Cradock is a green economy initiative. In doing so, the chapter points out areas where the ethanol project can be improved or needs effort for it to be a green economy initiative.

1.9 CONCLUSION

This research study assesses socio-economic implications of ethanol projects as a green economic model with specific reference to the Cradock (town) located in the Eastern Cape. Green economy is viewed as a panacea for socio-economic and environmental challenges faced by the world today. Over the last 20 years, the ethanol project has been increasingly presented as an idea where the green economic model aims to improve environmental quality while contributing to the economic development. Their promotion of ethanol production as a green economic project has been a part of various debates that argue whether it could achieve the desired outcomes. Diyar *et al.* (2014) note that “green economic projects tend to ignore socio-economic realities of underprivileged people, especially in rural areas and small towns”. Hence the investigation of the extent to which ethanol production in Cradock, Eastern Cape, complies with the stipulations of a green economic initiative, with a focus on social and economic implications. This is of particular importance because the energy sector in South Africa is still in its infancy. Secondly, there is no evidence of a positive as well as a negative impact of green energy projects on the socio-economic livelihoods of local people and the betterment of social welfare.

CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

The purpose of this chapter is to provide the literature review discussion with a particular focus on the historical development of biofuel production dating from the early 1800s to the present dispensation. The chapter argues that the narrative around the production of biofuel in the early modern epoch (i.e. 19th century) has evolved over time, based on the value and use of biofuel during this historical period. This historical analysis is crucial to fully understanding the socio-economic effects of ethanol production on the lower-income population living in Cradock. Firstly, the chapter unpacks the historical dynamics and circumstances that led to the origin of biofuels production during the industrial epoch of the early 1800s. This section of the chapter will further unpack the changing public discourse or narrative of biofuel production; as a product that was first invented to meet economic demand of the industrialised economy in 1800s to the product which seeks to integrate local social development with economic development and environmental concerns since the mid-1990s to date. It is also argued that the recent emergence of biofuel heralded the failures associated with the use of fossil fuels as main source of energy fully incorporated into the mainstream economies on a global scale.

It was the rise of environmentalism in the 1970s, rather than new economic needs that motivated the world to move towards the use of biofuel as an alternative source of energy. The rise of environmentalism influenced the manner in which energy was developed for future generations. These trends were central in understanding the broader values with regard to the relationship between the energy and the environment. This leads to the second part of this chapter with a discussion focusing on the manner in which sustainable development has affected the ideas that culminated into the ideas about sustainable energy. These ideas are an integral part of the principles in drawing from a broader concept of green economy as an alternative economic development adopted by the world in general and South Africa in particular. Finally, the chapter concludes that the development of biofuel production should show integration of local social development, economic development and environmental protection. Social development,

economic growth and environmental protection are essential pillars of sustainable development. Therefore, biofuel production currently should integrate the three pillars of sustainable development.

2.2 THE ORIGIN OF BIOFUEL PRODUCTION FROM THE 1820S-1960S

The production and subsequent use of biofuel as a source of energy (fuel) is not a new phenomenon, it began in the early 1820s (Siegel, 2012). As (ibid) argues, the rise of biofuel production coincided with the invention of the automobile car which were to be supplied to meet the needs of the then industrialising economy in Britain and North America. It is reported that the first cars in the automobile industry ran on a blend of turpentine which used bioethanol fuel for its normal operation (Webb, 2013). It is thus critical to note, as Webb (2013) states, that the motive behind the use of biofuels during this period was primarily to meet the needs of the emerging small automobile industry rather than a desire to enhance environmental quality driven by clean technology. However, the demand for biofuels as a form of energy was still on a small scale as many people were using horses as a mode of transport. Nevertheless as the scale of industrial development increased overtime, the world became more industrialised with a huge demand for auto mobile cars using mainstream sources of fuel (Yeh, 2007). It was thus during this time that the petroleum liquid was first discovered as the cheapest and most readily available form of energy. Although the biofuel was not favoured to meet the demands of mass-industrial production, Yeh (2007:4) argues that it was sporadically used on a smaller scale by certain industries. For instance, Henry Ford developed a model T car which ran on hemp derived from biofuels. The complete displacement of biofuels as fuel of choice was more apparent in 1859, as the world became even more industrialised with a popular notion that fossil fuels would be able to supply fuel for the growing global economies. The continued use of fossil fuels as the fuel of choice increased globally, leading to great economic growth (Strange & Bayley, 2008). According to these authors, this growth in world economies has increased by six-fold in the last 2000 years, and for countries that were industrialised first, the growth increased by ten-fold. Furthermore, the growth in economies resulted in social benefits and consequences as well as environmental consequences.

During the World War II, the world experienced oil shortages; these shortages resulted in the use of biofuels as supplementary fuel (Kopke *et al.*, 2007). For instance, Germany started experimenting with a blend of gasoline and alcohol derived from potatoes (Specht, 2011); while

Britain experimented with a mixture of petrol with alcohol derived from grains. Once the war ended cheap oil from the Middle Eastern countries and the Gulf regained its position as the fuel of choice displacing biofuels again (Specht, 2011). During the 1950s and 1960s, most nations were preoccupied with economic growth and energy consumption, which led naturally to a dramatic increase in energy demand. Economic growth was a major concern, with social and environmental issues being ignored in comparison (Davidson, 2006).

2.2.1 Problems associated with the use of fossil fuels in the mainstream economies

Since industrialisation, petroleum has been the energy source of choice, integrated into the global economies (Strange & Bayley, 2008). However, this energy source, according to Strange and Bayley (2008); Davidson (2006), has been associated with great environmental challenges. Davidson (2006) explains that these challenges are both local and global. The use of petroleum has been related to climate change, due to gases such as nitrous oxides, sulphur dioxide, carbon dioxide and methane emitted from petroleum (Davidson, 2006; Bozkurt & Destek, 2015; Goodyear & Beach, 2012). Bozkurt & Destek (2015) explains that these gases trap the heat in the atmosphere. For a natural cycle the sun releases heat and radiation in the atmosphere, the heat is then retransferred to space. However, as Bozkurt & Destek (2015) mentions, that the presence of the heat trapping gases results in the trapping of the sun's heat, keeping the heat in the atmosphere. Thus the earth begins to heat up and this results in climate change. It is reported that over 150 years, the use of fossil fuels has increased carbon dioxide emissions by 25%. Climate change has led to the rise in temperature, with a global average rise in surface temperature from 0.3 – 0.6 Degrees Celsius (Olah *et al.*, 2009). Moreover, petroleum's impact on air pollution does not result in climate change alone, but gas flaring as well (Kadafa, 2012). Omoweh (1995) describes gas flaring as the emission of waste gas from petroleum stacks; this waste gas is a by-product of petroleum. Once the waste gas is emitted, it causes an increase in temperature in the region where it is emitted. Omoweh (1995), suggests that the high temperatures become damaging to vegetation and animal life in the area. Furthermore, Kadafa (2012) argues that the combustion of carbon materials results in excess carbon monoxide, which when inhaled by animals or people prevents them from taking in oxygen needed for survival, this can lead to death.

As a consequence of air pollution caused by petroleum, globally there is the challenge of acid rain (Doroda *et al.*, 2003). Acid rain is when nitrogen dioxide emitted from petroleum reacts with water to form nitric acid which then falls as acid rain (Turco, 2002; Doroda *et al.*, 2003). The authors argue that effects of acid rain are devastating ranging from acidification in surface water,

contamination of ground water through leaching, the corrosive effect which can corrode anything from metals to buildings, inhibiting growth of plants and animals. Furthermore, the emission of the various gases such as volatile oxides, particulates, carbon, nitrogen and sulphur dioxide has adversely impacted on ground water (Ogwu *et al.*, 2015). The transportation of oil spills from one nation to another usually takes the sea route; this has resulted in one of the biggest impacts of petroleum which is oil spills (Goodyear & Beach, 2012; Ukoli, 2005; Briggs *et al.*, 1996). The authors concur that once the spill occurs, the oil floats on top of the water preventing solar radiation from penetrating and reducing oxygen needed for aquatic life. This leads to different impacts depending on the amount of oil spill. Briggs *et al.*(1996) suggest that the contamination of the animals' habitats by oil spills reduces their reproductive rate, reduces the chances of survival and promotes physiological impairment. Ukoli (2005) argues that the oil spills cause the death of fresh water aquatic life, reduces soil fertility which then leads to the hindrance of vegetation growth. Finally, Goodyear and Beach (2012) argue that oil spills endanger species in affected habitats. Furthermore, Ogwu *et al.* (2015) suggest that oil spills are a cause of biodiversity loss in affected ecosystems such as rainforest and mangroves which are usually found in regions where oil spills occur. The environmental impacts of petroleum are diverse ranging from air, surface water, ground water and ecosystems.

2.2.2 Energy and the environment

The realisation and consideration of environmental issues in economic development came around the 1960s to 1980s (Davidson, 2006). The realisation was that the global economies driven by energy had led to environmental degradation. As a result, people called for development that considers environmental issues. During this period, the environmental impacts of energy as the driver of the economy could not be avoided. Thus the environment and energy are interlinked (Strange & Bayley, 2008). History shows us that the increase in energy use and mechanisation pressures the environment resulting in a range of environmental problems (O'Connors, 1998). For the most part, the global energy supply in carbon dioxide-intensive results in a diverse range of environmental problems (Dincer & Zamfirescu, 2011). Sparks & Mwakasonda (2006) suggests that the energy sector in South Africa is mainly bulk energy supply to the household sector and the transportation sector. Furthermore, the Department of Transport reports that petroleum liquids make up 89% of liquid fuel used in the industry, thus petroleum drives the transportation sector. The use of petroleum, as highlighted in the previous section, has contributed to a diverse range of environmental problems ranging from:

- air pollution,

- climate change,
- degradation of soil and surface water as well as ground water, and
- the adverse effects on the aquatic life as well as terrestrial life (Goodyear & Beach, 2012).

Although petroleum is significant in driving economies globally, it is also significant to note that it contributes to great environmental problems hence the need for alternative energy sources (Bozkurt & Destek, 2015). According to this author, the energy alternatives must be a sustainable energy system and must be integrated into the mainstream economy to replace petroleum.

Goldemberg and Johannsson (1995) suggest that the sustainable energy system must be able to provide for present energy needs without compromising the ability of future generations to satisfy their energy needs. Dincer and Zamfirescu (2011) suggest that the economy must integrate the use of energy sources that do not have environmental impacts. While O'Connors (1998) concurs with the authors, the emphasis is on the promotion of energy that will address environmental problems such as the renewable energy sources. Furthermore, the promotion of the use of renewable energies is deemed as providing an opportunity for people to live prosperous lives in an industrialised world without degrading the environment. Undoubtedly, the sustainable energy system must integrate environmental and social integrations by ensuring that the energy needs of the present generation are met without jeopardising the future generation from meeting theirs, thus achieving sustainable development (O'Connors, 1998). Davidson (2006) acknowledges that renewable energy as an integral part of the sustainable energy systems, but emphasises that it must contribute to sustainable development.

2.3 SUSTAINABLE DEVELOPMENT

Sustainable Development (SD) is a new way of thinking about the philosophy underpinning the movement towards the integration of economic development with the broader environmental concerns. As Davidson *et al.* (2006:2) note, the concept of sustainable development is closely related to sustainable energy. By sustainable energy, they refer to the energy which provides affordable, accessible and reliable energy services that meet economic, social and environmental needs within the overall developmental context of society. This concept differs from the previous notion of energy supply and consumption that emerged after the Second World War (SWS II) development paradigms. Following a number of international deliberations across nation states, sustainable development emerged in the late 1980s after the realisation that the environment and development are linked and interdependent (Diesendof, 2000). As Davidson *et al.* (2006:2) argue, sustainable development paradigms started to become part of the international agenda. While sustainable development has gained international appeal, it is crucial to mention that some

scholars refer to it as a “catch all phrase”, which means different things to different people or sectors. Likewise, Furze *et al.* (1996) caution that not all definitions of sustainable development are the same. Thus reaching consensus on how to implement sustainable development principles often proves to be difficult. This concept of sustainable development was first adopted in the late 1980s and early 1990s following a report called Our Common Future or the Brundtland report published by the World Conference Environment Development (WCED). The report defined Sustainable Development (SD) as “the development that meets the needs of the present without compromising the ability of the future generations to meet their own needs” (WCED 1987:43). As Davidson (2000a) states, one of the major focus of sustainable development is on energy, environmental and development for the benefits of both the present and future generations.

Critiquing the concept of sustainable development, Oelofse (2001) argues that sustainable development implies an end point, something one can or has achieved rather than an idealised concept. This is because the single concept of sustainable development holds in tension two contending concepts, namely environment and development which have traditionally been treated as separate agendas (Zungu, 2003:14). It presents society with some pressing challenges to achieve sustainable development in our current world system. Alternately sustainability is, however, a current dominant notion of achieving some of the principles of sustainable development. Thus Oelofse suggests the following approach, and that is:

Sustainability is a pathway or direction that we need to move along so as to achieve greater balance between the social, economic and ecological environment. Sustainability is about applying the goals and principles of sustainable development so that we can achieve a better quality of life while protecting or enhancing the integrity of the natural environment. Thus, sustainability is about improving what we are doing while at the same time seeking to transform society so that we live in a world that is socially and ecologically just (Oelofse, 2001:5)

However, the steps that society ought to take in order move towards sustainability are hotly debated. As Oelofse (2001) argues, sustainable development, particularly in the context of energy management, is about integrating economic, social and ecological concerns in decision making regarding natural resources management; petroleum or biofuels. From a social sustainability perspective, sustainable development, Soubotina (2004) argues is about affording people equal opportunities to sustain their well-being, for the benefit of both the present and future generations. This means that everyone must have the opportunity to take charge in improving his or her well-being without compromising the well-being of other people. Soubotina (2004) argues that without

equity within the present generation, inter-generational equity cannot be achieved. Thus sustainability is about a new direction sought to strike a balance between the economic, social and ecological (Duvenage *et al.*, 2013). It also argued that sustainable development can be achieved only if we operate in all these three circles (see Figure 2.1 below).

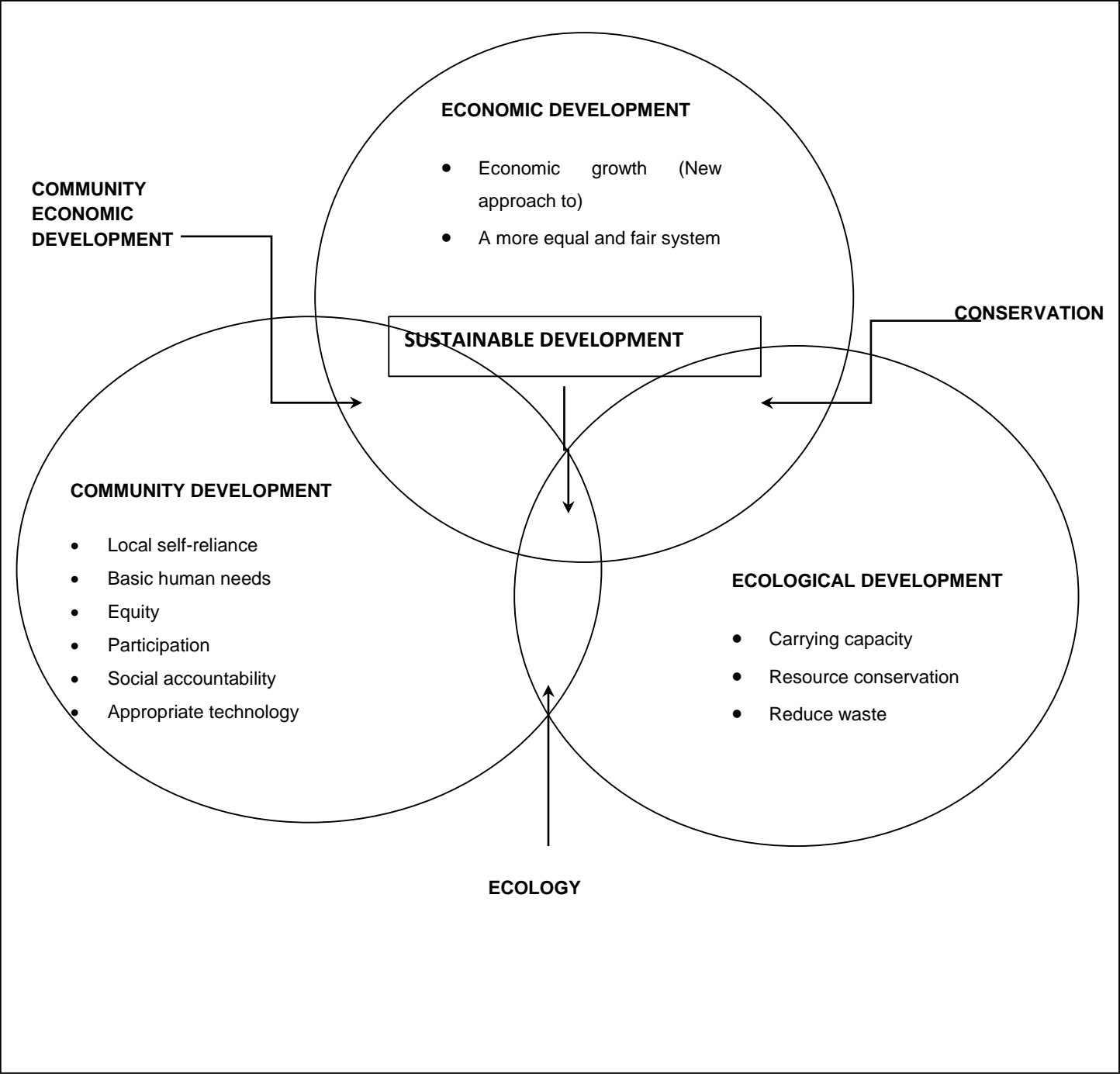


Figure 2.1: The sustainable development challenge (Oelofse, 2001).

As depicted in above diagram, sustainable development involves economic development, social development and environmental development in spheres of life. As Davidson (2000a) states, economic development is economic progress that gives the ability to people to be willing and able to pay for goods and services that enhance income and efficient production within the ecological limit. However, this economic development should be supported by social development which entails the improvements in the well-being of individuals and society. As Davidson (2000a) argues, the social development aspect of sustainable development should lead to an increase in social capital, institutional capital and organisational capital. This aspect of sustainable development (i.e. social development) is closely related to the notion of stewardship as the key preamble of sustainability; meaning that local people must develop a sense of ownership in any development that is proposed to benefit them. Moreover, the environmental development is an integral part of the economic and social development aspect of sustainability. Environmental development is the management of natural resources and ecological goods and services that humans depend upon. While sustainable development considers all three helix, the challenge is how does society work in these three spheres in a way that treats each system equally.

2.3.1 The principles of sustainable development

SD is not rigid and is not confined to a particular political ideology. However, the implementation of the concept is guided by principles;

2.3.1.1 Governance

The Brundtland report highlights the importance of governance in achieving sustainable development. The report states:

Those responsible for managing natural resources and protecting the environment are institutionally separated from those responsible for managing the economy. The real world of interlocked economic and ecological systems will not change; the policies and institutions concerned must" (WCED, 1987:9).

From this view, governance has a major role to play in achieving sustainable development. Governance is about the establishment of rules and decision making procedures and operations of social institutions guided by these rules (Bosselmann *et al.*, 2008). In local governance, it is important that local people become active and empowered. The active involvement of the local residents is essential in achieving sustainability. The local governance can consist of varying

groups of people such as the local governments, community groups, businesses and NGOs (Bosselmann *et al.*, 2008). According to the authors, in any local project these different groups of people are fundamental in governance that seeks to achieve sustainability.

Fakir *et al.* (2005) suggest that even though rules are necessary in governance, the decision making process guides the management and control of both the environment and the natural resources. Therefore in bioenergy, governance is about rules, policies that help decide on bioenergy projects that will protect the environment and the natural resources such as land and water used in bioenergy production. Governance should provide democratic participation of the local people in making decisions, where solutions to environmental problems are based on the particular community and action for change is encouraged. Bosselman *et al.* (2008) suggest that frameworks on local government should encourage the local people to participate in decision making and solving problems. It is from this context that Fakir *et al.* (2005) argue that the communities must be involved in the decision making process on bioenergy projects and many other projects that will impact the environment. Additionally, the impacts of bioenergy projects are experienced by the communities. According to Lemos and Agrawal (2006), communities are important because governance takes place at the global, regional, national and local level. Thus community structures are necessary for local decision making especially since bioenergy projects are locally based. Furthermore, the authors argue that governance, even at the local level, will not be effective if the costs of the bioenergy projects are not fully recognised. This is because without a clear indication of the expenses, the decision made will not be effective in managing the environment as well as the natural resources. De Wet and du Plessis (2010) emphasise that for South Africa, decision making cannot be carried out without the consideration of the Constitution and Section 24 which seeks to achieve SD. Therefore, decisions about bioenergy projects in South Africa are made in consideration of the Constitution, Section 24 and sustainable development.

Weber (2015) suggests that governance that will be able to achieve sustainable development that is, transparent, accountable and open, provides access to information, respects human rights and takes into account the opinions of the civil society in decision making. Additionally, Fakir *et al.* (2005) suggest that the governance must also be inclusive and promote social equity and justice. Bosselmann *et al.* (2008) argue that the kind of governance that will achieve sustainable development should be interdependent on citizenship because the governance has to consider duties and rights together. In governance on any form of development, the caretakers responsible for sustaining the environment, economy, and the social well-being and human health decisions must be well-informed and reasonable. Thus well-informed and reasonable decisions could prevent or mitigate adverse impacts that could arise.

2.3.1.2 Public participation

Democracy and participation as a language has penetrated every part of the world. It appears differently at different levels. For instance at the national level it concerns good governance and civil society, whereas at a local project it appears as a commitment to popular participation (Zungu, 2003:24). Zungu (ibid) explains this difference as:

Barrow and Murphree (2001) state that this is part of a fundamental shift in development thinking over the past 20 years which seeks to move from being capital-centred to people-centred and it is also based on the need for radical shift in emphasis from external professionals to local people.

Presently, the local community development projects embody the need for participatory approaches. The IUCN (1991) in Zungu (2003) suggest that communities can make positive contributions in decision making and in creating sustainable societies; if these communities are informed, appropriately mandated, and empowered. Table 2.1 below shows the typology of participation varying from passive participation to self-mobilisation. What participation means varies and is used to cover quite some activities: the provision of materials or cash and labour, taking part in problem identification, planning and implementation of projects and partnership related projects (Zungu, 2003). Zungu (2003) argues that variety in what participation covers is a reflection of the different interests that people have regarding determining who participates and at what level they are involved. In local community development projects, diverse groups of individuals such as stakeholders and community members may want to be involved in participation. It is likely that because of their differences, these people may have different interests and perspectives on the same project. Zungu (2003:24) suggests that key issues that result in different interests and perspectives are:

Gender differences in terms of the way men and women use natural resources; equity for improving conditions of the poor, and their relations with the wealthy and powerful; decision makers at individual, household and group levels and their relationship with the rest of the population.

Table 2.1: How people can participate in development projects.

Participation Typology	Some Components
Passive Participation	People are told what is going to happen or already happened. This takes the top down approach, where information shared belongs only to external professionals.
Communication In Information Giving	People answer questions posed by extractive researchers using survey and other methods. Here people are unable to influence.
Participation By Consultation	People are consulted, and the external agents listen to the views of the people. Here the problems and solutions are usually defined externally. People are not really involved in making the decision. Participation is as consultation.
Communication By Material Incentives	Resources are provided, for example labour. People are given little incentive to participate after the end of the incentive.
Functional Communication	To meet the predetermined objectives, groups are formed. This is usually done after major decisions on projects have been made, therefore initially dependent on outsiders but may become self-dependent, and enabling. Here participation is as organisation.
Interactive Communication	The analysis is joint to joint actions. Possible use of new local institutions or strengthening existing ones. Enabling and empowering, so people have a stake in maintaining structures or practices.
Self-Mobilisation	Already empowered, take decisions independent of external institutions. May or may not challenge existing inequitable distributions of wealth and power. Participation is as empowerment.

Source: Adams & Hulme (2001:45).

Public Participation (PP) as an integral principle of sustainable development that should result in the integration of socio-economic issues in environmental decision making (Murombo, 2008). Alnabhani, Khan and Yang (2016) argue that PP transcends beyond being a fundamental principle of SD but is a right. Furthermore, the authors suggest the public must participate in decision making especially on issues that will affect their health, the environment and well-being of the present generation as well as the future generations. Public participation is about involving the people, whether as individuals or as a group to exchange information, have their opinions and interests heard and integrated into decision making (DETR, 2000). Dernbach (2002); Higgs *et al.* (2008); Moseti (2010) concur that interested parties must be able to influence decisions made. As highlighted in the sections above, the energy sector has a range of impacts on the socio-economic

and the environment. These affect the health and well-being of the present and the future generations, thus people should voice their opinions on energy decisions and ultimately as the authors above mentioned, influence the decision. In this view, Higgs *et al.* (2008) suggest that the views of the people must be reflective of their understanding of the environmental energy problem, as well-versed people will yield informed opinions. Hence access to refined and precise information on energy and associated impacts is an important aspect of PP. Since the energy developments occur on a local scale, the local people are the most vulnerable. Thus deprivation of information or misinformation significantly affects the quality of participation which could lead to citizens making decisions that are detrimental to the environment and their health and well-being (Nyalunga, 2006).

Additionally, Murombo (2008) suggests that the provision of refined and precise information on energy is based on the understanding that PP is not once-off but rather a process. PP has a series of steps beginning with identifying the socio-economic and environmental problems that are likely to arise due to energy development projects, through to the conception and approval of the projects. Nyalunga (2006) concurs that people must be allowed to participate at all levels of a project, improving the credibility, effectiveness and accountability of energy projects. Furthermore, Mosei (2010) adds that all citizens affected by the energy development must have equal opportunities for consultations and decision making. Thus the decision will be a reflection of the consensus amongst all people not of a selected few. Moreover, the decisions on the energy development once all citizens are allowed the same opportunities will be considered as fair and more likely to be implemented successfully (Dernbach, 2002).

In contrast to this, Murombo (2008) explains that the needs of the people differ depending on their socio-economic status; therefore the decision might not represent the consensus or be seen as fair. This argument is based on the case of South Africa where the level of inequality, as indicated by the Gini coefficient, is amongst the highest in the world. Thus this implies there is a huge gap between the rich and the poor; therefore it can be argued that the opinions of the rich on energy development will differ from those of the poor resulting in a decision that does not reflect consensus. Alnabhani *et al.* (2016) and Sarzynski (2015) emphasise that PP is an indication of democracy that will result in the understanding of the issues associated with energy and in confidence on the government. Contrasting this, Purcell (2006) argues that the participation of local people in environmental decision making does not necessarily imply democracy or even sustainability.

The involvement of local communities in decision making is a great tool for implementing successful local projects. However, Zungu (2003) argues that this participation does not guarantee equity. Barrow and Murphree (2001) in Zungu (2003) argue that sharing in participation does not necessarily mean that power is shared. This raises questions about participation; for instance, styles used in managing participation while they give people a voice, they do not give a voice to everyone? For example, in discussions, men who are vocal may dominate. Are there people who will be affected negatively by something that will benefit the others? Can all diverse groups be consulted?

Experiences have shown that various communities present difficulties in ensuring that everyone is involved in decision making (Zungu, 2003). It is within this context that the author argues that the participation of local people in discussions should not be something that is wished upon, but it should recognise forces that dominate the lives of the citizens. Thus suggesting that participation of the local population must take into consideration the conditions and challenges within that particular community.

2.3.1.3 Access to information

Access to information is an important principle in achieving sustainable development. It is important in that participation of local people and, for governance that achieves sustainability, access to information is an empowering tool (see Figure 2.2 below). Access to information is known as a human right revealed in Article 19 of the UN Declaration on Human Rights and the International Covenant on Civil and Political Right (ICCPR) (UNDP 2003). The UN Declaration on Human Rights and the ICCPR highlights this importance by suggesting that freedom of expression is not based only on the freedom to 'impart information and ideals of all kinds' but on the freedom to 'seek' and 'receive' information as well; this is regardless of frontiers in whatever medium. This information is valuable in that people can make informed decisions regarding matters that affect their lives. To understand what access to information entails, the UNDP (2003:3) states that:

Access to information is not only about promoting and protecting rights to information but is equally concerned with promoting and protecting communication (use of information) to voice one's views, to participate in democratic processes that take place at all levels (community, national, regional and global) and to set priorities for action.

The information that people must access is information that comes in different forms, which vary in relevance, quality and accessibility. This information required can be held by various groups of people such as the private sector, communities and civil society organisations (UNDP, 2003). Figure 2.2 below demonstrates how access to information can ensure democratic governance and

active participation of the local people in projects. Each of the boxes in the circle represents essential components of access to information which transcends to the active involvement of the people.

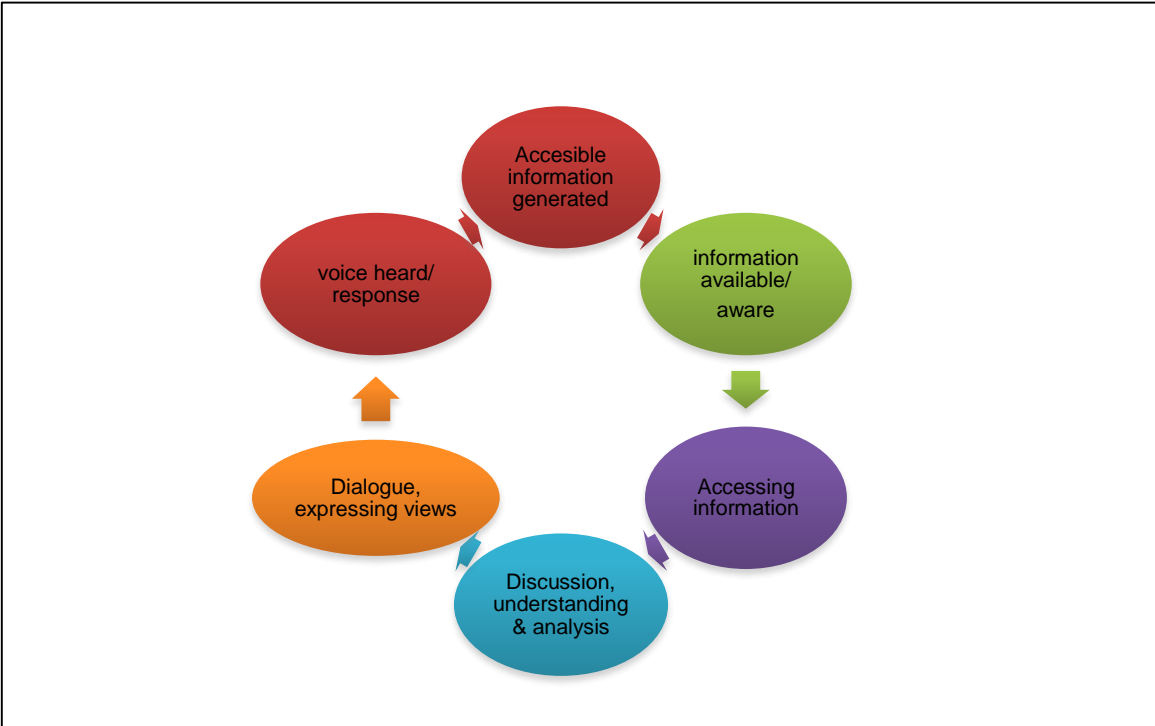


Figure 2.2: The information and communication cycle (UNDP, 2003).

The energy sector has a broad range of socio-economic and environmental impacts, which can be harmful to the health and well-being of the environment, the people of the present generation as well as future generations (Dincer & Zamfirescu, 2011). It is, thus, important for the people to understand the precise impacts, costs and benefits associated with energy development that take place within their regions or even areas. This occurs when citizens have access to information about such development. Access to information is the freedom that allows people to seek and receive the information they require, whether held by the government or any other person to protect any right (Neuman, 2004). Although access to information is a principle of sustainable development, it is also a human right enshrined in many countries' constitutions such as South Africa. The UNDP (2003) and Neuman (2004) suggest that access to information is not limited to protecting rights, but is about equipping the citizens so they can have a voice in decision making. Borgman (2000) emphasises that it is critical that the information be refined and precise. Furthermore, the author argues that the information must be transparent, easily accessible, user-friendly, sufficient and in a language that the citizens will understand. According to this author,

some documents given to citizens are usually full of jargons that can only be understood by a few, thus limits the understanding of other citizens which ultimately affects decision making.

It is thus in this view that people have refined, precise, user-friendly and readily available information on energy projects at all levels. This will ensure that the people are empowered, and the decisions that they will make will be informed decisions (Neuman, 2004). The proper mechanism for citizens to access information about energy projects in their areas is through public meetings that are transparent and provide information that is precise. The UNDP (2003) suggests that during these meetings, the citizens will be able to analyse the project and determine which relevant information they need to make decisions. Thus communities can take control of achieving their energy development projects (Orme, 2015). Access to information is imperative to SD because it is required to make informed decisions. It is thus important that everyone must have access to information and everyone must have an equal opportunity to the accessed information (Banisar, 2006).

2.3.1.4 Stewardship

The history of stewardship can be traced back to the cultural traditions and religion where people are stewards of resources created by God (Callicitto, 2013). From the cultural and religious background stewardship is about taking care of what is considered valuable (Berry, 2006). The concept of stewardship has over the years taken an array of different meanings. For example, Worrell & Appleby (2000: 275) define stewardship as “the responsible use of natural resources in a way that takes full and balanced account of the interests of society, future generations, and other species, as well as private needs, and accepts significant answerability of society”. Di Paola (2015) defines stewardship as the responsible use and protection of natural resources and the practice where individuals take responsibility. According to Brown and Mitchell (1996) stewardship describes practices of “responsible” management where sustainability and environmental quality are promoted.

Even with the range of different meanings of stewardship some key elements remain the same. The element of responsibility in managing what is valued is important. Another element of importance in stewardship is that the practice is an inclusive practice. Krasny & Delia (2015) suggest that to responsibly manage and protect resources, a collaborative effort between the citizens and competent authority is required. This collaborative effort should seek address the concerns and interests of the citizens involved (Worrell and Appleby, 2000). These concerns and interests are addressed through governance arrangements that create a participatory process for

the people (Prager, 2015). The author argues that the participation of citizens is important to the management and protection of resources. The IUCN (1991) in Zungu (2003) suggest that communities can make positive contributions in decision making and in creating sustainable societies; if these communities are informed, appropriately mandated, and empowered. This suggests that citizens should be informed, mandated and empowered in order to be stewards that will effectively manage and protects resources.

As mentioned in the previous sections, the energy sector is associated with certain costs and benefits, thus in the development of power generating projects such as bioenergy, there is a need for stewardship. Furthermore, those who are affected by the environment and the change in its quality have the responsibility to manage the resources because bioenergy projects are usually found in rural areas. Thus the citizens of the rural areas have the responsibility to manage the projects. Krasny and Delia (2015) suggest that citizens are the social and ecological custodians with the responsibility to protect and maintain the land, the water availability, biodiversity and forests which are threatened by bioenergy; for the good of both the citizens and the ecosystem. Moreover, the citizens have a better understanding of the land in the area, the water resources of the area, the biodiversity of the area; therefore they would be able to leave a positive legacy for the next generation (Worrell & Appleby, 1999).

It is argued that custodians in stewardship have shown a change regarding how much they value the natural resources, improved environmental performance continuously, compliance with environmental requirements and efficient use of natural resources from the ecosystems (Johnson, 2005). Conversely, Stedman and Parkins (2003) suggests that the involvement of citizens in projects such as bioenergy will give the citizens a sense of place, sense of satisfaction, pride and active participation which encourages participation in community improvement, resulting in pro-environmentalism. Additionally, Young and McCay (1995) argue that the involvement of the citizens in maintaining the bioenergy project, for example, will lead to long-term benefits for the citizens and the economy, as they see the importance of the project as well as the importance of preserving the natural resources to maintain the project.

2.3.1.5 Integration of environmental, social, and economic decisions

The integration of environmental considerations in economic decisions and development is an indication of the realisation of the link between the environment and the economy (Noorbakhsh and Ranjan, 1999). Dovers (2005) states that economic development without regard to the cost to the environment results in long-term damaging impacts on the environment as well as the economy. Therefore, bioenergy projects must take into consideration the environment by recognising the full costs of the project on the environment. The costs should be included in the

project planning to find ways to reduce environmental impacts (Dovers, 2005). Noorbakhsh and Ranjan (1999) suggest that integration of environmental considerations in bioenergy economic decisions lie in establishing the carrying capacity of the region. According to these authors, the current state of the natural resources required for bioenergy projects must be established, followed by the utilisation rate of the bioenergy project.

Once there is a clear indication of the impact the project will have on the environment, better economic decisions can be made. Thus the development of energy projects such as bioenergy economic considerations must take into account the environment and society. Noorbakhsh and Ranjan (1999) emphasises that the integration is to promote the achievement of sustainable development, thus must strike a balance between environmental, social and economic impacts. Similarly, Basiago (1999) argues that the society must also take into consideration the environment and the economy in decision making. Furthermore, Dovers (2005) suggests that the integration recognises the importance of all three aspects; hence the three are to be respected and treated equally. This ensures that consequences of one pillar are assessed carefully and can be prevented. A sustainable development integrated decision making and planning is important. The integration must be efficient, timely, accountable and cross-sectoral and should include an inter-generational viewpoint of future needs and consequences (Drexhage & Murphy, 2010). The decision making process should effectively integrate both long and short term economic, environmental, social and equity considerations.

2.3.2 Bioenergy and sustainable development

More recently, the widespread of bioenergy trade and its evolution into a commodity market has entered into the sustainable development discourse (Faaij & Domac, 2006:7). This is because over the last 30 years, the modern use of biomass has increased rapidly in many parts of the world (ibid, 2007:7). While this is the case, the rise of sustainable development particularly in the early 1990s coincided with many countries seeking to comply with the Kyoto Protocol's Greenhouse Gas (GHG). The reduction target has also been the major motivating factor. As Faaij and Domac (2006) note, the concept of sustainable development has undoubtedly offered a new paradigm which various nations use to think about how to achieve sustainable development through bioenergy development or production. As a result, there is an increasing awareness that bioenergy could be used to solve many environmental problems experienced as result of over reliance on a conventional source of energy by countries across the globe, especially the industrialised countries.

Critiquing the linkage between energy and sustainable development, it is clear that the main focus has been on the integration of economic development with environmental development (i.e. improving environmental quality) through bioenergy with the exclusion of social development. This neglect is recognised by Najam and Cleverland (2003) in their article entitled: *Energy and Sustainable Development at Global and Environmental Summits: An Evolving Agenda*. While the chapter on energy has not received adequate attention in the previous international deliberations on sustainable development, it however first appeared in the Agenda 21 of the most comprehensive Rio documents. According to Najam and Cleverland (2003), out of 40 chapters of the document, it is only chapter nine that has specific attention to the energy sector but only about the protection of the atmosphere with a particular focus on climate change. For instance the chapter on changing consumption (chapter 4), promotion of sustainable human settlement development (chapter 7) and promotion of sustainable agriculture and rural development (chapter 14) made mention of energy as a global issue. As Najam and Cleverland (ibid) note, a large array of discussions in these chapters have some bias and are myopic to the need to balance the environmental and economic nodes of the sustainable development triangle.

Thus the Stockholm Conference carried a clear mandate with an emphasis on the environmental impacts of energy production and use in relation to climate change. The key concepts that emerged out of these chapters, which have entered the global sustainable energy discourse, are decreased energy consumption, increased energy efficiency and developing cleaner sources of energy (Najam & Cleverland, 2003). However, the third dimension of the sustainable development triangle dealing with social development such as the role of energy as a human need is not expressed prominently in the popular sustainable development policy discourse as an integral part of environmental and economic development.

2.4 CONCLUSION

The production of biofuels evolved from the 1800s where motivation behind the development was purely economic. With the rise of environmentalism, modern biofuel production presents a different paradigm where development seeks to integrate local social development with economic development and environmental concerns. The production of biofuels has also brought the use of fossil fuels in the global mainstream economies under the microscope. It shows the adverse effects of the incorporation of fossil fuels on the economy, the environment and on the societies. This influenced the need for a better relationship between the economy and the environment, which led to sustainable development. Sustainable development is a movement of integrating economic development with the broader environmental concerns. This is done through the three

pillars of sustainable development: social development, economic development and ecological development. Sustainable development advocates for equity amongst these pillars, ensuring that no one pillar is given preference over the other. It is from this context that a product of sustainable development should integrate the three pillars. Furthermore, sustainable development principles are an important aspect of achieving sustainable development. It is thus from this view that sustainable development products should show the principles: stewardship, participation, access to information, integration of environmental, social and economic decisions and governance.

CHAPTER THREE
THE THEORETICAL DEBATE ON GREEN ECONOMY

3.1 INTRODUCTION

While the previous chapter has traced the origins of ethanol production (i.e. biofuel), this chapter seeks to contextualise the study within the theoretical debate on the green economy. The purpose of this chapter is to present this discussion from a critical perspective. The chapter argues that the green economy, as a contemporary economic development theory, needs to be subjected to scrutiny, particularly its theoretical assumptions and practices. The chapter is thus sceptical of the view that the green economy is likely to solve today's pressing global or national economic and environmental crises.

Firstly, the chapter will present basic theoretical assumptions of green economy as held in the policy discourse at both national and global scale. In this section, the nature and significance of green economy will be presented. This section will also show how a neoliberal market-based approach, expressed in the name of green economy, is portrayed as a panacea for environmental and social challenges besetting the contemporary world.

Secondly, the chapter will thus present a view that the green economic theoretical assumptions have not been successfully implemented to transform global economic order to address issues of equity and justice, particularly in the global South (see Facer *et al*, 2014). In this section, the chapter exposes green economy, not as an alternative economy but as an elitist economy that virtually led to the exclusion of the poor and vulnerable local people. Thus, the neoliberal paradigm which underpins the green economy system seeks to present a particular type of development; development that is sold as solutions to the social, economic and environmental problems. But the pursuit of this kind of development depends entirely on the economic growth in a neoliberal sense (Wanner, 2015). However this type of economic growth has not been without intense criticism and rejections from the deep green organisations to those that advocate for the economic justice for the global poor (Wanner, 2015). The major critique of the green economy is that it provides developments and projects to appropriate resources from nature for the benefit of big multi-national companies that are already rich. This chapter further engages with this debate to critique green economy thereby locating the research study within the broader theoretical debate.

3.2 THE NATURE OF GREEN ECONOMIC THEORY

The green economy is a new concept that emerged as an alternative pathway to achieving the vision of sustainable development. While the origin of this concept can be traced from 1989 when

it was introduced by Pearce *et al.* (1989 in Faccer *et al.*, 2014), it only gained popularity during the global financial crisis of 2008. This era, Faccer *et al.* (2014:643) argues, coincided with heightened recognition of deepening environmental and social crises. It is thus within this context that the “United Nations General Assembly, as a powerful global force, saw this crisis as an opportunity to incorporate green investments in the stimulus packages being implemented to ignite economic recovery” (Faccer *et al.*, 2014:643). Moreover, the notion of new global economic growth, through the protection of the natural environment, emerged under the nexus of the green economy. Over the last ten years, global and national formations have adopted green economy as a framework that seeks to ameliorate environmental and social problems (Wanner, 2015).

However, the concept has been criticised from all angles, with those who argued that it affects economic growth to those who complained about its tendency to support established global economic order. In the centre of the green economy is the idea that environmental protectionism could foster sustainable economic growth for the poor countries; countries that have been ravaged by the vagaries of the global economic order. It is an economic system that was adopted to achieve the tenets of sustainable development. As Faccer *et al.* (2014:643) note, the concept became one of the two focal themes in the Rio+20 where it was concluded that the global economic systems and nations across the world need to move towards greening their economic systems. According to this view, the green economic venture was supposed to be more inclusive rather than exclusionary to the broader previously disadvantaged and vulnerable local communities¹. The introduction of a green economy was met with concerns and contestations from various political spectrums. For instance, those from the developing countries expressed concerns over the role of these countries in the pursuit of the green economic agenda. They were concerned that their voices will be under-represented and that the developed countries will use the concept to impose their national interest under the guise of green protectionism (Resnick *et al.*, 2012 in Faccer *et al.*, 2014). Similarly, NGOs (on behalf of the developing countries) also cautioned that the adoption of a green economy would disrupt the commitments made by developed countries to assist in achieving the goals of sustainable development. The key issue concerning the sustainability of green economic projects was to do with its ability to deal with the scourge of poverty facing the developing countries. This is crucial as the social inequality across the globe continues to grow. For instance, in countries as South Africa, inequality is said to be very high with a Gini coefficient

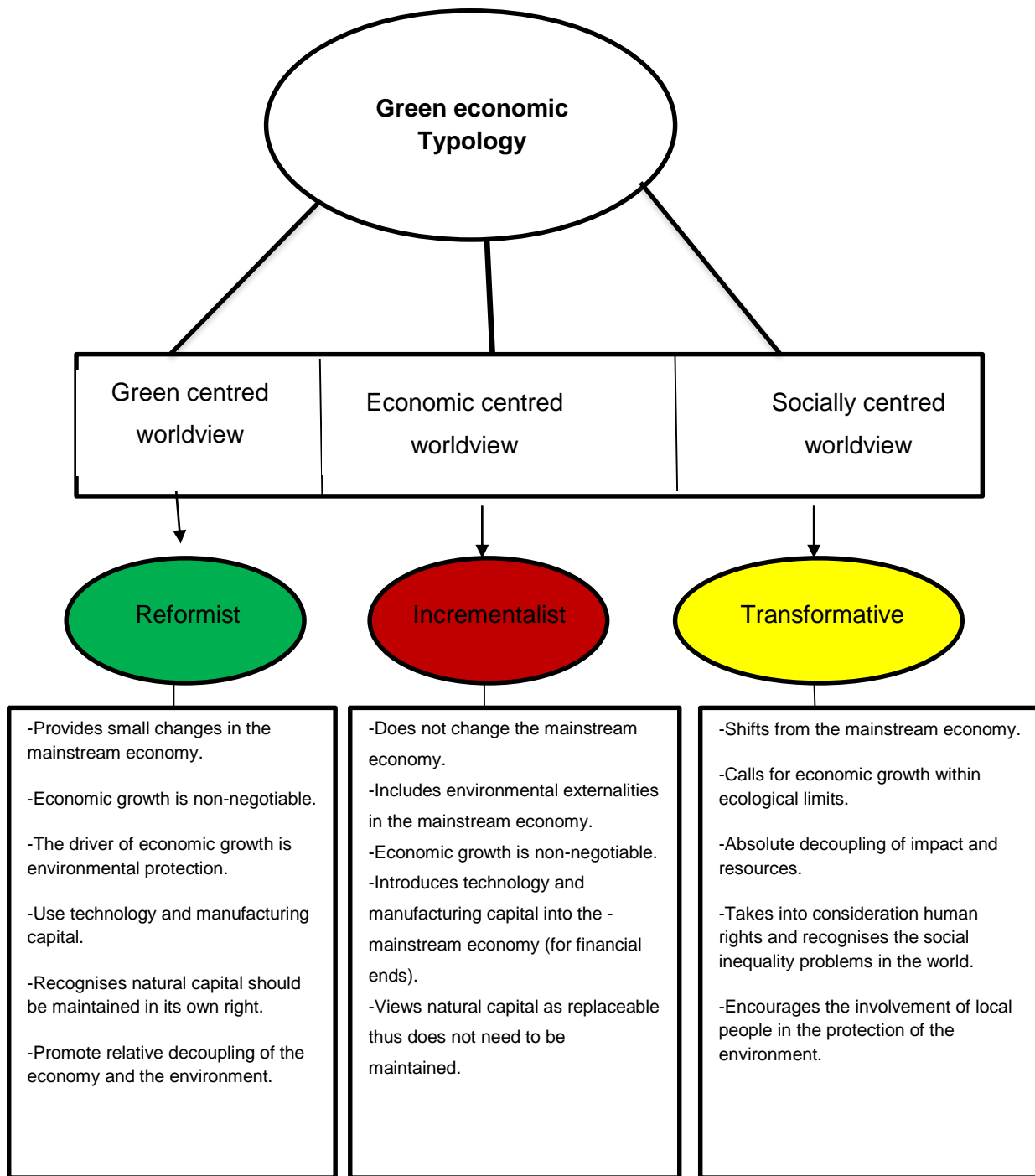
¹Vulnerable communities are communities that are unable to endure adverse impacts from multiple environmental risks that they are exposed to.

of 0.59². Furthermore, it is reported that the 10% of the richest earn 66% more than the 10% of the poorest (World Bank, 2014). The country is also reported to have a high level of poverty. Poverty lines in South Africa are classified into three: the upper bound (i.e. below R779 per month), the low bound (i.e. below R501 per month) and the food poverty line (i.e. R335 per month). It is reported that approximately 27 million people live below the upper bound line, and 18.6 million and 10.7 million for low bound (R501 per month) and food poverty (R335 per month) lines respectively (StatsSA, 2015). According to Basiago (1999), this level of socio-economic ills reflected on a global scale reveals the failures of the world economic order.

Thus the theoretical debate is whether or not the green economy can achieve social welfare to deal with the inequalities embedded in the global capitalist system. According to Fedrigo and Brink (2012), the green economy is supposed to privilege the social dimension to a level of importance that is equal to that of the economic and ecological dimensions. From a sustainability perspective, it is argued that these components must not be treated as separate entities. From the holistic nature of the green economic conception, it is captured in the UNEP (2011)'s definition which states that the green economy is an economic system that results in an improved social well-being (social equity), while significantly reducing environmental risks and ecological scarcities. Likewise, South Africa's policy discourse has adopted similar conception in that it states that green economy is a "system of economic activities related to the production, distribution and consumption of goods and services that result in improved human well-being over the long-term, while not exposing future generations to significant environmental risks or ecological scarcities" (Department of Environmental Affairs, 2010). Thus, the varying definitions from various countries and organisations indicate that the concept is inherently contested. To develop a more illuminating theoretical grounding of this concept, Faccer *et al.* (2014) outline three distinct discourses upon which to understand the manner in which the green economy is theorised and contextualised. They argue that green economic worldview can be located from strong-green based discourses³ to mainstream economic paradigm right to the socialist or reformist oriented viewpoint.

² A Gini coefficient is used in statistics as a measure of the degree of variation represented in a set of values, particularly used in analysing income inequality.

³ Discourse is the event of talking or writing; the process of engaging in the talks and politics surrounding an event.



As depicted in the above Figure 3.1, Faccer *et al.* (2014) provide three discourses which are: the incrementalist discourse, the reformist discourse and the transformative discourse. The world view characterises these discourses that it is based on. For example, the incrementalist discourse rests on the economic world view which espouses economic growth over environmental protection and social well-being advancement. It introduces the use of technology and manufacturing capital to green the mainstream economy, and in this context, the GDP is viewed as the measure of progress. While the economy under the incrementalist perspective takes into consideration environmental externalities through the use of technology, it does not, however, view the people and environment as an integral part of the economy. In the main, the discourse views natural capital as replaceable assets, hence it does not recognise the need to maintain the natural capital or nature environmental assets. The advocates of the incrementalist green economic viewpoint fail to acknowledge the contradictions inherent in the capitalist oriented green movements. For Fairhead *et al.* (2012:239) this contradiction is apparently manifested between the rapidly growing global economy and the earth's resources.

Unlike the incrementalist viewpoint, the reformist discourse is green centred such that it is based on the notion that economic growth is preceded by concerted efforts towards environmental protectionist. Like the incrementalist discourse, reformist discourse also privileges economic growth as an essential part of green economic imperatives. Furthermore, the discourse seeks to promote the use of technology and science as a means to manufacture natural capital. The example of these could be drawn from the sudden explosion of energy efficiency and other technological measures widely used to mitigate and restore the depleted environment from the improper use of natural resources for fuel or energy usage. It is thus for this reason that Fairhead *et al.* (2012:240) argue that the green economy is firmly rooted in the "vision of ecological modernisation⁴ where economic growth and environmental conservation work in tandem". While the reformist discourse provides some alternative progressive narrative than the incrementalist discourse by recognising environmental limits, it, however, ignores the social dimension or social equity. Furthermore it calls for a relative decoupling of economic growth from the consumption of natural resources and the adverse effects it has on the environment. Relative decoupling is explained as "a reduction in impact per unit of GDP" (Faccer *et al.*, 2014:650). In relative decoupling, the use of resources can increase, but it has to grow at a rate that is lower than economic growth.

⁴Ecological modernization is the school of thought that argues that the economy benefits from moves towards environmentalism.

The most progressive theoretical views of a green economy are transformative discourse which calls for a fundamental structural change in the mainstream economy. It is based on the notion that the growth paradigm of the prevailing capitalist system is the cause of social inequality and environmental degradation (Faccer *et al.*, 2014). The discourse is of the view that economic growth should be achieved within the ecological limits and in a socially responsive manner. As such, the discourse promotes absolute decoupling of both impact and resources. UNEP (2011a) in Faccer *et al.* (2014) state that decoupling of resources entails reducing the rate at which resources are consumed, while impact decoupling entails the wise and clean use of resources. It is argued that absolute decoupling of resources and impact will result in a decrease in consumption of natural resources thus avoiding issues of scarcity, while resource productivity increases. In the process, these measures are assumed to contribute in minimising the impact of development on the environment. Unlike the reformist and incrementalist perspectives, the transformative is centred on the commitment to the pursuit of socio-economic justice. It is precisely because this point of view privileges a notion that places significance to the consideration of human rights where local people are supposed to be the main beneficiaries of the green economic venture. More interestingly, the transformative discourse makes a clear pronouncement against the inherent socio-economic inequality. In a nutshell, the transformative is based upon the following progressive green economic principles:

- The well-being of the society is suggested as an alternative measure of progress;
- Promotes the involvement of the local people in the green economy, ensuring that their voice is heard and their rights are protected; and
- The focus is on the absolute decoupling of impact and resources.

While the above green economic perspectives are illuminating, or somehow allowing us to have assessed green economic ventures, a critical academic analysis is still required. Therefore, the following section presents a critical review of the green economy at a more theoretical level. The key question to ask is: to what extent, if at all, would the green economy replicate the ideals of sustainability? This issue is crucial based on the UNEP definition of the green economy which state that: a green economy is an economic system that results in improved well-being and social equity while reducing environmental and ecological scarcities.

From a normative perspective, it is clear that the above definition leads us to conclude that the green economy is essentially based on the three core commitments that are: the economy that seeks to achieve, *social equity*, *ecological justice* and *economic growth*. Thus the debate highlighted in the next section is about how far the green economy attempted to achieve all these commitments in an integrative fashion.

3.3 THE DEBATE ON GREEN ECONOMY

The discussion around the nature of the green economy and what it stands for has resurfaced amongst scholars (Lederer *et al.*, 2015; Bond & Cottle, 2011; Kelly, 2011). In the centre of this debate is whether or not the green economic venture is pro-poor or is privileging the notion of environmental protectionism while sustaining the economic system that excludes the poor. In the debate around green economy, it is important to highlight again that green economy is promoted as a solution to economic, social and environmental problems in the world. The nature of green economy revealed that green economy in simpler terms is the greening of economies with the intention to solve environmental problems and social problems such as reducing social equity and reducing poverty. Furthermore, it is said that green economy is based on getting the economy right, as such; the widely known definition of the concept by UNEP (2011) defines the concept of an economic system that results in an improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities.

However, these noble ideas have been confronted with critics who argue that the green economy is nothing but an essentialist market-based approach underpinned by the neoliberal paradigm (Wanner, 2015). The notion of the neoliberal economic paradigm builds upon the promotion of the prevailing hegemonic market economic system where markets are allowed to function freely (Wilson & Post, 2013). The free market system allows for the ownership, the operation and the decisions to be taken by often powerful private individuals and organisations, at the expense of those that are powerless and vulnerable. The example of this could be drawn from how ecotourism ventures in developing countries have been captured by powerful private companies while excluding the neighbouring communities adjacent to conservation areas (Adams & Hulme, 2001). In many countries in Africa, people have lost their land used for hunting and sustaining their livelihoods for wildlife conservation (Ramutsindela, 2003). The local residents now work for private companies who make money off of the animals while paying the local residents small change. The local people lose their sources of livelihood and are forced to become cheap labour for the rich.

Another example is the development of biofuel in Africa. Sulle and Nelson (2009) report on such problems. These authors reported that Tanzanian communities were forced out of their land without compensation. In most instances, the private companies make offers to the communities promising to improve their infrastructure. The local people engage in agreements that see them lose their land because they do not understand their rights. It is appalling that the states are increasingly less influential in limiting exploitation by controlling the free market system.

Critical to this debate is that green economy is paradoxical in a sense that it seeks to provide changes in the economic system as a commitment to achieving sustainability. However, it does not alter the dominant economic order that perpetuates inequalities. The green economy thus conjures up assumptions that both environmental and social problems could be best tackled with this problematic economic order (Lederer *et al.*, 2015). As a result of the mainstream economy, South Africa has the highest carbon dioxide emissions in Africa and is number 14 in the world. In 2011, South Africa contributed approximately 1.4% of the global carbon dioxide emissions and 40% of Africa's emissions (DEA, 2011). Furthermore, Terreblanche (2012) argues that the South African economic system is created in a way that does not allow the poor to take part in the economy. The same mainstream economy in South Africa has failed to improve the lives of the black majority of the country (Bond & Cottle, 2011).

3.3.1 Green economic model as an elitist project

The critics of green economic ventures argue that the green economic projects are seen so have created an elitist economy that virtually excludes the poor or local people (Wanner, 2015). According to Kelly (2005), conservation practices, particularly in Africa, can be viewed as a form of primitive accumulation. In this context, he argues that primitive accumulation refers to the enclosure and dispossession and accumulation of commons such as land, bodies, ideas or social structures. The primitive accumulation, Kelly (2005) argues, can be viewed as an "act of dispossessing the people from environmental goods and placing them in the hands of the private". Fairhead *et al.* (2012:240) further argues that:

the green movement has transformed, it is in response to this contradiction: it has stepped from critical margins to hold centre stage in an advocacy of a new global 'green economy', firmly located in capitalist networks (quoting from UNEP 2011), and as part of a vision of 'ecological modernisation' where economic growth and environmental conservation work in tandem (quoting from Mol and Spaargarden 2000).

As a green economic project, Kelly (2005) also concurs with the above statement when he argues that conservation and protected areas are a form of primitive accumulation. In a similar vein, conservation practice in Africa, especially the newly established private game farming, is an example of green economic practices. Consequently, things that are green are highly capitalised and become "big business and an integral part of the mainstream economic growth" (Fairhead, 2012:240). The commodification of environmental assets under the new green economic paradigm has raised some concerns regarding the position of the green movement in a world that

is increasingly dominated by exploitative economic order. For instance, Fairhead (2012:240) says that:

In the twentieth century, the 'green movement' could be depended on as a critical voice and antagonist with 'industry', countering the ravages of capitalist expansion and voracious economic growth, this is increasingly difficult to uphold. While in the twentieth century, conservation agendas were surely implicated in the alienation of land and the regulation of land use by colonial and post-colonial regimes, this was often not with commercial intent (quoting from Mackenzie 1988, Adams 2004).

Indeed, green economic practices much like other primitive accumulation practices privatise environmental goods taken from the local people. Under this system, the natural commons are increasingly commoditised and privatised for the benefits of the few elites. This tendency has played out in various forms, but more visible in the form of the appropriation of environmental goods to the private, giving them exclusive rights to accumulation (Kelly, 2005). Fairhead (2012:241) argues that as the contradiction between the global economy and the global environment becomes more apparent, nature is becoming increasingly valuable as "a source of profit". It appears, unlike the past Marxist materialistic perspective that a new form of materiality has emerged with unique political economic relations of co-production (see Fairhead, 2012:241). Quoting from Moore (2000), Fairhead further states that:

At every phase of capitalism emerges from the restructuring of nature is clearly also associated with the global discourses that have been attributing value to it, making an analysis of discursive framing too.

Thus the marketisation of nature has penetrated every aspect of human life as more green agenda is increasingly gaining an appeal to the public policy discourse. For instance, there is no Carbon-Trading without the science-policy discourses that have to discern global warming (Fairhead *et al.*, 2012). There would be no protection of biodiversity without the threatened status or trophy-hunters in the case of big game reserves as spectacles of natural enclosures.

The accumulation of resources in the neoliberalism system results in a concentration of capital in the hands of individuals or private organisations that already hold capital (Harvey, 2003). It is from this context that green economic practices have a divide. On the one hand are private organisations who continue to accumulate capital, while the poor are cheap labour for the elite and they remain without capital. An example of this is provided by Sulle and Nelson (2009) on biofuel development in Tanzania. The authors report that people are dispossessed of their land and are forced to work for little money. In this case, the private companies produce fuel which they

sell and make money off of, while the local people provide labour without money thus remaining poor.

Harvey (2003) reports four processes in the neoliberalism system of green economic practices that result in the accumulation of capital by those who already hold it. The processes are privatisation, financialisation, state redistribution and the management and manipulation of crises. The privatisation sees nature that the state holds in trust of the public, privatised and sold to private individuals and organisations. Thus from this view, nature becomes that of those who can afford it; the elite. This has been visible in ecotourism projects where land used for grazing is sold to private companies for ecotourism. Through attaching of monetary value on goods and services from nature, new markets have emerged becoming big business. Facer *et al.* (2012: 244) say that:

While the original motivation focused on garnering policy support for resource conservation by demonstrating extensive economic value, it has transformed into an approach which seeks payment for services, on the assumption that such remuneration will ensure their provision. This creates a market for different elements of valued ecosystems, which in turn creates the opportunity for financialisation.

The emergence of new markets provides opportunities for resources from nature to be stripped (Facer *et al.* 2012). From this context, it can be argued that the elite as those with ownership rights and who can strip nature of its resources to accumulate wealth. Furthermore, because the elite have the capital they can abandon the stripped ecosystem and acquire other resources only to do the same thing. Facer *et al.* (2012) suggest that the markets for nature are part of a wider financial world. The world is described as one that is prone to boom and bust and other crises. These conditions provide a platform for the accumulation of resources by others while dispossessing others (mostly the vulnerable). Often governments that are indebt are forced by the rich international organisations to privatise the public's natural resources for their accumulation. Harvey (2003) suggests that state distribution plays a significant role in the accumulation of wealth by a selected few. The author points out that states create policies to attract investment that does not take the local people into account. These policies make available assets such as land for the investors to own or lease for certain years. These investors are usually individuals or private companies from countries with biofuel and food shortages who use the assets to produce what they need and accumulate capital. Facer *et al.* (2012: 246) state that:

A crucial dimension to these dual processes of accumulation and dispossession, which consolidate 'capital', is the way that those implicated in the accumulation of value are also those implicated in the attribution of value itself.

This provides the private organisations and individuals with an opportunity to accumulate more wealth. Kelly (2011) highlights a critical form of accumulation and dispossession in green economic practices. He argues that Community Based Natural Resource Management (BNRMs) and Participatory Conservation Project (PCPs) are accumulation practices by the wealthy. While these projects are sold as projects that protect ecosystems' degradation and promote the alleviation of poverty, these projects are used for accumulation of capital by the private organisations and not for the local. The local people in this project do not have control of what happens and how things should be done. As a result, the local people receive low ranking jobs with small pay, while people from the outside head the projects. The local population are often referred to as unskilled and cannot run the projects. The skilled people from outside come and lead the projects, accumulate capital and leave the local people without capital or skills. From this perspective, the green economy is not for everyone. It provides for a selected few to accumulate capital and improve their livelihoods while excluding the majority from the accumulation of capital and improving their livelihoods.

3.3.2 Green economy and social exclusion

Scholars such as Fairhead *et al.* (2012); Sulle and Nelson (2009), Corson *et al.* (2013) argue that green economy promotes social exclusion. As highlighted in the previous section, green economic practices are a form of primitive accumulation. Kelly (2005) refers to primitive accumulation as the enclosure and dispossession and accumulation of commons such as land, bodies, ideas or social structures. These resources are accumulated by the private individuals and organisations from the state entrusted by the public to manage these resources. In a green economy, these states privatise natural resources in the name of sustainability, "greening", and efficiency. While this is viewed as a way to ensure continued use of natural resources over a long time, this has provided a platform for social exclusion of the poor and vulnerable (Kelly, 2005). Harvey (2003) provides four processes in which natural resources are taken from the poor and vulnerable and accumulated by the rich elite. The privatisation of natural resources is stated as one process that contributes to social exclusion. This is because the process takes away natural resources from the poor and vulnerable whose livelihoods are depended on these resources. The state sells these natural resources as stock to the private individuals and organisations and gives them exclusive rights to these resources. Providing an example of the stripping of resources from the poor and excluding them from benefiting is the growing trend of land. People in developing countries are stripped of their land by the government for the allocation of land to developing

countries for biofuels (Sulle & Nelson, 2009). The land used by local people for grazing is sold to ecotourism companies and game farming (Snijders, 2012 in Fairhead *et al.*, 2012). From the example of ecotourism, local residents are left without grazing land for their animals which are used as a source of livelihood.

The dispossession of land from the poor is one of the biggest impacts of green economic practices. Conservation efforts have led to the exclusion of a large number of people in accessing natural resources. Local residents are stripped of access and ownership of their resources because their consumption is viewed as “destructive”. These people are forced to sell their land for conservation, only to be accumulated by private organisations who force them to work to sustain their livelihoods (Kelly, 2005). Ramutsindela (2003) in Kelly (2005) reveals that in South Africa, national parks are an example of such. The author states that the Transvaal Game Protection Association forced local people to sell their land for conservation. This is after the association complained that consumption by the locals was destructive. People were driven to look for employment to sustain their livelihood, while the private made money off of their land. More important is that the elite who dispossess the local people ensure that the people have no alternative regarding employment so that they become cheap labour.

This way, local residents slave away for small change on land that was previously theirs. This leads to cases where local residents are unable to sustain their livelihood. In 2008, Madagascan people experienced being stripped of land when South Korea made a deal with the government for 1.3 million hectares (half of arable land) for energy consumption and food. Korea would be able to provide for its energy needs meanwhile the local people go hungry. Wollenberg *et al* (2009) reports that in Indonesia, in less than a decade communities have lost more than 18 million hectares of rain forest, this left communities without places to stay and no source of livelihood. Sulle and Nelson (2009) report the loss of land and access to other resources by Tanzanian people because of land dispossession for biofuel. Tanzanian people were stripped of land for the biofuel projects by international organisations. These organisations promised the local residents employment and improvement of infrastructure. Instead, they ended up losing their land and access to the resources they had. While in a green economy wealth should be distributed equitably, the above examples provide proof that in green economic practices one side of the private accumulates resources and capital, while the local poor are dispossessed of resources and become cheap labour to sustain their livelihood.

Green economic practices have been found exclusionary regarding the right of the local people voicing their concerns and participating in decision making. Green economy is viewed as a

participatory approach that requires the involvement of the local residents. Furthermore, the local population's needs and interests should be catered for (UNDP, 2012). Kelly (2011) reveals important issues which exude an element of exclusion even in community projects where people are involved. The author reports that Community Based Natural Resource Management (BNRMs) and Participatory Conservation Project (PCPs) seen as projects that protect ecosystems and alleviate poverty are not for the poor. The local people are not involved in decision making, and they do not have a say in how things are done even though the projects are called community projects. The local people do not have ownership of the projects; instead they are used as participants who are excluded in positions of power and authority. As a result, the higher positions are given to other people because it is said that they do not have the required skills. These issues of exclusion have led to the failure of these BNRMs and PCPs to create financially independent local people. The nature of these projects prevents the local people from achieving financial freedom and access to resources that would see their livelihoods improve.

Corson *et al* (2013) state that in some instances, the expropriation of land resources that is exploding globally is a result of the transactions between the government and the private businesses. These have seen people lose their land, while those who are lucky not to lose the land have rules imposed on them to control how and when they have access to resources. Sulle and Nelson report that in some communities in Tanzania, people have been threatened and intimidated to get them out of their land. However, in some instances the leaders of the communities have made deals with international organisations for biofuels without the rest of the communities. These communities are left in the dark without any knowledge of leasing and transfer of ownership of their land.

3.4 CONCLUSION

Nowadays, green economy is a product of sustainable development, viewed as a solution for all global or national economic and environmental crises. The origin of this concept is traced back to 1989 when Pearce *et al* introduced it. However, it only gained popularity during the global financial crisis of 2008. As a product of sustainable development, the concept seeks to treat the three pillars as equal. The concept has been divided into three discourses: the incrementalist based on the economic centred worldview, the reformist based on the green centred worldview and the transformative based on the socially centred worldview. In the heart of the green economy is the idea that environmental protectionism could foster sustainable economic growth for the poor

countries; countries that have been ravaged by the vagaries of the global economic order. This concept has been criticised from all angles that suggest that green economy is an elitist project that excludes the poor and vulnerable. It is argued that green economy does not improve the well-being of the people as advocated for in the Green Economy Report published by United Nations Environmental Program.

CHAPTER FOUR

RESEARCH METHODOLOGY

4.1 RESEARCH DESIGN

The aim of the study and the nature of the problem investigated in the research determined the type of the research design adopted in this study (Creswell, 2003). Therefore, the research problem and the main aim of the research informed the kind of research philosophical construct adopted in this research. While the theoretical framework adopted in a study also plays its part in determining the type of methodology to be used in collecting and analysing data, the nature of the research enquiry is vital in influencing the theoretical approach to the research study. In a nutshell, the research enquiry determines the type of research design to be adopted in the study (see Creswell, 2003; Welman & Kruger 1999). Thus, the research design selected for the research study is qualitative. This is because a research design of this nature is relevant in deepening an understanding of how people represent and construct a phenomenon that is enquired in research.

At the centre of this study was to collect data that would allow the readers to understand how the local people of Cradock make sense of the socio-economic effects of ethanol projects in the former commercial agrarian areas (see introductory chapter). The qualitative design is thus suitable because it allowed the researcher to gain an in-depth understanding of the underlying reasons and motivations for action, as well as establishing how people feel and interpret their experiences and the world around them (Coyne, 1997). Contrary to the quantitative research techniques, which are thought to objectify meanings and experiences and often reduce these into “numbers and figures” descriptively, the qualitative research design provides rich and detailed information about an event or occurrence. It is why human geographers and environmental historians (see Coyne, 1997) often refer to this kind of methods as an interpretative methodology.

The formulation of the research design adopted in the study is underpinned by four key aspects of the research, and these are:

- The research question formulated (i.e. research enquiry);
- The explanation of a theoretical framework within which the question is to be investigated;
- The methodology was chosen to inform the collection and data analysis; and
- Consideration of the academic philosophy that binds this process and within which knowledge is constructed.

(Source: Robinson, 1998 in Zungu, 2003: 59)

The selection of the methodological technique in the study was also significant in that it informed the collection methods and the type of data analysis. While there are several methods of data gathering and analysis in research, it is crucial that a researcher selects an appropriate methodology to answer the overarching research question formulated in the study. This process does not occur in a vacuum, as Robinson (1998) states, but it is a process of the construction of knowledge which, in turn, depends on the relationship between theory and the object being studied. At a theoretical level, in this research, the researcher sought to understand how the ethanol project reflects the broader notion of green economy as a theoretical angle.

4.2 RESEARCH PHILOSOPHY AND APPROACH

All research is often underpinned by certain philosophical assumptions (Robinson, 1998). In qualitative research philosophy, it is assumed that a researcher has a particular worldview which has far-reaching influence on the research approach and methodology chosen (Saunders *et al.* 2009). Since the researcher collects data from the people based on the specific subjective object of enquiry, it is highly recommended that a researcher remains objective during the research process. The qualitative research philosophy requires that the researcher interacts closely with the participants by building a rapport. It is within this context that Dixon-Woods *et al.* (2001) argue that knowledge constructed through qualitative research is not value free, as the researcher and researched cannot be separated. Furthermore, Holden and Lynch (2004) suggest that qualitative research is context-bound; by ensuring that the researcher gets close to the data without manipulating the researched phenomenon and the outcome of the study.

The form of reasoning to be used in addressing the problem that has been identified should be an appropriate one as well. This means that the way the research problem is defined and formulated determines the research design required and the reasoning (philosophical construct) used to ground the study (Kitchin & Tate, 2000). In most cases, any scientific research is likely to employ one of the two most important research approaches, namely; deductive or inductive research design (*ibid*). These two methods are crucial in the construction of scientific knowledge in any research study. For instance, the deductive research design is usually used in natural sciences' research, while inductive is invariably employed in social sciences or environmental sciences and human geography (Robinson, 1998)⁵. The deductive approach known as the "top down" approach is concerned with testing the theory. This approach moves from the general theory to the more specific. In other words, it seeks to use the generalised scientific principles often derived from the

⁵ Robinson, G.M. (1998) *Methods and Techniques in Human Geography*, John Wiley and Sons, New York.

theory to approach the specific context (facts). In contrast, the inductive approach known as the “bottom-up” approach is concerned with the generation of new theories emerging from a specific context. Unlike the deductive approach, the inductive moves from definite observations to broader generalisations and theories (Soiferman, 2010).

This research study adopted an inductive approach. The inductive approach is widely influenced by the data collected from the participants in that the information from the informants contributes to the building of themes (Soiferman, 2010). Unlike the deductive method where it is concerned with challenging and confirming hypotheses, this research study started with identifying the problem and progressed to the stage where a general theory was used which led to the formulation of research questions and determination of data needed. Thus, the approach used for the research project is more open-ended as opposed to the narrow nature of the deductive approach (Creswell & Plano Clark, 2007). Furthermore, the research project is human centred investigating the socioeconomic implications of ethanol production as a green economy; the approach required should be an approach that is human centred and explanatory such as the inductive approach. The research project requires in-depth opinions of the people in the area from which the project is located, thus should be interactive and explanatory. Saunders *et al.* (2003) suggest that for a study that requires an explanation of the phenomenon such as this research study, the inductive approach is suitable.

4.3 CASE STUDY APPROACH

The case study method was used as an approach to this research because it provided an in-depth and multi-faceted understanding of the researched phenomenon rooted in a real case scenario (Crowe *et al.*, 2011). Robert Yin defines a case study as “an empirical inquiry that investigates a contemporary phenomenon within its real-life context” (Yin, 1984: 23). As Creswell argues, the case study approach allows the researcher to analyse the study in a holistic and meaningful manner taking into consideration the historical context. The case study for this research was the ethanol production project in Cradock located in the Central Karoo of Eastern Cape.

Case study analysis, as an approach to the study, is useful in bringing out a much deeper context around the phenomenon that is being studied. That is in the case of the ethanol project in Cradock; the case study approach provided rich and in-depth information about the project. This case study in Cradock is particularly important for many reasons. Firstly, Cradock is an agrarian town that was established in 1814 following the expansion of commercial agriculture. For over 200 years, the town’s economy and its populace relied on traditional commercial agriculture; as a result, the

agricultural community specialises in the production of livestock, wool and mohair. This type of agriculture has been providing the local people with housing, food and employment. Secondly, the ethanol project introduced the production of biofuel feedstock sorghum and sugar beet in the land that was used for food production (both crops and livestock farming). It was, therefore, important to discover how the change from producing food to producing biofuel feedstock would affect the economy of Cradock, particularly because the town has relied on food agriculture since its inception. Furthermore, Yin (2003) argues that case study approach is useful when the study focuses on answering “how” and “why” questions. Thus the case study adopted in this research was relevant because it allowed the researcher to focus solely on the ethanol project in Cradock: to explore this phenomenon intensively by an emphasis on the specific context peculiar to the study area. The case study approach allowed for the researcher to study Cradock and its residents at great length. Thus, studying Cradock in isolation or its peculiar nature allowed the research to address the problem of over-generalisation; by ensuring that the data gathered in this case study was located within the broader theoretical debates. The debate here: is how the ethanol project (as a green economic model) benefits the local people? It is answering these questions that the researcher treated the case of Cradock as an isolated individual case; as such the ethanol project in Cradock was dealt with as an individual case without comparing it with other ethanol projects elsewhere (see Chapter Five). While the case study approach was useful in the study, one cannot ignore its limitations. For instance, Crowe *et al.* (2011) state that the case study lacks scientific rigour and provides little basis for generalisation. Despite the case study limitations, the strength inherent in the case study approach is that it provided an in-depth understanding of various aspects of the project.

4.4 SAMPLING METHODS

The population of the study area is often too large such that it is practically impossible to collect research data from all individuals in the population. To avoid this challenge, the researcher has to select a sample that is representative of the entire population of the study area. (Welman & Kruger, 1999). Therefore, this research study used two sampling methods; purposive and random sampling techniques.

The purposive research study is a non-probability technique where the researcher’s sound judgement is used to select the participants in the research study (Black, 2010). This means that the researcher uses personal judgement to select people to participate in the research; people

that can provide information that would help the researcher in answering the research questions and achieving the research objectives (Creswell & Plano Clark, 2011). The purposive sampling technique was thus used in the study because there are people who have information about the ethanol project because they are directly or indirectly involved in the project. The purposive sampling also assisted the researcher to select people (informants) with relevant information that would help the researcher to answer the research question and achieve the research objectives. The research technique helped the researcher save time and money which would be lost in trying to interview scores of people, some of whom would not provide the researcher with the relevant information.

The public participation report from the Environmental Impact Assessment Report on the ethanol project in Cradock was used to select the key informants. The respondents were; the emerging farmers (land beneficiaries), the Department of Agriculture, the Local Economic Development, the Rural Development and Land Reform, the Agrarian Research Development Agency, the farm workers on the ethanol project farms, the business sector and the local people of Cradock.

This technique was relevant in this study because it allowed the researcher to capture a broad range of perspectives on the ethanol project. The researcher was able to capture how the ethanol project is seen and understood by different people in different settings, providing rich insight into the project from all angles. Furthermore, the researcher was able to identify common themes that were evident across the sample.

Part of the research study was to find out how local people benefit from the ethanol project in Cradock. The collection of information about the ethanol project from local residents was conducted using a survey. The selection of informants in the survey was through random sampling. Random sampling is a sampling method where all members of a particular population of interest have a predetermined probability of being selected for participation (Marshall, 1996). The selection of household informants in Cradock was based on the availability of the household from both townships, Lingelihle (predominantly black) and Michausdal (predominantly coloured).

4.5 DATA COLLECTION TECHNIQUES

The qualitative research methodology embraces some techniques in collecting data. The study used a combination of primary sources and secondary sources in the collection of data. Data collection for the study was conducted during a two weeks trip to Cradock in June 2015. Two

research assistants accompanied the researcher⁶, who supported the researcher where needed. Informant consent was secured before the interview using letters that were sent to the informants requesting their permission to participate in the research (see Appendix A for a request for participation letter). Following the letters, appointments were then made with these participants to ensure that they take time off their schedules to meet with the researcher. This excludes the residents, emerging farmers and the farm workers because it would have been practically impossible for the researcher to send them letters requesting permission. For the emerging farmers, contact was made with the competent authority responsible for the emerging farmers to arrange suitable times for meetings.

4.5.1 Primary sources

Some primary sources were utilised in this research study. The main sources used for this research study consisted of interviews, questionnaires and observations.

4.5.1.1 Interview as a method

Interviews are a technique of qualitative research used widely in social research methodologies. Interviews are verbal conversations between two people with the objective to get the stories behind the experiences of the participants (McNamara, 1999). The research study used in-depth interviews with the following key informants;

- The Agrarian Research Development Agency (ARDA);
- The Department of Agriculture (DoA);
- The Local Economic Development (LED);
- The Department of Rural Development and Land Reform (DRDLR); and
- Emerging farmers.

An in-depth interview is a form of interview that allows for intensive interviewing of an individual, providing the researcher with the opportunity to capture data that is both rich and descriptive (Boyce & Neale, 2006). This type of interview was relevant for this study because the respondents are involved in the ethanol project in Cradock at various levels. Therefore, it was important to

⁶ Sinazo Mhlanga and Sinalo Jebe were used as research assistants in the collection of data. The research assistants assisted by taking photos on the farms and taking notes.

capture the information from these informants in a manner that allowed them the freedom to dwell on issues relating to the project. An in-depth interview was conducted with each representative of ARDA, DoA, LED and DRDLR (see Appendix B for a guide of the questions). Furthermore, 18 in-depth interviews were carried out with the emerging farmers who are defined as the land beneficiaries (see Appendix C for a guide of the questions). Before the interviews commenced, the interviewer explained the purpose of the research and that participation by the key informants was voluntary. The interviewer gave the interviews enough time to allow the informants to share their stories, experiences, expectations, and issues relating to the ethanol project. The interviews were captured using a tape recorder and written notes.

4.5.1.2 Questionnaires as a method

Questionnaires are a method of gathering information from some individuals; a “sample”, to learn something about the larger population from which the sample is drawn (Dörnyei, 2003). The questionnaires for the research study consisted of both open-ended and closed questions. The questionnaires were self-administered, but for informants who indicated that they could not write, the research assistants filled out the questionnaires for them.

Three sets of questionnaires were administered during the data collection process. The first round of questionnaires was administered to the local households of Cradock consisting of informants from both Lingelihle and Michausdal townships (see Appendix D for the local households’ questionnaire). Similar to the interviews, the purpose of the research was explained before administering the questionnaires, and that the participation was voluntary. The second set of questionnaires was administered to the farm workers working on the farms purchased for the ethanol project. The questionnaire was different to that of the local households. However, it consisted of open-ended and closed questions relating to the ethanol project (see Appendix E). Similar to the local households, the purpose of the research was explained before administering the questionnaires and they were informed that participation was voluntary. The farm workers asked that their names be kept confidential in the research study.

The third set of questionnaires was administered to the local business sector. The business sectors were the following;

- The hospitality sector;
- The tourism sector; and

- The agricultural retail sector.

The questionnaire consisted of both open-ended and closed questions relating to the ethanol project. The questionnaire was different from that of the households and farm workers because it focused on their experiences and expectations of the ethanol project (see Appendix F for the questionnaire). A total of eight participants were interviewed from the business sector; three from the tourism industry, four from the hospitality industry and one from agricultural retail. The agricultural retail store is used as the main supplier for the ethanol project in Cradock. In the hospitality sector, the four represented a hotel in town and a township hotel, a lodge, and BnB. The participants expressed themselves freely but requested that their confidentiality be protected. Table 4.1 below provides the summary of the primary data collection process of the research project.

Table 4.1: The summary of the data collection process.

Research participants	Type of data collection method	Number
ARDA, DoA, LED, and DRDLR	In-depth interview	4
Emerging farmers	In-depth interview	18
Local households	Questionnaire	51
Farm workers	Questionnaire	12
Business industries	Questionnaire	8

As shown in Table 4.1 above, a total of 22 interviews and 71 questionnaires were obtained from Cradock during the data collection process relating to the ethanol project.

4.5.1.3 Observations as a method

Observations, as a form of data collection, were used in this research study. Observation is the systematic recording and description of the behaviour of the research sample, and events in the research study social setting (Marshall & Rossman, 1999). This method was relevant in this research study because the researcher was able to capture more than what was said by the participants in the investigation. The researcher visited the farms involved in the ethanol project, the Cradock town and the two townships of Lingelihle and Michausdal. Through observations, the

researcher watched things as they unfolded, trying to obtain understanding without communicating with the participants to gain information. The observations were helpful in the following ways:

- Reporting on nonverbal expressions;
- Understanding how the land beneficiaries (emerging farmers) interact with the farm workers on their farms;
- How the residents feel about the ethanol project and their involvement in the ethanol project;
- The role the ethanol project has played in the lives of the emerging farmers and farm workers the processes within the farms;,
- Understanding how the farm support structures (ARDA, DoA, DRDLR) relate with the emerging farmers; and,
- Understanding the dynamics of the ethanol project in Cradock.

The researcher used direct observations where the researcher did not try to be in the shoes of the participants; the researcher did not take part but watched. The observations from the ethanol project in Cradock were captured using photographs, notes and recordings.

4.5.2 Secondary sources

Secondary sources are important in the research study because the researcher obtains theoretical frameworks from them. The secondary sources were used early in the research stages to provide an understanding of the topic, as well as to provide a picture of the ethanol project in Cradock. One of the main reports utilised in this research study was the Environmental Impact Assessment Report on the ethanol project in Cradock. The EIA provided an understanding about the issues and concerns on the project. These are the issues that the research aimed to investigate; the social, economic and ecological implications as well as the sustainability of the project. The articles were useful in providing updates on the developments of the project over the years. Furthermore, the various maps used in this research also fall as secondary sources.

4.6 QUALITATIVE ANALYSIS

It is important to remind the reader that data collected in this research study was mainly qualitative. Similarly, data were analysed using qualitative analysis. Creswell (2003) defines data analysis as the process through which the researcher constantly reflects on collected data, to gain an understanding of the data and to represent the data, the researcher then derives meaning from the data represented. In qualitative data analysis, data analysis is identified by two approaches namely grounded theory and content analysis. The content analysis approach identifies the themes for analysis before analysis begins, while the grounded theory used in this research study derives the themes for analysis out of data collection. Furthermore, the grounded theory employed in this research study is recognised as an inductive approach. Data analysis in this research is important in that it was used to make sense of the data collected. It is important to note that the process of data analysis did not start at a later stage of the research, but rather started early in the investigation process.

To better understand the data collected during the interviews, the researcher spent a substantial amount of time at the farms, visiting the fields used and the associated infrastructure, the farmers' houses, and the houses of the farm workers. Data were collected in June of 2015, during this time after each day of sessions, the researcher transcribed the findings. The transcriptions helped the researcher to identify the gaps which were resolved during the visits to the farms.

The collection of data and the visits to the farms provided the researcher with a clear picture of patterns and themes. The nature of qualitative data and the data collected were coded and grouped into themes that arose from the participants' responses highlighting both commonalities and differences in issues raised. Mouton (1996) suggests that highlighting both commonalities and differences is significant in data analysis because it shows that the reporting is full and not selective. The researcher combined the data collected from the primary and secondary sources to provide a broader understanding of the data gathered.

While this study was qualitative, some aspects of the quantitative nature were used in the analysis. This is the numeric data that was collected from the fieldwork, this data is reported in the form of graphs and tables which show relationships between variables. The application used for capturing and producing graphs of the responses from the participants is Statistic Product and Service Solution (SPSS) and Microsoft Excel Professional Package. The diagrams contained in thesis were developed using Microsoft Word 2010. For the qualitative data aspect, quotations from the

interviews were used. The quotations are important in that they reflect the views of the respondents adequately in the presentation of the results.

4.7 ETHICAL CONSIDERATIONS IN SOCIAL RESEARCH

The nature of qualitative research presents many ethical issues for the researcher during the data collection stage. This is because the researchers, unlike quantitative researchers, do not collect data from objects, but from people with feelings and views. The researcher has to interact with the people, and the way the researcher interacts with the people is important in ensuring the outcome of the research. The interaction of the researcher with the research participants whether negative or positive, influences the outcome. Before conducting data collection, ethical clearance was obtained from the ethical committee of the Cape Peninsula University of Technology (Cape Town Campus), Applied Sciences faculty (see Appendix G for ethical clearance letter).

The fieldwork presented the researcher with some ethical issues; these are provided below:

- Who the researcher is and the purpose of the research. The local people expressed that they have been involved in research before where they thought they would gain something for their participation. The researcher explained that the research is for academic purposes and not for any project that promises to compensate them for their involvement. The purpose of the research was explicitly explained to all participants, and all participants gave consent.
- The participants feared to participate because they wanted to protect their identity. The researcher assured all those involved that their identity would be protected in this research.
- Consent for the participation of the farm workers was obtained from the emerging farmers before acquiring consent from the farm workers.
- To ensure that the farm workers were free to express their views without the fear of the farm owners, the researcher interviewed the farm workers without the farm owners present and did not discuss the views of the farm workers with the farm owners.
- The local townships consisted of Xhosa and Afrikaans speaking people. The researcher made sure that people could communicate in a language that they felt was comfortable, that included enlisting assistance for Afrikaans speaking people.

It is of particular importance to qualitative researchers to pay attention to ethical difficulties during research. This is because their research, unlike quantitative research, involves the investigation of identity and the daily realities of participants (Kitchin & Tate, 2000 in Zungu, 2002). The nature of qualitative research relies on people being open to voice their views on the particular research.

It is important to ensure that limitations that would result in people not participating freely are eliminated. Also because of the nature of the research, it is important that the confidentiality of the people be protected. During the fieldwork, some of the participants expressed concerns with some of the authorities involved in the project. The researcher ensured that the identities of the farmers were not revealed to avoid causing problems within the project.

4.8 STRENGTHS AND LIMITATIONS OF THE METHODS USED

It is important to remind the reader that the study was based on the qualitative research design. Similarly, the methods selected for the research study were qualitative methods. These were selected on the basis that they would help the researcher understand how the local people of Cradock make sense of the socio-economic effects of the ethanol project. It is pivotal to note that each method used has limitations and strengths. The strengths and limitations of the methods utilised in this research study are as follows:

4.8.1 Strengths

The methods selected and used for this research project are methods that are suitable for achieving the aims and objectives of the research study. Qualitative research methods allow for the interaction between the researcher and the participants resulting in more detailed rich and explanatory mode. Atieno (2009) argues that in qualitative research, the researcher learns from the participants' understanding of their perceptions and how they interact with the phenomenon being researched. Because the research study set out to ascertain the views and experiences of the people of Cradock on the ethanol project, the method used in this research was suitable in achieving this. Qualitative methods allowed the researcher to collect data, and manage it without destroying the complexity and context of the data.

The methods can do justice to these complexities by allowing what people experience, the meanings people attach to their experiences and how they interpret things (Atieno, 2009). In-depth interviews obtain large amounts of data within a short space of time. Because the study focused on lengthy individual participation, it was able to grasp the complexity and background of individual experiences better. Semi-structured interviews allowed for the collection of large amounts of data while providing flexibility and modification based on what the researcher viewed as appropriate

(van Teijlingen, 2014). In structured interviews, because the participants are asked the same question, it is easy to repeat and check reliability. The qualitative research techniques employed in the study provided information that could be understood and interpreted. Furthermore, the methods used were cost effective in that the researcher did not have to spend large sums of money for data collection.

4.8.2 Limitations

The methods employed also come with limitations, these limitations are provided below (see Atieno, 2009):

- The analysis of the findings cannot be extended and make generalisations, without a degree of uncertainty. This is because the findings of a research study are not tested to discover whether they are statistically significant or they are due to chance (Atieno, 2009:17);
- Because the nature of qualitative research deals with the views, experiences and interpretations, the validity of the data collection can sometimes be questionable;
- Qualitative research can often be time-consuming due to complex issues discussed between the researcher and the participants. Because the participants are given the freedom to express themselves, this can often take up more time than is expected; and
- The quantity of data collected in qualitative research makes the interpretation and analysis of data time-consuming.

4.9 RELIABILITY AND VALIDITY OF THE STUDY

Reliability and validity are important to the evaluation of the quality of the research. Furthermore, it speaks to the integrity of the study and ensuring the credibility of the research results. The process of reliability and validity of the research study is provided below:

4.9.1 Reliability

Reliability in research is known as to what extent the findings of the research can be duplicated (Ritchie & Lewis, 2003). Carr (1994) argues that quantitative research is more reliable than qualitative research. According to Duffy (1985), this statement is true because qualitative research is reliant on the observer's insights, while quantitative controls unnecessary variables with the

study and the data as opposed to qualitative which can be tested using standardised testing. It is hard to replicate the findings of qualitative research because the data collected reflects the reality of the situation during data collection and the reality is likely to change (Marshall & Rossman, 1999). Hence reliability in qualitative studies is at often considered as an unrealistic demand.

Though reliability in qualitative studies such as this one is very difficult, in this research some measures were taken to ensure its existence. Firstly, the interviews of all participants from the government, farmers and the various businesses were recorded on tape and a book, except for those who were uncomfortable with being tape recorded. After the interviews, the researcher went back to the tapes to make sure that the interviews were written word for word. Secondly, to avoid misunderstandings, the participants were given the opportunity to indicate if they did not understand the questions so that the researcher could explain the questions until they understood them. Finally, because of the open-ended nature of qualitative research, all participants in interviews were given the opportunity to explain further on their answers if they felt the need.

4.9.2 Validity

The validity of the research is regarded as the accuracy or correctness of the research findings (Ritchie & Lewis, 2003). As opposed to reliability, qualitative research studies have fewer problems than the quantitative research studies. Sandelowski (1986) suggests that this is the case because qualitative studies are conducted in the natural setting of the subjects, which presents fewer threats to external validity.

Similar to reliability, some measures were undertaken to ensure the validity of the research study. In this research, triangulation was used by providing a combination of different research methods namely semi-structured interviews, formal interviews, in-depth interviews and observations in researching the ethanol project in Cradock. This was done because the researcher acknowledged that one method would not provide a clear picture of the ethanol project in Cradock. Therefore, the combination of methods provided richer information. Secondly, to ensure validity none of the questions asked were outside the scope of the research topic, the questions were posed to achieve the aim and objectives of the study. Thirdly, the research maintained a high level of data transcription and analysis, for example, the researcher compared the written responses with the taped responses to check the accuracy of the data. Finally, the secondary sources were used to determine the validity of the information given.

4.10 CONCLUSION

As conversed in the chapter, the study is conceived as qualitative research, and as a result qualitative methods were used to collect and analyse data. Qualitative research methods were used to gather data with the aim to answer the research questions and achieve the objectives of the research study. This research methodology chapter outlined every stage of the project from the selection of methods, philosophy and approach through to the data collection, research reliability and validity as well data analysis. Important to highlight is that the choice of all methods used was largely influenced by the research question, aim, and objectives which required qualitative information, hence the selection of qualitative research methods.

For the collection of in-depth data, semi-structured interviews, observations and questionnaires were used. The research also discussed ethical issues concerning the research study; these were examined in detail. The chapter also described and discussed the methods used for sampling in this investigation. There were two sampling techniques used namely purposive and random sampling. The research also discusses the relevance of these two techniques in this ethanol project. A wide range of diverse participants were used as informants in this research study providing a broad range of perspectives on the ethanol project. This broad variety of perspectives and other results on the data collection on the ethanol project in Cradock are presented in the following chapter on the results' findings.

CHAPTER FIVE

RESULTS FINDINGS

5.1 INTRODUCTION

The previous chapter paid attention to the discussion on the methodological design of the data collection methods adopted by the study. This chapter presents the data collected during the field work. The results presented in this chapter address the research questions on the potential socio-economic implications of ethanol production in Cradock as a green economic initiative. It is thus crucial to note the implementation of the ethanol production project is divided into four phases which are:

- the acquiring of land;
- the allocation of land to the potential beneficiaries;
- the construction of the plant; and
- The production of ethanol.

It was assumed that each of these phases would yield benefits to the local people. In the context of this study, the project beneficiaries are conceived as the local residents, comprising of the residents of Cradock, those who stay in town (predominantly white population), and those who live in the townships (predominantly black and coloured population). The project is currently in phase two where the emerging farmers have moved into the farms producing maize and lucerne while awaiting phase three to commence with the production of biofuel feedstock. Thus the chapter

will report on the socio-economic impacts of the first two phases and the potential (perceived) socio-economic implications of the remaining two phases of the project.

5.2 ETHANOL PRODUCTION IN CRADOCK: PROJECT CONCEPTION

Over the past 20 years, South Africa has increasingly sought alternative ways of producing energy from a renewable source. This transition was part of a global trend to adopt clean production of energy; energy production that has minimal impacts on the environment. It is from this contextual background that the ethanol production, as a renewable source of energy, came to Cradock. For instance, in Cradock, the ethanol production was first introduced in 2007 as a joint venture of the Central Energy Fund (CEF), Industrial Development Corporation (IDC) and Sugar Beet South Africa (SBSA). The CEF, IDC and SBSA agreed to establish a processing plant in the Eastern Cape following the National Biofuels Strategy (NBS) that was tabled in 2002. The joint trio was primarily based on research conducted by SBSA of more than ten years, where it was searching for areas suitable for sugar beet production as a source of ethanol. The research found Cradock district as a suitable area for the manufacture of sugar beet. According to the report (Cradock Ethanol Production Environmental Impact Assessment, 2009), it was discovered that Cradock ecological conditions could yield sugar beet stock necessary to produce sufficient ethanol energy for the country. After 2002, SBSA saw an opportunity for a new market using sugar beet to produce biofuels (Cradock Ethanol Production Environmental Impact Assessment, 2009). The research findings of the SBSA were thus instrumental in securing funding from the IDC and CEF to produce sugar beet as a source of biofuel energy. The NBS was used as a framework to motivate for Cradock district as a suitable area to produce sugar beet as feedstock for biofuel production.

However according to ⁷Respondent 1 from the ARDA, the IDC is said to be the only investor in the project as the CEF pulled out years after the project was introduced. The Department of Rural Development and Land Reform (DRDLR), Department of Agriculture (DoA) and Local Economic Development were approached by the joint venture to participate in the project, and subsequently, the government agreed to be a project partner. Following the government agreement to take part in the project, two studies were conducted to investigate the feasibility of the project. For instance, in 2008 a feasibility study was conducted followed by the Environmental Impact Assessment (EIA)

⁷ Respondent 1* Mrs van der Merwe is a representative of the Agrarian Research Development Agency interviewed at the Eastern Cape Research Development Agency offices in Cradock on June 15 2015. The respondent asked for her anonymity to be respected.

study in 2009. Both studies showed the project as feasible from the environmental and socio-economic perspectives. The production of ethanol as described in the background to the study comprises of two components; the ethanol distillery and associated infrastructure and secondly the agricultural component. The agricultural component is said to provide the feedstock produced from the farms to be supplied exclusively to the plant. For instance, Figure 5.1 below depicts the various stages and processes involved in the project.

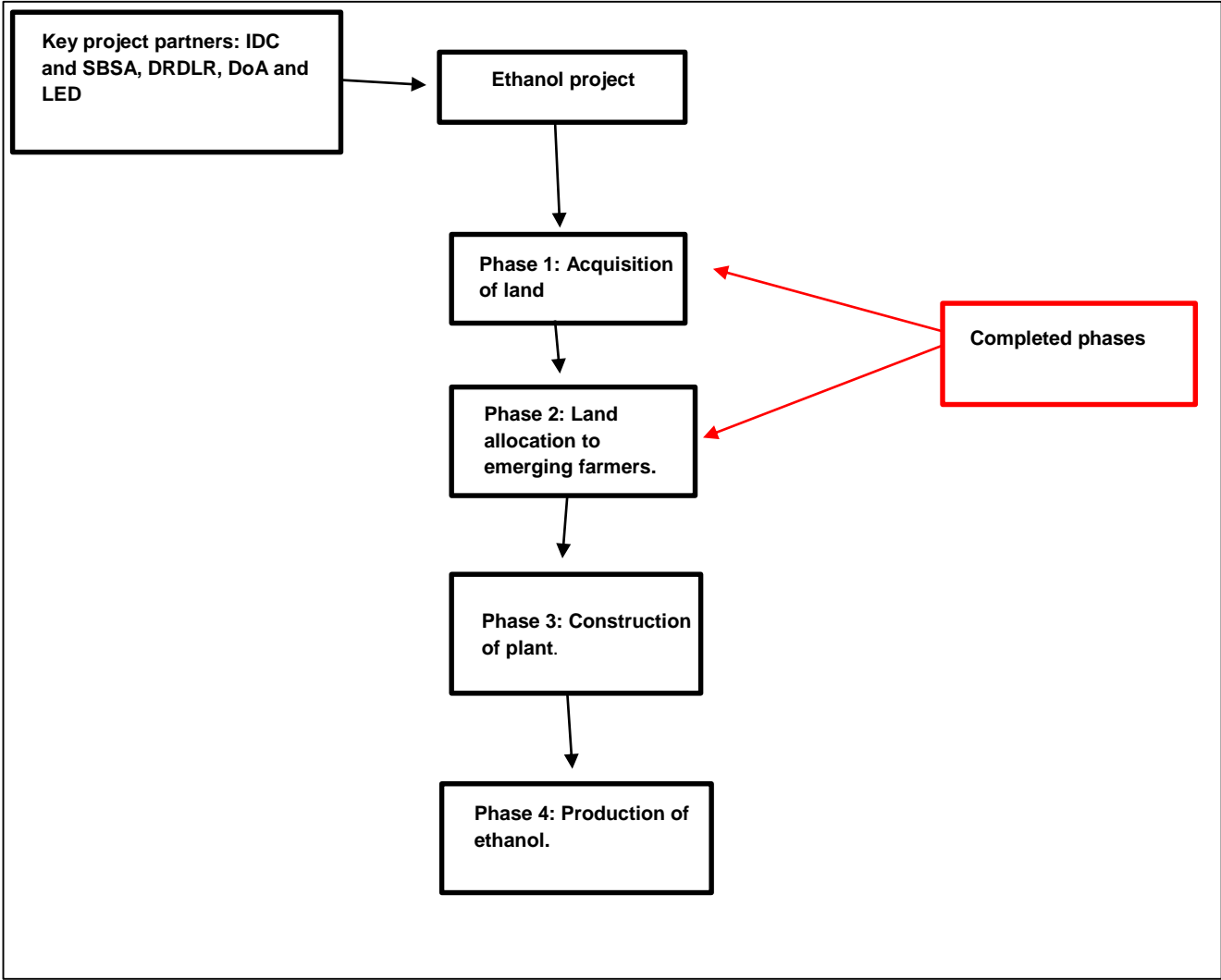


Figure 5.1: The Cradock ethanol production and project phases.

As shown in the above Figure 5.1, the acquisition of land to be allocated to the beneficiaries is the first phase of the project that has been implemented thus far. According to respondent 2 of DRDLR, the allocation of land for this project to the beneficiaries was an integral part of the land reform programme to address historical imbalances created by the apartheid government. The

Land Reform and Restitution Act was used to allocate land to the potential beneficiaries; primarily to the blacks and coloured communities that were previously excluded from accessing land. Therefore, the acquisition of land for the beneficiaries forms a crucial socio-economic benefit for the project. This means that as early as the first phase of the potential project beneficiaries gradually began to realise socio-economic benefits associated with the project.

Furthermore, as depicted in Figure 5.1 above, the two phases namely; the land acquisition and allocation of land to emerging farmers have already been completed. The project is expected to benefit the local economy of Cradock by attracting favourable investment to create employment and accelerate access to markets (Cradock Ethanol Production EIA, 2009). On the other side, the project seeks to reduce the reliance on crude oil.

5.2.1 Acquisition of land

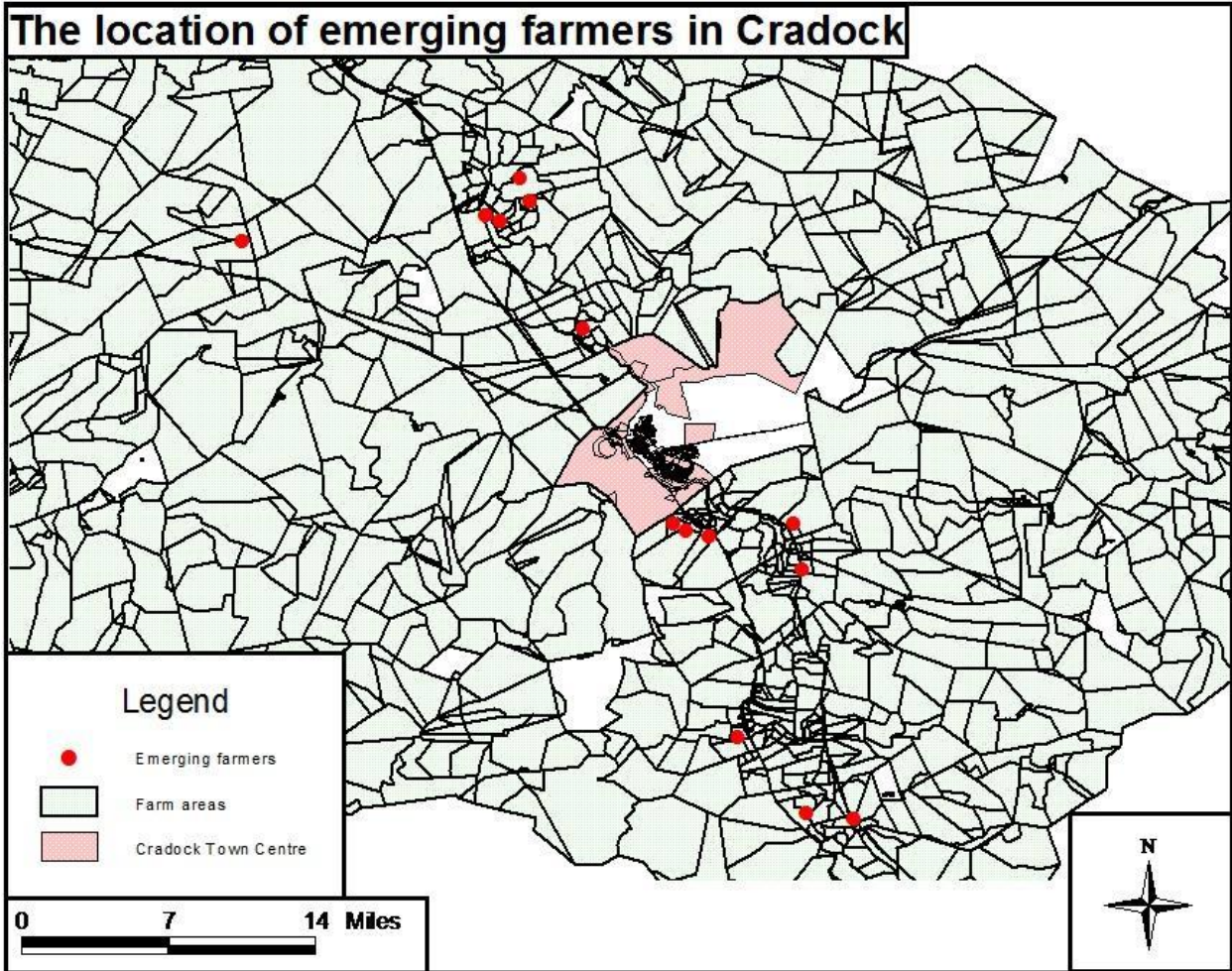


Figure 5.2: The location of the Cradock farm in the ethanol project (modified from Department of Agriculture, 2017).

The purpose of the acquisition of land section is to show how land was acquired and allocated to the beneficiaries (emerging farmers). The acquisition and allocation of land took place after it was clear that the ethanol project in Cradock was feasible, from an environmental and social perspective. It is, therefore, crucial to clarify that the land acquired by DRDLR was for two types of land uses; namely land for farming to grow sugar beet and land to accommodate the construction of the plant for the production of ethanol.

The DRDLR, being the responsible department for acquisition and allocation of land, entered into a process of securing land for farming of sorghum. According to Respondent 2, the DRDLR saw the opportunity to use acquisition and allocation of land as part of addressing land⁸ imbalances created by the apartheid legislation. Therefore, the land for the project was acquired from white commercial farmers using the land distribution policy; “willing seller and willing buyer’s principle”⁹. The policy allows for land owners to sell land when they want, to whomever they want to sell their land to at the market price determined for the land. Before the purchasing of land, the DRDLR conducted an economic valuation to determine the value of various potential land that was occupied by the farms. However, the controversy was created when these commercial farmers argued that the evaluation conducted on one-third of the farms was effectively used as a benchmark to determine the value of all the land farms, leaving them with lower prices to sell their farms to the DRDLR. Consequently, the offers were about 10-15% less than the original offers (Kings, Mail & Guardian, 2012). Ultimately, 25 farms were purchased at a cost of R346 million. As Respondent 2 stated, the aim of the DRDLR is to increase the number of farms allocated to emerging farmers as the production and supply of ethanol advances overtime. Therefore, DRDLR managed to purchase 25 farms in Cradock, Somerset East and Cookhouse along the Fish River (see Table 5.1). These areas were selected as ideal areas for the plantation and growing of sugar beet necessary to produce ethanol. The DRDLR advertised the need for farms in the above-mentioned areas with specifications such as size and infrastructure. The interested farmers responded to the advert after which they met with the department to discuss the value of their

⁸ During the apartheid era 80% of South Africans were black people who were stripped of their land and resources. The black people were allocated 7.5% of the land in the country restricting their ownership of land to the former farmlands. The minority white people owned 92.5% of the land and resources in South Africa leading to imbalances in terms of ownership of land.

⁹ The willing seller and willing buyer allows land owners to prevent redistribution efforts. The government and land owner agree on the price of the land government intends of expropriating.

farms. The size of the farms varied such that those that were big were sub-divided into two or three beneficiaries. The list of acquired farms for the ethanol project.

Table 5.1: The list of acquired farms for the ethanol project.

Farm name	Municipality	Farm name	Municipality
1. Alfa	Inxuba Yethemba Local Municipality	14. Vorentoe	Inxuba Yethemba Local Municipality
2. Avelon	Inxuba Yethemba Local Municipality	15. Brakfontein	Blue Crane Route Municipality
3. Bergendal	Inxuba Yethemba Local Municipality	16. Draaihoek	Blue Crane Route Municipality
4. Blaauwkrantz	Inxuba Yethemba Local Municipality	17. Elandsdrift 1	Blue Crane Route Municipality
5. Brookfileds	Inxuba Yethemba Local Municipality	18. Elandsdrift 2	Blue Crane Route Municipality
6. Cloverfield	Inxuba Yethemba Local Municipality	19. Krantzkloof	Blue Crane Route Municipality
7. Helvetia	Inxuba Yethemba Local Municipality	20. Lenetal	Blue Crane Route Municipality
8. Perldene & Surprise	Inxuba Yethemba Local Municipality	21. Nuwerus	Blue Crane Route Municipality
9. Rynlands	Inxuba Yethemba Local Municipality	22. Sonder	Blue Crane Route Municipality
10. Steenboktrust	Inxuba Yethemba Local Municipality	23. Soutvleij	Blue Crane Route Municipality
11. Vischgat	Inxuba Yethemba Local Municipality	24. Rocky Ridge A	Blue Crane Route Municipality
12. Sanctuary	Inxuba Yethemba Local Municipality	25. Rocky Ridge B	Blue Crane Route Municipality
13. Steenbokvlakte	Inxuba Yethemba Local Municipality		

Source: Department of Agriculture, 2017.

5.2.2 Land distribution and allocation to beneficiaries

While the above section has dealt with the acquisition of land for the project, the purpose of this section will show how the land was distributed to the beneficiaries. This section is thus crucial in that it signals the first stage in which beneficiaries began to realise benefits from the project. As

indicated earlier in the chapter, it was in phase one and phase two that the beneficiaries accrued benefits from the project.

After the land was acquired, the DRDLR advertised the land to the potential beneficiaries, in particular, those who were interested in farming sugar beet for ethanol production in Cradock. A selection committee was instituted consisting of the representatives from the Agrarian Research Development Agency (ARDA), Inxuba Yethemba Local Municipality and Blue Crane Route Municipality, various farmers' unions and the Eastern Cape Research Development Agency (ECRDA). This committee was formed to oversee the application and selection process of the beneficiaries of the project. The criteria for the selection of potential beneficiaries to receive land for farming were drafted, and these were based on:

- *Skills and attitude towards farming*: do farmers have the necessary skills and interest in farming sugar beet?
- *Operate with minimal assistance*: can the potential farmers work independently on their farms using the skills and resources at their disposal?
- *Willing to use arable land for the production of feedstock for ethanol project*: are the potential farmers willing to use the allocated land for the production of ethanol?
- *Proof of ownership of livestock and agricultural assets*: is there evidence to demonstrate that the potential applicants have experience in farming and management of agricultural assets?

The beneficiaries were shortlisted and interviewed to assess their suitability for farming, and these shortlisted beneficiaries were mainly blacks and coloureds. Those who were deemed suitable were passed over to the Land Allocation Control Committee from the DRDLR for final review and allocation of land to the successful candidates. However, the field visit to the farms revealed that the former farm workers did not go through the formal process stipulated by the DRDLR. Instead they acquired the land without the usual selection process. ¹⁰One of the three farmers (beneficiaries) explained:

We did not know about the project. Our commercial farmer packed his things and left without telling us anything. Weeks went by, and he was absent. We as farm workers, we decided to go to DRDLR in Queenstown about our problem that is when they told us about the project. We told them we are interested soon after they gave us a contract of 5 years to sign.

¹⁰ This respondent is one of the emerging farmers who were farm workers before he was allocated land to farm for the project. The Interviewed on the 16th of June 2015 on his farm where is a beneficiary on.

The general allocation of farms was to individuals and the National Youth Service Corps. The farms were handed over to the emerging farmers on the 3rd of April 2013 by the Minister of DRDLR Mr Gugile Nkwinti. During the handing over ceremony, the farmers signed 5-year lease contracts. This first five years was the period where the government wanted to ascertain the capability of the emerging farmers to produce feedstock for the project. After the 5-year lease contract, the farmers will sign 30-year lease contracts. However, the emerging farmers indicated that they are not clear what will happen to the farms after the term of the lease agreement comes to an end. However, Respondent 2 from DRDLR had a slightly different understanding on this matter. She argued that the emerging farmers have two options to pursue farming after the lapse of the lease contract: (a) To buy the land or (b) To renew the lease contracts.

5.2.2.1 Unpacking the background of the beneficiaries

To determine whether or not the residents have benefited from the ethanol project, it is critical to unpack the socio-economic background of the beneficiaries who have been allocated land to cultivate sugar beet for the ethanol project. This section is relevant in that it will provide a clear picture as to who is included and excluded from the project. Concerning the ethanol project in Cradock, the field work for the study revealed that beneficiaries for this project come from a diverse socio-economic background of black and coloured communities. For instance, the survey interviews conducted for this research indicate that there are six categories of beneficiaries and these are:

- Farmers who have owned small farms and saw the project as an opportunity to own bigger farms;
- People who have worked in agricultural projects around the Eastern Cape;
- People who were practising subsistence farming;
- Former farm labourers;
- The National Youth Service Corps; and
- People involved in agriculture as farm managers.

The percentage of these beneficiaries according to their background is shown in Figure 5.3 below.

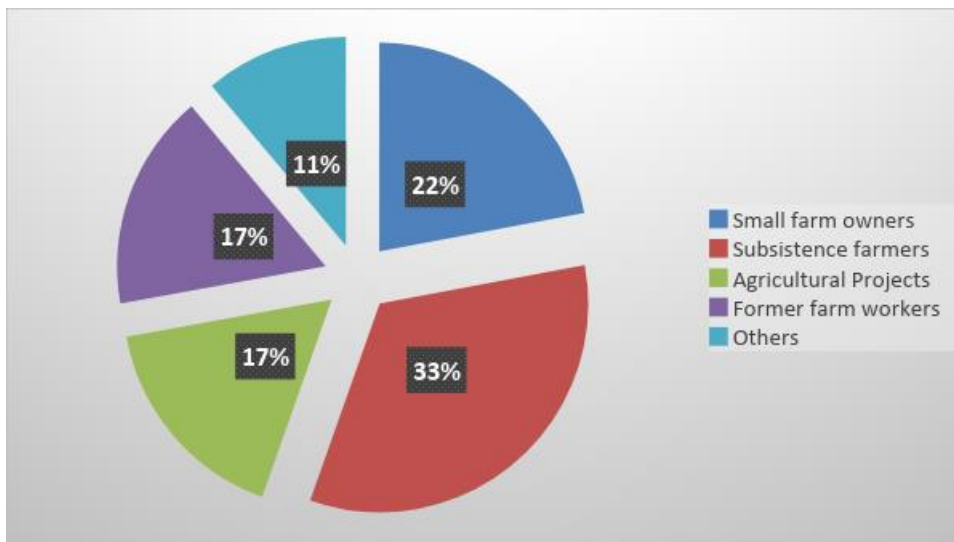


Figure 5.3: The background of the land beneficiaries in Cradock.

For instance, the above diagram shows that the largest number (i.e., 33%) of the farm beneficiaries in the project is the people who previously have never owned private land for farming. However, this does not mean that they do not have farming experience as most of them said they have previously been engaged in crop production and livestock production in their yards. This percentage is followed by 22% of farm beneficiaries who stated that they have previously owned farms, albeit the sizes of their farms are small. When asked why they left their farms, they argued that they foresee the ethanol project as an opportunity to own bigger farms, in other words, to accumulate more land for farming.

Against this backdrop, the study reveals that at least 17% of the beneficiaries are people who have never owned farms before but have worked in various agricultural projects in the Eastern Cape. These beneficiaries have a significant amount of farming experience acquired either as farm workers or small scale farmers in different agricultural projects, some of which are run by the DoA. Also, the above graph (Figure 5.3) indicates that 17% of the beneficiaries in Cradock are former farm workers from white farms. Finally, 11% are people who were working in various agricultural jobs such as farm managers and farm administrators but were not previously considered farmers. It is crucial to mention that the current groups of beneficiaries do not necessarily all come from Cradock but some are from outside Cradock in various areas of the Eastern Cape.

5.2.2.1.1 Gender representativity

As part of unpacking the background of the beneficiaries, it is crucial to interrogate the aspect of gender representativity in the project. The issue of gender is increasingly important in the post-apartheid democratic South Africa where women were considered as a previously marginalised social category that has to be incorporated into the mainstream economy. With regard to the ethanol project in Cradock, the question was raised as to whether or not women are benefiting from the project. From the fieldwork study on the project, the results indicate that 100% of the farms were allocated to men. Although there were no farms assigned to women, there are females who are involved in the farms as farmers.

5.2.2.1.2 Farmland allocation according to age

One of the main strategies adopted by the National Development Plan focuses on youth development through integration into the mainstream economy and creation of jobs targeted at the youth. It is expected that the allocation of farms for the ethanol production project would incorporate young people for employment as well as poverty alleviation purposes.

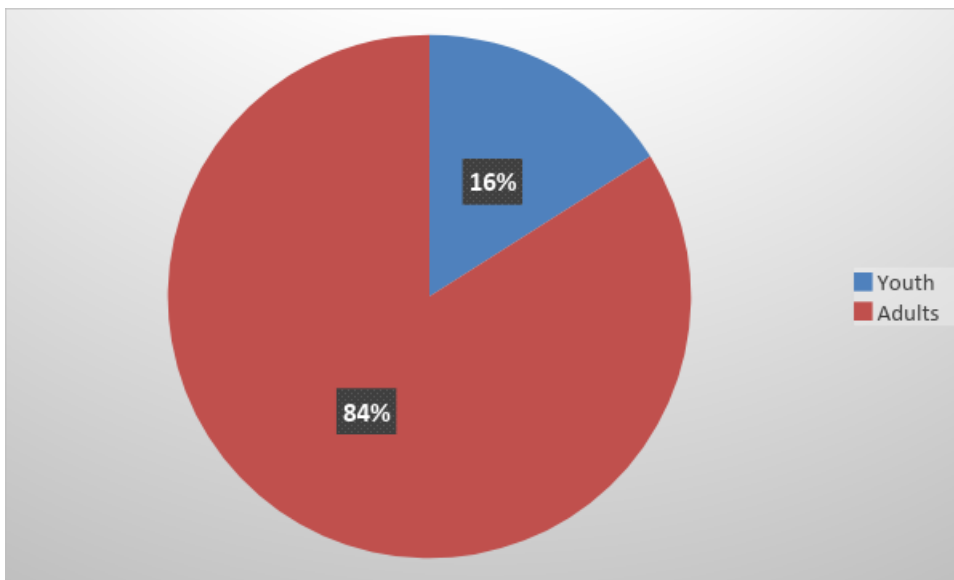


Figure 5.4: Farmland allocation according to age.

¹¹The results from the field study show that four out of the 25 farms allocated for the project were given to the youth, who are between the ages of 18 and 35 (see Figure 9 for age representation and farm allocation).

5.3 THE SOCIAL EFFECTS OF THE ETHANOL PROJECT

This section will present empirical data to answer the research question as to who benefits or took advantage of the ethanol project in Cradock. This aspect of the chapter is crucial as it relates to the core of the research project, which is to investigate the socio-economic implications of the ethanol project. Therefore, the benefits which will be presented in this section are divided into three categories namely; social, and economic benefits. It is crucial to remind the reader that the benefits of this project were witnessed as early as the initial stages of the project. While the implementation of the project regarding the construction of the plant is yet to be materialised, the study reveals that some people have been benefiting from the project, at least in the first two phases of the project. This section reports on the current benefits and the anticipated potential benefits of the project.

The respondents that were selected for this study were asked a range of questions with specific reference to how the ethanol project enhanced their social well-being. In the context of this social research, benefits constitute those areas of the project which improve the quality of life of the local people in Cradock. For instance, Respondent 1 of the ARDA was asked a question on the social relevance of the project, and she stated that the project is designed in a way that everyone in Cradock should benefit from the social perspective. She continued to argue that the social benefits as promised by the government and the trio joint venture are, land access, public participation, poverty reduction, provision of jobs, adequate income, good working conditions, skills development and transfer, and improved well-being.

5.3.1 Access to land

One of the key social benefits of the project so far is access to land by people who previously had no ownership or any access to land. Therefore, the ethanol project catalyzes to facilitate land reform and distribution to the people who were previously marginalised. It is from this context that

¹¹ Agriculture is a key focus of the National Development Plan particularly ensuring that the youth participates in agricultural projects and programmes. Age representation in the research is important to see how far agricultural projects promote the participation of the youth in agriculture.

access to land is regarded as a significant social benefit. The project has a total of 32 beneficiaries who have access to land spread across the 25 farms. The emerging farms are producing crops, and a few sell livestock.

More importantly, access to land has effectively “transformed” the social identity of the beneficiaries from being proletariat landless farm workers into emerging farmers. These farmers have developed a sense of aspiring for future growth and accumulation of capital as a result of access to land. As mentioned earlier in the chapter, these emerging farmers acquired their land in 2013 having signed 5-year lease contracts. The role of the ARDA is to provide support to ensure that the emerging farmers’ farmlands are economically viable.

Although the emerging farmers have access to the land as a form of social benefit, it appears that their sense of ownership, by means of holding title deeds for this land, is still outstanding. For instance, the farmers who were interviewed stated that the title deeds for virtually all the farms they have acquired have the name of the government as the owner (DRDLR). In this context, the DRDLR owns the land, and the legal status of the emerging farmers is thus not clear. The controversy created as a result of the legal uncertainty regarding the ownership of land by the emerging farmers has led to the lack of sense of the ownership. For instance, 100% of emerging farmers have expressed that they do not have a sense of ownership of the land. One of the emerging farmers expressed this clearly by stating that;

We are only custodians of these farms. I cannot even get a loan from the bank because I am not the owner of the farm, the government is. I do not know what I will do after the five years.

Despite the lack of ownership, it is clear that the farmers have at least access to land to produce crops and farm in livestock for commercial purposes. Since 2013, they have been producing maize and lucerne while waiting for the construction of the ethanol plant.

5.3.2 Improved social wellbeing

An improved social well-being of the people is a major selling point of ethanol production projects especially for areas that were previously disadvantaged. The well being of citizens takes into consideration some factors such as access to clean water and sanitation, improved living conditions and access to energy. The results from the field study reveal the diverse opinions on improved well-being associated with the project. For instance, of the 18 emerging farmers that were interviewed 78.6% indicated an improved social well-being directly linked to the ethanol

project. 21.4% reported that their social well-being had not been improved. Those who projected a positive narrative towards the project argued that the project has afforded them opportunities they never had before. One¹² of the emerging farmers cited upward social mobility as a contributory factor of his improved social well-being by saying that:

I make more money as a farmer in this project than I did at my previous job. I have been able to buy myself a car that I couldn't afford before this project. The farm is doing well; colleges from outside Cradock bring their students here for practicals.

Likewise, an emerging farmer who worked as a farm worker for the farm he now co-owns with two other people said;

I have three kids and a wife I supported with R1, 600.00 a month as a farm worker. Since being involved in the project, I have been able to afford my family a life we never afforded before, so the project has improved my wellbeing and that of my family.

Furthermore, the emerging farmers maintain that the project has taught them a great deal with regard to the management of farms, financial management as well as the management of people especially for emerging farmers who did not own farms before the project. For the emerging farmers who were previously involved in projects and farm workers, the project has afforded them the opportunity to become their own bosses. These emerging farmers argued the significance of being the boss as having the freedom to make decisions with regard to the daily operations on the farms. On the contrary, the emerging farmers who hold a different opinion on improved well-being stated that their farms were vandalised by the previous owners, which meant they had to use their funds to fix these farms. These farmers suggested that they have been running farms at a loss since 2013.

However, a slightly different view from that of the majority of the emerging farmers is gained from the Cradock residents. For instance, the household individuals who were interviewed in Cradock said they had not witnessed any improved social well-being from the project. Of the 51 households interviewed in the study, 100% of them reported that the project had not improved their well-being. The question was posed whether or not they anticipate any social well-being from the project in

¹² This respondent used to work in agriculture before applying to become a beneficiary in the ethanol project. He is now one of the beneficiaries interviewed in this project, interviewed on the 16th of June 2015 on his farm in Cradock.

the near future. 88.2% of them held the view that the project was likely to improve their well-being, in particular, once the ethanol plant is constructed. However, the 11.8% of them held a pessimistic view towards the project by arguing that the project would not improve their well-being at all even after the plant is built. The residents reported that some promises including an improved social well-being were made by the competent authority in the project, but these promises have not been fulfilled.

For the farm workers (i.e. those working for the emerging farmers) the social environment has not improved. Of the 12 farm workers interviewed in the project, 25% of them reported an improved social well-being. However, 75% of the farm workers argued that the conditions on these farms are still the same. In other words, nothing has changed since the project was implemented. Most of the farm workers identified the poor and dilapidating structure of their houses as a major social problem (Figure 5.5 below). Furthermore, 16.7% of the farm workers reported that the housing conditions are good, whereas 66.6% and 16.7% of the farm workers reported poor and unacceptable conditions respectively.



Figure 5.5: The dilapidating conditions of the houses on Cradock farms

Other issues that were identified as part of the social well-being are water and sanitation and access to electricity. All the farms involved in the project have access to drinking water with farm workers' drinking water sources separate from those of the emerging farmers. The farm workers raised the lack of clean drinking water as a distressing issue encountered daily. For instance, (45%) of the farm workers feel that their drinking water is of poor quality. 30% feel that their drinking water is fair, 16.7% said their drinking water as good and 8.3% said very good.

Associated with water issues on the farms is the lack of proper forms of sanitation. The farm workers argued that the farms did not have proper sanitation structures while others reported non-existent sanitation structures. Furthermore, these farm workers claimed that they use the bushes to relieve themselves.

Another important social well-being issue raised by the farm workers on these farms relates to the access to electricity. While farm owners have access to electricity, some of the workers do not. Some of the farm workers argued that not having access to electricity was good because they would get their full salaries. The farm workers explained that both water and electricity is deducted from their salaries every month. Therefore, not having access to electricity meant monthly reductions are only for water. While some of the farm workers were happy with the lack of access to electricity, some were not. Some emerging farmers argued that the lack of access to electricity affects them negatively; they use firewood to prepare food, they do not have proper food storage facilities such as refrigerators, it is not safe for them to walk at night and they have to travel to the farmers' houses to charge their phones.

5.4 ECONOMIC EFFECTS OF THE ETHANOL PROJECT

In South Africa, poverty is more acute amongst the black Africans, followed by coloured and Indians as these people were denied access to land by the apartheid regime. On the other side, the white people had legislative rights and privileges to own land to secure access to natural resources while depriving the other races the same rights.

Concerning perceived socio-economic benefits of the ethanol project, results from the field study reveal the diverse opinions especially from blacks and coloureds who were previously marginalised. For instance, of the 18 emerging farmers that were interviewed 16 stated that they had experienced positive change in their lives. Firstly, some of the emerging farmers argued that the project has given them the opportunity to become bosses and make decisions in running the farms. Furthermore, being farm owners provides them with the platform to learn about managing farms, managing people and marketing their products. Secondly, the emerging farms stated that the farms make more money than they made before the project. As indicated earlier in this chapter, the beneficiaries range from small subsistence farmers to former farms workers. These beneficiaries argue that owning a farm, as part of the project, has enabled them to provide for themselves as well as their families. Thirdly, for the recipients who were small subsistence farmers before the project; the project has provided them with more land and infrastructure to produce more than they did in their small subsistence farms.

While 16 of the emerging farmers stated a positive change in their lives, two argued that the project had not changed their lives positively. These two reported that the farms which were allocated to them were destroyed by commercial farmers before they took over as managers. They explained that they had to use their funds to fix the farms and associated infrastructure. One of the emerging farmers stated that he is still paying for the damages and furthermore the banks will not lend him money because he cannot use the farm as collateral because he does not own the farm. The emerging farmers argued that a huge percentage of the money made from the maize sales had to go towards paying for the damages and the management of the farms; there was not enough money left to afford luxuries such as cars.

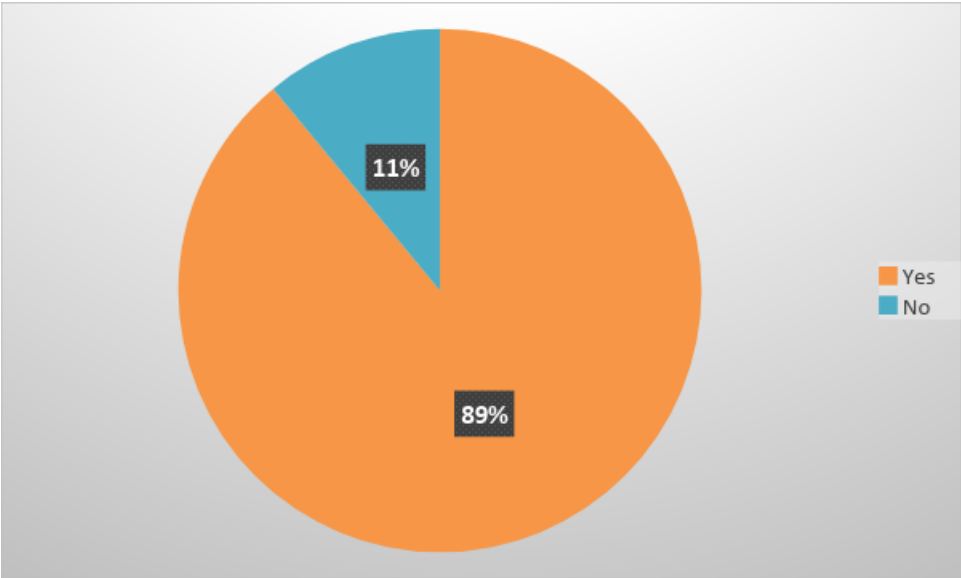


Figure 5.6: Emerging farmers on positive change related to the ethanol project.

Figure 5.6 above reveals that 89% of the emerging farmers expressed a positive change related to the project. On the contrary, 11% expressed that they have not experienced positive change from the project.

With regard to the capacity of the ethanol project to benefit the majority of the residents in Cradock particularly those in the townships, it was necessary to find out whether or not these benefits have trickled down to the general inhabitants (particularly in the townships). The results revealed that 100% of the 51 households interviewed reported that the project had not had positive economic benefits for them. The question was asked whether or not they anticipate a positive change from the project in the near future. 88.2% of the residents were uncertain about any positive economic benefits in the near future. 11.8% of them held the view that the project would not have a positive change in the near future. These residents expressed their disappointment with the project stating

that when it was introduced, they thought it would change their lives; however that has not been the case.

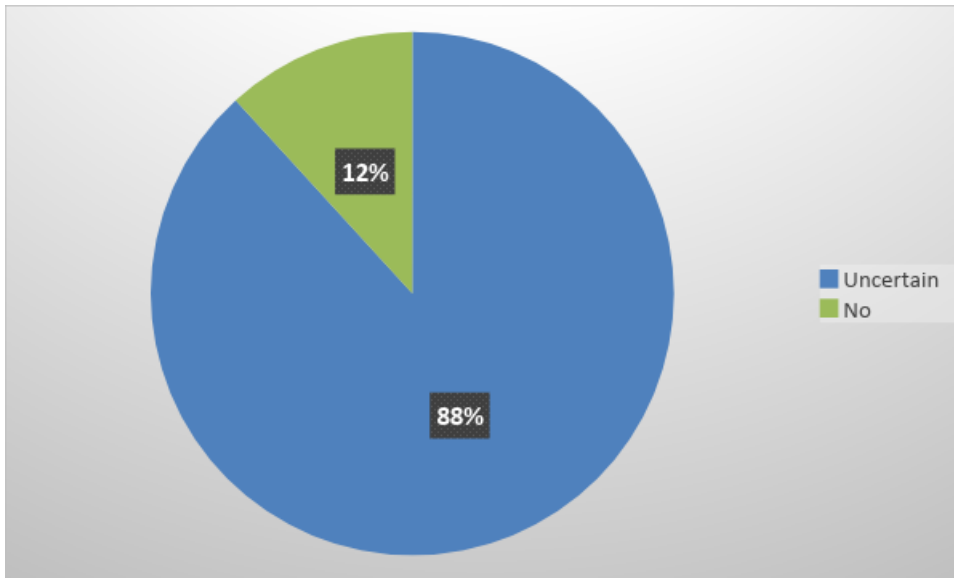


Figure 5.7: The perception of the Cradock residents on the positive change related to the ethanol project.

The farm workers (i.e. those who are working for the emerging farmers) held the view that the project has not had a positive change in their lives. Of the 12 farm workers interviewed in the project, all of them held the view that the project has not had a positive change in their lives. They argued that they still earn the same income they earned from the commercial farmers; the only change was in the management of the farms.

When the Departments of Agriculture and Local Economic Development were asked about poverty eradication directly linked with the project, the departments expressed different views on the matter. For instance, ¹³Respondent 4 of the Department of Agriculture had this to say about positive change linked with the ethanol project as well as the perception of positive change in the not so distant future:

The project has reduced poverty for those involved in the project. Not everyone is going to get a chance to partake in the project; those who will get the opportunity will earn money to take themselves and their families out of poverty. If you look at it that way it will reduce poverty for a few, while the majority remains trapped.

¹³ Respondent 4 is a representative of the Department of Agriculture (DoA). Interviewed for the study on the 18th of June 2015 at the DoA office in Cradock.

While the LED had presented a view that is both similar and different in some instances. The LED expressed uncertainty regarding the positive change in the near future. ¹⁴Respondent 5 of the LED had this to say about the project and positive change:

I am not sure of poverty reduction linked with the project but truly speaking in my opinion, not everyone is going to benefit from the project. The same is true for poverty eradication. However, all the money made from the project will be invested back into the town maybe then poverty will be reduced.

According to the Inxuba Yethemba Local Economic Development Strategy (2008) biofuels have been identified as one of the key drivers of the economy in the local municipality. The Inxuba Yethemba Local Municipality is characterised by low economic development, an unemployment rate and dependency rate that is higher than the provincial averages, and an average per capita income which is below that of the Eastern Cape. Thus it is important to promote economic development in this municipality. The promotion of economic development with a focus on agriculture is significant in this local municipality.

5.4.1 Provision of employment

One of the biggest motivations for ethanol projects particularly in South Africa is the creation of employment. Ethanol projects are known to be labour- intensive projects employing a large number of both skilled and unskilled workers. The ethanol project is particularly important in Cradock because the area as indicated in the background to the study is characterised by an unemployment rate of 43.2% as well as low education and skills attainment. The project is seen as an opportunity for the unemployed to become employed. According to Respondent 1 from ARDA, the project is planned such that people are employed from as early as phase 2 which is the allocation and distribution of land for the project.

The results from the field study reveal that the number of permanent workers varies from one farm to another with a minimum of one worker and a maximum of eight in one farm. According to farm owners, the number of permanent farm workers is expected to escalate as soon as the plant is in operation. Besides permanent workers, there are also seasonal workers who are employed during harvest time. However, even during harvest time, the number of seasonal workers varies from the

¹⁴ Respondent 5 is a representative of the Local Economic Development (LED). Interviewed for the research study on the 18th of June 2016 at the LED offices in Cradock.

needs of the farm, but the maximum is 12 seasonal workers. This means that 12 workers are guaranteed to be employed on each farm during either harvesting or off harvesting seasons. Also, the emerging farmers (who were interviewed) reported that preference for seasonal employment is often given to the family members of permanent farm workers. During the off-harvest season, the emerging farmers relied on the employment of women for at least eight months to assist in cleaning the water canals before river water is redirected and channelled to the irrigation system on their farms.

The question, however, was the issue of sustainability. Are employment opportunities on these farms sustainable? When asked whether or not the emerging farmers would most likely employ more workers permanently shortly, 80% of them stated they would employ more people to work on their farms. However, they argued that they would likely increase the number of temporary or casual workers rather than permanent workers to save escalating labour costs because it is less expensive to employ casual workers than permanent workers. The LED reported that more people will be employed in phase 3 and phase 4 as both temporary and permanent workers.

5.4.2 Income from the ethanol project

It is of particular importance take into account that in South Africa, the socio-economic significance of a job is often measured by income. The jobs provided by any specific sector must be accompanied by reasonable revenue for the people to sustain their socio-economic livelihoods. The major question was: Is ethanol production able to create jobs that would provide sustainable income?

The results from the field study reveal that farm workers' income varies from farm to farm. For instance of the 18 emerging farmers interviewed in the study, 16 stated that the farm workers are paid an income of R1, 600.00 per month. While two indicated that they paid their farm workers R2, 000.00 per month. The emerging farmers reported that they do not determine how much the farmers workers are paid instead they use government rates. For the emerging farmers, the money made each month differs. The emerging farmers argued that sales each month determine the amount of money made each month which differs from one farmer to another. ¹⁵One of the

¹⁵ This emerging farmer is one of the beneficiaries of the project, interviewed on his farm on the 16th of June 2016. *Mr Zukile is not the emerging farmer's name, the respondents did not feel comfortable with using his real name because he feared his name would end up in newspapers.

emerging farmers explained how money is made from utilising the farmland received from the government for the ethanol project:

We sell maize for R2, 500.00 per tonne at the market. We then sell lucerne to the commercial farmers. However, the commercial farmers determine the price they pay for lucerne depending on the specifications they want such as water content of the lucerne. We also mix lucerne and maize which we sell to farmers around Cradock. Some of the emerging farmers also sell livestock.

5.4.3 Agricultural development

As mentioned in the background to the study, Cradock is an agricultural town. This town was established in 1814 following the British industrial revolution that had a high demand for sheep and wool products. Consequently, Cradock has relied on commercial agriculture as a major source of employment for more than 200 years. Even though Cradock has an unemployment rate of 43, 2%, the agricultural sector is one of the largest employers for those who are less skilled and unemployed. The question here was what would happen in the economy of this town after the conversion of agrarian land towards sorghum for ethanol production? The answer obtained to address this question reveals that the project has played a pivotal role in stimulating local access to land as a panacea of agrarian development in the town. For instance, Respondent 4 of the Department of Agriculture (DoA) argued that the project brought positive agricultural development in the region:

Some of the farms bought for the ethanol project were not productive. The project bought these farms and made them productive once again, improving agriculture in the region.

Likewise, the LED expressed a similar view regarding the contributions of the project towards agricultural development. As Respondent 5 of the LED explained:

The project is upgrading the existing roads to the farms and in the years to come will construct new ones. The emerging farmers can reach the markets easily increasing their accessibility. Additionally, this is a first for Cradock; therefore, investments in agriculture in the area will increase.

Furthermore, 86% of the emerging farmers interviewed said that the project is playing a significant role in agricultural development. They stated that the project had improved access to the farms by

the local people from the townships. For instance, some emerging farmers argued that the vast areas of their farms were dormant before the project was introduced. However, currently these farmland areas produce crops and, rear sheep and livestock. A small minority (14.3%) of the emerging farmers interviewed stated that they were uncertain about the role of the project in agricultural development in the region.

5.4.4 Contribution of the ethanol project to other business industries

Respondent 5 from the LED said the ethanol project in Cradock provides economic benefits for other businesses within the region. According to the LED, the businesses in the retail sector hope to take advantage. For example Pick n Pay is planning to open a store in Cradock as a result of the project. Even clothing stores will benefit because of the anticipation of an increase in the buying power of the residents because of new job opportunities. The agricultural retail is also benefiting from the project, for example, Cradock Saad is the local service provider for all agricultural products and small agricultural equipment required for the agricultural component of the project. The hospitality sector has reported benefits from the project as it had occasional business directly linked to the project when pilot studies were made as early as 2007. However, after 2009, the sector stopped receiving business because of the government's delay in facilitating the construction of the ethanol plant. The tourism industry reported that so far, they have not received any benefits associated with the ethanol project, but hope that there will be benefits in future as visitors to the plant would also want to visit tourist places of attraction for example game farms and heritage sites. Furthermore, Respondent 5 reported that more businesses would benefit once phase three and four are implemented; businesses such as security, cleaning and food catering.

5.4.5 Access to markets

Although the production of feedstock for the ethanol project has not yet started, the government allowed emerging farmers to produce maize and lucerne and engage in livestock farming. The emerging farmers sell their products to commercial farmers in the region, who determine the prices of the goods. There are, however, systems and procedures in place on how the emerging farmers access markets for their products. Many of the emerging farmers do not have facilities to harvest their produce. According to government's policy, a local emerging farmer who could help in assisting with harvesting for the other farmers would be given preference to do this and be paid by the government. From the field, it was apparent that the emerging farmers were excluded from decision making on the market price of their products and who gives them assistance. It would be

interesting to find out how emerging farmers would access markets and be part of the decision making process in this regard.

The ethanol project, when it is fully operational, boasts a guaranteed market, thus ensuring a captured market for their product. For instance, the production of bioethanol feedstock by the emerging farms will be sold to the processing plant for the production of ethanol. Furthermore, according to the ARDA, the project presents a guaranteed market for commercial farmers around the Eastern Cape who will provide 70% of the bioethanol feedstock. For the end-product namely bioethanol, the market in South Africa is guaranteed as well. The government published mandatory blending and pricing regulations which require that petroleum be blended at 2-10% with bioethanol to be used in vehicles and the aviation sector. The regulations require that all petroleum be blended unless the manufacturer can prove that they do not have enough petroleum to blend. Furthermore, the regulations require the purchase of ethanol from licensed manufacturers thus creating a market for licensed manufacturers such as the Cradock project.

According to Respondent 1 of the ARDA, all the fuel produced from Cradock will not be used locally but will be transported by rail to licensed petroleum manufacturers. Furthermore, the respondent suggested that bioethanol will be utilised in the automotive industry as well as the aviation sector, while the ultimate goal is to also sell to other African countries.

5.4.6 Competition for land use (shift from food based agriculture to non-food based agriculture)

Cradock is an agrarian town that has been sustained by food based agriculture for more than 200 years. The ethanol project will use the 25 farms purchased to produce bioethanol feedstock which is not food. It was interesting to find out how the shift from producing food to producing ethanol feedstock would affect the town.

The consensus from the local people is that the project will not hurt food security or food prices. A majority of (84.3%) of the local residents believe that the shift will not negatively affect food security resulting in price hikes, while 15.7% believe the transition from food based agriculture will impact on food security and price hikes. Local people argued that the food supplied to the town comes from food suppliers outside Cradock; therefore the shift will not have effects on the town.

According to Respondent 4 of the Department of Agriculture, the shift, as a result of the ethanol project, will not have adverse effects on Cradock. The respondent reported that the majority of the

farms purchased for the project are farms that were not productive therefore did not contribute to food security or the local economy. These farms are now productive due to the project thus can contribute to the local economy.

Respondent 5 of the Local Economic Development offered a different view from that of Respondent 4. According to this respondent, the ethanol project will offer limitations regarding food supply in the province. The respondent argued that the effects of food supply limitations will be felt in the Eastern Cape because a large supply of feedstock will come from commercial farmers who may decide to stop producing food to make money in producing fuel feedstock.

5.4.7 Investments

The success of the project will depend on huge investments from both the government and the private sector. The Biofuel Industrial Strategy (2007) highlights the need for investment in the development of biofuels, reporting that investment from small investors and producers is encouraged. The ethanol project in Cradock is divided into two components, the agricultural component and the plant component. The government invested on the agricultural component of the project by making land available. The government purchased 25 farms at the cost of R346 Million and allocated them to black emerging farmers (Nasterlack, 2013). The government is also responsible for the support of the farms by providing them with start-up capital. When emerging farmers were asked about the start-up capital, some argued that they had not received any money instead they had used their funds. Some emerging farmers reported that the money given to the emerging farmers was taken by their mentors who promised to help them. The government indicated that the plan is once the project is fully operational; more farms throughout the Eastern Cape will be bought to increase the feedstock supply for the plant.

Investment on the plant component of the ethanol project was made by the Industrial Development Cooperation and the CEF. However, the Central Energy Fund pulled out years back. The investment on the ethanol processing plant is approximately R1 billion. The general levy as from the 1 October 2015 is between 4.5c and 6.5c per litre for over 20 years to give the manufacturers 15% return on investment. According to the Biofuel Industrial Strategy (2007), bioethanol producers as from 2008, will receive fuel levy exemption of 100%.

5.5 CONCLUSION

The results reported in this chapter presented the results as gathered from the field study in Cradock on the proposed ethanol project. The results reported are a collection of all the respondents involved in the project. These results indicated that the ethanol project in Cradock has social and economic implications, particularly to the Cradock residents. The different respondents had different socio-economic experiences related to the ethanol project in Cradock. The next chapter will present the analysis and discussion of the data collected from Cradock on the ethanol project. The analysis and discussion are on the ethanol project as a green economic initiative.

CHAPTER SIX

DATA ANALYSIS AND DISCUSSION

6.1 INTRODUCTION

While the previous chapter presented the results of the study, this chapter provides the analysis and discussion based on the research findings. It is important to highlight that the project investigates the potential socio-economic implications of the ethanol project in Cradock as a green economic initiative. The research study argues that the inclusion of the local people in decision making for the ethanol project is crucial to securing their benefits from the project. This means that local people should be involved early in the decision making process. Failure to engage the residents in the initial stages of decision making on the project may create a lack of sense of ownership resulting in a lack of socio-economic benefits for the residents. This chapter seeks to analyse the ethanol project in Cradock by drawing on the green economy theory. As such, this chapter will first locate the project within the green economic model to show how the project improves environmental quality while creating economic opportunities for the local people. It is thus important to note that regarding this study, green economy practices should adhere to the principles of sustainable development. The key questions that are addressed in this chapter are: who benefits from the project? Who is included and excluded in the project's decision making process?

6.2 ETHANOL PROJECT AS A GREEN ECONOMIC MODEL

Like elsewhere in Southern Africa, the ethanol production project in Cradock is being sold as a green economic initiative aimed to improve environmental quality while addressing socio-economic concerns besetting the poor local communities in the town. The notion of ethanol production is viewed from the vantage of enhancing clean production of fuel to enhance environmental quality. While the primary aim of the project is about sustaining the natural environment, it is crucial to mention that the local people must truly accrue socio-economic benefits from the project. This means that the project deliverables should meet green goals without compromising the social and economic livelihoods of the people. The question now is how this project has adhered to the green economic imperatives (see Chapter Two and Chapter Three). A question of this nature compels us to locate the project within the sustainable development

framework. The figure below (Figure 6.1) shows how the ethanol project in Cradock mirrors the tenets of sustainable development.

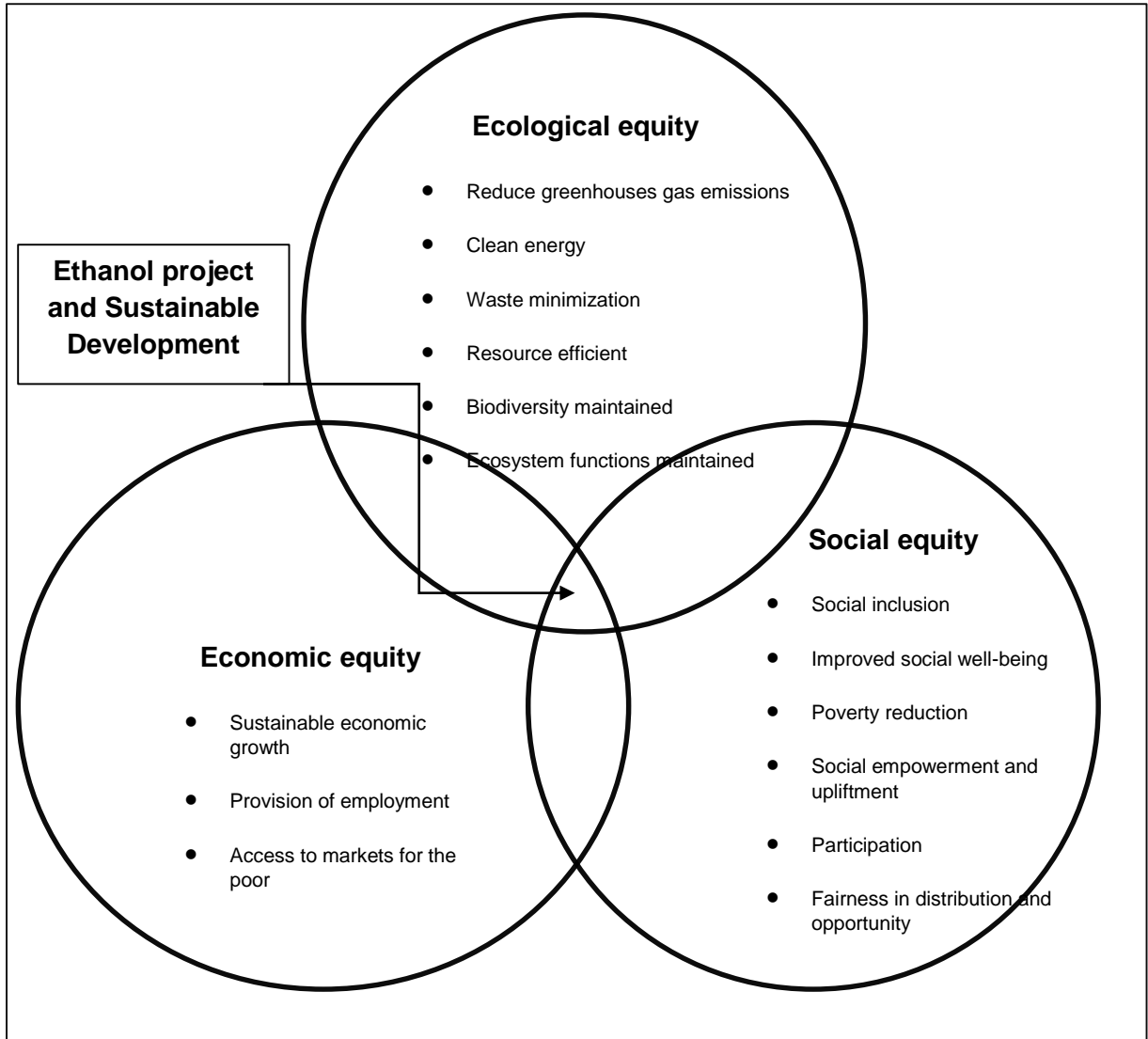


Figure 6.1: The ethanol project within the context of sustainable development (Zungu, 2003).

Figure 6.1 depicts that the ethanol project within the context of sustainable development must achieve all three pillars of sustainable development (ecological, economic, and social), they must be reflected upon both the globally and locally.

Given the above figure 6.1, the study revealed that there is a range of environmental and economic benefits that the projects seek to achieve. From an ecological perspective, the ethanol project was

conceptualised to ensure that it contributes to the global green agenda. This narrative is well documented in the recent EIA report which states that the project will produce green fuel¹⁶ that is blended with petroleum for use in motor vehicles (Environmental Impact Assessment of the ethanol project in Cradock, 2009). The reason being that the blend of green fuel and petroleum will reduce greenhouse gas (GHGs) emissions such as carbon dioxide (CO₂). It is anticipated that the ethanol project in Cradock will produce 90 million ml of ethanol per annum¹⁷. This green practice, expressed in the form of ethanol production, is said to have some environmental benefits.

6.2.1 The environmental merits of the ethanol project and its contradiction

This section focuses on the discussion of how the ethanol project impacts on the environment. In the centre of this debate is the contradiction inherent in the project regarding its impacts on the environment. This contradiction reflects an ongoing environmental debate on the global environmental agenda versus the local environmental agenda. This discussion is demonstrated in the ethanol project.

While the project is environmentally justified regarding its contribution to the reduction of GHG emissions on a national and global scale, the environmental impacts of this project on the local environment have been glossed over. These relate to the impacts from the ethanol processing plant to the natural environment, which will in turn further affect the socio-economic environment in Cradock. For instance, the local people (particularly the tourist operators) are citing serious environmental impacts of the project on their business. One of the owners of the hotel¹⁸ stated that:

The ethanol project particularly the plant is going to cause pollution in the town. This pollution is going to affect our business because we get people who come to Cradock for the environment. Once the plant is here the number of customers coming into the environment will decline, and our business will suffer.

Reflecting on the above insert, it is clear that the local people are concerned about the ethanol project regarding air quality. This will further impact on the ¹⁹“sense of place” as a viable tourist destination. Furthermore, a similar view is also expressed in the air quality assessment report for

¹⁶Green fuel refers to biofuel which is viewed as less harmful to the environment and health of the people as opposed to fossil fuels.

¹⁷This statement is extracted from the environmental impact assessment report of the ethanol project 2009.

¹⁸ A representative of a hotel in Cradock town.

¹⁹ Sense of place is the meaning and intrinsic character of a place that local people and visitors feel.

the ethanol project in Cradock (EIA on the ethanol project, 2009). These findings on the ethanol project in Cradock are likely to result in the emissions of carbon dioxide, volatile organic compounds (VOCs), criteria pollutants²⁰ Nitrogen oxides (NOx), and particulate matter PM10. These emissions will have adverse effects on the local environment, as the emission of VOCs will cause an unpleasant "alcohol like" smell. Because the plant is located in the riverine valley not far from the town's residential area, it is anticipated that the emission from the plant will significantly affect the residents residing in the town centre and the townships²¹. Thus, the anticipated environmental impacts of the ethanol project, regarding emission reductions to the atmosphere, inherently contradict the anticipated adverse effects of the project on the local environment. While the project carries positive environmental gains, one of the main concerns is that these gains will occur in the face of invisible environmental and social injustices on the ground. For instance, the emission from the ethanol processing plant will cause smog, which will result in a change in the colour of the air to yellowish or brownish²². This smog, accompanied by extreme levels of odour, will modify the tourists' perception of the Karoo as a destination known for having clean air and a "pristine environment". It is for this reason that the tourism sector will be severely affected with negative impacts on the town's economy. This is indeed critical as the tourism industry plays a vital role in the economy of the town and it is a source of livelihood for many of the people in Cradock.

The growth of tourism economy in the Karoo (including Cradock) has been widely attributed to the unique semi-arid ecosystem which has, for the last 200 years, sustained fauna and flora that continued to draw tourists worldwide. Apart from that, the pristine nature of the Karoo has effectively led to the emergence of the so called "creative class" as noted by, Ingle in the article entitled: *A "Creative Class" in the South Africa's Arid Karoo*. According to Ingle (2009:1), a creative class refers to those people who make a living from creative pursuits, including artists, designers and knowledge-based professionals. Ingle (2009) further argues that the phenomenon of the rise of the creative class in the Karoo is parallel to the escalation of eco-tourism or nature-based tourism as an economic driver of the Karoo economy.

²⁰ Criteria pollutants are pollutants that are thought to have potentially negative impacts on health and well-being.

²¹The EIA on the ethanol project (pp 69) suggested that about 50% of the population of Cradock will be able to detect the uncommon smell of VOCs in the air.

²²Horvath, H. "1971. On the brown colour of atmospheric haze. *Atmospheric environment* (1971), 5(5), pp. 333-334

Essentially, these people who predominantly comprised the white middle class are said to have decided to leave the big city or cosmopolitan lifestyle to settle in the Karoo in search of the lost nostalgic lifestyle²³. Their economy and lifestyle in the Karoo are linked to the natural environment. It is for this reason that the study also revealed that there are people in Cradock who have chosen to stay in the Karoo (i.e. Cradock) and spend money (invest) in the area due to the inherent pristine Karoo environment. Thus, the study also revealed that there is an intricate relationship between the environment and economy such that any effects on the environment will have direct and, or indirect impacts on the economic systems of the Karoo. For instance, the change in smell and colour of the air will mean that the eco-tourism sector will not thrive leading to a loss of business revenue. The lost business income from the eco-tourism sector will, in turn, result in the loss of livelihoods for many township people whose daily income is derived from the eco-tourism industry. This will ultimately have ripple-effects on the economy of the town. The study revealed that the ethanol project impacts regarding air pollution and odour, would also affect the agriculture sector. One of the respondents cautioned that the location of the plant, along the Fish River riparian areas where there is agriculture, might have adverse effects on livestock and crops resulting in loss of agrarian productivity. This impact is, once again, critical as Cradock's economy has always been intertwined with the agrarian economy which has sustained the town's economy for the last 200 years. For instance, Nel *et al.* (2007:10) argue that the Karoo small towns were:

Strongly dependent upon the prosperity of their agricultural hinterlands and, to an extent, reliant upon the fortunes of these regions to ensure the sustainability of the centres with many of the services and functions provided by these centres being linked to the region's economic activity, for example, agricultural training centres, and agricultural finances.

As noted in the above insert, commercial agriculture in the Karoo in general and Cradock, in particular, generates some material resource supplies to the people residing in the town²⁴. For instance, commercial agriculture in Cradock provides food such as meat, milk and maize to the town's residents. Apart from that, commercial agriculture contributes about 25 percent employment compared to other sectors which make it be the biggest employment provider with a significant contribution to the town's economy. Thus, the negative effects of the ethanol project on agriculture will result in the loss employment, livelihoods and food. The effects of the conversion from commercial farming and livestock to the production of biofuel feedstock will be explored later in the chapter.

²³This is sense of loss of the old natural lifestyle that they used to enjoy in the past.

²⁴ This statement is extracted from Zungu (2017:44).

The ethanol project in Cradock as a green economic practice calls into question the green merits of the project regarding the local environment. Part of the ethanol project as a green practice is that it must be able to address the environmental concerns within the local context. From the socio-economic perspective, it is crucial to understand how the ethanol project calls into question the socio-economic benefits for the local people.

6.3 SOCIO-ECONOMIC IMPLICATIONS OF THE ETHANOL PROJECT

This section provides an analysis of the socio-economic impacts of the ethanol project in Cradock. The socio-economic impacts relate to the social costs and benefits as well as the economic consequences that have emerged as a result of the introduction of the ethanol project in Cradock. The ethanol project is divided into three categories depicted in Table 6.1 below.

Table 6.1: The categories of the ethanol project in Cradock.

Category	Description
Land allocation	25 farms have been purchased by the Department of Rural Development and Land Reform. The farms were allocated to land beneficiaries
Construction of the ethanol processing plant	The constructed plant will be used to process the biofuel feedstock into fuel
The production of ethanol	Biofuel feedstock is processed into ethanol fuel

As indicated in chapter one, the allocation of land has already taken place and was led by the Department of Rural Development and Land Reform. While other categories (construction of the plant and the production of ethanol) are yet to be implemented, the informants particularly the local people have raised concerns more so with the ethanol plant. Therefore, the following section will provide an analysis of the economic implications taking into consideration the categories.

6.3.1 Economic implications

This section focuses on the economic aspects of the introduction of the ethanol project in Cradock concerning the shift from the traditional commercial agriculture to the production of biofuel feedstock and its effect on job opportunities and access to markets.

6.3.1.1 Conversion of land

The production of ethanol provides a shift from the traditional commercial to the production of biofuel feedstock. This suggests that the project will convert land that was used for traditional commercial agriculture to the manufacture of biofuel feedstock. The conversion of the land from traditional commercial agriculture to producing biofuel feedstock is important because the traditional agriculture contributes 25% of employment and 10% of the gross geographic products.

For the ethanol project, 25 farms were purchased for the production of 30% of the biofuel feedstock required for the ethanol project. The conversion of these farms is said to have a positive effect on the local agricultural sector as well as on the local economy. The respondent from the departments of agriculture said:

Some of the farms bought for the ethanol project were not productive. The project bought these farms and made them productive once again, improving agriculture in the region.

It is said in the above insert that some of the farms purchased for the ethanol project were not productive. It is also said that the ethanol project has made these farms productive again contributing to the agricultural sector in Cradock. The farms produce maize, lucerne and livestock while awaiting the plant's construction. While all the emerging farmers produce crops on the farms, few produce livestock. 22% of the emerging farmers practice livestock production on their farms, while 78% of the emerging farmers do not practice animal husbandry. This shows that a large proportion of the emerging farmers do not own livestock. They make their living through crop production on the farms. This is evidenced in the extract below whereby some of the beneficiaries' responses dwelt heavily on the effects of crop production on the lives of the emerging farmers:

We sell maize for R2, 500.00 per tonne at the market. We then sell lucerne to the commercial farmers. However, the commercial farmers determine the price they pay for lucerne depending on the specifications they want such as water content of the lucerne. We also mix lucerne and maize which we sell to farmers around Cradock. Some of the emerging farmers also sell livestock.

I have three kids and a wife I supported with R1, 600.00 a month as a farm worker. Since being involved in the project, I have been able to afford my family life we never afforded before, so the project has improved my wellbeing and that of my family.

The above inserts show that the emerging farmers have been using the land to produce crops and livestock ensuring multiple sources of income. It is also said that the ethanol project has had a positive effect such that the emerging farmers can afford to buy necessities they did not afford before the project. While the use of the land for crop and livestock production has had a positive effect on the lives of the emerging farmers, there are concerns about the effect of an anticipated shift toward producing biofuel feedstock for ethanol production. This is because the introduction of ethanol production will effectively compel these emerging farmers to focus only on producing biofuel feedstock, and thus further limit their existing farming activities as an alternative source of livelihood.

Similarly, the local people have also expressed concerns over the conversion particularly because Cradock is an agrarian town that has relied on traditional commercial agriculture for more than 200 years. In addition to the provision of food by commercial farming, it is also one of the biggest employment providers. Therefore, the concerns were how this conversion would affect food security and employment. While the project will force a shift in agriculture regarding the 25 farms, it is important to note that these farms will provide 30% of the feedstock. 70% of the feedstock will come from farms that are currently not part of the project. This does not exclude other farms within Cradock from participating. This suggests that more than 25 farms will have food based agriculture displaced by the production of biofuel feedstock. Therefore, fewer farms will produce food thus food supply will decrease.

Research conducted by Bailey for Oxfam International (2011: 38) suggests that the displacement of food by biofuels has resulted in food security issues and hikes in food prices. According to the research, biofuels contribute to an increase in food prices. As such in at least three years, food prices have increased by approximately 83%. An increase in food prices will have adverse effects on the local people of Cradock. This is because 43.2% of the local residents are unemployed and 71.1% of the people in the Inxuba Yethemba Local Municipality earn less than R1 600.00 a month. Therefore, the increase in food prices will undermine household food security for both the employed and unemployed. The 71.1% people who are employed will be faced with having to change their planning on how much money is spent on food and how much money is spent on

other essential needs. This could potentially see a negative effect on household food security as more money would have to be devoted to a small quantity of food. For the unemployed, the increase in food prices will exacerbate household food security. The effects that the ethanol project will have on employment will be discussed in the following section.

6.3.1.2 The effect of the ethanol project on job opportunities

We now turn to the effects that the project has on job creation in Cradock. The discussion of the effect of the project on jobs is important because the creation of employment is one of the envisaged benefits of the project. It is said in the Environmental Impact Assessment of the project that employment opportunities will emerge from the project and other businesses as a result of the project, reducing the 43.2% unemployment rate in the Inxuba Yethemba Local Municipality.

In essence, the ethanol project is expected to create employment for small businesses such as security companies, food catering and cleaning services at the plant. These will provide new job opportunities for the local people. Respondent 5 suggested that large enterprises will be expected in Cradock because of the project. He stated that Pick n Pay was to come to Cradock particularly because of the project. The introduction of companies such as Pick n Pay in Cradock will create employment for the local people. The project itself will create approximately 169 jobs at the plant, 1 000 jobs from the construction of the plant, 1 000 indirect jobs and 1 500 from manual harvesting. Additionally, the beneficiaries will create employment for various functions around the farms. For example, the beneficiaries have farm workers employed permanently on the farms. The number of employees varies from each farm. However, the maximum in one farm is eight, and the minimum is one. Also, the beneficiaries employed women for eight months to clean water canals used for irrigation.

While the project will create employment opportunities, there are issues of concern such as who will receive these jobs, the duration of these jobs and whether or not they can reduce the high unemployment rate. As indicated, the plant will provide 169 jobs, 140 of these jobs require skilled people and 29 unskilled people. It is said that because the local population do not have the skills necessary to operate the plant, the 140 jobs will be given to people provided by the plant manufacturing company. The local residents will be allocated the 29 jobs. However, they will be trained to take over the plant once the skills transfer is deemed adequate. What is shown by the results is that the significant portion of the jobs will be for external people and the local residents will receive fewer jobs on the plant.

The results show a similarity to what Kelly (2011) describes as community projects being practices by the wealthy to accumulate more wealth. The scholar argues that in these projects, people from outside come in to head the projects because the locals are said to be unskilled. The local populations receive the low-ranking jobs with low pay. The skilled people from outside receive the high paying jobs. The author further argues that the skilled people (from outside) in the case of the ethanol project have the opportunity to accumulate wealth. While the unskilled (Cradock residents) remain poor. This raises questions such as: How are the local people going to yield benefits from the plant? The issue of the duration of some of the jobs is evident in the construction of the plant. The plant is expected to create 1 000 jobs for 18 months. What this suggests is that the jobs provided in the construction of the plant are temporary. This raises questions such as: what happens to the people after 18 months? Are temporary jobs sufficient to reduce the unemployment rate?

The overlooked point in the ethanol project, with regard to the agricultural component creating most of the jobs, is that the large proportion of the employment opportunities is seasonal. For example, the women employed for cleaning the water canals were employed for eight months. It is assumed that these women will be employed again when the cleaning of canals is needed. Similarly, 1 500 jobs expected from manual harvesting are also seasonal as once harvesting is complete, the people are not needed. This raises questions such as: What effect does seasonal employment have on the creation of jobs? What role does seasonal employment play in reducing unemployment? How long will these jobs exist, particularly the manual harvesting? Goldemberg *et al.* (2011) suggest that manual harvesting jobs decline with the introduction of technology. According to these authors, manual harvesting jobs declined significantly as people were replaced by machines. While the project provides employment opportunities, the number of permanent job opportunities is lower than the temporary. This is essential for the realisation of economic benefits from the project. For a great many people, the economic benefits from employment will be as temporary as their jobs

6.3.1.3 Access to markets

Access to markets for the emerging farmers is critical in ensuring their socio-economic benefits from the project. Currently, the land beneficiaries produce maize, lucerne and livestock. The emerging farmers reported that they have access to market their products. Maize is sold at the

market in Cradock, lucerne to commercial farmers around Cradock and livestock is sold by the emerging farmers with livestock. The articulation by the emerging farmers reveals that the emerging farmers have access to two and three different markets producing two or three sources of income. However, in the market for lucerne, the customers (commercial farmers) determine the price. Therefore, in this market, the commercial farmers identify the benefits of the emerging farmers.

These emerging farmers are expected to shift to producing biofuel feedstock once the plant is constructed. The emerging farmers are to produce 30% of the feedstock required by the plant. While this guarantees the emerging farmers with access to the market, it, however, confines them to a single customer; the ethanol plant in Cradock. As per the agreement to be part of the ethanol project, the emerging farmers are to exclusively provide feedstock to the plant in Cradock. Furthermore, the plant is to determine the price of the feedstock sold to them by the emerging farmers. This suggests that there is no opportunity for the emerging farmers in the ethanol project regarding access to more markets. There is also no opportunity to grow regarding making more money from the single customer because the 30% from the emerging farmers is fixed. Therefore, the ethanol project confines the emerging farmers to one market while limiting them regarding the amount of money they make.

6.3.2 Social implications

This section focuses on the social aspects of the introduction of ethanol project in Cradock concerning public participation and stewardship as key components of social sustainability. The section argues that the level of stakeholders' participation in a project determines the extent and magnitude of socio-economic benefits toward a range of stakeholders. This is crucial as proper involvement in this project (e.g., ethanol project) can allow the local communities from Cradock to "contribute to decisions that affect them where they play an indispensable part in creating a securely based sustainable society" (IUCN, 1991:2). This, in turn, influences the manner in which local communities develop a sense of ownership (i.e. stewardship) toward the project as a mechanism of ensuring sustainable access to the socio-economic benefits derived from the project. To recognise the strengths and weaknesses of a specific participation style employed in the HUP/community partnership, one needs to consider different levels of participation (See Table 6.2). Thus, the first part of the section will discuss issues of stakeholders' involvement and decision making while the second aspect will extend the first theme toward issues of stewardship.

6.3.2.1 The question of public participation and decision making

Like various development projects elsewhere, the ethanol project had some form of engagement with different stakeholders in decision making. In the context of the ethanol project undertaken in Cradock, a number of interested parties were consulted to form part of the project. These stakeholders were: the local people (i.e., residents of the two townships of Cradock; Lingelihle and Michausdal, the land beneficiaries (i.e., emerging farmers), farm workers, the business sector, government departments and government agencies. The involvement of these stakeholders is said to be significant in the success of the ethanol project. Despite the acknowledgement of the importance of the participation for each of the stakeholders, there are challenges regarding the quality and the outcome of stakeholders' participation in decision making in this project. For instance, the local people from the townships were not involved in the actual conception (design stage) of the project. This is crucial because it is at this juncture that anticipated benefits and beneficiaries are determined. It is also at this juncture that communities should assume active involvement in the project decision making process, a process which guarantees their ability to secure socio-economic benefits derived from the project.

However, while the township people were consulted to form part of project steering committee with other stakeholders, the results of the interviews with these people suggest that their public participation in this platform does not enable them to influence the outcome of the project actively. This is because the local people have not been afforded a chance to participate in the early stages of decision making for the ethanol project. *Mrs Bakubaku expresses this situation. When she stated that:

Sugar beet called us to the hall and told us about a project that was going to provide employment and business opportunities for people who have cars for people such as me. We submitted our CVs at their office in town, and we are still waiting, no one told us anything concrete from the beginning, and we did not care because we want jobs. They never asked us if we want the project or not, they did not want to form a committee with the leaders of the community so we can get updates. The last I heard about the project was when we submitted our CVs

The above insert demonstrates that these people were viewed as “mere beneficiaries” rather than active participants in the project. The articulation from *Mrs Bakubaku also shows vividly that the local populations' benefits to this project were already pre-destined by external agencies in

consultation various government departments without clear inputs from the communities before the conceptualisation of the project. The active role implied here is regarding understanding the nature of the project, the role they play in the project and their position or decision level in the project.

Contrary to the local communities, it appears that the business sector in Cradock was involved in the ethanol project during the public participation aspect of the project's Environmental Impact Assessment. The business stakeholders that were consulted were: the tourism sector, hospitality sector, and agricultural retail. While there is only one individual from the township representing the hospitality industry, it is clear that business stakeholders were predominantly from the town dominated by white business stakeholders. Unlike the local people stakeholders, the business stakeholders (tourism, hospitality, and agricultural retail) participated in the project in a "meaningful way" as they had constant engagement with the project development agency such as Sugar Beet SA. During this process, they had the opportunity to have a better understanding of ethanol, which further allowed them to raise their concerns. However, despite their meaningful engagement and the voicing of concerns, the business sector still feel that they were not involved in decision making. They further argued that they were only involved in the procedural aspect of public participation through EIA, but entirely excluded in the decision making process about the future direction of the project. The impact of the project on their businesses, in particular, the tourism industry (Hotel and Bed & Breakfast operators) was not entertained in the environmental assessment for this project. In this context, it is clear that the business sector, just as the local people, did not play an active role in decision making. Although the industry had a much more meaningful participation in the project regarding understanding it and voicing concerns, they too were felt excluded from the major decision making process of the project. For instance, *Michelle one of the business respondents commented that:

We were consulted about the project called the "sugar beet" project during the public participation process. The project was explained very well to us, and we opposed it. Clearly, our concerns for our businesses were not taken into consideration because the project proceeded. We were ignored as if we did not say that we disapproved of the project, they did not consider our opinions because they had already decided about the project.

As expressed in the above insert, the business sector was consulted as part of a procedural process required for public participation processes. The articulation from Michelle shows that the industry was also not part of the conception stage of the project. It also indicates that the business

community's involvement in the project was at a later stage where decisions regarding the project had already been made. This suggests that the consultation with the business community was just a formality as their concerns had no power to influence the decision about the project.

Furthermore, farm workers felt they too were not involved in the project's decision making. The agricultural workers did not know of the project until the allocation of land to beneficiaries. One of the farm workers who worked on the farms prior the ethanol project explained that they did not know about the project until their farmer left the farm. According to the farm worker they had to go to Queenstown to enquire about the farmer's absence where they found out about the project.

This depicts that the farm workers are passive participants in the project. While the residents and the business sector were involved in the project at the public participation stage, the farm workers became aware of the project in the land allocation stage. This shows that they were involved far later than the other stakeholders in the project. This late involvement meant that the farm workers could not voice their opinions and determine their benefits from the project. Furthermore, unlike the local people and business sector, their knowledge of the project came through the departure of the commercial farmers who owned the farms purchased for the project. This suggests that the farm workers were viewed as people of less importance in the project even though they are a significant part of producing feedstock for the project.

Other stakeholders in the ethanol project are the emerging farmers who happened to be land beneficiaries for this project. These people came after they underwent a rigorous selection process to qualify for land access which was to be used to plant sorghum for the production of ethanol in the plant. The land allocation was administered by the DRDLRF as part of the land reform process. A selection committee was formed to oversee the application and selection of beneficiaries. The committee consisted of the representatives from the Agrarian Research Development Agency (ARDA), Inxuba Yethemba Local Municipality and Blue Crane Route Municipality, various farmers' unions, and the Eastern Cape Research Development Agency (ECRDA).

The selection of beneficiaries for the project has inconsistencies that will be discussed later in this chapter. The selected emerging farmers were allocated land to produce biofuel feedstock. However, because the ethanol plant had not been constructed, the emerging farmer was instructed by the Department of Agriculture to plant maize and lucerne. This depicts the power dynamics within the ethanol project where the emerging farmers, though farm beneficiaries, are told what to produce and how much to produce without consultation. This suggests that the

emerging farmers have limited powers regarding decision making in terms of what happens on their farms. The emerging farmers said that they sell lucerne to local commercial farmers who determine the price to pay based on the characteristics they want. Furthermore, once the feedstock is produced, the ethanol plant will determine the price to pay the emerging farmers. What this depicts is a group of beneficiaries who do not influence how much they benefit from their work. This also depicts that the project has put in place a system that does not allow the emerging farmers to make decisions; as such their benefits are determined by others.

The last of the stakeholders in the project are the government departments such as the Department of Rural Development, Department of Agriculture, Local Economic Development, and the government agency (Agrarian Research Development Agency). The Government Departments and agency were approached by the joint venture, Sugar Beet SA and IDC, to form part of the ethanol project. The joint venture presented the idea of the ethanol project, and the role that each of the involved departments would play in the project. The various departments saw the project as a chance for the local people to benefit. For instance, DRDLR saw the project as an opportunity to provide individuals who were previously marginalised with access to land. This department spearheaded the acquisition and allocation of land. The DoA saw the project as an opportunity to grow agricultural development in Cradock; this department provides agricultural support to the emerging farmers. Similarly, the ARDA provides agricultural support to the emerging farmers to ensure economically viable farms. The LED is responsible for the ethanol plant regarding the construction of the plant and the labour for the plant operations.

While these departments and agency were involved earlier than the rest of the stakeholders, their roles were predetermined by the joint venture. The results show that there is a lack of understanding about which domain belongs to which department. As such, the ARDA and the DoA often provide the same support to the emerging farmers. Furthermore, these departments and agency are not the highest levels of authority in the ethanol project. This is because they always refer to the joint venture when it comes to decisions regarding the project.

6.3.2.2 Locating stakeholders within the participation typology

The extent of stakeholder involvement can be further explored regarding the participation typology described in the literature review by Adams and Hulme (2001:45) (see Chapter 2). In general, participation should empower the stakeholders to take responsibility for the project. Locating the stakeholders within the participation typology shows where the stakeholders are regarding empowerment and decision making in the project. Kotze and Kelleman (1997) argue that proper

participation by people is participation that allows them to make a decision and influence the direction of the project. Table 5 below shows how the local people participate in development projects. This is important in recognising the strengths and weaknesses of the type of participation used in a project. As depicted in Table 6.2 below, participation ranges from passive participation at one end, to self-mobilisation at the other extreme. This section seeks to answer the questions: at what level of involvement are the stakeholders located? Does the location of the stakeholders allow them to make decisions on the project?

Table 6.2: How the local people participate in development projects.

Participation Typology	Some Components
Passive participation	People are told what is going to happen or already happened. This takes the top down approach, where information shared belongs only to external professionals
Communication in information giving	People answer questions posed by extractive researchers using survey and other methods. Here people are unable to influence
Participation by consultation	People are consulted, and the external agents listen to the views of the people. Here the problems and solutions are usually defined externally. People are not involved in making the decision. Participation is as consultation
Communication by material incentives	Resources are provided for example labour. People are given little incentive to participate after the end of the incentive
Functional communication	To meet the predetermined objectives groups are formed. This is usually done after major decisions on projects have been made, therefore initially dependent on outsiders but may become self-dependent, and enabling. Here participation is as organisation
Interactive communication	The analysis is joint to joint actions. Possible use of new local institutions or strengthening existing ones. Enabling and empowering, so people have a stake in maintaining structures or practices
Self-mobilisation	Already empowered, take decisions independent of external institutions. May or may not challenge existing inequitable distributions of wealth and power. Participation is as empowerment

Source: Adams and Hulme (2001:45).

The above table effectively allowed the reader to locate this stakeholder on different levels of participation. For instance, Figure 6.2 below provides an insight on how the various stakeholders were involved in the ethanol project across all sectors of the participation typology.

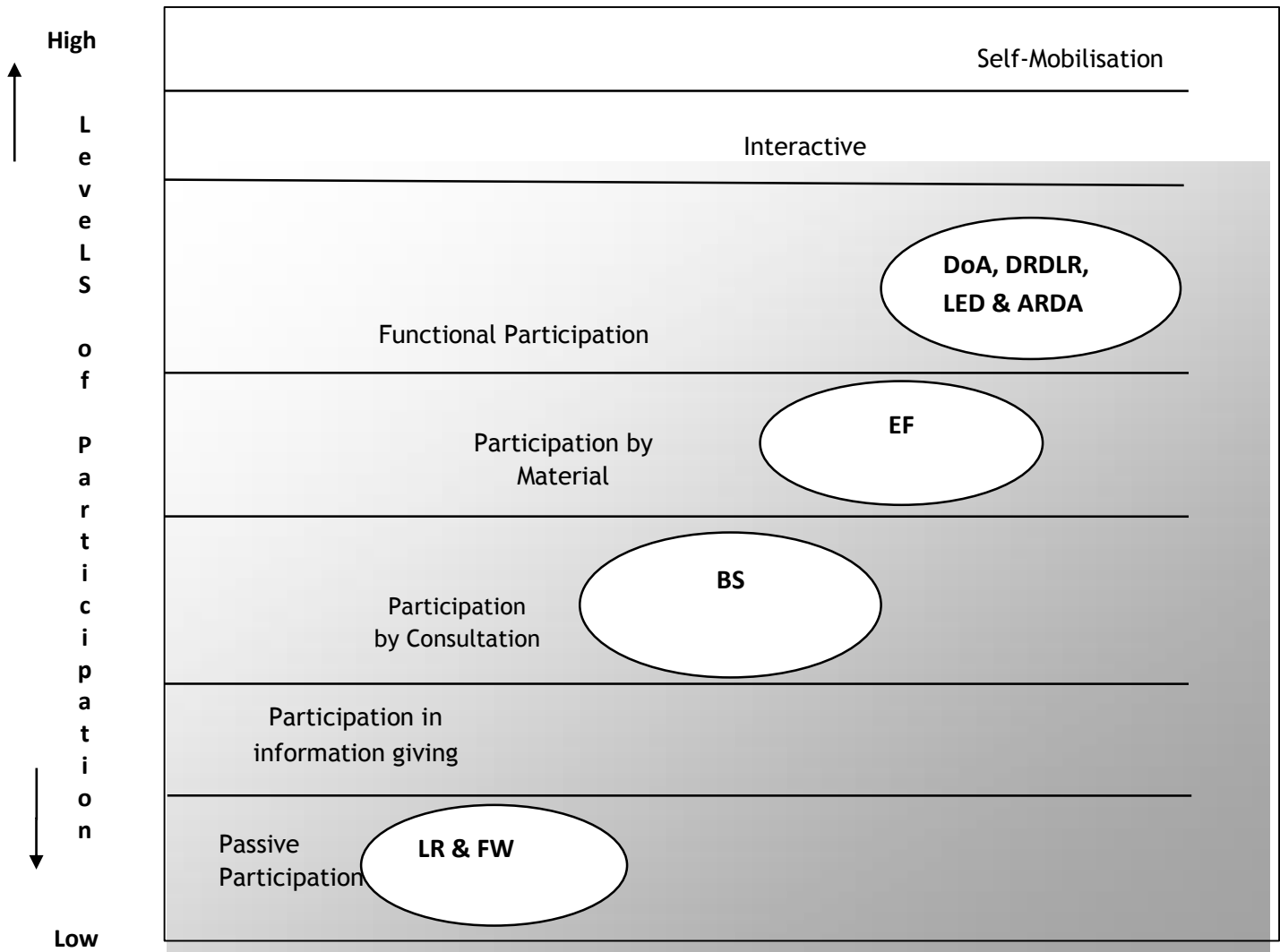


Figure 6.2: locating the stakeholders within the participation typology

LR= Local residents of Cradock; FW= Farm Workers; BS= Business sector; EF= Emerging Farmers; DoA= Department of Agriculture; DRDLR= Department of Rural Development and Land Reform; LED= Local Economic Development; ARDA= Agrarian Research Development Agency

Overall, the participation of the interested parties in the ethanol project has not reached the self-mobilisation stage. The involvement of the stakeholders ranges from passive participation to functional participation. At the end of the passive level of participation, is the local people of Cradock and the farm workers, while at the degree of involvement by consultation is the business sector, at the participation by material incentives is the emerging farmers and at functional participation are the government departments and agency. This suggests that none of the stakeholders participated at a level where they would be empowered to make decisions

independently, not to mention taking charge of the project as a self-sustaining business enterprise. While this is a case, it also emerges that these stakeholders (ideally beneficiaries of the project) are not as empowered as the other stakeholder such Sugar Beets SA Agency (SBSA) and Industrial and Development Corporation (IDC). Unlike the local communities, these stakeholders had enormous decision making powers while the residents (from the townships) and farm workers are depicted as passive participants. Invariably passive level of participation is characterised by stakeholders who are just poor beneficiaries as they are often told what to do and what will happen in the project. Contrastingly, it appeared (as indicated in Table 6) that the business sector was consulted regarding the project, but only during the public consultation process instituted as part of the project's EIA process. Unlike the local communities, these stakeholders were, to some lesser extent, engaged about the project. However, they were unable to influence the project's direction towards their benefits. The emerging farmers are located via communication by incentives because they are provided with land with associated infrastructure for them to participate in the project. The government departments and agency are located within functional participation because they form groups to meet predetermined objectives after decisions on the project have been made. For example, a committee for the selection of beneficiaries was established after the decision was made by the SBSA and IDC to acquire and allocate land to potential recipients. The government departments and agency depend on the joint venture between IDC and SBSA for the direction of the project, hence the sustainability of the project raises some serious questions.

Thus, the study revealed, as depicted in Figure 6.3, that the stakeholders' participation in this project varies across these levels of participation typology. For instance, the local community stakeholders do not participate at a level where they are empowered to make decisions independently. This raises questions on the sustainability with specific reference to the concept of stewardship as a major principle of sustainable development. It is argued that communities should participate actively in these projects to develop a sense of ownership (stewardship) which will further ensure sustainable access to socio-economic benefits from the project.

6.3.2.3 The question of stewardship and socioeconomic dimension of the ethanol project

Stewardship is a fundamental principle of sustainable development. Stewardship of the ethanol project in Cradock refers to the sense of ownership of the project by the project's stakeholders. The question of stewardship in the project relates to how the feeling of ownership refers to the socio-economic dimensions of the project. One of the benefits of the ethanol project is the

provision of access to land to emerging farmers. The land allocated to the emerging farmers is land that was acquired for land redistribution by the DRDLR. The importance of this land allocation in the ethanol project is that it provides land to people who were previously excluded from accessing it (see chapter five). With the access to land, the emerging farmers produce maize, lucerne, and livestock. It is assumed that the access to land has had a positive change in the lives of the emerging farmers. This is because 78.6% of the emerging farmers said that the project had had a positive impact on their lives. Below are responses of some of the emerging farmers who are land beneficiaries in the ethanol project:

I make more money as a farmer in this project than I did at my previous job. I have been able to buy myself a car that I could not afford before this project. The farm is doing well; colleges from outside Cradock bring their students here for practicals.

As depicted in the above insert, access to land has had a positive impact on the emerging farmers regarding providing positive change. The articulation by the emerging farmers suggests that they make more money than they did before the project and by that virtue, they, can better their lives. While access to land has had a change in the lives of the emerging farmers, there are questions of stewardship of the land and production process of the project. The emerging farmers have expressed that they do not have a sense of ownership of the project. As part of the allocation of land, the emerging farmers signed 30 year lease contracts. This has raised uncertainties for the emerging farmers, leading to them feeling that they do not have a sense of ownership of the project. *Mr. Ndongeni, an emerging farmer in the project, said the following:

We are only custodians of these farms. I cannot even get a loan from the bank because I am not the owner of the farm, the government is. I do not know what I will do after the 30 years.

As said in the above insert, the emerging farmers feel that they are custodians of the farms, but they do not have ownership of the farms. The articulation from *Mr Ndongeni shows that the farms cannot be used as collateral in banks. The above insert also indicates that the emerging farmers are uncertain about their future in the project. This is because it is unclear for them what will happen after the 30 year lease contract expires. The state land lease and disposal policy of South Africa states that land that is acquired for redistribution is owned by the state and land beneficiaries lease the land from the state. Therefore, in the case of the ethanol project in Cradock, the emerging farmers do not have ownership of the actual land instead; they rent the land from the government. The government, as the owner of the land, will decide what will happen to the

emerging farmers after the lease contract expires. This depicts that the emerging farmers do not have the power to decide what will happen after 30 years. This uncertainty will affect an important aspect of sustainable development which is ²⁵intergenerational equity. Sustainable development requires that the present generation use natural resources with each other and with the future generation. This, however, is unclear in the ethanol project because after 30 years, the contract might not be renewed which means that the future generation might not be able to use the land. Furthermore, this suggests that socio-economic benefits of access to land are not secure for the present generation and the future generation.

While the representative of the DRDLR said that the farmers might purchase the farms they have access to, it is important to note that this comes with conditions. The land policy requires that for the emerging farmers to be considered for purchasing the farms, they have to rent the farms for 50 years. Even after renting the farms for the allocated time, the government still has the power to decide to sell the farms to the farmers or not. These conditions show that the emerging farmers do not have the authority regarding land ownership in the project. Therefore, the socio-economic benefits of the project do not include ownership. It can be argued that the land allocation of the ethanol project prevents previously marginalised individuals from owning land, and it does not produce a new class of black commercial farmers. Instead, the project takes all the power away from the emerging farmers and limits their socio-economic benefits.

In the same fashion as land ownership, there is a question of stewardship and socio-economic benefits in the production process at the farms relating to the emerging farmers. The manufacturing process at the farms relates to what is produced on the farms, and the prices of the produce from the farms. The results suggest a lack of ownership of the production process by the emerging farmers. To prepare the emerging farmers for the running of farms, the ARDA presented programmes such as workshops, meetings, and mentorships. These programmes were designed to equip the farmers with skills needed in managing the farms successfully. These, however, did not yield the desired outcome. *Mr. Langa, an emerging farmer in the ethanol project, explained:

The programmes did not help us because of how they taught us and what they taught us. As a person who has never had a farm before I could not get a clear picture of how

²⁵ Intergenerational equity is a concept that says that humans 'hold the natural and cultural environment of the Earth in common both with other members of the present generation and with other generations, past and future' (Weiss, 1990, p. 8)

to run a farm. I wanted to learn about the marketing of my products and how to run an economically viable farm, but all of that was not in training. We were not asked what skills we have and what skills we feel we need to have to make successful farmers.

As mentioned in the above insert, the programmes designed to equip the emerging farmers with skills did not yield the desired outcome for the emerging farmers. As articulated by Mr Langa, the emerging farmers did not have a say in what skills they should acquire. As a result, the emerging farmers did not receive training on the marketing and managing economically viable farms. These are important because they are at the core of the socio-economic benefits accrued by the emerging farmers. The emerging farmers needed to learn how to market their produce to make money, and they needed to learn to run these farms economically to ensure a financial gain. The above insert also shows that the emerging farmers did not have ownership of decisions and power in terms the skills they needed to manage the farms. This lack of ownership and power can be observed throughout the production on the farms. For instance, the emerging farmers produce maize, lucerne and livestock from which they make a living. However, the decision to produce these products was taken without their consent. The emerging farmers were informed about what to produce. Furthermore, when the plant is built the emerging farmers are expected to shift and produce the feedstock required by the plant. The emerging farmers will have to shift from producing products that give them multiple sources of income to producing biofuel feedstock that offers one source of revenue. This is because the criterion for the project requires that emerging farmers produce biofuel feedstock.

This raises questions regarding the socio-economic benefits of the emerging farmers such as: currently the emerging farmers have expressed that the multiple sources contribute positively to their lives, will the shift be as beneficial economically as the current sources? Can the shift have a positive effect on the lives of the emerging farmers? These questions are of particular importance because the emerging farmers will be confined regarding production to biofuel feedstock that is supplied to the one plant in Cradock. This suggests that the emerging farmers cannot produce the feedstock and compare prices to find a plant that offers a better deal. The emerging farmers are confined to producing biofuel feedstock which is limited to solely supplying the plant in Cradock. What is even more crucial is that the plant determines the price of the feedstock from the emerging farmers. From this context, it is clear that the emerging farmers do not have the power to determine their prices. Therefore, their benefits are determined by the plant and not by themselves. Given these points, there is no stewardship whatsoever for the emerging

farmers in the ethanol project. There is no ownership of land, no ownership of the production process regarding determining what to produce and the price of the produce.

Similar to the emerging farmers, the local people of Cradock have expressed lack of ownership of the project. The residents are said to be the stakeholders of the ethanol project. However, as seen in the participation section, they are treated as ordinary beneficiaries. The residents do not have an understanding of the project and are not involved in the processing taking place in the project. The lack of involvement is an important issue because the local people are assumed to be the stakeholders managing the ethanol processing plant. The ethanol plant manufacturing company is going to provide individuals to run the plant in the beginning. It is assumed that these experts will transfer the skills to the local people and once the skills transfer is adequate, the local people will take over the managing of the plant. It is, however, unclear whether the local population want to take over the operations of the plant because they were not involved in the designing of the project. The local people could not choose what they want to do within the project and how they want to benefit from the project. The local people were excluded from the earlier phases therefore; people who have been participants in the project will be expected to run the plant. This raises questions of sustainability regarding plant. The question is if the local people will be able to run the plant sustainably?

6.3.2.4 The living conditions on the ethanol project farms

It is crucial to revisit the conditions of life of those already benefiting from the project. Improving conditions of life is a prerequisite of the green economy. Conditions of life in the ethanol project refer to circumstances that are affecting the way people live on the farms with regard to their well-being. This includes food, shelter (housing), water and sanitation, and energy. The farm workers have raised issues regarding their living conditions in these farms.

6.3.2.4.1 Housing conditions

Housing is an important aspect of living conditions because it relates to human security and sustainable livelihoods. As mentioned in chapter five, the farms purchased for the ethanol project came with associated infrastructure which includes housing. The emerging farmers occupy the houses that were occupied by the farms' previous owners, while the farm workers occupy houses that are demarcated for farm workers. The farm workers have expressed their dissatisfaction with the conditions in which they live. As a result, 66.6% of the farm workers said that the conditions of

their houses are poor. Below is Figure 6.4 showing the condition of the houses on the ethanol project farms.



Figure 6.4: The dilapidated condition of the farm workers' houses in Cradock farms.

As depicted in Figure 6.4 above, the pictures show houses with dilapidated conditions. Picture A shows a house with windows patched with cardboards, cement falling off of the wall in places and a damaged door without a door knob. Picture B, shows a house without windows, a damaged door without a door knob, and a crack from the door to the roof of the house. The condition of these houses raises questions about the security of the farm workers as well as their well-being. Questions such as: should people be living in houses without windows? How safe are people in houses with broken doors without door knobs? Is it good for people to live in houses where windows are patched with cardboards?

These questions are important because the green economy requires that the living conditions (housing included) be improved in green economic projects. This is because improved living conditions contribute positively to improving the well-being of the people. The housing conditions of the farms suggest dilapidated conditions instead of improved ones. Therefore, it can be said that the housing conditions in the ethanol project in Cradock are retrogressive to the prospects of improving the well-being of the farm workers.

6.3.2.4.2 Access to clean water and sanitation

Similar to the housing conditions, access to safe drinking water and sanitation is an important aspect of improving the living conditions of the people. Access to adequate water and proper sanitation are essential to ensuring good human health. The ethanol project farms use different

facilities to provide water to the people residing on the farms. The facilities used in the farms are water taps and water tanks which are accessible to all individuals residing on the farms. While the farm workers have water facilities accessible to them, there have been concerns raised by farm workers in one of the farms. Figure 6.5 below shows the water tank used to pump out water from the farm.



Figure 6.5: Water tank in one of the Cradock farms.

The above figure 6.5 shows a water tank used to pump water utilised by the farm workers on the farm. Figure 6.5 also indicates that the tank is an open tank that is not completely covered. The use of the reservoir as a source of water for the farm workers raises questions about the health condition of those using the water. It is unclear whether the use of water from the tank will hurt people's health. However, as a prerequisite for the green economy, people should have access to clean water.

Similar to water, proper sanitation is essential for ensuring proper human health. Proper sanitation in the ethanol project refers to preventing human contact with hazards of particular waste faeces by proper disposal. The results show that the availability of sanitation structures varies from farm to farm, particularly in areas demarcated for farm workers. While some of the farms have toilet structures located outside their houses, some of the farm workers use a bucket and the bushes. Picture A of Figure 6.4 shows two buckets that are utilized by the farm workers to relieve themselves at night. The farm workers have said that during the day, they use the bushes found around the houses to relieve themselves. This shows a lack of proper sanitation. Proper sanitation structures are critical to the health and well-being of the farm workers. Therefore, the lack of proper

sanitation could potentially impact the health and well-being of the farm workers negatively. Furthermore, an adverse effect on health and well-being of the farm workers contravenes the notion of improving living conditions in the green economy.

6.3.2.4.3 Access to energy-ethanol fuel

Access to energy is important in improving the farm workers' living conditions because access to energy reduces energy poverty. As reported in the introduction (see Chapter 1), the ethanol project in Cradock is expected to produce approximately 90 million litres of ethanol fuel. The fuel produced from the plant in Cradock will all be transported to a petroleum manufacturer through the rail. Therefore, no ethanol fuel produced in Cradock will be used in Cradock. This is important to highlight because the project, as a project of green economy, must improve the living conditions of the people. However, the transportation of all the fuel suggests an exclusion of the local residents from accessing the fuel.

6.3.2.5 Sense of place

This section focuses on how the ethanol project affects the ²⁶“sense of place” in Cradock. One of the benefits of the ethanol project is that it is going to create an industrial area in Cradock. This is because the large-scale production of ethanol in Cradock is going to result in Cradock becoming an ethanol manufacturing hub. ²⁷It is assumed that this manufacturing hub will have a positive effect on the local economy. However, the local people of Cradock have raised concerns that changing Cradock from a rural area to an industrial area changes the sense of place that they and tourists are accustomed. Figure 6.6 below provides an idea of Cradock as an ethanol manufacturing hub and the associated outputs.

²⁶ Sense of place is the meaning and intrinsic character of a place that local people and visitors feel.

²⁷ The positive effect of the ethanol project on the local economy is extracted from the Environmental Impact Assessment on the ethanol project.

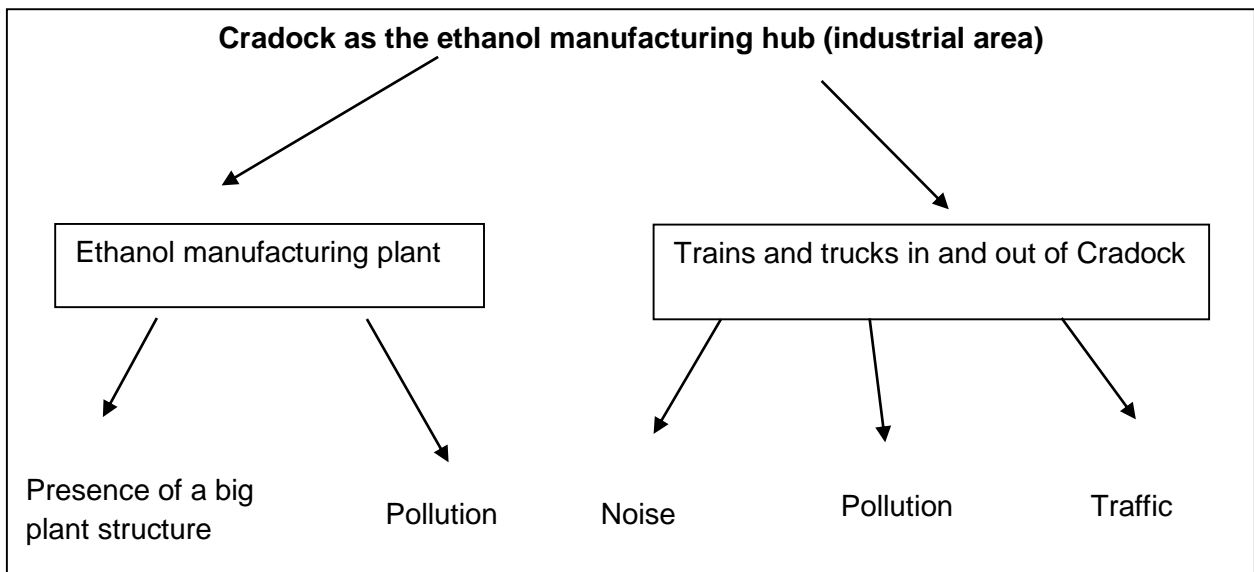


Figure 6.6: Ethanol manufacturing process and its impacts.

As shown in the above figure, the ethanol project, as an ethanol manufacturing hub, will result in changes such as the ethanol plant and increased transportation particularly trains and trucks. The construction of the ethanol manufacturing facility will lead to the presence of a plant structure that was never there before. This will change the visual environment, particularly because the area earmarked for the ethanol plant currently lies dormant. Furthermore, as highlighted earlier in this chapter, emissions from the plant will pollute the local environment, therefore, affecting the quality of air. The quality of air is important in Cradock because clean air is a part of the town's charm. The town prides itself as a clean air destination. Therefore, the change in clean air will change the character and atmosphere of Cradock.

Beyond the presence of the ethanol manufacturing plant, it is assumed that the project will result in an increase of trains and trucks in and out of the town. This is because the ethanol produced will be transported using rail lines while the feedstock from the farms to the plant will be transported using trucks. The increase of these forms of transport is expected to result in increased noise, pollution, and traffic. These will, in turn, change the sense of place because Cradock is also known as a quiet town with minimal transportation from trucks that pass Cradock at night. Therefore, the increase in traffic, the noise and pollution from transportation may alter the atmosphere of Cradock.

6.4 ISSUES OF SUSTAINABILITY IN THE ETHANOL PROJECT IN CRADOCK

This section discusses issues concerning the sustainability of the ethanol project in Cradock. The question of the viability of the ethanol project is important. This is because as a project of sustainable development, it should ensure that both the current and future generations use the same resources to meet their needs. It is in this context that the sustainability of the ethanol project is scrutinised.

The issue of sustainability in the ethanol project is linked with the problem of ownership of the project. This is because the lack of ownership of the project by the stakeholders has raised concerns about its sustainability. For instance, the lack of ownership of the land used to produce biofuel feedstock by the emerging farmers affects sustainability in various ways. For example, the emerging farmers signed lease contracts of 30 years but are uncertain about their future after the contracts expire. One option is that after 30 years, the emerging farmers could potentially be without land. Therefore, the use of land in the ethanol project would be restricted to the current generation without a chance for the future generation to use the same land.

Equally important in the discussion on the sustainability of the ethanol project in Cradock, is the involvement of the residents. The results suggested that the local people do not have a sense of ownership of the project. However, these are the stakeholders that are said to be responsible for the plant operations. There is uncertainty about whether these people want to run the ethanol manufacturing plant or not. This uncertainty is a concern for the project's sustainability because, potentially, if the residents do not want to manage the plant, they will not run the plant. This will create a scenario where the future generation of Cradock will not receive the chance to run the plant and reap the benefits thereof. The issues discussed in this section are issues that could potentially affect the sustainability of the project. It is, however, unclear whether these issues of concern will, in fact, have an impact on the sustainability of the project.

6.5 CONCLUSION

The main aim of this chapter was to provide an analytical discussion based on the data collected about the perceived socio-economic effects of the ethanol project in Cradock. The chapter began by focusing on the project as a green economic model within the context of sustainable development. In this regard, it was argued that the project should ideally achieve the three pillars

(principles) of sustainable development. The environmental merits of the project, as well as its contradictions, were identified and discussed. Furthermore, the socio-economic implications of the project were identified, analysed and reviewed together with issues of the project's sustainability. The findings show that the lack of involvement of the local people in the early stages of the ethanol project played a huge role in determining the socio-economic benefits of the project. The key findings presented in this chapter were; the ethanol project contributes to the national and global objective of greening the environment but fails to take into account the local environment. This is because the local environment is left polluted and degraded by the production of ethanol; the residents, farm workers and business sector were not involved in the project design, therefore could not determine their benefits on the project. The lack of involvement of the emerging farmers and residents has created issues with the stewardship of the project. The ethanol project introduces a shift from the traditional commercial agriculture in Cradock to the production of biofuel feedstock. The production of feedstock is expected to contribute positively to the local economy through providing employment and creating business opportunities. However, the findings suggested that the employment will be mainly temporary. The sustainability of the ethanol project in Cradock is questionable due to issues of uncertainty.

CHAPTER 7

CONCLUSION AND RECOMMENDATIONS

7.1 INTRODUCTION

This chapter concludes and provides recommendations for the research study. This research study was set out to investigate the socio-economic implications of the ethanol project as a green economic model in Cradock, Eastern Cape. The four main objectives of the study were:

- To investigate the economic implications of the ethanol project on the local people of Cradock.
- To investigate the social implications of the ethanol project on the local people of Cradock.
- To investigate ecological implications of the ethanol project on the local people of Cradock.
- To investigate the sustainability of the ethanol project in Cradock.

The research study argued that the inclusion of the local people in the ethanol project's decision-making is crucial to securing their benefits from the project. This means that local people should be involved early in the decision making process. Failure to engage the local residents in the initial stages of decision making would create a lack of sense of ownership resulting in a lack of socio-economic benefits for the residents.

The significance of this research study lies in the fact that it is an investigation into the green energy sector that is still in its infancy in the country. Biofuel projects are projects within the green energy sector that are viewed as projects that improve environmental quality while addressing socio-economic concerns besetting the poor local communities. However, there is no evidence of a positive as well as negative impact of green energy projects on the social and economic livelihoods of local people and the betterment of social welfare. Therefore, this research provides an understanding of the implications of the ethanol production, with specific reference to how these projects improve the quality of life of communities or contribute to the sustenance of the local economies while protecting the quality of the environment.

Based on the information gathered and discussed in this thesis, it is concluded that the stakeholders of the ethanol did not participate in a meaningful manner; this lack of meaningful participation affected the socio-economic benefits accrued. The stakeholders did not participate at a level where they can determine their benefits in the project. The lack of participation resulted in the lack of ownership of the project by the stakeholders. This raised concerns about the

sustainability of the ethanol project in Cradock. The main findings of this study are summarised in this chapter together with recommendations. The recommendations provided in this section are suggestions on how the ethanol project could be improved to resemble a green economic model. Firstly, below the main findings are reviewed.

7.2 THE ETHANOL PROJECT AS A GREEN ECONOMIC MODEL

The study investigated the ethanol project in Cradock as a green economic model. The aim was to ascertain the extent to which the ethanol project resembles a green economy with a specific focus on the socio-economic implications. As a green economic model, the ethanol project needed to take into consideration the three pillars of sustainable development; the economy, social, and ecological. The project as a green economic model should enhance environmental quality and meet green goals without compromising the socio-economic livelihoods of the people. The findings depict that the ethanol project at Cradock does not promote environmental quality and has the potential to compromise the social and economic livelihoods of the people. Therefore, the ethanol project does not resemble a green economic model.

Notably, the environmental merits of the ethanol project in Cradock are greatly exaggerated. While the ethanol project in Cradock will produce ethanol fuel that contributes significantly to the reduction of GHGs by producing 90 million litres of fuel, its effects on the local environment are dire. As documented in the Environmental Impact Assessment for the project, the project will reduce pollutants such as CO₂, VOCs, NO_x, and PM10. These pollutants will have adverse effects on the local environment. For instance, VOCs when emitted into the environment cause a change in the smell of the air to an “alcohol like” smell. The emission of these VOCs into the environment also changes the colour of the air into a yellowish or brownish colour which impacts everything in the local environment negatively. The pollution from the pollutants from the ethanol processing plant will have an adverse effect on the local environment.

Consequently, the ethanol project will hurt the livelihoods of some of the local people. The pollution will result in a change in the local environment which is a source of subsistence for people working in the ecotourism sector. The adverse effect on the ecotourism sector will result in the loss of livelihood as the ecotourism business directly depends on a clean local environment. Furthermore, the location of the plant along the Fish River riparian areas will have a negative effect on livestock and crops resulting in loss of agrarian productivity. This impact is critical as Cradock’s economy has always been intertwined with the agrarian economy which has sustained the town’s economy

for the last 200 years. Therefore, the adverse effect of the ethanol project on the local environment of Cradock will thus have an adverse effect on the local economy.

These points suggest that the ethanol project, as a green economic model, has not achieved a balance regarding the three pillars of sustainable development. Furthermore, the project is going to have a dire effect on the livelihoods of the people, the local environment, and the local economy. This is the direct opposite of what a green economy seeks to achieve with a project such as the one in Cradock.

7.3 THE PARTICIPATION OF STAKEHOLDERS IN DECISION MAKING AND ITS EFFECTS ON THE REALISATION OF BENEFITS

The research argued that the involvement of the project stakeholders in decision making is critical to securing benefits. The findings of the thesis depict that the level of involvement of the interested parties in the project indeed has an impact on securing benefits from the project. The various stakeholders were involved differently in the ethanol project. For instance, the local people of Cradock participated in the project through the PP. The local residents argued that they were told what they would benefit from the project. These local people were unable to influence how would take advantage of the project because they were not involved in project design where the beneficiaries and benefits are determined. As a result, even in the allocation of land, a large proportion of the land beneficiaries were people who are not residents of Cradock. Therefore, the local residents were treated as mere recipients of the project.

Similarly, the business sector was not involved in the project design process. This sector was, however, consulted and provided with the opportunity to voice their opinions and concerns with regard to the project. The farm workers were also involved late in the ethanol project in the allocation of land, during the time when the commercial farmers were vacating their sold farms. Therefore, the farm workers were also not involved in the project design. The emerging farmers participated in the ethanol project through their applications to become part of the ethanol project. The emerging farmers went through a selection process to be eligible for selection as land beneficiaries in the ethanol project. The government departments and agencies (DoA, DRDLR, LED, and ARDA) were approached by Sugar Beet SA and the IDC to participate in the project. When the stakeholders were located within the participation typology, the results indicated that the stakeholders were not at a stage where they are empowered just as Sugar Beet SA and the IDC. This implies that the project stakeholders, particularly the local people of Cradock, the

emerging farmers and farm workers, do not participate at a level where they are empowered to make decisions independently. As a result, the project stakeholders (the local people, emerging farmers, and farm workers) were unable to dictate their benefits in the project. They were involved at stages of the project where the benefits had already been determined. The local people did not participate early in the decision of the ethanol project, and as a result, they could not influence the fruits of the project.

7.4 THE EFFECTS OF STAKEHOLDER PARTICIPATION IN THE SENSE OF OWNERSHIP

This thesis claimed that failure to involve the local people in the early stages of the decision making process will create a lack of sense of ownership resulting in a lack of socio-economic benefits. The results found that, indeed, the failure of involving the local people in the early stages of decision making, results in the lack of sense of ownership.

This is evident in the case of the emerging farmers that are involved in the ethanol project as land beneficiaries. The emerging farmers were not involved in the early stages (project design) of the ethanol project which affects their sense of owning the project. The emerging farmers stated that they did not have a sense of ownership mainly because they did not have ownership of the farms. However, the discussion revealed that the lack of ownership transcends beyond the ownership of the farms. The emerging farmers do not have ownership of the land because the government leases the land to the farmers who have signed 30 year lease contracts. There are uncertainties from the emerging farmers regarding what will happen after the 30 years has expired. Even though there is an option to purchase the farms, the government requires the emerging farmers to lease the land for 50 years. Even after the 50 years, government has the power to decide whether to sell the land to the emerging farmers or not. The emerging farmers also do not have ownership of the production process on the farms because they are told what to produce on their farms. Furthermore, once the plant is built the emerging farmers will be expected to shift and produce biofuel feedstock even though it will reduce the amount of the source of income. Moreover, the emerging farmers do not have the power to determine the price of the biofuel feedstock that they will provide to the plant. These points suggest that the emerging farmers have powers regarding the ownership of the project specifically, the land, and the decisions on the farms as well as the production process of the biofuel feedstock.

Similar to the emerging farmers, the local people do not have the sense of ownership of the ethanol project. The local residents are involved in the project as passive participants that are told what will happen and what has already occurred. This implies that local people are treated as mere

beneficiaries who cannot influence the benefits of the project. These local residents are assumed to be the beneficiaries who will operate the ethanol plant. It is, however, unclear whether or not the local residents want to run the ethanol plant. This suggests that the local people do not have the power to say where they wish to be involved in the project, as a result, their benefits in the project are predetermined by other stakeholders particularly Sugar Beet SA, IDC and the Government Departments.

7.5 SUSTAINABILITY OF THE ETHANOL PROJECT

One of the objectives of the study is to investigate the sustainability of the ethanol project in Cradock. The results show that the sustainability of the project is questionable because of current uncertainties within the project. Two issues of uncertainty were identified as issues that will affect sustainability. The first issue is ownership of the farms by the emerging farmers. The emerging farmers signed lease contracts of 30 years; however, they are uncertain about what will happen to them after the 30 years has elapsed. This suggests an uncertainty regarding realising benefits from the farms because they are unclear as to whether they will still be able to realise benefits from the farms after 30 years. The emerging farmers could be without land after 30 years ending their ability to realise benefits and restrict the use of land to the current generation without a chance for the future generation to use the same land to acquire benefits.

The second issue that can potentially affect the sustainability of the project is the ownership of the project by the local people. The local residents are said to be the stakeholders that are going to be responsible for the plant operations. There is uncertainty about whether these people want to run the ethanol manufacturing facility or not. This uncertainty is a concern for the project's sustainability because potentially, if the residents do not want to run the plant, they will not run the plant. Therefore, this creates uncertainty regarding realising the benefits of running the plant.

7.7 THE RECOMMENDATIONS

The recommendations provided below suggest improvements in the ethanol project in Cradock so that it resembles a green economic model. The recommendations are as follows:

7.7.1 The ownership of the ethanol project by stakeholders

The thesis proposes that the ethanol project ensures ownership of the ethanol project by the project stakeholders. This implies that firstly, all the stakeholders must participate at the same level of involvement regarding decision making. For the stakeholders to be able to participate in decision making regarding the project, they need to be empowered. The stakeholders need to be empowered regarding information and skills about the ethanol project. The stakeholders, particularly the local people, need to have a clear understanding of the project and all its processes. The stakeholders need to be empowered regarding the skills required for the ethanol project. For instance, the local people are said to be the stakeholders that will be responsible for the plant operation. To run the plant, the local residents must be equipped with the skills required to manage the plant efficiently and sustainably. The emerging farmers, as the stakeholders that are responsible for the farms, must have all the necessary skills required to run economically viable farms. Once all the stakeholders are empowered, decisions regarding the project must be taken collectively by all stakeholders. There should not be stakeholders that are passive participants in the project.

Consequently, ownership of the project must be given to the stakeholders. The emerging farmers must be given ownership of the farms. The signing of lease contracts does not imply ownership because after the period outlined in the contracts expires, the emerging farmers are faced with a possibility of losing the land. Therefore, the emerging farmers must be given the option to buy the farms from the government. Furthermore, the emerging farmers must be treated as stakeholders of equal importance to the government departments and agencies. This is regarding decisions regarding the production process on the farms. The emerging farmers should be able to produce the products that they want to produce on the farms. Even though the farms were purchased for the ethanol project, the emerging farmers should be allowed to produce other products on the farms. The emerging farmers should be given the opportunity to contribute 30% and be able to produce other products to increase their sources of income. Furthermore, the emerging farmers should be given the opportunity to negotiate the price of their product to the plant. This is important because the emerging farmers will have a say in the benefits that they realise from supplying the ethanol plant.

Similarly, the ownership of the ethanol plant must be given to the stakeholders. It is said that the plant manufacturing company will bring in experts to run the plant and transfer skills to the local people. Once the skills transfer is adequate, the local residents will take over the plant operations.

It is recommended that there be a timeline for the transfer of expertise to ensure that the local residents get to manage the plant. This is to avoid a scenario where after 15 years, the plant is operational and the experts are still running the plant while the local people are waiting on the sidelines. The local residents should be given all the skills necessary to run the plant. The local population must be involved in decisions taken within the plant even during skills transfer. This will help them learn how and why certain decisions are taken.

The ownership of the entire project by the project stakeholders is important in that it will ensure the sustainability of the benefits. While the stakeholders such as the local people, emerging farmers, farm workers and the business sector were not involved in the early stages of the project, their involvement regarding ownership will help them acquire some benefits from the project.

7.7.2 Reducing the environmental impacts of the ethanol project on the local people

A huge objective of a green economy is enhancing environmental quality. This implies that a project such as the ethanol project in Cradock should not affect environmental quality adversely but should enhance it. While this is a requirement in the green economy, the enhancement of the environment is also important to the local economy of Cradock and on the livelihoods of the local people. As mentioned before, the town is known as a clean air destination, and its economy and livelihoods are highly dependent on a clean environment.

This thesis proposes that the ethanol plant, as the main source of pollution in the local environment, must reduce its emissions on the environment. The plant must employ various measures such as filters that will ensure that its emissions on the local environment are minimised. Furthermore, the thesis proposes that Cradock uses a certain amount of the ethanol fuel on its motor vehicles, trucks transporting the feedstock and the machinery used in the agricultural processes of the project. This will ensure that the emissions from the motor vehicles are reduced and the local people realise the benefits of the use of ethanol as fuel. The thesis proposes that the emissions from the plant are monitored and regularly recorded to ensure that the plant does not exceed the limits. The reduction of the project's environmental effects means that the project will be able to contribute to the global green agenda without compromising the local environment.

7.7.3 Improving the living conditions of the farm workers

Improving the lives of the people is crucial in the transition towards a green economy. The ethanol project as a green economic model must improve the lives of the people particularly the farm workers. Firstly, the housing conditions must be improved for all farm workers. The houses the farm workers live in must be renovated, and proper doors must be installed as well as windows. The farm workers must have access to clean water and proper sanitation facilities. Furthermore, the farm workers must be paid salaries according to the Basic Condition Employment Act. This Act, as of 01 March 2015, requires that farm workers earn a minimum salary of R2, 606.78 per month.

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Appendix A: Request for participation



Corner of keizersgracht and tenant street zonnebloem

P. O. Box 652, Cape Town, 8000.

Email: jebethulisa@gmail.com

I am a masters student conducting research on the potential socio-economic implications of the ethanol project as a green economic model in Cradock. Would like to invite you to participate in the research. If you agree please sign below.

Signature

Date

Appendix B: Semi-structured interviews for government departments and agency.

Semi structured interviews- Department of Rural Development and Land Reform

What is your role in the Department of Rural Development and Land Reform?

How did the Department get involved in the ethanol project?

What is the role of the Department in the ethanol project?

What do you understand about the ethanol project?

How involved is this Department with other stakeholders in the ethanol project?

Do you understand the role of other stakeholders in the ethanol project?

25 farms were purchased by the Department as part of the project, what was the thinking behind purchasing the land?

Please explain the land acquisition process for the ethanol project?

An article published by Mail & Guardian suggested that commercial farmers were unhappy with the prices paid for their farms, what was the process of determining the price of the farms?

How many land beneficiaries were selected for the ethanol project?

How were the beneficiaries selected for the land allocation for the ethanol project?

Where are the beneficiaries from?

How are the beneficiaries allocated in the farms purchased for the ethanol project?

How important is it for the Department to ensure a balance in gender in projects like this?

Of the beneficiaries selected for the land allocation in the ethanol project how many males, females and youth?

Why the use of lease contracts?

What are the terms of the lease contracts issued for the emerging farmers?

How long are the lease contracts?

What happens to the emerging farmers when the contracts expire?

Do the emerging farmers understand the length of the contracts, what the contracts mean and what will happen after the contracts expire?

How does the use of lease contracts benefit the emerging farmers in the ethanol project?

How sustainable will the benefits of accessing land be for the emerging farmers in the ethanol project?

Does giving the emerging farmers access to land as part of the ethanol project close the gap between the emerging farmers and commercial farmers?

Are the benefits of the project in terms of the role of the Department limited to the land beneficiaries or the benefit the general public of Cradock?

If so how does the Department in terms of the ethanol project ensure benefits for the general public of Cradock?

The land purchased for the ethanol project is land that was used for food production. the ethanol project introduces a shift from food based agriculture to biofuel production. Are there any concerns in the Department about food security in Cradock?

Since its inception what changes has the Department seen in Cradock as a result of the ethanol project? in terms of rural development and land reform.

Who benefits from the ethanol project and who does not?

Semi-structure interview- Department of Local Economic Development

What is your role in the Department of Local Economic Development?

How did the Department get involved in the ethanol project?

What is the role of the Department in the ethanol project?

What do you understand about the ethanol project?

How involved is this Department with other stakeholders in the ethanol project?

Do you understand the role of other stakeholders in the ethanol project?

Since the inception of the ethanol project, what role has it played in the local economy of Cradock?

According to the Environmental Impact Assessment report the ethanol project will improve the local economy. What does an improved economy mean for the local people of Cradock?

One of the listed benefits of the ethanol project in the Environmental Impact Assessment Report is the creation of job opportunities for the local people. since its inception how many job opportunities have been created by the project?

How is the ethanol project going to create job opportunities for the local people?

How sustainable will the job opportunities be?

What role do job opportunities play in the local economy?

Agriculture contributes significantly to employment in the town. The ethanol project shifts the farms from commercial agriculture that has been providing employment to the production of biofuel feedstock. Will this shift affect employment in the agricultural sector?

What impact will this shift have on the local economy considering the role played by commercial agriculture in the local economy of Cradock.

From the Environmental Impact Assessment, a large proportion of the job opportunities created are part-time. What impact does part-time employment have on the local economy?

How is the ethanol project going to impact on the lives of the people of Cradock, particularly those that are not directly involved in the project?

How is the ethanol project going to benefit other industries within Cradock?

With the change in Cradock becoming an ethanol manufacturing hub, how will industries such as ecotourism be affected mainly because they rely on pristine environment?

With concerns about the degradation of environmental quality, how will the local economy be affected if the environment is degraded?

According to the Environmental Impact Assessment report on the ethanol project, local people will run the ethanol plant. This will happen after skills transfer from experts is adequate. How involved were the local people in the decision for them to run the ethanol plant?

What does this mean for local people?

How many people will/have receive this opportunity?

How have/ will the people be selected for this opportunity?

What will be done/ has been done to prepare local people for skills transfer?

How sustainable is this opportunity for the local people?

How involved is this Department in the determination of the price of the feedstock sold to the plant by the emerging farmers in the ethanol project?

Who benefits from the ethanol project and who does not?

Semi-structured interview- Agrarian Research Development Agency.

What is your role in the Agrarian Research Development Agency?

How did the Department get involved in the ethanol project?

What is the role of the Department in the ethanol project?

Why was it important for the Department to be involved in the ethanol project?

What do you understand about the ethanol project?

How involved is this Department with other stakeholders in the ethanol project?

Do you understand the role of other stakeholders in the ethanol project?

What is the relationship between this agency and the emerging farmers?

How is the relationship with the emerging farmers?

How active is the communication between this agency and the emerging farmers?

How has this agency prepared the emerging farmers for running economically viable farms?

Who decides the skills set needed by the emerging farmers to run economically viable farms?

Since the emerging farmers moved into the farms in 2013, have they been able to run economically viable farms?

Would the emerging farmers be able to apply what they have learnt from the agency outside the production of biofuel for the ethanol project?

Are there any challenges that the emerging farmers have/ experienced in the running of the farms?

What were you hoping to achieve with the mentorship programmes?

Were they effective?

Do you think that the training and mentorship of the emerging farmers offered by the agency closes the gap between emerging farmers and commercial farmers?

How has the ethanol project impacted on the emerging farmers?

Does the agency have a relationship with the farm workers?

If so, what is the relationship with the farm workers on the ethanol farms?

How has the ethanol project impacted on the farm workers?

How has the ethanol project impacted on the local people of Cradock?

Who benefits from the ethanol project?

Cradock is referred to as a “clean destination” how will this project impact air quality of this town?

Projects like these are known to use up large quantities of water, how do you plan on ensuring that there is water for all agricultural activities, considering the fact that the town is already getting additional water from the orange scheme?

What systems are put in place to make sure that the farms’ production is sustainable for generations to come?

What are the environmental benefits of the project towards the town of Cradock?

How is the ethanol project going to contribute to the local economy?

How is the ethanol project going to contribute to agriculture locally?

How is the ethanol project going to affect food security in the town considering that the farms purchased for the project will shift from food based agriculture to producing fuel feedstock?

The project is expected to create employment for people, how sustainable will the jobs be?

Do you have an estimation of how many jobs have been created by the project so far?

If yes, how many?

Do people still have those jobs?

Do you think the ethanol project and its benefits will be sustainable? Please explain your answer.

Semi-structured interview- Department of Agriculture.

What is your role in the Department of Agriculture?

How did the Department get involved in the ethanol project?

What is the role of the Department in the ethanol project?

Why was it important for the Department to be involved in the ethanol project?

What do you understand about the ethanol project?

How involved is this Department with other stakeholders in the ethanol project?

Do you understand the role of other stakeholders in the ethanol project?

How often is the interaction between this Department and the emerging farmers?

How is the relationship between this Department and the emerging farmers in the ethanol project?

How did the decision to place the emerging farmers who are part of the ethanol project under maize and lucerne production come about?

How has the decision benefited the Department?

How has that decision benefited the emerging farmers who are part of the ethanol project?

What has the Department through the maize and lucerne production taught the emerging farmers in terms of running the farms?

What role do you play in terms of the marketing of the emerging farmers' products?

How do you see this ethanol project benefiting the emerging farmers who are part of the ethanol project?

How sustainable are the benefits to the emerging farmers as part of the ethanol project?

What impact does the ethanol project have on agriculture in Cradock?

In future how do you see the ethanol project impacting on agriculture in Cradock?

What impact does the ethanol project have on the general public of Cradock?

Commercial agriculture plays a significant role in terms of providing food and employment in the town. What impact will the shift to biofuel production have on food security?

What impact will the shift have on employment in agriculture in the town of Cradock?

Do you have an idea of how much employment the ethanol project has created in agriculture so far?

The Environmental Impact Assessment report on the ethanol project suggested that the project will have more part time job opportunities than permanent job opportunities. What impact does this have on agriculture in Cradock, particularly its contribution in providing employment.

In terms of producing biofuel feedstock, how prepared is the Department? What goes into preparing for this kind of production?

projects like the ethanol project are known to use up large quantities of water, how do you plan on ensuring that there is water for all agricultural activities, considering the fact that the town has had water shortage problems in the past?

Are there concerns about the soil considering that the ethanol project introduces a different kind of production to the normal food crops?

How involved is the Department in the pricing of the biofuel feedstock?

How is the relationship between the Department and the farm workers in the ethanol project farms?

What has the Department done for the farm workers in the ethanol project?

What impact does the ethanol project have on the lives of the farm workers?

Who benefits from the ethanol project and who does not?

Appendix C: Semi-structured interview for the emerging farmers

Semi-structured Interviews- emerging farmers

Where are you from?

How long have you worked in the agricultural industry?

What kind of experience do you have in this industry?

What was your occupation before the ethanol project?

How did the opportunity to be involved in this project come about?

What was your initial thought on the project when you first heard about it?

What do you understand about the ethanol project?

Before the ethanol project did you have experience in running a farm?

Did you have interest in producing biofuel feedstock?

Do you have ownership of livestock?

Did you understand the project and what was expected from you as the land beneficiary of the project?

Do you understand what lease contracts are?

How long are your lease contracts?

What will happen after the lease contracts expire?

Before moving into the farms what sort of training did you go through to prepare you for your role in the ethanol project?

Was the training effective?

If not, what did you wish could have been added to the training?

Did you communicate your wishes with the people responsible for the training?

Do you think the skills picked up from the training would benefit you outside of the ethanol project?

Are the skills transferable?

Do you feel that the skills learnt help in closing the gap between emerging farmers and commercial farmers? Please explain your answer.

Which Department are you directly in contact with concerning the ethanol project?

How is the relationship between you and the Department you are directly in contact with?

What kind of support are you receiving from this Department?

What kind of support are you receiving from the other stakeholders in the ethanol project?

How is your relationship with the other emerging farmers?

Since being involved in the project how has your life changed?

Has the ethanol project improved your well-being? Explain your answer

How has the ethanol project changed the lives of your family?

How do you see the ethanol project affecting your life in future?

How was the project affected the farm workers on your farm?

Are your farm workers new or old workers who were there before the ethanol project?

How many permanent workers do you have?

How many temporal workers do you have?

How do you secure workers for the farm?

How is the relationship between you and your farm workers?

Would you say that the lives of the farm workers are better working for you than the previous farm owner? Please explain

How are the farm workers paid?

How much are the farm workers paid?

Who determines the salaries to pay the farm workers?

What are the working hours for the farm workers?

Who determines the working hours?

What are you currently producing on the farms?

How did you reach your choice of products to produce on your farm?

Who do is your market for your produce?

How do you determine the price for your produce?

Are you prepared to shift from what you are producing to fuel feedstock production? please explain.

How are you ensuring that the soil is well taken care of?

How are you in your farm ensuring that water is used responsibly?

How do you ensure that you produce maximum produce?

In your opinion how is the project going to impact the lives of the people of Cradock?

Appendix D: Questionnaire for local households

Questionnaire for residents of the Cradock community

Please answer the following questions.

Please mark your answers with an X where required

Basic information

Male	
Female	

1. Gender

2. Age

Below 20		
21 – 30		
31 – 40		
41 – 50		
51 and above		
No formal education		

Completed primary education (Grade 7 and below)	
Secondary education (Grade 8-11)	
Matric (Grade 12)	
Matric plus diploma/degree	
Others please specify	

3. Highest educational qualification obtained?

4. Current occupation?

Unemployed	
Self employed	
Government service	
Private sector	
Other please specify:	

Questions on the ethanol project.

5. How did you first hear about the project?

.....

6. When you first heard about the project what were your initial thoughts about it?

.....

7. What you understand about the ethanol project?

.....

8. How was the general public of Cradock informed about the ethanol project?

.....

9. Do you feel like the people of this town's opinions about the project were taken into account during the beginning of the project? Yes/No

10. Please explain your answer
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.....

11. What were the promises made beginning of the project?
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12. Have these promises been fulfilled?
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13. How much change has the ethanol project brought to town since it was first introduced?
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14. How do you feel about the project so far?
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.....

15. What have you individually gained from the project so far?
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.....

16. Do you think will benefit from this project in future? Yes/No

17. If yes what do you think you will benefit from it, if no why do you think you will not benefit?
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18. What do you think the town will benefit from the project?
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.....
.....

19. In your opinion do you think the ethanol project will address unemployment in Cradock? please explain your answer
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.....

20. Do you think this project will help eradicate poverty in Cradock? Yes/No

21. If yes how do you think this project will eradicate poverty, if no why do you think this project will not eradicate poverty?
.....

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.....
22. Has the town of Cradock been negatively affected by the ethanol project? Yes/No
23. If yes how has it been affected?
.....
.....

Thank you

Appendix E: Questionnaire for the farm workers

QUESTIONNAIRE: FARM WORKERS AT THE ETHANOL PROJECT FARMS

**Please answer the following questions.
Please mark your answers with an X where required**

1. How long have you been a farm worker?

2. Did you work at this farm before the ethanol project?

3. How did you find out about the ethanol project?

4. What do you understand about the ethanol project?

5. How many hours a day do you work?

6. How many days off do you get a week?

7. Have you had to work longer hours here?

Yes___

No___

8. If **YES**, were you compensated for working longer hours?

If **NO**, why were you not compensated?

9. Is there a difference between the money you were paid before the project and the money you are paid now?

Yes__

No__

10. If yes, what is the difference?

11. How would you rate the working conditions?

<u>Characteristic</u>	<u>Very Good</u>	<u>Good</u>	<u>Fair</u>	<u>Poor</u>	<u>Unacceptable</u>
Water facilities					
Food storage facilities					
Rest room facilities					
Health and safety					
General working conditions					

12. Are there cases where you or a fellow farm worker had to be taken to hospital or clinic?

Yes__No__

13. If **Yes** what was the problem?

14. Would you say the project has improved your well-being?

Yes__

No__

15. Please explain your answer.

16. Would you say the project has benefited all farm workers?

Yes__

No__

17. Please explain your answer.

18. Has the project contributed to farm development?

Yes___

No___

19. Please explain your answer.

20. In your opinion, has the people of Cradock in general benefited from the project?

Yes___

No___

21. If yes how have they benefited?

22. How is your relationship with the emerging farmer?

23. Do you think the project will eradicate poverty and reduce unemployment in Cradock?

Yes___

No___

24. Please explain your answer

Appendix F: Questionnaire for the business sector

QUESTIONNAIRE: TOURISM SECTOR

**Please answer the following questions.
Please mark your answers with an X where required**

1. How did you first hear about the project?

.....

2. What were your initial thoughts about the ethanol project?

.....
.....
.....

- 3. Do you understand what the ethanol project is?
Yes__ No_
- 4. If yes, what do you understand about the ethanol project?
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.....
.....
- 5. Did you have concerns about the ethanol project?
Yes_ No_
- 6. Please explain your answer?
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.....
.....
- 7. Have your concerns been addressed?
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.....
- 8. What impact has the ethanol project had on your business?
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- 9. What impact has the ethanol project had on your industry?
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.....
- 10. In future what effect do you think the ethanol project will have on both your business and industry?
.....
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.....
- 11. In your opinion do you think the ethanol project has had an effect on other business sectors in Cradock? please explain your answer
.....
.....
.....
- 12. In future do you think the ethanol project will have an effect on other business sectors?
.....
.....
.....
- 13. In your opinion what effect does the ethanol project have on the local economy?
.....
.....
.....
- 14. In your opinion, do you think the ethanol project reduces unemployment in Cradock?
please explain

.....
.....
.....
15. In your opinion, how has the ethanol project impacted the local people of Cradock?

.....
.....
.....

16. Cradock is known as a clean air destination, have there been changes to the air since the introduction of the ethanol project?

Yes_ No_

17. In future do you think the town's air quality will change due to the ethanol project?

Yes_ No_

18. Please explain your answer

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.....
.....

19. Has there been a change in the "sense of place" in Cradock since the introduction of the ethanol project?

Yes_ No_

20. Please explain your answer

.....
.....
.....

21. Are there any changes in Cradock due to the ethanol project?

Yes_ No_

22. Please explain your answer

.....
.....
.....

Thank you

QUESTIONNAIRE: AGRICULTURAL RETAIL

Please answer the following questions.

Please mark your answers with an X where required

1. How did you first hear about the project?

.....
.....
.....

2. What were your initial thoughts about the ethanol project?

.....
.....
.....

3. Do you understand what the ethanol project is?

Yes__ No_

- 4. If yes, what do you understand about the ethanol project?
.....
.....
.....
- 5. Did you have concerns about the ethanol project?
Yes_ No_
- 6. Please explain your answer?
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.....
- 7. Have your concerns been addressed?
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- 8. What impact has the ethanol project had on your business?
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- 9. What impact has the ethanol project had on your industry?
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- 10. In future what effect do you think the ethanol project will have on both your business and industry?
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- 11. In your opinion do you think the ethanol project has had an effect on other business sectors in Cradock? please explain your answer
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- 12. In future do you think the ethanol project will have an effect on other business sectors?
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.....
- 13. In your opinion what effect does the ethanol project have on the local economy?
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.....
.....
- 14. In your opinion, do you think the ethanol project reduces unemployment in Cradock? please explain
.....
.....
.....

15. In your opinion, how has the ethanol project impacted the local people of Cradock?

16. As the agricultural retail sector do you think the ethanol project will have an effect on food security, particularly because the farms will shift from food based agriculture to fuel feedstock production?
 Yes_ No
17. Please explain your answer

18. Has there been a change in the "sense of place" in Cradock since the introduction of the ethanol project?
 Yes_ No_
19. Please explain your answer

20. Are there any changes in Cradock due to the ethanol project?
 Yes_ No_
21. Please explain your answer

Thank you

QUESTIONNAIRE: HOSPITALITY SECTOR

**Please answer the following questions.
 Please mark your answers with an X where required**

1. How did you first hear about the project?

2. What were your initial thoughts about the ethanol project?

- 3. Do you understand what the ethanol project is?
Yes__ No_
- 4. If yes, what do you understand about the ethanol project?
.....
.....
.....
- 5. Did you have concerns about the ethanol project?
Yes_ No_
- 6. Please explain your answer?
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.....
- 7. Have your concerns been addressed?
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- 8. What impact has the ethanol project had on your business?
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- 9. What impact has the ethanol project had on your industry?
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- 10. In future what effect do you think the ethanol project will have on both your business and industry?
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- 11. In your opinion do you think the ethanol project has had an effect on other business sectors in Cradock? please explain your answer
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.....
- 12. In future do you think the ethanol project will have an effect on other business sectors?
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- 13. In your opinion what effect does the ethanol project have on the local economy?
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- 14. In your opinion, do you think the ethanol project reduces unemployment in Cradock? please explain

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15. In your opinion, how has the ethanol project impacted the local people of Cradock?

.....
.....
.....

16. Has there been a change in the "sense of place" in Cradock since the introduction of the ethanol project?

Yes_ No_

17. Please explain your answer

.....
.....
.....

18. Are there any changes in Cradock due to the ethanol project?

Yes_ No_

19. Please explain your answer

.....
.....
.....

Thank you

Appendix G: Ethical clearance



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Office of the Chairperson Research Ethics Committee	Faculty of Applied Sciences
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The Faculty Research Committee, in consultation with the Chair of the Faculty Ethics Committee, have determined that the research proposal of..THULISA JEBE.. for research activities related to the MTech / DTech: ENVIRONMENTAL MANAGEMENT at the Cape Peninsula University of Technology requires / does not require ethical clearance.

Title of dissertation/ thesis:	Socio-economic implications of ethanol production as a green economic model in Cradock, Eastern Cape
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Comments (Add any further comments deemed necessary, eg permission required)
Research activities are restricted to those detailed in the research proposal.

 Signed: Chairperson: Research Ethics Committee	06/07/2015 Date
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 Signed: Chairperson: Faculty Research Committee	 Date
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