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Acronyms

AMA	Agricultural Marketing Authority
ARDA	Agricultural Rural Development Authority
CAP	Common Agricultural Policy
CCD	Climate Compatible Development
COMESA	Common Market for Eastern and Southern Africa
CSA	Central Statistical Agency
CSR	Corporate Social Responsibility
DA	Development Agents
DRC	Democratic Republic of Congo
ECAT	Ethnographic Content Analysis Techniques
EU	European Union
FAO	Food and Agricultural Organisation for the United Nations
FGDs	Focus Group Discussions
FTA	Free Trade Area
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GMB	Grain Marketing Board
GMOs	Genetically Modified Organisms
HDI	Human Development Index
IPC-IG	International Policy Centre for Inclusive Growth
KA	Kebele Administration
LDCs	Least Developed Countries
LED	Local Economic Development
LGAs	Local Government Authorities
NGOs	Non-Governmental Organisations
NTBs	Non-Tariff Barriers
OLS	Ordinary Least Squares
SADC	Southern African Development Community
SAPs	Structural Adjustment Programmes
SNNPR	Southern Nations, Nationalities, and Peoples' Region
SPS	Sanitary and Phytosanitary measures
SPSS	Statistical Package for Social Sciences
UNDP	United Nations Development Programme
USA	United States of America
WHO	World Health Organisation
WOA	Woreda Office of Agriculture
ZIMASSET	Zimbabwe Agenda for Sustainable Social and Economic Transformation
ZIMRA	Zimbabwe Revenue Authority
ZIMSTAT	Zimbabwe National Statistics Agency
ZRA	Zambia Revenue Authority
ZRP	Zimbabwe Republic Police

Food Security and Trade Protectionism: The Impact of COMESA's Agricultural Programmes in Addressing Trade Protectionist Challenges on Zimbabwean Maize Imports

Solomon Muqayi and Charity Manyeruke

Abstract

The main focus of this chapter was to assess the relationship between food security and trade protectionism. It also assesses the impact of the Common Market for Eastern and Southern Africa's agricultural liberalisation programmes in addressing trade protectionist challenges on importation of maize in Zimbabwe. The overall objective of this study was to evaluate the trade protectionist barriers constraining the importation of maize in Zimbabwe. The study offers some useful recommendations for promoting the availability and accessibility of maize products in Zimbabwe. The major hypothesis underlying this study is that trade protectionist measures practised by Zimbabwe on maize imports are likely to worsen food security challenges, and prolong food unavailability and inaccessibility in Zimbabwe. The study employed both qualitative and quantitative data gathering methodologies. Systematic and purposive sampling techniques were employed. Statistical Package for Social Sciences software was applied to analyse the quantitative data whilst content analysis was employed for analysing the qualitative data. The authors noted that there are few studies that link food security to trade protectionism, yet trade is fundamental for the development of Zimbabwe's maize industry. The paper was developed in the framework of the liberalism theory. Since 1980, Zimbabwe has been the bread-basket for countries in the Southern Africa region. However, this was adversely affected in the year 2000, when the government implemented the Land Reform programme, which severely disrupted maize production and led to Zimbabwe becoming heavily dependent on maize imports. The importation of maize in Zimbabwe is marred by a series of trade protectionist features that have worsened Zimbabwe's food insecurity situation. These protectionist measures include a ban on genetically modified maize imports, corruption, long documentation procedures, sanitary and phytosanitary (measures, and border delays.

Keywords: Food security, maize, trade protectionism, liberalisation, borders, food availability and accessibility.

1. Introduction

1.1 Background to the Study

Maize is the key staple cereal crop in the Zimbabwean agricultural sector. About 80 per cent of rural households grow maize, followed by groundnuts [32 per cent] (Zimbabwe Vulnerable Assessment Committee 2013). Zimbabwe produced 2.1 million tonnes of maize in the year 2000, and there was a steep decline to 800,000 tonnes in 2014. The country's maize production declined by 1.3 million tonnes in 2014 compared to the year 2000 (Cox 2014). Zimbabwe consumes about two million tonnes of maize per year (World Food Programme 2013). Poor trends in Zimbabwe's maize production are largely attributed to insufficient investment in irrigation rehabilitation as well as erratic and high cost of agricultural inputs, such as fertilisers, seeds and chemicals, which contributes to prolonged unavailability and inaccessibility (Food and Agricultural Organisation 2014). The decline of maize production in Zimbabwe has resulted in a severe crisis in food security, with the country having shifted from a producer of large amounts of maize to one of the highest importers of maize. Maize imports from South Africa, Zambia, Mozambique, and Malawi have played a fundamental role in rescuing Zimbabwe from a daunting food security crisis (World Food Programme 2014). However, the maize importation process is marred by a series of trade protectionist challenges that have worsened Zimbabwe's food security challenges (Cox 2014). This study, therefore, discusses several trade protectionist challenges practised by Zimbabwe on maize imports, such as border management challenges, banning of genetically modified (GM) maize, sanitary and phytosanitary (SPS) measures, and corruption at the borders.

1.2. Statement of the Problem

The link between food security and trade protectionism is becoming a central issue in the contemporary international political economy. Food insecurity has been one of the major daunting problems experienced at national level in Zimbabwe. For example, a 2013 report of vulnerability assessment showed that about 2.2 million people (25 per cent of the population) in Zimbabwe face severe food insecurity challenges (Zimbabwe Vulnerable Assessment Committee 2013). In Zimbabwe, prevalence of poverty and extreme poverty were estimated at 63 per cent and 16 per cent, respectively (Zimbabwe National Statistics Agency [ZIMSTAT] 2013). Even though there are very high levels of poverty, hunger, and starvation in Zimbabwe, the government still implements trade protectionist measures that restrict maize imports at the national borders in the face of huge maize shortages. This study seeks to determine why the Zimbabwean government imposes trade protectionist measures at the borders while the country really needs maize imports to save the entire population from a food security crisis. No study has been conducted that links food security and trade protectionism, in relation to maize imports, for Zimbabwe. The study provides recommendations and strategies that can be

adopted by the Zimbabwean government and policymakers in order to improve maize availability and accessibility.

1.3. Objectives of the Study

The overall objective of this study was to evaluate the trade protectionist barriers constraining the importation of maize in Zimbabwe. Specifically, this study aimed to:

- a) evaluate the effects of trade protectionism on food security; and
- b) indicate policy measures and practices which the Zimbabwean government and other related institutions can implement in order to improve Zimbabwe's food security status.

1.4. Methodology

The methodology comprises information regarding sampling and population, data gathering and data analysis. The methodology applied in this study was influenced by Creswell (2003), who proposed the mixed methods approach, which involves combining quantitative and qualitative research techniques. Thus, the study benefited from triangulation at different stages and processes, such as data gathering, sampling and data analysis. Data gathering methods included interviews, questionnaires, observation, and documentary search. These methods ensure covering of both primary and secondary sources. Rahman and Yeasmin (2012) note that combining primary and secondary data collection methods helps to overcome the intrinsic biases, weaknesses and problems that come from a single method. Thus, primary and secondary data collection methods complement each other in order to improve reliability and validity of data obtained from the data collection process.

In selecting respondents for interviews and questionnaires, the study applied systematic sampling and purposive sampling techniques. Systematic sampling is a probability sampling technique which is referred as a statistical method involving the selection of units from an ordered sampling frame (Thompson 2012). The application of systematic sampling makes use of a starting point and a fixed period interval for selecting units. Jawale (2012) notes that when applying systematic sampling the study has to number the cases in the population sequentially:

Divide the number of cases in the population (N) by the desired sample size (n) to determine the skip factor (k) that is, $k = N/n$.

The study used a sampling frame of 400, a number that was provided by the Zimbabwe Revenue Authority database. Thus, about 400 maize traders transit Chirundu One-stop Border Post (OSBP) from Zambia to Zimbabwe on weekly bases. The study, therefore, used 400 as the study population. According to Eng (2003), the investigator would select a minimum of 10 per cent of the population as the sample size. In this case, the study could have a sample size of 40 from the population of 400 cross-border maize traders. However, the study increased the sample size to 100, which is

supported by Dell *et al.* (2002), who articulate that increasing the sample size helps to increase the accuracy of the study. Thus, using the formulae $k = N/n$, the study calculates the sampling interval as:

$$400/100 = 4$$

The interval was set as four (4) because the researcher selected one trader out of every four maize traders crossing Chirundu OSBP. The researcher sought permission from the Zimbabwe Revenue Authority (ZIMRA) to use their Chirundu OSBP desk. Thus, all the maize traders declare their consignments at the ZIMRA desk when transiting the border post. Over a period of one week, the researcher distributed the 100 questionnaires to the maize traders, who declared their maize consignments at the ZIMRA desk. The study also applied purposive sampling, which is sometimes referred to as a judgmental sampling tool. It involves the deliberate selection of a respondent based on the qualities he or she possesses. Purposive sampling falls under non-probability sampling, whereby respondents who are willing and able to give data by virtue of experience are identified (Lewis and Sheppard 2006). The study, accordingly, identified all key informants based on their judgments. Various factors were considered in choosing respondents for key informant interviews, such as officials/authorities in specific organisations, people who had attended food security meetings and negotiations; governmental officials who work on either the Common Market for Eastern and Southern Africa (COMESA) desk or desk for international trade; customs officials; traders involved in exporting and importing maize to the COMESA region; people involved in the formulation or implementation of food security policies; people involved in border management; and representatives of traders.

The study used interviews in soliciting qualitative data. There were four major types of interviews, namely, face-to-face interviews, telephone interviews, group interviews, and job interviews (Neuman 2011). The study applied two telephone interviews. Face-to-face interviews were the most commonly used interviews. These interviews allow respondents to clarify issues raised by the interview questions and offer further explanations (Thompson 2012). Key informant interviewing involves identifying the knowledgeable respondents in a community on the study topic (Seidman 2006). Using key informants helps in gathering data from individuals with first-hand knowledge of the community, for instance, professionals, community leaders and experts. The main advantage of having key informants is that they are highly flexible, therefore, detailed and rich data can be collected (Seidman 2006). The study used a list of interview guide questions. The researcher conducted all the interviews. This helped to foster intimacy and greater understanding of the research topic. The study used 30 face-to-face interviews with respondents from various organisations and government ministries, such as the Ministry of Agriculture, Grain Marketing Board (GMB), Research Council of Zimbabwe, Agricultural Marketing Authority, ZimTrade, Ministry of

Industry and Commerce, ZIMRA, Zambia Revenue Authority (ZRA), Shipping and Forwarding Agents' Association of Zimbabwe (SFAAZ), Shalom Clearing Agency, and maize traders. Interviewees were chosen on the basis of being directly involved in either food security policymaking or trading of maize across the borders.

The study also administered survey questionnaire to solicit primary data from the 100 cross-border (Chirundu OSBP) maize traders. All the questionnaires were filled adequately; hence the response rate was 100 per cent. Documentary search was also used to solicit data for the study. The documents collected from various institutions provided statistics as well as a historical background of the development of both Zimbabwe and COMESA food security policies. The study also employed the field observation technique to collect primary data. The researcher of this study started the observations at Chirundu OSBP in 2012, which helped the researcher to build an in-depth understanding of various issues regarding maize trading and food security.

Both quantitative and qualitative data analysis techniques were employed in the study. Content analysis was applied in analysing qualitative data, which was obtained from interviews, documents and observations. When applying content analysis, one has to consider the meaning of phrases, words, sentences, pictures, simples, paragraphs, and ideas (Hsieh and Shannon 2005). Some relevant themes were developed for this study. Thematic analysis involves branching of data into major ideas and themes based on the content. Usually, thematic analysis forms the first step in analysing qualitative data (Krippendorff 2001). For this study, each theme was clearly defined in order to avoid unnecessary repetition. The themes were then used to formulate some headings and subheadings. Coding is usually performed after the themes have been developed. The researcher familiarised himself with data collected, which helped to simplify the data analysis process. The coding process used in this study involved the application of some verbal descriptions to small chunks of data. After coding, the researcher embarked on a meticulous verification process in order to check the consistency of coding. This helped to increase the validity and reliability of the data analysis process.

Quantitative data was gathered from 100 questionnaires that were filled by cross-border maize traders at Chirundu OSBP. The questionnaire used for this study consisted of closed-ended and open-ended questions. The researcher analysed the responses from open-ended questions using content analysis while Statistical Package for Social Sciences (SPSS) version 16.0 was used to analyse data obtained from closed-ended questions. Blumenthal (2010) notes that SPSS is a computer software package used to analyse data. It can take data from virtually any type of file and use the data to create tabulated charts, plots of distribution and trends, reports, complex statistical analysis, and descriptive statistics. The researcher received assistance from the SPSS experts at the Department of Statistics, University

of Zimbabwe. These experts helped in coding the questionnaire and feeding the data from questionnaires into the computer. The application of SPSS made it easier to produce statistics describing the key features and characteristics of cross-border maize traders, such as gender, business experiences and operational challenges. These key features and characteristics were presented using graphs, pie charts and tables.

1.5. Organisation of the Chapter

This chapter has four major sections. The first section, which is the introduction, contains the background, statement of the problem and methodology. The second section consists of the literature review and theoretical framework, and also presents the concepts guiding the study. The third section presents the findings, including outlining the impact of trade protectionist measures on the Zimbabwean maize sector. The topics and subtopics in Section Three are relevant in showing the nature and characteristics of trade protectionism that derails Zimbabwe's maize imports, thereby adversely impacting on food security. The fourth section presents the conclusion, which contains fundamental aspects of the study such as key findings, strategies, recommendations, and overall conclusion.

2. Literature Review and Theoretical Framework

2.1. Food Security Concept

The concept of food security falls under the discipline of human security. Human security, as a concept, was introduced in 1994 by the United Nations Development Programme (UNDP). The new concept of human security equates security with people rather than territories, and with development rather than arms (United Nations [UN] 2014). Basically, the major reason for introducing human security in international relations was to overcome the weaknesses of state security. State security was condemned for failing to consider complex vulnerabilities and risks faced by humans (Simane *et al.* 2012). According to Chi-Thao (2012), state security is highly criticised because of its rigidity, as it puts much focus on states whilst neglecting the requirements of human beings. State security puts more emphasis on issues, such as arms building, arms race, physical confrontation, territorial invasions, balance of power, and *détente* [a relaxing of tension, especially between nations, as by negotiations or agreements.]. The introduction of human security in the discipline of international political economy resembles a paradigm shift from high politics to low politics, which can be referred to as a move from state security towards human security. The main components of human security, as outlined by UNDP (2013) are personal security, economic security, health security, political security, community security, environmental security, and food security. Food security focuses on a wide array of issues, such as the production, distribution and trading of food products. This study, therefore, puts more emphasis on evaluating the relationship between trade protectionism and food security.

The 1996 World Summit on Food Security defined food security as, “When all people at all times have access to sufficient, safe, nutritious food to maintain a healthy and active life” (World Health Organisation [WHO] 2013: Web). It involves both physical and economic requirements for people to meet their food preferences and dietary needs. The absence of good dietary requirements therefore amounts to a plethora of health effects, such as food-borne diarrhoea and malnutrition, amongst others. According to WHO (2013), food security is basically built on three main pillars:

- a) food availability, which entails sufficient quantities of food available on a constant basis.
- b) food access, which involves having sufficient resources to obtain appropriate foods for a nutritious diet.
- c) food use, which refers to appropriate use based on knowledge of basic nutrition and care as well as adequate water and sanitation.

According to the Food and Agricultural Organisation (FAO), food insecurity is not only a national or regional issue but it is also a challenge that is experienced at global level. Globally, over 800 million people live without adequate food. Over 60 per cent of the world’s undernourished people live in Africa and Asia. Africa has the highest proportion of hungry people, amounting to 33 per cent while Asia’s hungry account for 16 per cent (FAO 2013). Food security is comprehensively linked to issues of sustainable development. It adequately corresponds to complex issues, such as sustainable economic development, trade and environment. One can conclude that food security is met when households do not experience hunger and starvation.

In the contemporary international political economy, food security is one of the major topical issues being studied by several scholars. Manyeruke *et al.* (2013), FAO Zimbabwe (2012), and Matshel (2009) offered an evaluation of the challenges facing food production in Zimbabwe, and their major finding was that climate change is one of the primary factors contributing to food insecurity in Zimbabwe. In addition, a study conducted by the Zimbabwe Vulnerable Assessment Committee (2013) indicates that Zimbabwe’s food insecurity is as a result of the inefficiencies and incompetence of the GMB. This is supported by Zhou (2012) who argues that GMB faces severe operational challenges, such as lack of reforms, lack of competitiveness, inability to structure the board to international standards, and slowness in responding to urgent matters. However, these studies focussed more on domestic challenges to food security without focusing on the challenges affecting Zimbabwe’s maize imports. This study, therefore, provides an evaluation of the relationship between food security and trade protectionism. It also presents a detailed evaluation of the impact of biotechnology on food security. The studies conducted by Lewin (2007) and Mudzonga *et al.* (2009) show that the application of biotechnology systems, such as Genetically Modified Organisms (GMOs), is detrimental to the food sector of Zimbabwe and other African countries.

However, this study offers some findings and recommendations which are contrary to Mudzonga *et al.* (2009), and suggests that the adoption of policies that support the execution of GMOs in Zimbabwe could be the best alternative in rescuing Zimbabwe from the food security crisis.

Trade protectionism is one of the central aspects discussed in this chapter. Trade protectionism refers to the practice of sheltering domestic industries and producers from foreign competition (Watson and James 2013). Many of the relevant studies on agricultural trade protectionism were conducted in developed countries in the United States of America (USA), Europe and East Asia. Examples of past studies that were conducted in developing countries include Aksoy and Beghin (2005), Magness (2009), Hufbauer (2010), Action Aid (2009), and Oxfam (2009). Little attention has been given to both developing and underdeveloped countries, yet there is an ever-increasing rate of agricultural trade protectionism in developing countries. Kameri-Mbote (2008, 34) states, “While most complaints against agricultural protectionism have customarily been directed towards developed countries, less scepticism has been raised regarding the rationale for agricultural protectionism in developing countries”. This view is also supported by Houck (2008) and Aksoy and Beghin (2003), who argue that food tariffs are higher in developing countries than in developed countries. However, this study desists from the tradition of studying agricultural trade protectionism in developed countries; it therefore unravels agricultural trade protectionism practised by developing countries, specifically the Zimbabwean government and its trading partners within the COMESA region. In addition to the above argument, many studies conducted so far focus on the agricultural protectionist policies and programmes implemented by developed countries while neglecting the policies and programmes of developing countries. Examples of the policies that are widely researched include the European Union’s Common Agricultural Policy (CAP) and the US Farm Bill. Scholars who conducted such studies include Colman (2001), FAO (2010), and Borrell and Hubbard (2000). Furthermore, international trade analysts and scholars are placing emphasis on the ‘Buy American’ policy while giving less attention to the ‘Buy Zimbabwean’ policy. It appears that there is a literature gap on Zimbabwe’s agricultural protectionist policies. One can observe that the costs and benefits associated with the ‘Buy Zimbabwean’ policy need to be comprehensively studied.

Available literature gives a broad dimension to the study of COMESA’s regional integration. Many studies that have been conducted on COMESA’s trading activities do not focus on only a few selected products. Mathema’s (2008) study focuses on various products. Some of the products mentioned in that study include gold, iron, copper, maize, wheat, rice, vegetables, tobacco, and sugar. Chipeta (1997) also focuses on several products such as foods, clothes, spare parts, construction materials, and tools. In most cases, studies that assess many products usually lack a detailed analysis of specific items. However, the main strength of this

chapter is that it focuses on just one product — maize. This lends more originality to the study since no study of this type has been conducted before.

2.2. Liberalism Theory

This section links the theoretical underpinnings to the study topic. The study was conducted within the framework of the liberalism theory which is one of the major theories of international political economy. The theory of liberalism, in its early stages, was originally known as classical liberalism (Wells 2014). It was formulated by the early liberal thinkers, such as David Ricardo (1772–1823), Giuseppe (1805–1872), Jean Jacques Roseau (1712–1778), Immanuel Kant (1724–1804), Adam Smith (1723–1790), John Stuart Mill (1632–1704), John Locke (1632–1704), and Thomas Hobbes [1588–1679] (Gaus and Courtland 2011). Out of these liberal thinkers, this study focuses much on the ideas of Adam Smith because his writings and views offer a comprehensive link between economy and politics. Furthermore, Smith’s principles are the most applicable in the discipline of international political economy. This opinion is strongly buttressed by Kelly (2004, 3) who states, “Political liberalism involves the recognition of equal status and what is often referred to as the strategy of privatization”. Thus, political liberalism and economic liberalism are inextricably linked.

The theory of liberalism has some basic tenets and principles that are constantly respected by several scholars. Wells (2014) notes that the major principles and tenets of liberalism raised by Adam Smith in his works include free trade; free flow of capital; competition in the markets; limited role of the government in the economy; and specialisation. However, the fundamental assumptions of free trade are given by Mccalla (2006, 330) who indicates:

The main guiding assumptions for free trade are: (i) full or pure domestic and international trade, (ii) factors are mobile within and between industries inside the nation but immobile between nations, (iii) full employment of all resources exists, (iv) a currency such as gold exists which is multilaterally convertible at approximately stable rates, and (v) a monetary system exists which can either automatically or be centrally adjusted to promote smooth or rapid equilibrium of international balance of payments.

Thus, the concept of free trade (trade liberalisation) emphasises the free movement of goods, finance, capital, and services. In other words, free trade stresses the significance of balance of trade in international trade. The concept of balance of trade is actually based on maintaining equilibrium between imports and exports (Salvatore 2011). The study found that trade protectionism can be used as a measure to improve Zimbabwe’s balance of trade, thus restricting maize imports whilst promoting the increment of domestic maize production.

Adam Smith's liberalist views are centred on the notion that the government should stay out of the economy and should allow domestic and international markets to regulate themselves (Sen 2010). Smith, cited in Butler (2011), further alludes that government's intervention in the economy derails efficiency as well as causes distortions in the markets. The study noted that in Zimbabwe, the government intervenes in several ways in relation to Zimbabwe's trade with COMESA member states. Thus, the Zimbabwean government is directly involved in the issuance of trade permits, bio-safety permits, SPS certificates, and clearance of products at the borders. The involvement of the government in such key processing causes many delays and bureaucracy, thereby derailing the development of Zimbabwe's maize trade.

3. Results and Discussion

This section contains a discussion of several key issues such as the relationship between food security and trade protectionism; characteristics and demographic details of Zimbabwe's maize importers; protectionist challenges hampering the importation of maize into Zimbabwe; and statistics indicating Zimbabwe's maize imports from neighbouring countries.

3.1. Zimbabwe's Maize Imports and Characteristics of Maize Traders

Historically, Zimbabwe used to play a leading role, especially in the production and distribution of maize and other related cereals to the extent that the Southern Africa region used to depend on food produced by Zimbabwe. Zimbabwe was mandated to oversee food security issues in the whole Southern African Development Community (SADC) region (Chiwara 2014). This role was later threatened due to a plethora of challenges, such as the implementation of structural adjustment programmes (SAPs), perennial droughts, sanctions, political and economic instability, implementation of the land reform programme, inflation, devaluation of currency, and corruption (Chiwara 2014). Currently, Zimbabwe is one of the biggest importers of maize. Zimbabwe usually imports maize products from the following COMESA countries: Zambia, Malawi and Democratic Republic of Congo (DRC). It also imports maize from non-COMESA member states, such as South Africa, Mozambique, Tanzania, and Namibia (World Food Programme 2014) (see Table 1).

Zimbabwe obtains its largest share of maize imports from Zambia and South Africa. However, the Zimbabwean government prefers Zambian maize imports because Zambian maize is free from GMO while South Africa produces GMO products. Hence, the research for this study was conducted at Chirundu OSBP which is the biggest border post, linking Zimbabwe and Zambia. In addition, Zambia is a COMESA member state whereas South Africa did not join the COMESA regional bloc. In December 2014, Zimbabwean maize imported from Zambia was valued at about US\$ 1,653,000 (Trade Map, 2015). An average of 223 trucks cross

Chirundu OSBP from Zambia to Zimbabwe on a daily basis (Transport World Africa 2013).

Table 1. Zimbabwe's maize imports, 2012–2014

Maize exporter Country	Value (in thousands of US Dollars) of maize imported in different years		
	2012	2013	2014
Zambia	US\$ 264.129	US\$ 39.083	US\$ 19.644
South Africa	US\$ 4.436	US\$ 67.566	US\$ 77.156
Mozambique	US\$ 0	US\$ 192	US\$ 2.862
Malawi	US\$ 18	US\$ 0	US\$ 1.790
Kenya	US\$ 10	0	0

SOURCE: Trade Map (2014).

Information provided by ZIMRA officers, who work at the border, indicates that an average of 50 trucks cross Chirundu OSBP with maize from Zambia to Zimbabwe on a daily basis, mainly in December to March, when there is a high demand for maize in Zimbabwe. The majority of the traders who import maize from Zambia are aged 33–over 51 years (Table 2).

Table 2. Age of maize traders

Age (Years)	Number of responses
20 years and below	2
21–30	8
31–40	33
41–50	41
Over 51	16

SOURCE: Fieldwork data (2015).

The study noted that Zimbabwe's maize trading is dominated by traders aged between 30 and 50 years. This is an economically active age group and the majority of people who fall in this category have diversified family demands, hence are forced to provide food for their families. The maize traders also indicated that they have dependents that rely on their earnings and support (Table 3).

Table 3. Number of dependants who rely on the earnings of maize traders

Number of dependants	Number of respondents with those number of dependents
0	3
1–2	44
3–4	26
5–6	18
Above 7	9

SOURCE: Fieldwork data (2015).

As indicated in Table 3, the majority of traders who responded to the questionnaire have one or two dependants. The reason given for not keeping many dependants was that life is very expensive in Zimbabwe,

which was witnessed by costly prices of food, health, education, and transport. The maize traders who responded to the research questionnaire indicated that they support various dependants, such as elderly people, extended family members, orphans, and homeless children. This means that they are directly helping the nation, in terms of meeting the food needs of vulnerable people.

The questionnaire respondents indicated that they recruit people to perform several tasks, such as selling maize in the local markets, for instance, Mbare, Sakubva, Epworth, Mabvuku, and Highfields. Some of the employees are hired to drive maize trucks, supervise the exports as well as travel to Zambia to purchase maize from Zambian farmers and maize dealers. Traders who have more than 11 employees indicated that their businesses had expanded to an extent that they are now considered as large-scale maize commercial traders (Table 4). The study noted that the creation of employment as a result of maize trading significantly supports the Zimbabwean political economy in that the employed people can afford to buy food for their families, therefore rescuing their families from food security challenges.

Table 4. Number of people employed by maize traders

Number of employees	Number of responses
0	3
1–3	32
4–6	35
7–10	19
Over 11	11

SOURCE: Fieldwork data (2015).

Table 5. Number of years in maize trading

Period	Number of responses
Prior 1990	0
1990–1999	4
2000–2009	15
2010–2015	81

SOURCE: Fieldwork data (2015).

From Table 5, it is clear that the majority of maize traders who participated in this study began their operations from the year 2010 up to the present year (2015), whereas only a few participated in maize trading prior to the year 2000. Zimbabwe was once a chief supplier of maize, from the year 2000, and the country produced enough maize to meet the local demand as well as exporting the surplus to the surrounding countries. In the year 2000, Zimbabwe implemented the Land Reform Programme, whereby more than 4,500 white farmers were evicted from their farms; hence, they joined the Zambian maize production sector (Mutsaka 2015). Zambia has become one of the largest producers of maize in the Southern Africa region and its food security status has greatly improved. On the other hand, Zimbabwe has become heavily dependent on maize imports from Zambia, and this is

witnessed by the ever-increasing number of maize traders. Maize imported from Zambia is sold in various markets and the maize traders who filled the study questionnaire sell their maize in different places (see Figure 1).

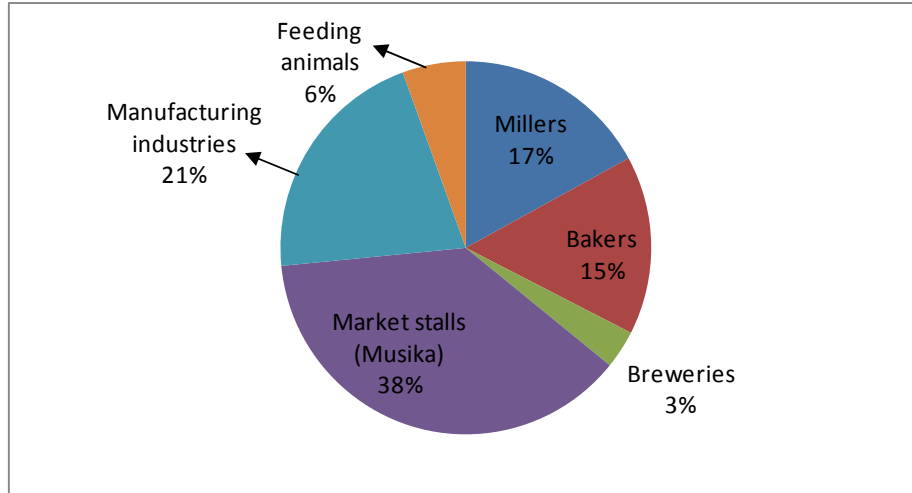


Figure 1. Where Maize Traders Sell Their Maize

SOURCE: Generated from fieldwork data (2015).

As indicated in Figure 1, most of the maize imported from Zambia was sold in market stalls, such as Mbare. Maize sold in the market stalls is consumed in homes; hence, it directly addresses food security needs at homestead level. Other importers sell their maize to manufacturing industries, such as producers of cooking oil, popcorn, porridge, and beer. One can therefore note that Zimbabwe's maize traders play a crucial role in supporting the manufacturing sector as well as addressing the food security challenge in Zimbabwe.

Regarding the major sources of capital (finance) for maize traders (see Table 6), the traders who filled the study questionnaire indicated that Zimbabwean banks were not offering bank loans to them because their businesses were not established. Furthermore, there was a torrid financial crisis that was negatively affecting Zimbabwe's banking sector, to an extent that some of the banks ceased to offer loans to business operators. In addition, the Zimbabwean government was also facing severe financial challenges, hence reduced its financial support towards business operators. This caused the traders to experience stiff challenges pertaining to working capital.

Table 6. Sources of capital for maize traders

Source of capital	Number of responses
Personal savings	15
Bank loans and credible financial institutions	8
Informal sources	65
Credit facilities from relatives and friends	10
Government loans	2

SOURCE: Fieldwork data (2015).

The majority of the Zimbabwean maize traders acquire loans and operating capital from informal sources which are referred to as *Chimbadzo* in Zimbabwe. This is a process whereby people secure loans from unregistered financial institutions which offer inconsistent interest rates that are not sustainable for business operations. The respondents indicated that there are several risks associated with borrowing from unregistered financial institutions; and those risks include physical harassment, risk of properties being attached in the event that the trader defaults in repayment and very high interest rates which reduce levels of profitability. The government should, therefore, provide capital to the traders since maize traders contribute in creating employment opportunities for the entire Zimbabwean population as well as sustaining the economy through supporting manufacturing industries.

Maize traders who participated in the study indicated that the majority of them earn between US\$ 1,000 and US\$ 10,000 (Table 7).

Table 7. Earnings per trip

Range of earnings (US dollar)	Number of responses
Below 1,000	4
1,001– 5,000	38
5,001– 10,000	36
Above 10,000	22

SOURCE: Fieldwork data (2015).

The study noted that maize traders earn huge profits per trip since the Zambian maize is acquired at very low prices and is sold at very high prices in the Zimbabwean maize markets. The discussions between the researcher and the traders indicated that the maize buying price in Zambia was in the range of US\$ 150 to US\$ 200 per tonne, whereas the selling price in Zimbabwe was between US\$ 380 and US\$ 450. The study suggests that the Zimbabwean government should reduce border-related challenges as a way of promoting the operations of maize traders since their businesses are doing well. This would help to improve the supply of maize to Zimbabwe, thereby helping to increase the availability of maize in the country.

Regarding levels of costs incurred by maize traders who participated in the study, the majority of the traders indicated that they experienced costs ranging between US\$ 1,000 and US\$ 5,000 (Table 8). They explained that this included purchasing costs, transport costs, border charges, rental

charges at the places where they sold their maize, toll gate fees, and acquiring maize import permits from the Zimbabwean government as well as the export permit from the Zambian government.

Table 8. Estimated costs per trip

Range of costs (US dollar)	Number of responses
Below 1,000	4
1,000–5,000	49
5,000–10,000	33
Above 10,000	14

SOURCE: Fieldwork data (2015).

3.2. Food Security and Trade Protectionism

This section presents the relationship between food security and trade protectionism in connection to the Zimbabwean maize sector. COMESA principles that regulate trade protectionism and food security are also discussed in this section. Article 55 of the COMESA Treaty (2004, Web) states:

The member states agree that any practice which negates the objective of free and liberalised trade shall be prohibited. To this end, the member states agree to prohibit any agreement between undertakings or consented practices which has its objective or effects on the prevention, restriction, or distortion of competition within the common market.

The study observed that tariff protectionist measures do not apply to maize trading between Zimbabwe and other COMESA member states because COMESA Free Trade Area (FTA) rules and regulations prohibit the imposition of import duties on agricultural raw products (Mbithi and Kio 2013). The study found that the major trade protectionist measures practised on the trading of maize in Zimbabwe are mainly in the form of non-tariff barriers (NTBs), such as SPS procedures, long documentation procedures, border delays, corruption, restrictions on the issuance of maize import and export licences, and ban on GMO maize products.

3.3. Corruption

Corruption is one of the greatest NTBs affecting the effectiveness of Zimbabwe's maize importation process at Chirundu OSBP, and it also occurs at the government offices that issue maize import permits. Corruption is the abuse of entrusted power for private gain (Transparency International 2014). It is an act whereby a person who holds a position in an official capacity illegally receives or acquires a benefit outside the salary in return for doing a certain activity or favour (Jain 2001). The study noted that most of the corrupt activities that occur at Chirundu OSBP include illegal issuing of documents, fraud, misappropriation of state funds, issuing documents to people who are not entitled to receive, aiding and abetting illegal foreigners, soliciting documents and the theft of face value documents or goods, and smuggling illegal goods such as drugs and

weapons. The most noted people involved in corruption activities at Chirundu OSBP were customs agents, immigration agents and security forces agents. Corruption at the Zimbabwean borders negatively affects Zimbabwe's food security status because large volumes of maize enter and exit the country without being recorded. The government may not know the available quantities of maize in the country, a situation which usually affects the making of food security policies at national level (Uchendu 2015). This study found that most of the respondents paid bribes at the border (see Table 9) for a number of reasons (Figure 2). And trading through paying bribes at Chirundu OSBP is not sustainable for Zimbabwe's political economy.

Table 9. Payment of bribes at Chirundu OSBP

Rate of corruption	Number of responses
Number of maize traders who pay bribes at the border	76
Number of maize traders who have never paid bribes at the borders	14

SOURCE: Fieldwork data (2015).

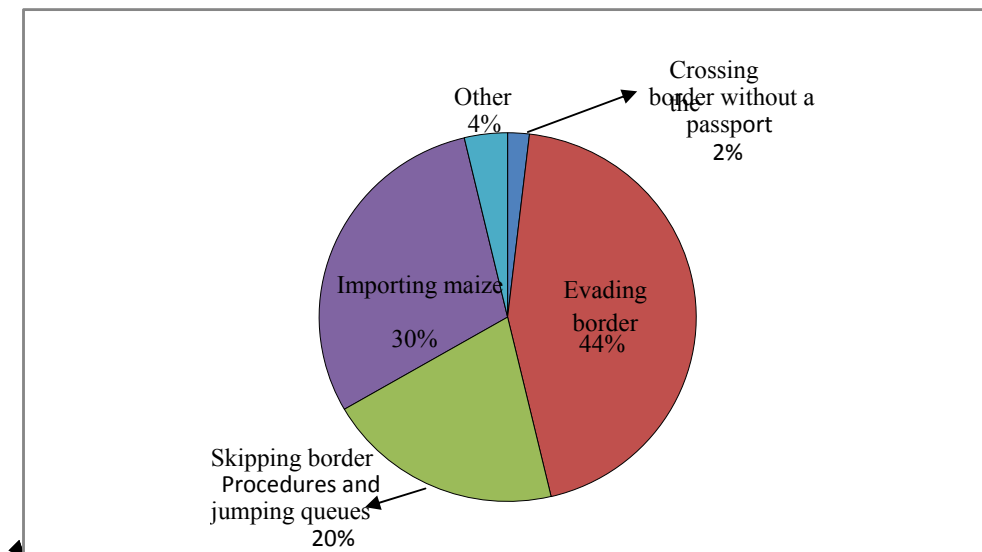


Figure 2. Major Services/Reasons for Paying Bribes

SOURCE: Generated from Fieldwork Data (2015).

As indicated in Figure 2, the major reasons for paying bribes at the border post include: to obtain favours from border officials, such as crossing the border without a license, and to evade payment of border charges and duties. The study also noted that there were several maize traders who crossed the border without maize permits. This situation is not good for the country's food security status as it hampers the government's efforts to

collect statistics of total maize imports each year. Importing maize without licences adversely affects monitoring of maize in the country because the local market is sometimes flooded with smuggled maize, thereby leading to reduction of the prices of illegally imported maize while outclassing local maize producers. This, therefore, negatively affects Zimbabwe’s domestic maize production.

Table 10 shows As regards the range of bribes paid by maize traders who responded to the study questionnaire at Chirundu OSBP, 35 of them indicated that they paid bribes of below US\$ 100, and, according to them, this small amount was meant to cover minor issues such as crossing without a passport, jumping queues or evading other minor border procedures such as border scanning. Those who paid above US\$ 1,501 indicated that this high amount of bribes was for concealing big offenses committed at the border, such as crossing the border without import licences or transporting a consignment in excess of the quantity stipulated on the permit.

Table 10. Range of bribes paid at the borders

Amount of money paid as a bribe (US dollar)	Number of responses
Below 100	35
101–500	28
501–1,000	18
1,001–1,500	12
Above 1,501	7

SOURCE: Fieldwork data (2015).

Corruption at the border post is unsustainable in that local maize producers find themselves competing with illegal traders who conduct business with minor business costs. The government should therefore meticulously combat border corruption so as to improve the monitoring of maize availability in the country.

3.3.1. Buy Zimbabwe Campaign

Buy Zimbabwe is a local initiative formed in 2011, with the vision of building the economy through encouraging citizens to purchase products that are manufactured in Zimbabwe (Buy Zimbabwe 2015). Buy Zimbabwe comprises stakeholders from various sectors, such as the civil society, private sector and the government of Zimbabwe. The main agenda of Buy Zimbabwe is to address the country’s negative balance of trade through limiting imports while increasing local production of goods and services. Objectives of the organisation include creating jobs, creating national wealth and fostering national pride (Buy Zimbabwe 2015). Zimbabwe National Trade Policy (2012, 25) states, “... the government will fully support industry and commerce, Consumer Council of Zimbabwe and civil society in promoting the use and consumption of goods and services produced in Zimbabwe under the ‘Buy Zimbabwe campaign’”. This form

of trade protectionism, whereby governments advise local people to purchase locally made products while discriminating against foreign products, has increased as a result of the global financial crisis. Several countries, such as the US, China and member states of the European Union (EU), have championed the 'buy local campaigns' as a way of trying to shelter local industries. However, in the Zimbabwean context, the applicability of the 'Buy Zimbabwe' campaign is very restricted because the country has very limited manufacturing industries.

The study noted that there is a very strong relationship between the Buy Zimbabwe campaign and trade protectionism. The Buy Zimbabwe campaign influences the government to support promising sectors of the economy and effect protectionist measures, such as subsidies, governmental support and tariffs, a process referred to as smart protectionism. Buy Zimbabwe has successfully influenced the government of Zimbabwe to increase import tariffs on products, such as flour, cooking oil and snacks. The second reason for linking Buy Zimbabwe to trade protectionism is that the Buy Zimbabwe campaign promotes a culture of discrimination, hence encourages Zimbabwean citizens to shun foreign products while giving special attention to locally produced items. The Buy Zimbabwe campaign produced a number of benefits, indicated in Figure 3.

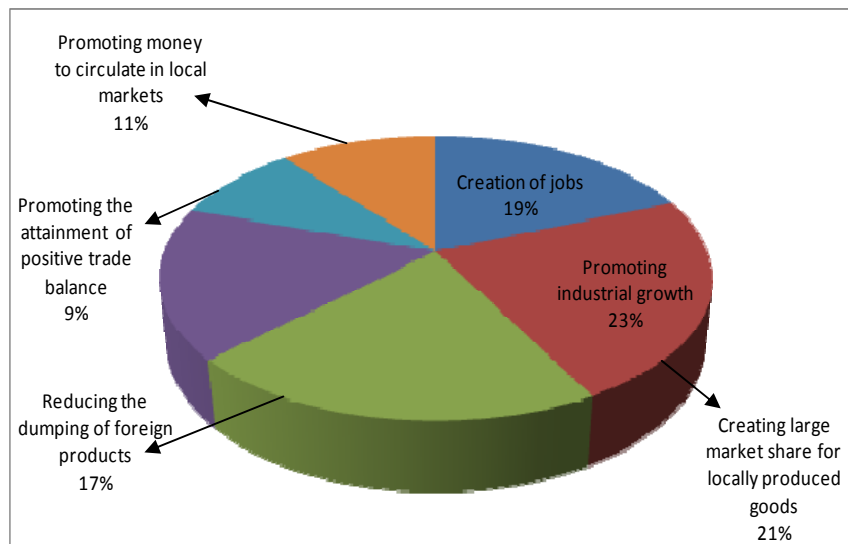


Figure 3. Benefits of Buy Zimbabwe
SOURCE: Generated from fieldwork data (2015).

Thus, the effective implementation of this campaign will help to boost local industries, which would encourage the creation of local jobs. If the majority of Zimbabweans are employed, it therefore means that they will be able to afford food and other related basic commodities that would help to reduce Zimbabwe's food insecurity challenges. In addition, the Buy Zimbabwe

campaign encourages local industries to use domestic maize products rather than imported maize, which helps to create a ready market for locally-produced maize, thereby helping to increase domestic maize production. If the Buy Zimbabwe campaign is effectively adopted, the country will be able to produce adequate maize, thereby increasing availability of maize in the country. This will, therefore, help to reduce dependence on foreign maize imports.

3.3.2. Banning of Genetically Modified (GM) Maize

The Zimbabwean government has banned the production, consumption and importation of GM maize products. According to the Zimbabwe National Biotechnology Authority Act, Section 3(2a): “The act shall apply the import, export, contained use, release or placing on the market of any product of biotechnology that is likely to have adverse effects on human health, the environment, the economy, national security or social norms and values”. The Biotechnology Authority is a state institution entrusted with the mandate to manage and support biotechnology research, application and development. The Zimbabwe National Biotechnology Authority is under the Ministry of Tertiary Education, Science and Technology, and it deploys its officers at the borders to regulate imports and exports, such as maize, wheat, beef, chicken, and rice. The major roles of the National Biotechnology Authority, as indicated by the National Biotechnology Act Section 5(2i), are: “To approve the safety aspects of the imports, exports, manufacturing, processing, and selling of any product of biotechnology, including substances, foodstuffs, and additives containing material and products of biotechnology”. The National Biotechnology Authority also issues biosafety permits to importers and exporters of agricultural and finished products, with the aim of avoiding the importation and exportation of GM maize products. The study noted that traders are required to obtain a biosafety certificate from credible laboratories in order to be issued with a biosafety permit by the National Biotechnology Authority. Traders are also required to submit product samples to the National Biotechnology Authority for testing before they acquire the permit. The National Biotechnology Authority issues the import and export biosafety permits after consulting with the Agricultural Marketing Authority (AMA). Thus, AMA has to check the availability of the specific product in Zimbabwe as well as determine if there is a real need to import or export the product. The National Biotechnology Authority also conducts some post-shipment inspections after the product has been successfully imported into Zimbabwe. Officers from the National Biotechnology Authority perform some follow-up, which consists of testing the consignment once it arrives at its final destination. In addition, the study noted that the National Biotechnology Authority also conducts biosafety surveillance exercises, which consist of random checks on products found in different places, such as retail shops, warehouses, seed banks, and wholesale stores. These exercises are meant to promote a GMO-free nation.

Zimbabwe's policy of banning GMOs is heavily criticised by international political economists, who believe that banning of imports amounts to trade protectionism. The survey results of the present study showed that about 55 per cent of the respondents want the government to accept the production and trading of GM products, and they also indicated that GM products offer a solution to the prolonged food security challenges that are being experienced in Zimbabwe. On the other hand, Gogo (2014) states that Zimbabwe imported about 121,000 metric tonnes of GM maize from South Africa between February and July 2014. In addition, the state-owned enterprise, GMB, also imported more than 52,000 tonnes of GM maize from South Africa at a cost of US\$ 180 per tonne, and resold this maize at a much increased price of US\$ 390 per tonne, thereby realising enormous profits (The Herald 2014). Theoretically, Zimbabwe prohibits GM products, yet in times of food security challenges, the government silently imports GM products in order to save the population. The study therefore suggests that the Zimbabwean government should legalise the production and trading of GM products as a way of improving food availability and accessibility in Zimbabwe.

The study noted that that the production of GM products is also associated with negative effects. The major drawback of GMOs is that they harm the environment in that the GM plants kill insects and bees, yet these creatures are beneficial to the environment, in particular, in spearheading natural processes, such as pollination and facilitating the decomposition process. Some of the respondents who participated in the study indicated that GM products cause diseases such as cancer. The researcher therefore engaged in an intensive discussion with experts at the School of Biotechnology, Chinhoyi University, and it was unanimously agreed that the allegations that GMOs cause cancer is not yet scientifically proven; the only impact of GMOs that was highlighted during the discussion was that GMOs cause challenges pertaining to cross-breeding in animals and plants. On the other hand, the study discovered that the major advantage of acquiring GM products is that they increase the quantity of yield. Stupak *et al.* (2011, 5) argue:

GM maize shows enormous differences in economic performances, between 10 and 15 per cent, compared to conventional (organic) maize, and the pesticides for GM maize are 25 to 60 per cent cheaper for GM maize than for conventional maize. Furthermore, yield levels for GM exceed those of conventional maize by 5 to 25 per cent.

The study, therefore, recommends that the government of Zimbabwe adopt policies and programmes that encourage the production and trading of GM maize since GM maize increases yield, thereby leading to the wide availability and accessibility of maize products in Zimbabwe.

3.3.3. Border Management Challenges

The study noted that Zimbabwe's maize traders were experiencing severe challenges at Chirundu OSBP, including the following:

- a) Payment of customs duty on goods that attract no customs fee, owing to lack of knowledge on the importance and existence of COMESA FTA. Zimbabwe Revenue Authority (ZIMRA) and Zambia Revenue Authority (ZRA) officials were not advising those traders who were ignorant about the existence of the COMESA FTA rule that exempts maize traders from import duties, and the researcher noted that some of the ignorant traders were compelled to pay import duties.
- b) The Zimbabwean borders lack affordable accommodation facilities. Chirundu OSBP does not function on a 24-hour daily basis. It is closed during the night; hence, traders who get to the border when it is already closed are forced to sleep on the roads and open spaces. This exposes traders to attacks by wild animals, dogs and snakes. In addition, closing borders at night exposes traders to the risks of robbery and loss of goods.
- c) Physical and sexual harassment, especially against women, by male border agents, such as immigration officers and Zimbabwe Republic Police (ZRP) officers, more so for women crossing the border without passports or smugglers.
- d) Seizure of goods by border officials because of incorrect payment or non-payment of customs duties.
- e) Uneducated cross-border traders experience difficulties when filling forms presented by border officials, such as the Plant Quarantine Services, ZIMRA and the National Biotechnology Authority. Generally, the majority of cross-border traders are not well informed on the issue of tariffs; hence, they are compelled to pay bribes at borders for no apparent reason.
- f) The study found that border clearance agencies work according to targets; when they fail to meet their targets, they end up charging unofficial tariff rates, while some officers charge the traders duty on some products that do not warrant fees.
- g) There is an influx of bogus border agencies, creating a situation whereby cross-border traders are being swindled.
- h) Some of the border security agencies do not fully understand the relevance of the COMESA FTA. Ignorant ZRP officers usually harass maize traders to produce duty clearance forms to prove that the trader has fully paid import duties at the border, yet those who utilise COMESA FTA at the border may not have the import duty documents due to duty exemptions. This occurs at the inland road blocks, where police officers search goods transported in cross-border trucks to

determine if traders have paid import duties at the borders. The government should, therefore, educate the entire police department about the utility of the COMESA FTA to avoid harassment of traders.

- i) Lack of information awareness programmes. The COMESA FTA programme was not fully circulated to the traders, thereby causing confusion whenever maize traders get to the borders. The majority of traders do not understand the rules of origin and other related issues, such as SPS certification and import/export permits. The government and COMESA should conduct increased information awareness programmes as well as advocacy programmes to improve the effectiveness of the COMESA FTA.

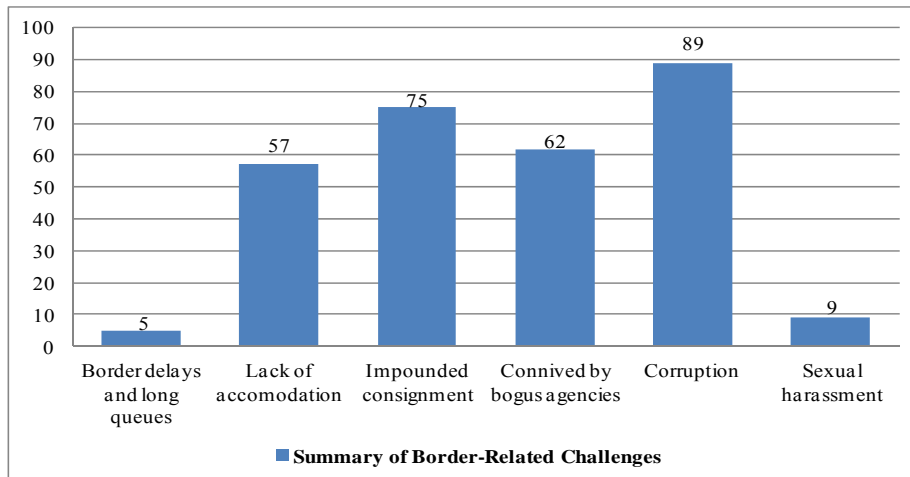


Figure 4. Summary of Border Related Challenges

SOURCE: Generated from fieldwork data (2015).

According to respondents of the study questionnaire, the major challenges experienced by cross-border maize traders at Chirundu OSBP are: lack of accommodation at the border; corruption; being connived by bogus border agencies; and impounding of goods by ZRP, ZIMRA and ZRA agencies due to non-payment of proper import duties or sometimes transporting goods without proper permits (Figure 4). The establishment of an OSBP at Chirundu has helped to reduce the incidence of border delays and long queues. The majority of cross-border maize traders also indicated that there is reduced sexual harassment by border agencies, such as immigration officers, ZRP, ZIMRA, and ZRA. This is as a result of tightened national laws as well as fear of contracting sexually-transmitted diseases, such as HIV and AIDS.

Table 11. Rate of border clearance at Chirundu OSBP

Rate of clearance	Frequency of responses
Fast clearance	21
Average clearance	65
Slow clearance	14

SOURCE: Fieldwork data (2015).

The maize traders who responded to the study questionnaire indicated that the establishment of an OSBP at Chirundu has resulted in improved border clearance time. However, there are times when the border experiences long queues, mainly in the peak hours, such as in the morning when the officials open the borders. Border clearance agencies face much pressure in the morning because they must clear customers who slept over. The government should therefore keep the border open on a 24-hour basis to avoid pressure and long queues. This would also help to increase the movement of maize across the border.

3.3.4. Sanitary and Phytosanitary Measures

One of the major trade protectionist measures affecting Zimbabwean maize traders at Chirundu OSBP is the application of SPS measures. The Asian Development Bank (2013) defines SPS measures as measures for the control and protection of animals and plants from the risks arising from the spread, establishment and introduction of pests and diseases. COMESA Treaty Article 132(d) states, “The member states harmonise their policies and regulations relating to sanitary and phytosanitary measures without impeding the export of crops, plants, seeds, livestock products, fish and fish products”. In the Zimbabwean Agriculture sector, the application of SPS measures is governed by the Ministry of Agriculture, Mechanisation and Irrigation Development, through the Plant Quarantine Services department, which deals with the trading of plants, crops, fruits, grains, and related agricultural products.

The study observed that SPS documents issued by the Plant Quarantine Services department are not issued for free. Traders are required to pay in order for their permits and certificates to be processed, which is considered as an additional cost of business. Interviews conducted during the period of study indicate that the costs of SPS documents issued by the Zimbabwean Plant and Quarantine Services department are as follows: US\$ 30 for each import permit; US\$ 10 for each phytosanitary certificate; and US\$ 30 for each transit permit. Plant and animal-related import permits, phytosanitary certificates and transit permits for non-commercial consignments cost about US\$ 5. Fines for breaching the Plant Quarantine Services procedures range from US\$ 70 and upwards for importing or exporting unsupervised permits, while fines and punishment for trading goods without permits range from US\$ 1,000 upwards. The general rule applied by the Plant Quarantine Services is that products that fail to meet SPS standards are subject to interception and destruction of the consignment. These strict measures

generally help to prevent Zimbabwe's plants and animals from being affected by pests and diseases from outside the country.

The major debate surrounding the application of SPS measures involves the relationship between SPS and protectionism, namely, why is SPS considered as trade protectionism? In Zimbabwe, the Ministry of Agriculture applies the Control of Goods Act Chapter 14(5), to issue the SPS documents (import and export permits) for both animal products and plant and plant-related products. The study found that the Ministry of Agriculture uses the Control of Goods Act 14(5) to control the availability of maize products in the domestic market and it liaises with local producers of maize to determine if there is need to import. If there is too much maize in the local market, the Ministry of Agriculture does not issue import licences, in order to protect local producers from international competition. In such a scenario, the Ministry may give reasons related to health, yet the actual reason is to protect local maize producers. Thus, one can observe that SPS is quite different from traditional protectionist measures, such as tariffs and quotas, which are quite straight forward and easy to detect and combat. In this way, SPS is therefore an NTB, which is controversial, ambiguous, indirect, and difficult to combat since governments justify their denial of import permits for certain products in the context of the maintenance of health and safety procedures.

3.3.5. Smuggling

During the period of the study, maize trading was also conducted in the form of smuggling. Smuggling is defined as a process of exporting or importing goods and services secretly, in violation of laws, especially evading payment of import or trade taxes (Shelley 2014). Thus, smuggling involves moving goods illegally out of or into a country. Maize was one of the major products smuggled at Chirundu OSBP. Smuggling mainly occurred in two forms. Firstly, it involved the crossing of goods through the border post, and at the same time, evading the payment of border charges. Secondly, it involved the crossing of goods at the borders, using undesignated routes, such as crossing the Zambezi River on boats with maize.

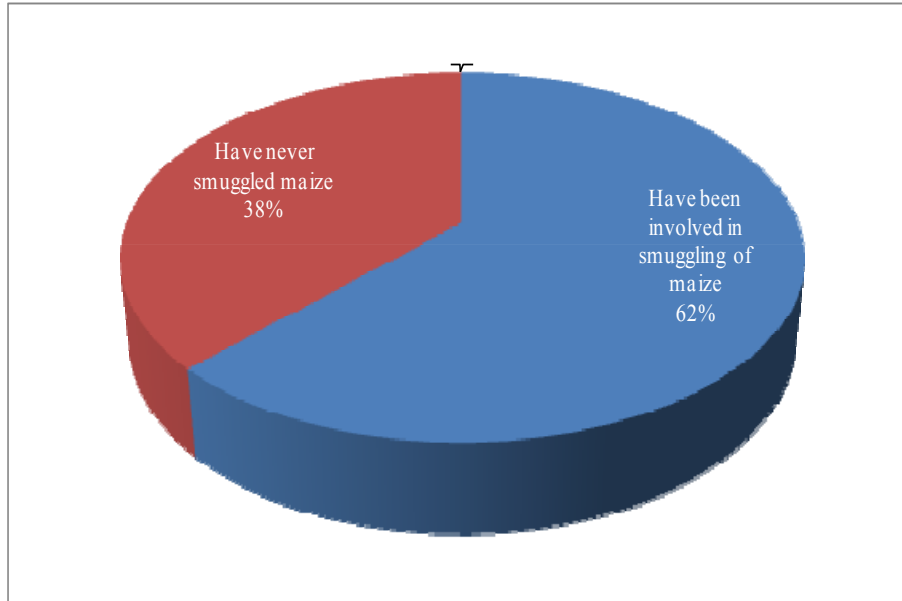


Fig 5: Traders Involved in Smuggling of Maize at Borders

SOURCE: Generated from fieldwork data (2015).

The study noted that the majority of maize traders are involved in smuggling activities. They pass the Chirundu OSBP with maize which exceeds the quantities indicated on their import permits (see Table 12 for their reasons).

Table 12. Reasons for smuggling maize

Reasons for smuggling	Frequency of responses
Avoiding documentation procedures	34
Avoiding payment of border charges and taxes	31
Avoiding normal border procedures	35

SOURCE: Fieldwork data (2015).

During the period of the study, it was noted that the major challenges and costs associated with smuggling include loss of revenue as the state does not collect the border charges and import duties from the traders. Secondly, formal companies are affected negatively. Smugglers enjoy fewer trading costs since they avoid the payment of border duties and border administration costs; hence, they are able to charge low prices for their products, thereby outclassing the prices charged by formal traders who go through normal border processes. During the period of the study, Zimbabwe's locally-produced maize products, such as cooking oil, porridge and maize meal, were facing stiff competition from goods smuggled into the country from neighbouring countries, such as Zambia,

South Africa and Botswana. These foreign products were being sold on the streets at very low prices. Customers prefer to buy cheaper products from the streets rather than expensive products from the shops, which compels big manufacturing companies and retailers to shut down. This was one of the reasons behind the decline of local maize production in Zimbabwe. Thirdly, smuggling is also associated with risks of being attacked by animals and snakes while crossing borders using bushy channels. Finally, smuggling comes with the risk of losing the consignment. There were several incidents whereby police and ZIMRA officers impounded the smuggled maize, leaving smugglers empty-handed.

4. Conclusion

This chapter focuses on the link between food security and trade protectionism, which is discussed with reference to Zimbabwe's maize imports. The main focus of this study was to outline the availability and accessibility of maize in Zimbabwe's markets. Maize production in Zimbabwe has declined due to many economic and political challenges that have been experienced since the year 2000, when the government implemented the Land Reform programme. Zimbabwe was then forced to rely on maize imports from Zambia, South Africa and Mozambique. However, the maize importation process was marred by trade protectionist challenges that are implemented by the Zimbabwean government. The major protectionist measures practised in Zimbabwe, in order to limit maize imports, are mainly in the form of NTBs. These include government policies: long documentation procedures, subsidies, SPS measures, corruption, banning of GM maize, border delays, and strict regulations, especially regarding the issuance of maize import and export licences. Generally, trade protectionist measures and policies are directly contrary to trade liberalisation policies and measures.

4.1. Key Findings and Recommendations

4.1.1. Liberalism, Trade Protectionism and Food Security

The study was guided by the liberalism theory, which emphasises the significance of removing trade barriers while promoting the practice of free movement of goods across the borders. The study found that too much liberalisation endangers food security. Thus, a country should not heavily depend on food imports, and should restrict the importation of main food products, such as maize and other related cereals. Restricting maize imports usually helps to maintain certain levels of maize in the domestic market for the local people. For instance, in dealing with the problem of maize shortages in the domestic markets, some African countries, such as Ethiopia and Tanzania, impose some export bans on maize. The main limitation associated with such a policy is that it limits local producers from participating in international markets; hence they may not have the exposure to international competition. Both farmers and private sector traders become less responsive in matters of supply and harnessing trade

opportunities. However, Zimbabwe should reduce dependence on foreign food products as a matter of safeguarding its citizens from food insecurity situations. For instance, as political scientists argue, there is no permanent friend in politics, but there are permanent interests. Zimbabwe depended heavily on food imports, a policy that caused problems when the country implemented the Land Reform programme, which caused Zimbabwe's relations with Western nations to become sour. This has caused Western countries to withhold their food supplies from Zimbabwe, thereby worsening the food security crisis. The study, therefore, suggests that Zimbabwe should utilise its arable lands and its good climate in order to produce adequate food for its people.

The study also noted that trade protectionism can be used as an effective weapon in maintaining food levels in a country. Thus, in days of excessive production resulting in maize surplus on the market, the government has to issue export incentives as well as loosen the processes of obtaining export permits, at the same time limiting the issuance of maize import permits. This may allow local producers to enjoy a larger market share, thereby giving them space to increase production and operational capacity. When local maize production is lower than the local demand, the government should open up borders by reducing protectionist measures such as tariffs and NTBs. The major reasons for effecting the highlighted maize control measures are the following:

- a) promoting the efficient allocation of resources, thus ensuring availability of maize in the local markets as a matter of promoting food security;
- b) promoting local maize farmers (producers);
- c) allowing local maize traders to make profits since they are constantly sheltered from external competition;
- d) promoting the creation of local jobs;
- e) supporting the growth of local industries;
- f) avoiding the dumping of poor quality foreign products into the domestic market;
- g) reducing of maize imports and promoting the increment of exports, which could be helpful in addressing Zimbabwe's balance of payment challenges; and
- h) reducing imports in the domestic market, which helps to improve domestic flow of money. The Zimbabwean government should therefore promote the local farmers to increase domestic maize production since this could help to build the country's economy.

The study found that there are several costs (negative effects) associated with Zimbabwe's trade protectionist measures that are practised at the borders. Border protectionist measures practised at Chirundu OSBP contribute to increased smuggling of maize across the border. The importation and exportation of maize within the COMESA regional blocs calls for a zero per cent tariff rate. However, traders routinely smuggle

maize into Zimbabwe as well as out of Zimbabwe into neighbouring countries, such as Zambia and Mozambique, despite a zero per cent tariff rate imposed at the border. The study found that smuggling of maize is increasing because traders are avoiding trade barriers, such as the long process of acquiring import and export permits, long border queues, border delays, unbearable searches at the borders, and corruption by border officials. Long processes and procedures are involved in order for a trader to acquire a maize import and export permit, and at the same time, the permits are very expensive, thereby limiting profit level. Traders, therefore, resort to smuggling as a way of avoiding the processes involved in acquiring maize importation or exportation permits. This is considered as one of the major impacts of trade protectionism on maize trading, thereby causing both negative and positive effects on food security. The negative impact of maize smuggling on food security is that when the quantity of maize in the local market is low, smugglers can end up compromising that little amount. Zimbabwe's borders are becoming increasingly porous due to globalisation and poor border management mechanisms. The government of Zimbabwe should improve border security measures as this may help to reduce the smuggling of products across the borders.

It is, however, noted that trade protectionism discourages the practice of competition in the market. The practice of trade liberalisation measures usually creates competition in the market. Generally, liberalisation promotes a situation whereby there will be many suppliers of products on the market. Thus, consumers may choose what they want. The availability of many suppliers as a result of liberalisation may, therefore, reduce the possibility of food shortages in the market. If local farmers are failing to meet demand, foreign suppliers can therefore fill that gap. For instance, from the year 2000 up to the present-day, local Zimbabwean farmers are not meeting the domestic maize demand. It was noted that Zimbabwe maize production has a huge shortfall which has to be complemented through import processes. The study, therefore, suggests that in the short-run, Zimbabwe should open up borders to allow maize imports which may help to address the food security challenges that are being faced at national level. However, the government of Zimbabwe should develop long-term policies that ensure increased production and supply of maize by local farmers. The government of Zimbabwe should also implement several motivational programmes in order to promote local production of maize, which may help to build the economy, since dependence on food imports is not safe for the economy.

4.1.2. GM Maize Import Bans and Food Security

The Zimbabwean government, through the National Biotechnology Authority, has boldly prohibited the importation and production of GM maize in Zimbabwe. However, there are incidences whereby the Grain Marketing Board purchased GM maize from South Africa in order to save the nation from the daunting food security crisis. The decision to ban the

production of GM maize, while importing it from South Africa, is regarded as irrational since the government would be enriching the South African economy. Zimbabwe should, therefore, legalise the production of GM maize in order to save the nation from the worsening food security crisis. GM maize has a wide range of advantages such as increased yield of production and easy adaptation to changing climatic conditions. The production of GM maize will, therefore, help to increase maize supply, thereby making it possible to satisfy local maize demand, and at the same time, positively increasing food availability and accessibility.

4.1.3. Buy Zimbabwe Campaign and Food Security

The study found that there is a modern style of trade protectionism which is referred to as the Buy Zimbabwe campaign. This is centred on encouraging Zimbabwean citizens to purchase locally-produced commodities. The major aim of the Buy Zimbabwe campaign is to boost the operations of local manufacturers as well as create jobs in Zimbabwe. The Buy Zimbabwe campaign is not yielding fruitful results because Zimbabwean manufacturing industries are on the decline due to economic hardships, which is causing a reduction in the supply and distribution of locally-made products. Zimbabwean local markets are dominated by foreign products, making it difficult to achieve success for the Buy Zimbabwe campaign. The major negative effect of the Buy Zimbabwe campaign is that the surrounding countries have retaliated. For instance, Zambia is embarking on a process of formulating the Buy Zambia campaign, which encourages Zambians to purchase products produced in Zambia. This act of encouraging local people to buy locally-produced products directly contradicts COMESA regional integration and regional liberalisation policies. On the other hand, one of the greatest benefits of the Buy Zimbabwe campaign is that it promotes the creation of wider markets for locally produced products, thereby helping local manufacturers to increase their operations. The government should, therefore, offer greater support to the Buy Zimbabwe campaign, through financing and policy support. This may help to improve efficiency and effectiveness of local manufacturing industries. The government of Zimbabwe should also initiate the Public-Private Partnership (PPP) with Buy Zimbabwe. This will help to improve the campaign as well as help to easily convince Zimbabwean citizens to buy locally-produced goods.

4.1.4. Value Addition and Food Security

In Zimbabwe, value addition is perceived as one of the vital components, which is but lacking. Zimbabwe is a producer of many agricultural products and the majority are exported in their raw state, whereas the countries that import these products make multiple profits after processing them. The study, therefore, recommends that the Zimbabwean government invests much in value addition activities. For instance, Zimbabwe adopted the Zimbabwe Agenda for Sustainable Social and Economic Transformation (ZIMASSET) blueprint, which is centred on value addition and

beneficiation, but its implementation is very slow due to lack of funding and research. The Zimbabwean government should, therefore, emphasise on promoting the success of ZIMASSET and its value addition vision. This will help to improve industrial growth, increase export volumes, increase creation of employment; improve attainment of positive balance of trade; facilitate economic growth; and increase availability and accessibility of locally-produced foodstuffs.

4.1.5. Gender and Zimbabwe's Maize Sector

Land distribution has always been a hotly contested topic in Zimbabwe. Thus, most of the agricultural land has been awarded to the male population in line with the practice of upholding cultural and traditional values. This has created several challenges for female-headed families. The government should avoid gender discrimination in the distribution and allocation of agricultural land. This may help to increase maize production since women are also competent farmers.

4.1.6. The Importance of Research for Food Security

One of the factors contributing to food insecurity in Zimbabwe is lack of research. The Zimbabwean government should, therefore, increase its budget proportion towards various research departments, for instance, in the Ministry of Industry and Commerce, and Ministry of Agriculture. The government should conduct research on maize seeds that can increase yield per hectare as well as researching on the proper irrigation and farm mechanisation techniques that can help to increase the production of maize. The government should also dedicate research towards finding modern marketing techniques which may help to improve the marketing and distribution of locally-produced maize, thereby making Zimbabwe's agricultural products more competitive at the COMESA regional level.

4.1.7. Agricultural Incentives and Motivation

In the modern political economy, governments are increasing the availability of maize products through the introduction of effective incentive programmes. Zimbabwe's farmers are shifting from maize production towards the production of cash crops, such as tobacco, cotton, forestry, and horticultural products. This is adversely affecting the availability of food in Zimbabwe since most of the cash crops produced in Zimbabwe are not edible. The government should, therefore, introduce incentives to maize farmers, such as tax exemptions, distribution of maize input subsidies, offering farm machineries at reduced prices, and extending loan facilities and credit facilities. Such incentives would help to motivate maize farmers, thereby discouraging them from shifting to the production of cash crops.

4.1.8. Zimbabwe's Agricultural and Trade Policies

One of the key observations made in this chapter is that Zimbabwe's national agricultural policy does not clearly define the application of SPS

procedures; yet, these measures are vital in the trading of maize across the borders. COMESA should, therefore, advise its member states to clearly articulate the definitions and operating procedures of SPS procedures in both the agricultural and trade policies. This will help to improve the trading of maize at regional level, thereby helping to solve food security challenges.

4.1.9. Public Sector Reforms

Food insecurity is also caused by the rigidity and redundancy of Zimbabwean public sector enterprises, such as the Grain Marketing Board, Agricultural Marketing Authority (AMA) and the Agricultural Rural Development Authority (ARDA). These organisations have been making a series of losses and draining the government of funds for their survival. The government should, therefore, adopt contemporary reforms, such as privatisation and commercialisation, in order to improve the operations and management of these organisations. This will improve competitiveness, efficiency and effectiveness. Effective operation of Zimbabwe's public sector enterprises will help to improve domestic maize production as well as its distribution at national and international levels. In addition, key issues that shape trade, such as policymaking, negotiations and implementation, are controlled by the government, leaving limited room for participation by the private sector and civil society organisations. During the period of the study, there was only one organisation that has partnered with the government in order to improve Zimbabwe's trade — Zimtrade. However, Zimtrade was giving much attention to the trading of finished products, while neglecting the trading of agricultural products. Therefore, the study recommends the creation of more private sector organisations that focus on the trading of agricultural products as this will help to reduce trade barriers that are negatively affecting Zimbabwe's maize importation processes.

4.2. Effective Border Management and Food Security

The study noted that border management plays a role in determining the flow of imports and exports. The establishment of Chirundu OSBP has helped to reduce border delays and congestion. However, there are some issues that still need to be addressed in order to promote effective trade. The study, therefore, suggests the following measures in order to improve the management of Chirundu OSBP, so as to reduce the smuggling of maize:

- a) Simplification of customs procedures will help to prevent cases of traders jumping procedures.
- b) Increasing security at the borders will help to curb problems arising from porous borders.
- c) Introducing systems that ensure voluntary compliance and desisting from the implementation of policies and tariffs that are conducive for

cross-border trade. Thus, the government should set levels and policies that can be easily afforded by everybody.

- d) Reducing long border documentation processes, which are a strain to the traders, encourages compliance to formal procedures.
- e) Improving the administration of customs and immigration processes.
- f) Avoiding unnecessary searches and inspection, and rather limiting them to be conducted at one point.
- g) Teaching and educating traders about the essence of conducting legal trade.

To summarise, the study is centred on the relationship between food security and trade protectionism. The study observed that there is a fundamental relationship between food security and trade protectionism in the Zimbabwean maize production and trading sector. The relationship can either be positive or negative. Thus, trade protectionist measures and policies can be applied in order to control maize levels in a country, thereby helping to address food security challenges. The government can implement trade protectionist measures at the borders in order to restrict the exportation of scarce products, such as maize, as a way of promoting locally-produced maize to meet the local demand without allowing it to move out of the country. On the other hand, the government can also restrict maize imports as a way of promoting the operations of local producers. The Zimbabwean government should therefore reduce its dependence on foreign maize and must encourage local farmers to produce adequate maize to satisfy local maize consumers. This may help to solve the food insecurity challenges that have been affecting Zimbabwe for more than a decade now.

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Causality between Food Security and Human Development in Sudan: An Empirical Analysis (1990–2013)

Mutasim Ahmed Abdelmawla

Abstract

Agriculture constitutes the backbone of the economies of developing countries, since it is the main source of food security and foreign currency through agricultural exports. Like many other African countries, agricultural gross domestic product in Sudan is highly volatile. Emphasising the importance of availability and accessibility to food, this chapter is an attempt to analyse the current situation of food security in Sudan. In particular, the chapter aims at empirically examining the causality between food security and human development in Sudan (1990–2013), using Granger causality test. Availability of food is captured by food production of wheat, sorghum, and millet, while per capita calorie intake of these crops captures accessibility to food. Despite the considerable attempts that have been made to examine the issue of food security in Sudan over time, none of the existing studies incorporates the human development index in the empirical model. Data on the variables of interest are compiled from official sources, namely the Central Bank of Sudan, the Food and Agriculture Organisation, and the United Nations Development Program. The Granger causality test indicates that food security, in terms of availability (production) and accessibility (intake), enhances human development, but human development in Sudan only causes accessibility to food rather than availability. With regard to development strategies, the study recommends that considerable financial resources be allocated to improve human development indicators and to increase food production. This requires, among other things, considerable investment in education, health, nutrition, agricultural technology, agricultural extension, roads, markets, and other infrastructure. Facilitating procedures to access domestic and foreign agricultural credit is highly recommended. Subsidising food prices is quite important in order to enhance food consumption, particularly for the poor segments of the population.

Keywords: Sudan, food security, human development, availability, accessibility.

1. Introduction

1.1. Background

The concept of food security has undergone an evolutionary change during the last 50 years. In the 1950s, food security was considered in terms of production. It was assumed that adequate production would assure adequate availability in the market as well as in the household. In the 1970s, it became clear that availability alone does not lead to food security, since those who lack purchasing power will not be able to have access to balanced diets. In this regard, the World Bank (1986, 1) defines food security as “Access by all people at all times to enough food for an active healthy life. Its essential elements are the availability of food and the ability to acquire it. Food insecurity, in turn, is the lack of access to enough food”. Purchasing power, again, is related to jobs or livelihood opportunities. More recently, it is becoming evident that even if availability and access are satisfactory, the biological absorption of food in the body is related to the consumption of clean drinking water as well as to environmental hygiene, primary health care and primary education (Swaminathan Research Foundation 2002). The latter indicators reflect the components of the human development index (HDI). Thus, food security is affected by human development.

The United Nations Development Program (UNDP 2012) argues that sustainable increases in agricultural productivity and better nutrition are the drivers of food-secure growth and human development. This argument is straightforward — more productive agriculture will build food security by increasing food availability and lowering food prices, thus improving access. Higher productivity can also raise the incomes of millions of smallholder farmers, elevating living standards and improving health and education, thus expanding people’s capabilities. Through science, technology and the diffusion of innovation, greater agricultural productivity can also enable better stewardship of the environment. Sound nutrition links food security to human development. Well-nourished people exercise their freedoms and capabilities in different domains— the essence of human development — and completing the cycle will be inclined to demand food security from their leaders. The human development approach focuses on entitlements and capabilities. Food security should thus be leveraged by empowering people to make their own choices and by building resilience in the face of shocks. This means preserving people’s food entitlements—income, market structures, institutional rules and governance that enable the poor to buy and trade food in fair markets. It also means reinforcing essential human capabilities in health and education.

According to the Food and Agriculture Organisation (FAO 2014) of the United Nations, the right to adequate food is a universal human right that is realised when all people have physical and economic access, at all times, to adequate food or the means for its procurement, without discrimination of any kind. Despite progress made in reducing chronic hunger,

undernourishment still affects at least 805 million people worldwide. Guaranteeing fair access to resources, rural employment and income are key to overcoming hunger and food insecurity. Ensuring food security requires action in multiple dimensions, including improving the governance of food systems; inclusive and responsible investments in agriculture and rural areas, in health and education; empowering small producers; and strengthening social protection mechanisms for risk reduction. Given that food security is defined and understood through its four dimensions — availability, access, stability and utilisation — it can best be explained and measured through a ‘suite of indicators’.

1.2. Statement of the Problem

In spite of the fact that Sudan has a huge economic resource potential, measured in terms of its endowment of natural resources, including arable and grazing land, water, mineral resources, and diversified and pervasive climatic zones, nonetheless, the share of agriculture in GDP is declining over time. In addition, agricultural export revenues are highly volatile. A number of studies assert that Sudan cannot guarantee available food within the country. In addition, Sudanese people cannot access the recommended levels of food consumption because of widespread poverty. This chapter tries to answer the following questions:

- (a) Are there food gaps in Sudan?
- (b) Are the indicators of food production, per capita calorie intake, and human development in Sudan increasing, decreasing or constant over time?
- (c) Is there a causal relationship between human development and food production, and in which direction?
- (d) Is there a causal relationship between human development and per capita calorie intake, and in which direction?

Despite the considerable attempts that have been made to examine the issue of food security in Sudan over time, none of the existing studies incorporates the human development index in the empirical model.

Emphasising the importance of availability and accessibility to food, and the vital role that human development plays in promoting food security, this chapter attempts to analyse the current situation of food security in Sudan, in linkage with enhancing human capabilities. In particular, the chapter aims to examine, from an empirical point of view, the causality between food security and human development in Sudan (1990 to 2013), using Granger causality test. The trends in food security indicators as well as the human development index will also be estimated. The selection of the period under study is dictated by the availability of data.

1.3. Research Methodology

This research uses both descriptive and empirical approaches. Firstly, some descriptive statistics of the study variables are provided. The Ordinary Least Squares (OLS) technique is used to estimate the trends in food security and human development indicators. The widely used Granger causality test is also used for estimating the causality between food security and human development.

1.4. Research Hypotheses

The hypotheses of this research can be summarised as follows:

- (a) There are food gaps in Sudan.
- (b) Food production, food intake, and HDI exhibit upward trends.
- (c) Food security causes human development.
- (d) Human development causes food security.

1.5. Organisation of the Chapter

The rest of this chapter is organised as follows: Section 2 briefly reviews some of the available literature, while Section 3 discusses the empirical model, data, and findings. Finally, Section 4 offers some concluding remarks.

2. Literature Review

Nowadays, there is a great deal of concern among development economists, regarding the appropriate development strategy that least developed countries (LDCs) should adopt in order to solve their food insecurity problems. For instance, Seers (1972) argues that development should be redefined as the promotion of basic human needs. Among these needs, food is at the top of the list. Lappe and Collins (1977) suggest a food-first development strategy to solve the hunger problem. According to them, famine in some LDCs is due to government policy that gives priority to the production of raw materials and ignores the production of subsistence crops.

Maxwell (1991) argues that the growth of domestic agricultural production is important for food security, so as to provide not only a stable supply of food but also incomes and employment for the bulk of the population.

On the other hand, some development economists and international organisations support the cash crop development strategy, with the objective of maximising the foreign exchange that LDCs so desperately need for the importation of food to solve the hunger problem of their people. The World Bank (1981), for instance, argues that cash crops are the only way to get money into subsistence economy and improve yield of food crops, and the countries which have been doing well in cash crops

production have also been most successful in expanding food production. The argument, in this regard, rested on the comparative advantage principle. Countries can maximise their economic growth by specialisation in the production of export commodities that they can produce most efficiently, and trading these goods for others that they need, but cannot produce so efficiently.

It may be noted that the conventional definition of food insecurity is incomplete because it focuses on consumption and fails to consider the link between food insecurity, poverty, vulnerability, and malnutrition. Thus, Maxwell (1989) suggests a wider definition, according to which a country and people are food secure when their food system operates efficiently, in such a way as to remove the fear that there will not be enough food to eat. He argues that food security might be pursued when equitable growth ensures that poor and vulnerable groups have sustainable livelihoods.

There are two kinds of food insecurity — chronic and transitory. Chronic food insecurity refers to a continuously inadequate diet caused by inability to acquire food. It affects households that are persistently characterised by the inability either to buy enough food or to produce their own food. On the other hand, transitory food insecurity results from instability in food prices, food production or households' incomes. In its worst form, transitory food insecurity produces famine. This definition has many advantages in that it puts more emphasis on consumption relative to production, it allows for seasonality and international variations, and focuses attention on the functionality of an adequate diet rather than simple calorie count.

According to Mahran (1996), two approaches exist as to what causes food insecurity, namely the supply-side approach and the demand-side approach. While the supply-side approach emphasises problems related to availability as the main factors causing food insecurity, the demand-side approach focuses on factors affecting accessibility or entitlement to food. With regard to the supply-side, the causes of food insecurity are classified into physical and human-related factors. The first category includes factors such as drought, floods and crop diseases, while the second group includes wars, armed conflicts, poverty, and distribution of economic resources.

Diakosavvas (1989) examined, from an empirical point of view, the causes of short-run food insecurity in LDCs. He applied simple regression on cross-section data for 49 countries. The results show that although both internal factors (real per capita income, domestic food production) and external factors (value of food imports, real merchandise exports) have significant effects on food consumption, instability in domestic food production is the most important single factor that explains variations in food consumption.

Using cross-section data from 73 countries, Cheng (1989) tested the food first hypothesis by regressing cereal production and manufacturing growth

on food intake. He concluded that in most LDCs, cereal production has a stronger effect on food intake than manufacturing growth.

Sub-Saharan Africa has abundant agricultural resources, but shamefully, in all corners of the region, millions of people remain hungry and malnourished — the result of glaringly uneven local food production and distribution, and chronically deficient diets, especially among the poorest. This is a daily violation of people's dignity, with many governments not fulfilling their basic responsibility of protecting their citizens from hunger. The chain of food security that runs from availability through access to use comes under constant stress in a region vulnerable to the impacts of erratic weather, volatile food prices, and conflict and violence. Agricultural productivity remains low — much lower than in other regions. Many Sub-Saharan African countries are net food importers, and even depend on food aid during all-too-frequent humanitarian crises. Where food is available, millions cannot afford it or are prevented from buying or trading it by underdeveloped markets, poor roads, long distances to markets, and high transport costs. Important as food availability and access are, food security is about much more. Proper use of food and good nutrition determine whether food security sustains human development. Malnutrition leads to illness and death — as insufficient access to safe water, energy and sanitation combine with diseases, such as HIV/AIDS and malaria, in a lethal mix that perpetuates the problem (UNDP 2012).

With regard to the case of Sudan, Mahran (2000) argues that agriculture is the mainstay of the Sudanese economy. Most of Sudan's land is suitable for agricultural development. Agriculture also drives activity in the service sectors, such as transportation, agro-industries, and commerce, which account for a large part of the rest of the economy. The main cash crops in Sudan are cotton and gum Arabic, while the main food crops are sorghum, millet and wheat.

According to Mahran (2005), the agricultural sector in Sudan has traditionally played a leading role in economic activity, contributing an annual average of nearly 34.0 per cent of GDP during the last three decades. However, its share in GDP has been falling over the decades, from 38.0 per cent during the 1970s to nearly 34.0 per cent during the 1980s, and further, to 31.0 per cent during the 1990s. Furthermore, agricultural GDP grew at an average real rate of 0.9 per cent per annum during the 1970s, declined at a rate of 1.1 per cent during 1980s, and accelerated at a rate of 4.8 per cent per annum during the 1990s. Despite the fall in its share in GDP, a combination of factors may be cited for the accelerated growth of agriculture during the 1990s, chief among which are the policy and institutional reforms. More recently, the important recent reforms in agriculture included the gradual removal of government control over crop prices, the elimination of food and input subsidies, the reduction of tariffs and other protection measures, and the liberalisation of the foreign exchange market. Despite these measures, however, Sudan's agriculture

still suffers from problems of low productivity and institutional impediments. Thus, Mahran (2000) argues that the agricultural sector in Sudan is far from being an economically viable sector with its inherent low productivity. Furthermore, low public investment in agricultural infrastructure, such as irrigation, drainage, and improvement of crop varieties through agricultural research, are also to blame.

The contribution of agriculture to GDP declined from 46.4 per cent in 2000 to 39.0 per cent in 2005, and further, to 30.6 per cent in 2013. In fact, the share of agriculture in GDP continued exhibiting a declining trend since 2003 due to the deterioration in the production of the mechanised and traditional rainfed agriculture. Table 1 indicates the contribution of agriculture to GDP for Sudan, for the period 2000 to 2013. The average share of agricultural GDP to overall GDP over the mentioned period is estimated at 38.3 per cent.

Table 1. The share of agriculture and its sub-sectors to GDP (%), 2000–2013

Item	2000	2002	2005	2008	2010	2013
Agriculture	46.4	45.9	39.0	36.3	31.3	30.6
Irrigated crops	11.5	12.6	11.0	10.5	9.0	8.5
Mechanised rainfed crops	2.9	1.3	1.0	1.0	1.0	1.0
Traditional rainfed crops	7.2	8.1	5.0	5.5	4.5	5.2
Livestock	21.8	20.9	19.0	17.1	14.6	14.0
Forest, fisheries and others	3.0	3.0	3.0	2.2	2.0	1.9

SOURCE: Ministry of Finance and National Economy, 2000 to 2013.

Many studies have been conducted to empirically test the problem of food insecurity in Sudan. For instance, Abdelghaffar (1994) applied Cheng’s (1989) procedures to time series data, for the period 1970 to 1984. He concluded that the food insecurity problem in Sudan is more related to accessibility rather than to availability of food. That is, the food problem in Sudan is a result of poverty, and therefore, of the inability to purchase the food necessary to meet the basic nutritional requirements.

Salaheldin (1994) examined the causes of food insecurity in Sudan. For this purpose, he applied the OLS method to annual time series data covering the period 1971 to 1988. The results show that lack of access to adequate food is mainly due to the lack of purchasing power in Sudan. Therefore, any policy measures undertaken to increase real income together with income redistribution should be given higher priority. Furthermore, the other basic causes underlying food insecurity can be addressed by accelerating the growth of agricultural sector.

Awad (1995) applied similar methods to annual data, covering the period 1971 to 1988. Her empirical results provide strong evidence that cereal production, saving and real GDP were the major determinants of increasing calorie food intake in Sudan. This means that the problem of food insecurity in Sudan is related to the availability of food and accessibility to it.

Osman (2003) applied the OLS method to annual data, covering the period 1960 to 1999. The empirical results reveal that cereal production and real per capita (GDP) are the major determinants of increasing food calorie intake in Sudan, suggesting that while the problem of food insecurity in Sudan is related to availability, accessibility to food plays a more important role in that respect. Idris (2006) tested the food first hypothesis and the availability-accessibility hypothesis, in relation to food intake in Sudan over the period 1978 to 2003. This period was further divided into two phases: The period before liberalisation policies (1978 to 1989) and the period after liberalisation policies (1990 to 2003). He specified a model in which per capita food calorie intake was regressed on the food production, the manufacturing output and real per capita GDP as the explanatory variables. The study concluded that in the first period among all variables, food production turned out to be the only significant variable in explaining per capita food calorie intake. For the second period, food production was found to be the most significant single variable, followed by real per capita GDP. Furthermore, the coefficient of manufacturing output was insignificant in the two periods.

3. The Empirical Model, Data and Findings

3.1 Empirical Model and Data

As pointed out earlier, the ultimate objective of this chapter is to test, from an empirical point of view, the causality between food security and human development in Sudan, using Granger causality test. The trends in food security indicators as well as the HDI will also be estimated. The availability-accessibility hypothesis relates to food intake in Sudan over the period 1990 to 2013. The indicators to be taken in the models include (C_t , Y_t , and HDI_t):

where:

C_t : per capita calorie intake of sorghum, wheat and millet.

Y_t : total production of sorghum, wheat and millet.

HDI_t : human development index.

In this study food intake is measured by aggregate per capita calorie intake (C_t) of sorghum, millet and wheat, which represent the main food crops in Sudan. Adding imports (in the case of wheat) or subtracting exports (in the case of sorghum and millet), we obtain domestic consumption of each food crop in thousand metric tonnes. These figures are then multiplied by 1000

to obtain domestic consumption of food in kilogrammes. According to FAO (1990), one kilogramme of sorghum, millet and wheat contains 3,410, 3,860 and 3,380 calories, respectively. These figures are used to transform our data into calories. Dividing the sum of calories of the three crops by the total population gives per capita calorie intake.

Food production represents the goal for rural-oriented food-first development strategy that favours agricultural development. This indicator captures the supply side of food security. On the other hand, the HDI is used in the empirical model to capture the accessibility hypothesis.

The HDI is an aggregate measure of three dimensions of the human development concept: living a long and healthy life, being educated and having a decent standard of living. It combines measures of life expectancy, school enrolment, literacy, and income to allow a broader view of a country's development than using income alone. Three features set the HDI apart. First, the HDI is supplemented by other indices that give, separately, specific characteristics of development and, together, a broader picture of the development processes taking place. Second, it was developed by the Nobel laureate Amartya Sen and several leading economists as well as supported by the UNDP and widely implemented in global debate and national human development reports. Finally, human development is not only a new measure of development performance — it involves a new approach to development altogether. The HDI, like the human development concept itself, is continuously evolving. The global *Human Development Report 2010* sets out a new method of calculating the HDI, adjusting the education and income indicators and the way the index is aggregated. The knowledge dimension replaced literacy with mean years of schooling; school enrolment was substituted by the years of schooling a child can expect to receive, given current enrolment rates. Gross national income per capita replaced GDP per capita in the standard of living dimension. Finally, a geometric mean is used to aggregate the indicators instead of a simple average (Sudan Federal Ministry of Welfare and Social Security, University of Gezira and the UNDP 2012). More information on these changes can be found in the global *Human Development Report 2010*.

This chapter firstly provides some descriptive statistics, namely the mean, the standard deviation and the coefficient of variation (as a measure of variability in relation to the mean) for (C_t, Y_t, HDI_t) . Furthermore, the least squares growth rate, g , will be estimated for these indicators by fitting a least-squares linear regression trend line to the logarithmic annual values of the variables in the relevant period. The growth rate (g) will be calculated using the standard formula:

$$g = (e^b - 1) \times 100$$

where $(e = 2.71828)$ is Euler's constant and b is the trend coefficient to be estimated.

As pointed out earlier, the ultimate objective of this chapter is to examine, from an empirical point of view, the causality between food security and human development in Sudan over the period 1990 to 2013. The Granger causality test is used for this purpose.

Granger's test has received widespread attention from both theoretical and empirical researchers. It is worth mentioning that Granger is a recipient of the 2003 Nobel Prize in Economics. Granger's definition of causality is based on two notions. The first is that the future cannot cause the past, while the past and present cause the future. The second notion is that causality exists only between two stochastic variables. It is not possible to talk about causality when the two variables are deterministic.

Granger's test utilises a one-sided distributed lag method, which is based on the incremental forecasting value of the past (or past plus present) history of one variable on another. Thus, Y cause X if the past (or past plus present) values of Y can enhance the prediction of X when employed in conjunction with the past values of X. According to Granger (1969, 428), "...we say that Y_t is causing X_t if we are better able to predict X_t using all available information than if the information apart from Y_t had been used".

A time series X is said to Granger-cause Y if it can be shown, usually through a series of F-tests on lagged values of X (and with lagged values of Y also known), that those X values provide statistically significant information about future values of Y. The test works by first doing a regression of ΔY on lagged values of ΔY . Once the appropriate lag interval for Y is proved significant (t-stat or p-value), subsequent regressions for lagged levels of ΔX are performed and added to the regression provided that they:

1. Are significant in and of themselves.
2. Add explanatory power to the model.

The above exercise can be repeated for multiple ΔX 's (with each ΔX being tested independently of other ΔX 's, but in conjunction with the proven lag level of ΔY). More than 1 lag level of a variable can be included in the final regression model, provided it is statistically significant and provides explanatory power.

For the present objective of examining the causality between food security and human development in Sudan, the test involves estimating the following regression equations:

$$\hat{Y}_t = \alpha_0 + \sum_{i=1}^n \beta_i \hat{Y}_{t-i} + \sum_{j=1}^m \beta_j \hat{X}_{t-j} + U_t \quad (1)$$

$$\hat{X}_t = \alpha_1 + \sum_{i=1}^p \delta_i \hat{Y}_{t-i} + \sum_{j=1}^q \delta_j \hat{X}_{t-j} + V_t \quad (2)$$

where:

n, m, p, q : The number of lags in the regressions.

The Granger causality test is based on the OLS estimates of equations (1) and (2) for checking the causality between Y and X, assuming that no correlation exists between U_t and V_t .

According to this test, one can postulate whether there is a one-way relationship or two-way relationship for the variables of our interest or no relationship. The following cases can be hypothesised for causality between X_t and Y_t :

1. If the estimated coefficients on the lagged X_t variable in equation (1) are significantly different from zero as a group ($\sum \beta_j \neq 0$), and the estimated coefficients on the lagged Y_t variable in equation (2) are not significantly different from zero as a group ($\sum \delta_j = 0$), then there is a one – way causality from X_t to Y_t .
2. If the estimated coefficients on the lagged X_t variable in equation (1) are statistically insignificant as a group ($\sum \beta_j = 0$), and the estimated coefficients on the lagged Y_t variable in equation (2) are statistically significant as a group ($\sum \delta_j \neq 0$), then there is a one – way causality from Y_t to X_t .
3. If both estimated coefficients on the lagged X_t variable in equation (1) as a group and the coefficients on the lagged Y_t variable in equation (2) as a group are statistically significant, then there is a two – way (feedback) causality between X_t and Y_t .
4. Independence between X_t and Y_t is indicated when the estimated coefficients on the lagged X_t variable as a group in equation (1) and the coefficients on the lagged Y_t variable as a group in equation (2) are both statistically insignificant.

The data used in this study is obtained from official sources, namely the Central Bank of Sudan annual reports, FAO reports and the human development reports of the UNDP. The data represents annual observations on the variables of interest for the period 1990 to 2013. The reason behind the choice of this period is dictated by the availability of data. In the next section, the empirical results are presented.

3.2. Findings

To accomplish the research objectives, descriptive statistics are first provided for per capita calorie intake of sorghum, wheat and millet (C_t), food production (Y_t), and the human development index (HDI_t).

Table 2. Descriptive statistics for the study variables, 1990 to 2013

Indicator	Mean	Standard Deviation	Coefficient of Variation
C_t	546662.9	135738.1	0.248
Y_t	4230727.9	1309670.7	0.310
HDI_t	40.3	4.4	0.108

SOURCE: Author's computations (2013).

It is clear from Table 2 that food production in Sudan is highly volatile compared to other variables, with an estimated coefficient of variation of (31 per cent). It is worth mentioning that during the study period, the contribution of agriculture to GDP exhibited declining trends in most of the years. The problem exacerbated after oil exploration in 1999, where the agricultural sector was almost neglected. On the other hand, Sudan achieved a low human development score during the period 1990 to 2013, estimated at 40.3 per cent on average, and with a degree of variability of 11 per cent. Furthermore, in most of the years under consideration, food production was lagging behind food consumption, particularly for the wheat crop, indicating a food gap in Sudan.

Among the food crops, realisation of self-sufficiency in wheat represents a big challenge for the Sudanese economy. The average self-sufficiency ratio for the wheat crop over the period 1990 to 2013 is estimated at 44 per cent. This indicates that 56 per cent of wheat consumption in Sudan is covered by imports. The self-sufficiency ratio for wheat declined significantly since 1999 (oil exploration period). The average self-sufficiency ratios for wheat crop for the periods 1990 to 1998 and 1999 to 2013 are estimated at (77 per cent) and (24 per cent), respectively. Figure 1 shows the trends in wheat production and consumption, while Figure 2 illustrates the trends in self-sufficiency ratio for wheat over the study period.

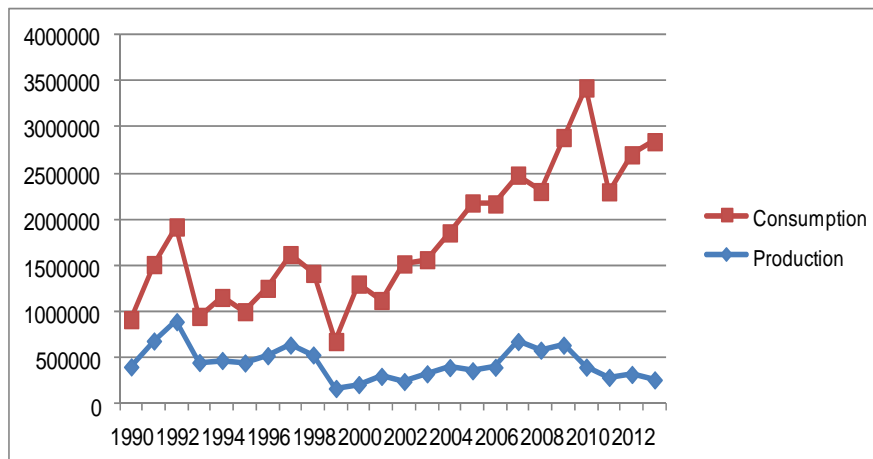


Figure 1. Wheat Production and Consumption in Sudan, 1990 – 2013

SOURCE: Generated from data collected from the Central Bank of Sudan, 1990 – 2013.

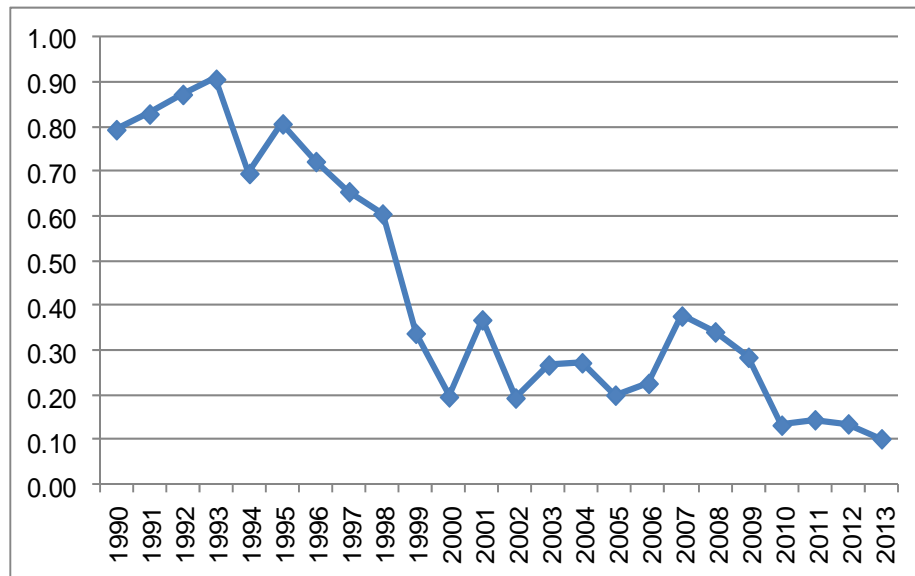


Figure 2. Trends in Wheat Self-Sufficiency Ratio in Sudan, 1990 to 2013
 SOURCE: Generated from data collected from the Central Bank of Sudan, 1990 –2013.

By applying the OLS technique, we estimated the trend equation for the study variables. The estimation results are shown in Table 3, where the figures inside the parentheses are the t-ratios of the estimated parameters and those inside the square brackets are the significance levels.

Table 3. Estimated exponential functions for the study variables in Sudan, 1990–2013

Variable	a	b	R ²	F	D
C _t	12.97 (125.2) [0.000]	0.017 (2.3) [0.032]	0.19	5.2 [0.032]	2.38
Y _t	15.30 (116.6) [0.000]	0.016 (1.74) [0.096]	0.12	3.4 [0.096]	1.87
HDI _t	3.50 (305.2) [0.000]	0.015 (20.3) [0.000]	0.99	3101.0 [0.000]	1.56

SOURCE: Author’s computations (2013).

The estimation results of Table 3 reveal that food security and human development indicators in Sudan exhibited positive trends during the study period. The trend coefficients are found to be statistically significant at either the 1 per cent, 5 per cent or 10 per cent levels, as indicated by the t-

ratios. The F-ratios give the same significance levels since the estimated functions are simple regressions. The Durbin – Watson statistic (D.W) indicates that there is no autocorrelation problem in all estimated equations. Based on the estimated trend coefficients and using the standard formula for calculating the least squares growth rate, g , the compound growth rate of (C_t) , (Y_t) and (HDI_t) are estimated at (1.7 per cent), (1.6 per cent) and (1.5 per cent) per annum, respectively.

Attempts are also made to examine, from an empirical point of view, the effectiveness of food security in inducing human development and the effectiveness of human development in enhancing the level of food security in Sudan. The results of Granger (1969) causality test are reported in Table 4, where N denotes the number of non-seasonal time lags in the test. To induce stationary, Box – Cox transformation parameter as equal to (1) for each time series was specified.

Table 4. Granger causality between food security and human development in Sudan, 1990 to 2013

Function	N	F-Ratio	P-Value	The Result
$Y = F(HDI)$	1	1.55	0.227	HDI does not cause food production
$HDI = F(Y)$	1	7.46	0.013	Food production causes HDI
$C = F(HDI)$	1	4.75	0.041	HDI causes food consumption
$HDI = F(C)$	1	3.10	0.094	Food consumption causes HDI

SOURCE: Author's computations (2013).

The results in Table 4 indicate that food security, in terms of availability (production) and accessibility (intake), enhances human development, but human development in Sudan only causes accessibility to food rather than availability.

For purposes related to food security (food access), these results raise the importance of allocating more financial resources to improve human development indicators, so as to realise high and sustainable levels of human development and to increase food production through vertical expansion (productivity) and horizontal expansion (increasing the area under cultivation). These require, among other things, considerable investment in education, health, nutrition, agricultural technology, agricultural extension, roads, markets, and other infrastructure. Facilitating procedures to access domestic and foreign agricultural credit is highly recommended. Subsidising food prices is quite important to enhancing food consumption, particularly for the poor segments of people.

4. Conclusion

The purpose of this chapter was to test the trends in food production, per capita calorie intake, and HDI for Sudan over the period 1990 to 2013. The chapter also examined the causality between food security and human development. Data on the variables of interest are compiled from official sources, namely the Central Bank of Sudan, FAO and UNDP. The Granger

causality test indicated that food security, in terms of availability (production) and accessibility (intake), enhances human development, but human development in Sudan only causes accessibility to food rather than availability. With regard to development strategies, the study recommended that considerable financial resources be allocated to improve human development indicators and to increase food production. These require, among other things, considerable investment in education, health, nutrition, agricultural technology, agricultural extension, roads, markets, and other infrastructure. Facilitating procedures to access domestic and foreign agricultural credit is highly recommended. Subsidising food prices is quite important to enhancing food consumption, particularly for the poor segments of people.

The findings of this study highlights that much needs to be done towards transforming human development and capacity for producing food rather than being dependent on others. To achieve this, a number of policy options are raised.

- a) Equitable distribution of the land with disregard to tribe, colour and other biased criteria.
- b) Granting adequate finance according to crop cultivated.
- c) Facilitating procedures (in a one-stop shop) to access finance.
- d) Reducing the interest rate on agricultural loans and reducing the guarantees.
- e) Activating the agricultural investment act regarding the elimination of tax rates on agricultural products.
- f) Agricultural spare parts and fertilisers should be free of custom duties.
- g) Adoption of fair pricing policies that take into consideration both producers and consumers.
- h) Improving market information systems.
- i) Improving infrastructure, particularly roads as well as other transportation and communication networks.
- j) Building or constructing new dams to solve irrigation problems.
- k) Water harvesting is highly recommended.

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The Missing Link between Climate Compatible Development and Agricultural Extensification: A Case Study from Southern Ethiopia

Siraj Akmel and Mesay Balcha

Abstract

Increasing agricultural productivity through extensification has a role to play in reducing poverty and hunger at the local level, although this might have the potential of impacting climate change, if not carefully managed and planned and/or streamlined into a climate compatible development manner. Thus, this chapter examines the impact of agricultural extensification (a production system conventionally characterised by horizontal expansion of farming at the expense of hitherto uncultivated land to raise agricultural yields) on climate change adaptation and mitigation, taking smallholder farmers of *Kebena Woreda* of Southern Ethiopia as a case study. Both quantitative and qualitative approaches were employed in data collection for this study. Household surveys, focus group discussions, in-depth interviews, and a desk review of available documents were conducted. Moreover, in order to supplement and verify the data obtained, direct field observation was conducted. The data indicates that significant land use/cover changes have occurred in the study area. The cultivation of perennial crops — a practice that is widely acknowledged as having positive contributions towards climate improvement — has not been given due consideration by the farm households. Marked differences in the magnitude and patterns of environmental degradation are evident, following widespread extensive cultivation of annual crops. Farm households were well aware of the fact that bringing of land covered with shrubs, woodlands and hillside slope areas into farming accelerated degradation of the environment. Agricultural extensification practised by the farm households was found to be negatively affecting climate. Poverty reduction strategies should give more emphasis to agricultural practices that benefit food production, adaptation and mitigation. Moreover, local level efforts aimed at reducing poverty and hunger should understand the common climate change adaptation and mitigation options as well as take into account capacity-building of smallholder farmers in the choice of crop varieties, cropping systems as well as enhancement of indigenous adaptation and mitigation strategies to attain the ‘triple win’. Beyond the provision of high-yielding cereal crops, such as *teff* and wheat, such support at local level ought to give due attention to the provisions of high-yielding perennial crops in order to minimise the impact of agriculture on climate change.

Keywords: Adaption, annual crops, climate change, land use changes, mitigation, perennial crop farming.

1. Background

1.1. Introduction

Agriculture is at the nexus of three of the greatest challenges of the twenty-first century — achieving food security, adapting to climate change and mitigating climate change — while critical resources, such as land, have become increasingly scarce (Beddington *et al.* 2012). There is growing focus on how to deal with climate change in ways that capture synergies and minimise the trade-offs between climate change mitigation, adaptation and development. These aims are embodied in the idea of climate compatible development (CCD) (Mitchell and Maxwell 2010). According to FAO 2010b, climate smart agriculture or CCD in agriculture may increase productivity sustainably, build resilience (adaptation), reduce greenhouse gas (GHG) emissions, and enhance achievement of national food security and development goals.

African agriculture has enormous potential for growth (Alliance for a Green Revolution in Africa [AGRA] 2013; United Nation Economic Commission for Africa [ECA] 2008). It is widely recognised that achieving rapid growth in agricultural productivity is essential in reducing poverty and hunger (New Partnership for Africa's Development [NEPAD] 2006; United Nations [UN] 2010a; World Bank 2010a; United Nations Environment Programme [UNEP] 2011). It is a key to raising the incomes of the poor (ECA 2004; UNEP 2011). Every 1 per cent increase in agricultural income per capita reduces the number of people living in extreme poverty by between 0.6 and 1.8 per cent, and reduces the poverty gap five times more than a 1 per cent increase in gross domestic product (GDP) per capita in other sectors (United States Agency for International Development [USAID] 2014; Christiaensen *et al.* 2011). The welfare of the poor in many parts of Africa remains connected to agriculture, which in turn relies on the natural resource base (ECA 2013; Dyer *et al.* 2013). It greatly influences the country's economic performance. In Ethiopia, for instance, about 11.7 million smallholder households account for approximately 95 per cent of agricultural GDP and 85 per cent of employment (Ministry of Agriculture and Rural development [MOARD] 2010).

Besides, the agricultural sector is a major contributor to GHG emissions and resultant global warming in Africa (ECA and Organisation for Economic Cooperation and Development [OECD] 2014; Intergovernmental Panel on Climate Change [IPCC] 2014). Agricultural GHG emissions account for between 10 and 12 per cent of emissions globally, with similar amounts due to land use change largely linked to agriculture activities (IPCC 2014). This poses a threat to the integrity of forests, biodiversity and other natural resources through expansion of cultivated land and unsustainable practices (ECA 2013).

According to ECA and OECD (2014), African agricultural growth has relied on cultivating more land and mobilising a larger labour force. Cultivated land increased from 180 million hectares in 1989 to 224.4 million hectares in 2009. Large-scale agriculture and major changes in human activities have been identified as the major causes of the dramatic changes in land cover and land use patterns (Ademiluyi *et al.* 2008). The largest conversion of land use in east Africa over the last 50 years has been the expansion of agriculture at the expense of grazing land (Joseph *et al.* 2010). Land use changes play an important role in global environmental change. This is one of the major factors affecting sustainable development (Lambin *et al.* 2003). The entire ecological infrastructure, including change of vegetation cover, soil characteristics, plant and animal population, and hydrological cycle, have been strongly influenced by the conversion of land and forest resources (Abebe 2005). Continued land use change and deforestation results in fast growing GHG emissions (ECA 2013).

Agricultural extensification is a production system that is conventionally characterised by horizontal expansion of farming at the expenses of hitherto uncultivated land to raise agricultural yields, thereby increasing farmers' income and reducing poverty. It remains questionable, however, whether such intensification can harmonise food production and environmental protection (Wu and Li 2013). The need to increase food production to allow for increased food consumption has become more desperate as the demands of an increasing population have not been met. As a result, marginal land has been brought under production, and commercial operations continue to use fertilisers for increased productivity, while fallow periods have been reduced (Aynalem 2014). Although such activities are designed to increase productivity, they may result in tiredness in the productivity of land. The combination of growing demand for agricultural products and inefficient agricultural practices may result in the over-exploitation of natural resources (Ellis *et al.* 2013), the outcome of which may constitute a challenge for climate change.

Against the above background, there is need for climate compatible strengthening of the agricultural sector. Climate change mitigation (actions taken to reduce the extent of climate change), adaptation (actions taken to ameliorate the impacts) and ongoing development are all critical in reducing current and future losses associated with climate change as well as to harness gains. National strategies on increasing agricultural productivity should understand adaption and mitigations strategies usually employed by smallholder farmers at the local level. This would help to reduce the harm-causing impact on climate change challenge and enhance opportunities from increased agricultural productivity.

1.2.Problem Statement

The ideas raised in the preceding section indicate that agriculture is at the nexus of three of the greatest challenges — achieving food security, adapting to climate change and mitigating climate change. In tackling the

challenge, CCD in agriculture increases productivity sustainably, builds resilience, reduces GHG emissions, and enhances achievement of food security and development goals (Anton *et al.* 2014). It requires the synergy of mitigation and adaptation. This makes it crucial to put in place a foundation for the implementation of CCD in agriculture at the local level, by identifying opportunities and challenges.

Agriculture is the main anchor of Ethiopia's economy, accounting for half of GDP, 83.9 per cent of exports and 85 per cent of total employment (UNDP Ethiopia 2011). According to the national five-year growth and transformation plan (GTP), agriculture will remain the core sector of the economy into the foreseeable future. However, the economic development path could deliver the required growth, but at the cost of significant agricultural land expansion (accelerating deforestation), soil erosion and higher emissions as well as at the risk of reaching the limits of further development (FDRE 2011).

Increasing agricultural productivity through extensification has a role to play in reducing poverty and hunger at the local level, although this might have the potential of impacting climate change if not carefully managed and planned, and/or streamlined into CCD. Strategies designed for implementation of the development policy at the local level should understand the common climate change adaption and mitigation options for the attainment of the 'triple win' (successful development, adaptation and mitigation) from the sector. Agricultural measures, for instance, the choice of adequate crops, cropping systems and sowing dates; use of improved crop varieties; soil conservation; and changing planting dates are the most widely used adaptation strategies in African countries, but several socioeconomic, environmental and institutional factors are key drivers influencing smallholder farmers to choose specific adaptation methods (Waha *et al.* 2013; Deressa *et al.* 2009). Thus, this chapter seeks to determine the impact of agricultural extensification on climate change adaptation and mitigation, taking smallholder farmers of *Kebena Woreda* of Southern Ethiopia as a case study. The specific objectives of the chapter are to:

- a) assess the types and extent of changes in land use patterns subsequent to agricultural extensification practices;
- b) assess local communities' perceived experience of the impact of agricultural extensification for climate variability; and
- c) assess the factors behind the changes in land use patterns.

1.3. Research Methodology

To address the objectives of the study, both qualitative and quantitative approaches in data collection and analysis were employed. In order to gather primary data from different sources, in-depth interviews, focus-

group discussions, household surveys, and a desk review of available documents were employed.

In-depth interviews: Individuals who were knowledgeable about previous and current situations in land use patterns (following the extensification of agricultural practices) and implications for degradation of the environment within the study area were selected for in-depth interviews. In-depth interviews were conducted with development agents (DA), *kebele* leaders, staff of the Office of Agricultural and Rural Development of the *woreda* as well as with elders of the community.

Focus group discussions: A group of farmers within each of the two sampled *kebele* were recruited/organised for the focus group discussions. The participants in the focus group discussions were all farmers, consisting of two elders, two female household heads, two other ordinary farmers, and two model farmers. They were asked to discuss issues relating to factual information on the type and extent of change in land use; forces behind changes in land use patterns; stratagems, struggles, and cooperation between stakeholders regarding intensification of agricultural land; and measures undertaken by the community members and other stakeholders to cope with possible land degradation.

Participant observation: Direct field observation by the researcher supplemented and helped to verify the information obtained through the other methods. Observation was conducted on the types and extent of changes in land use and implications of these changes for land degradation.

Household survey: In line with the objectives of the study, information was collected from a sample of household heads drawn from the two selected *kebele* for the purpose of gaining household level perspectives.

The case study provided useful information for designing specific local-level interventions in the study site, which can also be applied to similar environments across the region. Nevertheless, it should be noted that the case study covered only a single district (known as *woreda* in Amharic) and the focus is only on smallholder farmers, hence is not representative of the entire country.

2. Theoretical/Conceptual Framework

2.1. Conceptual Framework

Agriculture is at the nexus of three of the greatest challenges of the twenty-first century — achieving food security, adapting to climate change and mitigating climate change, while critical resources such as water, energy and land become increasingly scarce (Beddington *et al.* 2012). Evidence indicates that even though agriculture remains an important sector in much of Sub-Saharan Africa, it is both part of the problem as well as part of the solution to global climate change.

Current land tenure systems in Ethiopia provide that the right to ownership of land as well as all natural resources is executively vested in the state. This has weakened traditional institutions and contributed to uncertainty about land rights among farm households (Amare 1996; Yerasework 2000; Amsalu 2001). In addition, this has weakened local resource management and contributed to unsustainable exploitation of resources (Yerasework 2000). As indicated in the conceptual framework, economic and institutional forces draw large-scale investment into agriculture, causing investors to increasingly convert hitherto uncultivated lands into crop farming. The emergence of investors from outside the community may cause insecurity among local farm households, who resort to converting more hitherto uncultivated lands into crop farming, so as to retain the land or claim ownership rights over those lands. Such a trend has a double impact on climate. As a means of encroaching more hitherto uncultivated lands and/or due to the price and marketability, farm households have become more inclined to the cultivation of cereal/annual crops rather than perennial crops, although the cultivation of perennial crops is widely acknowledged as having a positive impact on managing climate change.

When farm households rely on agricultural extensification, land use change results (open areas and grazing lands are cultivated). When investors begin to emerge within the community, farm households become insecure about their lands and insecurity of tenure tends to weaken indigenous systems of resource management. Consequently, farm households are compelled to cultivate communal grazing and forest lands for cereal production. This, in turn, results in land degradation through the clearing of vegetation, causing changes in climate. Preparation of agricultural land, for instance, involves clearing of vegetation, which may reduce vegetation cover and either change or lead to a complete loss of primary vegetation cover. When grazing land is encroached for agriculture, the grazing area is reduced and the carrying capacity of the land decreases. All this contributes to climate change.

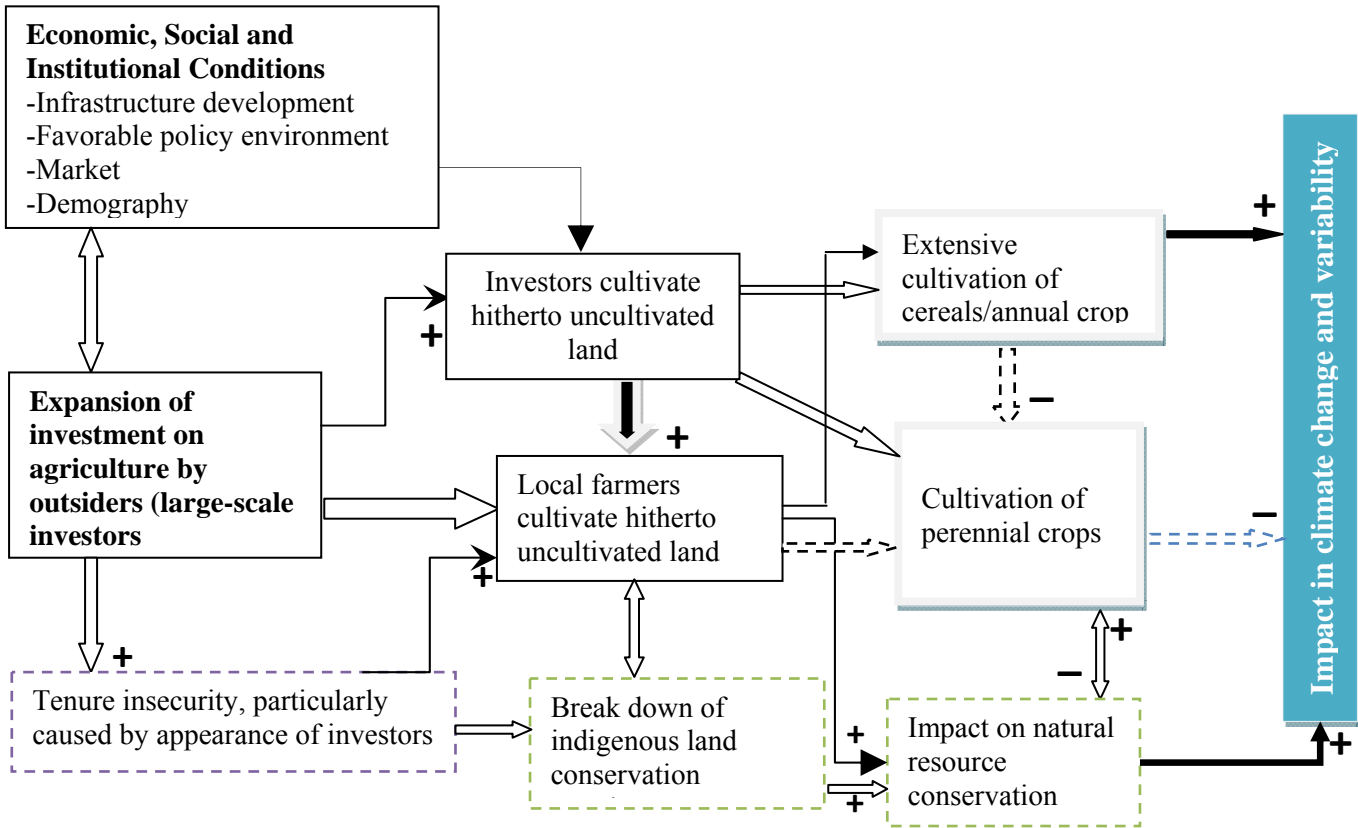


Figure 1. Schematic Presentation of Conceptual Framework for the Study

SOURCE: Authors' conceptualisation.

2.2. Climate Compatible Development in Agriculture

Climate compatible development in agriculture refers to agricultural practices that increase productivity sustainably, build resilience (adaptation), reduce GHG emission (mitigation), and enhance achievement of national food security and development goals (FAO 2010b). Climate compatible development strategies seek to lower GHG emissions or keep emissions low, promote development and build resilience simultaneously (Mitchell and Maxwell 2010). Hence, while agricultural development builds resilience but leads to net increases in emissions, this is offset by greater sustainable emissions reduction in the agriculture sector. Individual CCD programmes may include cultivation of perennial crops, which has positive contributions towards soil fertility replenishment, soil and water conservation and microclimate improvement through its nutrient cycling and shading effects (Kumar and Nair 2006). Some suggested efforts, in terms of adapting and mitigating climate change in the agricultural sector, include searching for greater climate tolerant crops, raising the efficiency of soil and water management, sustainable agricultural land management with biological pesticide and fertiliser control, and avoiding monocropping (NEPAD and OECD 2011). Adaptations most often occur locally and reactively in response to real or perceived climate threats (Adger *et al.* 2003).

Hence, adaption and mitigation strategies are the foundations for CCD (Tompkins *et al.* 2013). For most African countries, adaptation is fundamentally about sound, resilient development. Key focus areas include disaster risk reduction; sustainable land, water and forest management; and increased agricultural productivity. Adaptation for the agriculture sector is clearly necessary because of the direct impact of weather on agriculture (ADF VII 2010).

Climate-Smart Agriculture

Climate-smart agriculture seeks to increase sustainable productivity, strengthen farmers' resilience, reduce agriculture-related GHG emissions and increase carbon sequestration. By doing so, it strengthens food security and delivers environmental benefits (World Bank 2011). Climate-smart agriculture should be seen as a pathway towards development and food security (FAO 2011b). It includes proven practical techniques, such as mulching; intercropping; conservation agriculture; crop rotation; integrated crop-livestock management; agroforestry; and improved grazing and improved water management and innovative practices such as better weather forecasting, more resilient food crops and risk insurance (World Bank 2011). According to FAO, there are three pillars of climate-smart agriculture:

- a) Increasing productivity and incomes.
- b) Enhancing resilience of livelihoods and ecosystems.
- c) Reducing and removing GHG emissions from the atmosphere.

2.2.1. Potential Synergies and Trade-Offs among Agriculture, Climate Change, Mitigation, and Adaptation

Extensive farming, driven by large-scale expansion in some regions and poverty-level subsistence agriculture in others, has contributed to land degradation and deforestation (FAO 2010 cited World Bank 2012). Agriculture saw increasing yields, primarily due to the use of chemical fertilisers (Sparks 2009), yet has resulted in declining soil quality, land degradation, (Müller and Davis 2009) and deforestation — which resulted in 13 million hectares of forest lost annually over 1990-2005 (FAO 2010a). Intensification of agriculture is associated with rising pest and disease problems, and environmental degradation is on the increase (Hall *et al.* 2005). Agricultural activities account for about 35 per cent of severely degraded land worldwide (Marcoux 1998 cited in UNEP 2011). Climate change mitigation (actions taken to reduce the extent of climate change), adaptation (actions taken to ameliorate the impacts) and ongoing development are all critical in reducing current and future losses associated with climate change and in harnessing gains. Farmers can significantly reduce climate change by selecting agricultural practices that reduce GHG emissions or store carbon (Boto *et al.* 2012). Balancing environment and development needs has long been recognised as a matter of managing the multiple objectives of different and finding trade-offs and synergies between conservation and development (UNEP 2004). Climate change brings a destabilising effect to this balance by making it more difficult to identify clear winners and losers or clear successes and failures (O'Brien and Leichenko 2003). The challenge for policymakers is to identify how to select the 'best' options when faced with both long-term and wide spatial distribution of costs and benefits (UNEP 2004).

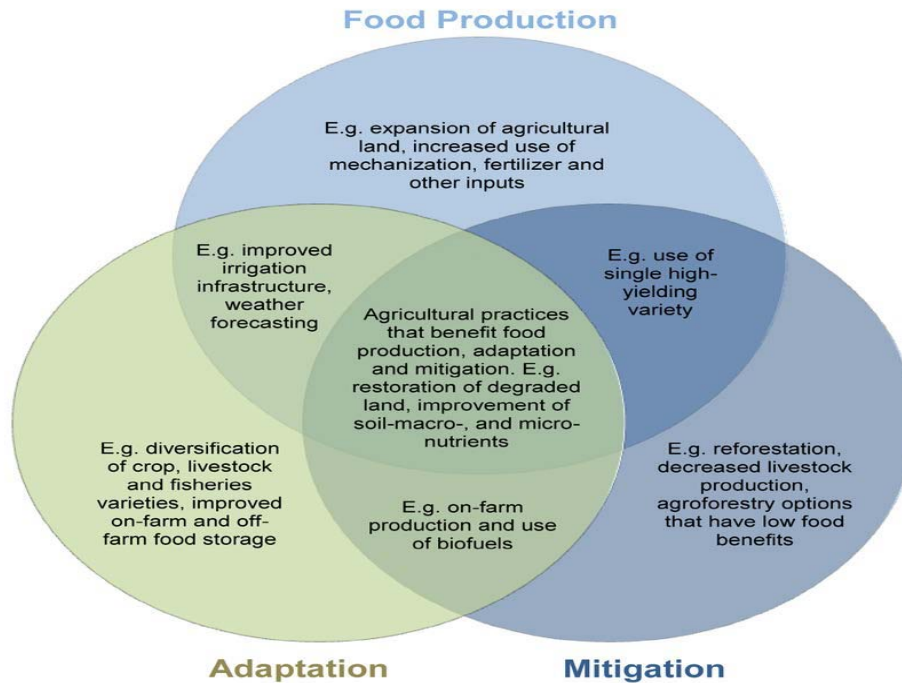


Figure 2. Potential Synergies and Trade-Offs in Agricultural Production, Mitigation and Adaptation

SOURCE: Taken from Lamboll *et al.* (2011).

2.2.2. Annual/Cereal Versus Perennial Crop Farming Impacts for Climate Change

Annual/cereal crops are crops such as maize, *teff*, sorghum, barley, and wheat, while perennials are coffee, *enset*, oranges, banana, and chat. Such crops occupy about 80 per cent of global agricultural land (Smith 2015). They are typically grown using resource-intensive cultivation methods (Glover *et al.* 2007). Cultivation practices contribute significantly to agriculture's overall impact on the environment (Smith 2015). Annual crops require frequent and expensive care to remain productive. Annuals have relatively shallow roots and live only until harvest time, hence many farmed areas experience problems with soil erosion, depletion of soil fertility or water contamination (Glover *et al.* 2007). In the course of cultivating annual crops, only between 18 and 49 per cent of nitrogen applied as fertiliser is taken up by the crops, while the remaining is lost to runoff, leaching or volatilisation (Cassman *et al.* 2002). Nitrogen losses from annual crops are between 30 and 50 times higher than those from perennial crops (Randall and Mulla 2001).

Perennial crops are highly efficient and responsive micro-managers of soil, nutrients and water. In contrast, annual crops provide less protection against soil erosion, manage water and nutrients less effectively, store less carbon below the ground, and are less resilient to pests and abiotic stresses than perennial plant communities (Cox *et al.* 2006). The conversion of perennial crop farmlands into agricultural croplands typically results in degradation of soil and water quality as well as dramatic shifts in soil flora and fauna and the ecosystem services they provide (MEA 2006; Bai *et al.* 2008 as cited in DuPont *et al.* 2010) due to shifts in rooting architecture and activity (DuPont *et al.* 2010). Perennial crop cover is more than 50 times more effective than annual crop cover in maintaining topsoil (Cox *et al.* 2006). Annual crops are photosynthetically active for shorter periods of time, and have shallower rooting depths and lower root densities than perennial crops (DuPont *et al.* 2010). When annual crops are replaced by perennial crops, negative environmental effects from current agriculture practices, such as erosion, nutrient leaching and the emission of greenhouse gases, may be reduced (Borjesson 1999). Perennial plants grow over a longer season than annual plants, hence they can intercept sunlight, utilise rainwater and absorb nutrients during parts of the year when croplands devoted to annuals lie completely bare or are sparsely covered by small seedlings with shallow roots (Cox *et al.* 2006).

The dominance of perennial crops in a system is likely to have a positive impact on soil fertility replenishment, soil and water conservation and microclimate improvement through its nutrient cycling and shading effects (Kumar and Nair 2006). They will function much more like the natural ecosystems displaced by agriculture which can live for many years (Glover *et al.* 2007). Perennial crops store more carbon in the soil than do annual crops (Robertson *et al.* 2000). Through greater carbon storage and lower needs for applied chemicals, perennial crops could help to restrain climate change. Their net value for global warming potential is negative, having been estimated at between 200 and 1,050 kg of carbon dioxide (CO₂) per hectare per year, as compared with positive potentials of between 410 and 1,140 kg per hectare per year for annual crops (Robertson *et al.* 2000).

2.2.3. Implications of Land Use Changes for Climate Change Challenge

Agricultural growth in Africa has relied on cultivating more land (ECA and OECD 2014). Cultivated land increased from about 180 million hectares in 1989 to 224.4 million hectares in 2009 (ECA and OECD 2014). Large-scale agriculture and major changes in human activities have been identified as the major causes of the dramatic changes in land cover and land use patterns (Ademiluyi *et al.* 2008). The largest conversion of land use in East Africa, over the last 50 years, has been the expansion of agriculture at the expense of grazing land (Joseph *et al.* 2010). These changes are associated with deforestation, biodiversity loss and land degradation (Maitima *et al.* 2009). Expansion of cultivation in many parts of East Africa has changed land cover into more of agro-ecosystems and

less of natural vegetation. Humans have increased agricultural output, mainly by bringing more land into production (Lambin *et al.* 2003 as cited in Maitima *et al.* 2009). Indeed, land conversion into agriculture in East Africa has outpaced the proportional human population growth in recent decades (Maitima *et al.* 2009).

Globally, concerns about the changes in land use/land cover emerged due to the realisation that land surface processes influence climate and change in these processes impact on ecosystem goods and services (Lambin *et al.* 2003 cited in Maitima *et al.* 2009). The impacts that have been of primary concern are the effects of land use change on biological diversity, soil degradation and the ability of biological systems to support human needs. Crop yields have declined, forcing people to cultivate more and more land to meet their needs (Kaihura and Stocking 2003 cited in Maitima *et al.* 2009).

With agricultural productivity increases lagging behind population growth rates, the gap between availability and demand for agricultural land continues to grow, resulting in severe land use conflicts between crop farming, animal grazing and forestry. Natural forests and plantations are encroached upon and cleared for cultivation or grazing by local people. State and community forest interests collide with local grazing interests on hillside land, and grazing and fuel wood/charcoal interests confront each other in the woodlands and bush lands (Teketay 2001).

According to the IPCC (2007) fourth assessment report, the agricultural sector contributes to 13 per cent of global GHG emissions. If emissions from deforestation due to land conversion to agriculture were also taken into account, it would bring the total share of emissions from agriculture to approximately one-third of global anthropogenic GHG emissions (Scialabba and Müller-Lindenlauf 2010). The expansion of agricultural land at the expense of forests has been estimated to represent 18 per cent of total global anthropogenic GHG emissions (Stern 2007). Agriculture's contribution to global GHG emissions will remain high in the future (Beddington *et al.* 2012). This makes the sector a major player that must be considered in attempts to mitigate global climate change (FAO 2011). Agricultural activities affect the climate and change in climate, in turn, may impact agricultural yield and destabilise future production.

2.3. Adaptation and Mitigation Options in the Agriculture Sector

The goal of adaptation measures should be to increase the capacity of a system to survive external shocks or change. It has been ascertained that adaptation helps farmers to achieve their food, income and livelihood security objectives in the face of changing climatic conditions, including climate variability, extreme weather conditions (such as droughts and floods) and volatile short-term changes in local and large-scale markets (Kandlinkar and Risbey 2000).

One of the policy options for reducing the negative impact of climate change is adaptation (Adger *et al.* 2003; Kurukulasuriya and Mendelsohn 2006). The perspectives of local farm households—the way they think and behave in relation to climate changes as well as their values and aspirations— have a significant role in addressing climate change (Doss and Morris 2001). Nevertheless, local farm households are only rarely considered in designing and adopting development options and implementation strategies, despite the fact that they are greatly impacted by impending changes of climate (Berkes and Jolly 2001). Common adaptation methods in agriculture include the use of new crop varieties and livestock, keeping species that are more suited to drier conditions, irrigation, crop diversification, mixed crop livestock farming systems, change of planting dates, diversification from farm to non-farm activities, increased use of soil and water conservation techniques, improved use of capital and labour, and planting trees for shade and shelter (Bradshaw *et al.* 2004; Kurukulasuriya and Mendelsohn 2006).

Adaptation to climate change is important in sustainable development and poverty eradication. It involves adjustment in natural or human systems, in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities (IPCC 2007). The link between climate change and sustainable development is seen in the fact that climate change is a constraint to development and sustainable development is key to capacities for mitigation and adaptation (FAO 2010b). The farmers' choice of adequate crops, crops systems and sowing dates can be an important adaptation strategy to climate change (Waha *et al.* 2013). These options should be considered in local development plans of action targeted towards improving agricultural productivity of the farm households. Cultivation of perennial crops, for instance, stores more carbon in the soil (320 to 440 kg per hectare per year) than do annual crops (0 to 300 kg per hectare per year) [Robertson *et al.* 2000]. Through greater carbon storage and reduced need for applied chemicals, perennial crops could help in restraining climate change (Waha *et al.* 2013).

According to Boto *et al.* (2012), there are three key strategic approaches possible for reducing GHG emissions in the food system:

- a) Measures to reduce agricultural emissions through better farm practices such as soil carbon sequestration, nutrient use efficiency, the management of manure and other outputs, and the use of renewable energy.
- b) Measures to reduce emissions beyond the farm gate through the decarbonisation of energy inputs, energy efficiency and waste management (not examined here).
- c) Measures to alter patterns of consumption, and in particular, to reduce demand for meat and dairy products that are highly GHG intensive, combined with measures to encourage consumers to avoid wasting food.

Mitigation of greenhouse gases is considered an important part of the sustainable adaptation criteria by African governments (Eriksen 2009). Africa's greenhouse gas emissions have remained relatively low compared to the rest of the world (Hepburn and Stern, 2008), with most of the contributions largely associated with land use change and forest degradation (ECA 2013). Coping strategies that have been recommended, for instance, in Ethiopia, to lessen the negative impacts of climate change include encouraging livestock ownership and planting early-maturing and drought-tolerant crop varieties (Deressa and Hassan 2009).

3. Findings and Discussion

3.1. Changes in Land Use Patterns

According to the Ethiopian Central Statistical Agency [CSA] as summarised on table 1 below, there has been significant increase the area of land covered with cereal crops between 2003/2004 and 2014/2015. For Southern Nations, Nationalities, and Peoples' Region (SNNPR), for instance, the total area of land covered with cereal crops for the year 2003/2004, 2005/2006, 2008/2009, 2009/2010, 2010/2011, and 2011/2012 is about 687,616, 708,276.48, 785,304, 837,849.64, 859,340.71, and 900,512.38, respectively.

Table 1. Total area of land covered with cereal crops, by year, for SNNPR and Gurage Zone

Year	SNNPR	Gurage Zone
	Total area covered in hectares	Total area covered in hectares
2003/2004	687,616	68,653
2005/2006	708,276.48	74,419
2008/2009	785,304	84,057
2009/2010	837,849.64	N/A
2010/2011	859,340.71	94,711.75
2011/2012	900,512.38	96,092.92
2014/2015	883,291	97,712

SOURCE: Central Statistical Agency, Statistical Bulletins 2004, 2006, 2009, 2010, 2011, 2012, 2015.

Similarly, for Gurage Zone, the estimated area under cereal crop farming has showed significant increase from 2004 to 2015. As indicated by Table 1, the land under cereal crop farming in the year 2003/2004 was about 68,653 hectares. It was about 84,057; 94,711.75 and 97.712 hectares in the years 2008/2009, 2010/2011 and 2015, respectively, which shows that more land use types were been converted to cereal crop farming. The estimated area of land for the given crops showed a significant increase between 2001/2002 to 2013/2014. However, the data indicates that land covered with permanent crops showed a slight decrease between 2004- 2015 (CSA 2004, 2006, 2009, 2010, 2011, 2012, 2015).

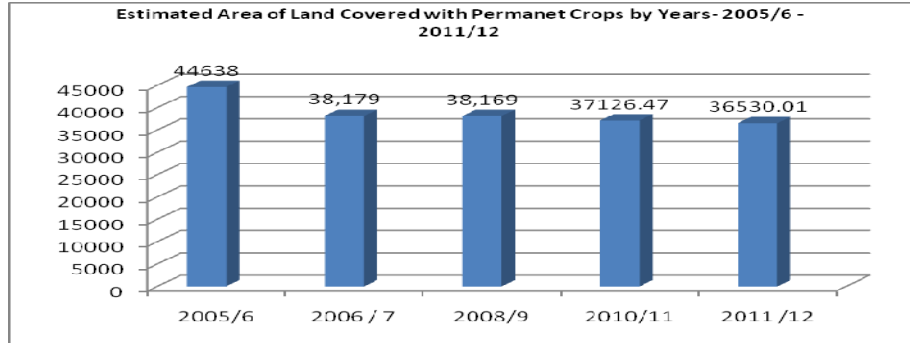


Figure 3a. Estimated Area of Land (in Hectares) Covered with Permanent Crops, by Years, for Gurage Zone

SOURCE: Adopted from CSA Statistical Bulletins, 2004, 2006, 2009, 2010, 2011, 2012.

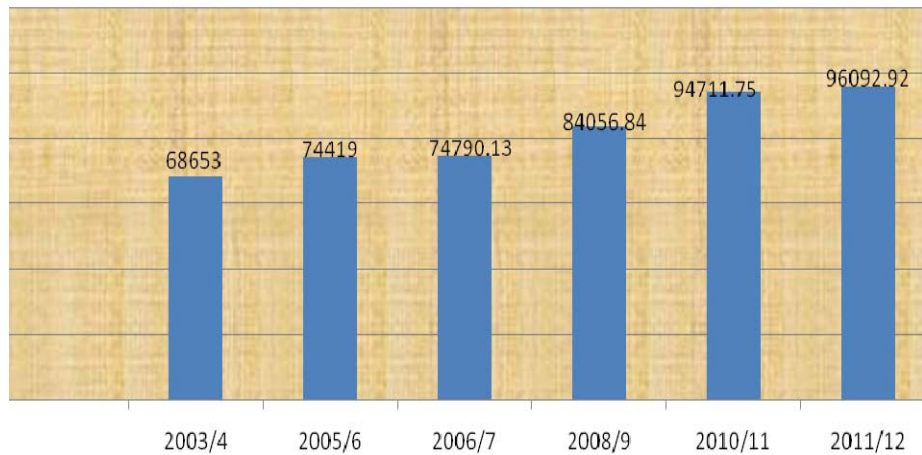


Figure 3b. Estimated Area of Land Covered with Cereal Crops, by Years, for Gurage Zone

SOURCE: Adopted from CSA Statistical Bulletins, 2004, 2006, 2009, 2010, 2011, 2012).

According to Figure 3a, the area of land covered with permanent crops, such as *enset*, *chat* and coffee, was 44,638 in the 2005/2006 and decreased to 38,179, 38,169, 37,126.47, and 36,530.01 in the years 2006/2007, 2008/2009, 2010/2011, and 2011/ 2012, respectively, indicating a slight decrease. On the contrary, as indicated by Figure 3b, the area of land covered with cereal crops, such as *teff* and wheat, was 74,419 in the 2005/2006 and increased to 84,056.84, 94,711.75 and 96,092.92 in the years 2008/2009, 2010/2011 and 2011/2012, respectively, indicating a significant increase from year to year.

The changes in land use pattern of the study area take the form of either conversion of land use units to other types and/or modifications in the land use patterns. In the study area, between 2000/2001, 2005/2006 and 2010/2011, shrub and grazing lands were converted into cereal crop farming and some perennial crop farms were converted to cereal crop farming. Intercropping of cereal crops was done with perennial crops and some of the lands covered with eucalyptus woodlots were converted to other perennial and/or cereal crop farming. Following a decline in the size of grazing allotments, hillside woodlands have become grazing areas. With the decrease in the productivity of some types of perennial crops, such as oranges and lemons, farmers in the study area have shifted to growing other perennial crop such as coffee, mangoes, avocados, and *enset*.

As indicated by Figure 4, about 34.2 per cent of the respondents indicated that they had changed some of their holdings from pasture and shrub land to cereal crop farming, and about 47.9 per cent of the respondents said that they had converted part of their land holdings from pasture, shrub and grazing land to cereal crop farming. Moreover, about 5.5 per cent of the respondents pointed out that they had converted part of their land holdings from perennial crop land to cereal crop farming.

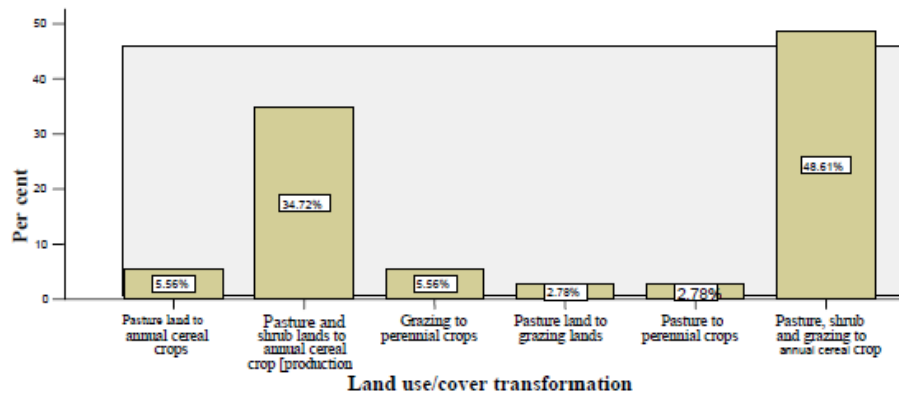


Figure 4. Percentage of Respondents response on Major Land Use/Cover Transformation

SOURCE: Survey data by authors.

Moreover, 2.7 per cent of the respondents had converted portions of their pasture land into perennial crop farming. The other 2.7 per cent had converted pasture land into grazing land. Thus, farm households' agricultural land has increased at the expenses of pasture, shrub and grazing lands. It is also noteworthy that the major land use conversions in the study area were the conversion of pasture, shrub and grazing land into cereal/annual crop farming, and that of hillside forestlands into grazing land and perennial crop lands into cereal/annual crop lands.

Therefore, it can be concluded that significant land use change patterns have occurred in the study area. As indicated by many findings, land use change plays a role in climate change challenge. For instance, according to the IPCC (2007) fourth assessment report, the agricultural sector contributes to 13 per cent of global GHG emissions. If emissions from deforestation due to land conversion to agriculture are taken into account, it could bring the total share of emissions from agriculture to approximately one-third of global anthropogenic GHG emissions. In defence of the argument that land use changes contribute to climate change challenge, Maitima *et al.* (2009) assert that land use changes are associated with deforestation, biodiversity loss and land degradation. Moreover, they argue that expansion of cultivation has changed land cover into more of agro-ecosystems and less of natural vegetation. This confirms that changes in land use pattern have a significant impact on future climate change. Furthermore, as discussed in the sub-sections below, significant land use changes have occurred following extensification of agricultural practices in the study area.

3.1.1. Changes in Size of Land Holdings

Considerable changes were observed in the size of land holdings of the respondents between the years (2000/2001, 2005/2006 and 2010/2011). Figure 5 indicates that the average size of land holdings of the respondents was 2.53 hectares in the year 2000/2001 and 2.78 hectares in the year 2005/2006. Between 2000/2001 and 2010/2011, the average size of land holdings of the respondents increased by 0.6 hectares (2.53 hectares in 2000/2001 to 3.13 hectares in 2010/2011). According to the data, this is because farm households converted communal lands (grazing, shrubs and woodlands) into personal use. Communal lands have been invaded by individual farmers for fear of losing them.

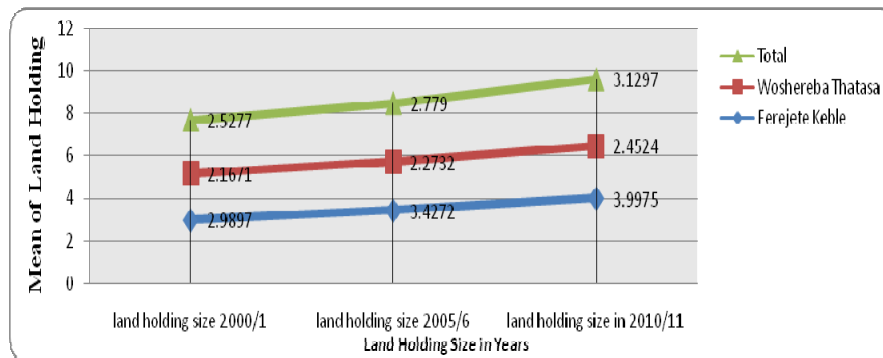


Figure 5. Respondents’ Changes in Average Land Holding Size per Year

SOURCE: Sample survey by authors (2013).

The extent of changes in size of land holding was found to be more substantial among the farm households of *Ferejete Keble* of *Kola* climate,

where cereal crops are widely cultivated than *Woshereba Thatasa Kebele* of *Woyinadega* agro-climate, where perennial crops are more intensively cultivated. The test statistics indicate that the change in the average size of land holding of the respondents between 2000/2001 and 2010/2011 were significant. For the respondents, the average land holding size increased between 2000/2001 and 2010/2011.

Surprisingly, focus group discussions and key informant interviews confirmed that farmers within the community were expanding their land holdings into communally held lands. The farmers' holdings have expanded because they have brought shrub and grazing lands that were previously used communally under cultivation. In support of this view, key informants argued that because the only access to land for individuals has been through inheritance, with the emergence of other interest groups over hitherto uncultivated lands, farmers began to expand their farming activity onto those hitherto uncultivated lands adjacent to their farms.

This has a number of implications on local-level institutions governing land and related resources, posing a significant impact on communal resources, and contributing in one way or another to climate change. As noted by Yerasework 1997, the reckless activities of farmers contribute to environmental degradation; hence, it is important to direct attention to these changes in land use patterns and consequent problems.

3.1.2. Expansion of Cereal/ Annual Crop Farming

Data from the focus group discussions indicates that the size of land allocated to cereal crop farming has been increased in the two Kebele Administrations (KA). As indicated by the informants, shrub and pasture lands have been changed into cereal crop farming by farm households. In support of this view, a member of the Woreda Office of Agriculture (WOA) stated:

Farmers were advised by agricultural extension workers to expand their farming as set by agricultural extension programmes. As a result, individual farm households expanded their agricultural land at the expenses of hitherto uncultivated lands.

Table 2. Distribution of changes in average land use pattern covered with annual crops by years

Kebeles		Change in Land Use Patterns in 2000/2001, 2005/2006, and 2010/2011		
		LCWA C ⁱ in 2000/2001	LCWAC in 2005/2006	LCWAC in 2010/2011
Ferejete KA	Statistic			
	Mean	1.7500	2.1532	3.1452
	Median	2.0000	2.0000	3.0000
	N	31	31	31
	% of Total sum	83.3%	69.4%	65.3%
Woshereba Thatasa	% of Total N	44.3%	43.1%	43.1%
	Mean	.2795	.7195	1.2634
	Median	.1000	.5000	1.1000
	N	39	41	41
	% of Total sum	16.7%	30.6%	34.7%
Total	% of Total N	55.7%	56.9%	56.9%
	Mean	.9307	1.3368	2.0736
	Median	.5000	.7500	1.7500
	N	70	72	72

SOURCE: Survey data by authors (2013)

As indicated by Table 2, data from the respondents also indicates the existence of changes in the extent of the land allotted to cereal crop farming between 2000/2001, 2005/2006 and 2010/2011. The average size of land holdings covered with cereal/annual crop farming that was about 0.93 hectare in the year 2000/2001 increased to between 1.34 and 2.07 hectares in 2005/2006 and 2010/2011, respectively. This indicates that the average size of land holdings allotted to cereal crop farming for the sampled household heads increased by 1.14 hectares between 2000/2001 and 2010/2011. The data indicates a significant difference in the mean size of land covered with annual crops for the respondents of the two Kebele Administrations. The average size of land with cereal crop farming for respondents from Ferejete KA was about 1.75 hectares in the year 2000/2001, expanding to between 2.15 and 3.15 hectares in the year 2005/2006 and 2010/2011, respectively. However, the increase in Woshereba Thatasa KA was from 0.28 hectares in 2000/2001 to 0.72 hectares in 2005/2006 and 1.26 hectares in 2010/2011.

The average size of land holdings covered with annual crop farming for the study respondents was about 0.93 hectares in the year 2000/2001 and about 1.34 and 2.07 hectares in 2005/2006 and 2010/2011, respectively. This indicates that farm households have converted other land use types into cereal crop farming within 2000/2001, 2005/2006 and 2010/2011. These changes in the average land holding sizes of the respondents was found to be significant.

Table 3. Significance of the changes in the mean size of land holding of respondents under annual crops in 2000/2001, 2005/2006 and 2010/2011

Year	Test Value = 0.93; alpha = 0.05					
	t	df	Sig. (2-tailed)	Mean difference	95% Confidence interval of the difference	
					Lower	Upper
Land covered with cereal crops in 2010/11	7.088	71	.000	1.14361	.8219	1.4653
Land covered with cereal crops in 2005/6	3.083	71	.003	.40681	.1437	.6699

SOURCE: Authors fieldwork data (2013)

To test the significance of changes in respondents' mean of land holding size under annual crop farming in 2000/2001 and 2005/2006:

The null hypothesis: The mean of land holding size of respondents covered with annual crop farming in 2005/2006 is equal to 0.93 hectares (the mean of land holding size under annual crop farming in 2000/2001).

The alternative hypothesis: The mean of land holding size of the respondents under annual crop farming in the year 2005/2006 is not equal to 0.93 hectares.

As shown in Table 3, at 71 degrees of freedom, the t-statistic is 3.08 and sig. (2-tailed) is equal to 0.003. Since the *p*-value (significant level) is less than 0.05 alpha, we accept the alternative hypothesis and conclude that the mean of land holding size of respondents under cereal crop farming in 2005/2006 was different from the mean of land holding size in 2000/2001. The result indicates that respondents cultivated cereal crops extensively in 2005/2006, more than in 2000/2001. The average land holding sizes of the respondents allotted to cereal crop farming increased between 2000/2001 and 2005/2006.

In the same expression, the changes in the average land holding size of respondents covered with cereal crops in 2000/2001 and 2010/2011 was found to be significant. At 71 degrees of freedom, t-statistic is calculated as about 7.09 and sig. (2-tailed) is equal to 0.000. In the same fashion, since the *p*-value is less than our usual indicator significance (0.05 alpha), there were significant changes in the size of land allotted to cereal crop farming. There is significant difference in the average size of land newly brought under the cultivation of cereal crops between the two KAs. More land is brought under cereal crop farming in *Kola Kebele Administration (KA) of Ferejete* than in *Woyinadega KA of Woshereba Thatas*.

From Tables 2 and 3, it is observed that farm households have been converting more and more land into cereal crop farming. Increasing agricultural productivity through extensification or continuous land use

changes plays a significant role in climate change. On the other hand, evidence indicates that land use changes have a significant impact on fastening challenges of climate change. For instance, the continued demand for land use changes is often responsible for deforestation and loss of biodiversity (UNEP 2011). Expansion of agricultural land at the expense of forests has been estimated to represent 18 per cent of total global anthropogenic GHG emissions (Stern 2007). Therefore, at the micro-level, CCD planning is very important. Appropriate adaptation and mitigation measures are therefore required for managing unintended effects of agricultural practices at micro-level. Efforts should be made on planning for CCD in the agricultural sector so that due focus is made while increasing agricultural productivity.

3.1.3. Changes in Average Size of Animal Holdings

Analysis of the data revealed that there was a change in the size of cattle holdings of the respondents, excluding oxen, between 2000/2001, 2005/2006 and 2010/2011. Figure 6 below shows that 70 of the respondents who owned cattle held, on average, 3.4 cattle in 2000/2001 and 3.71 cattle in 2005/2006. This shows that the total number of cattle holdings increased slightly between 2000/2001 and 2005/2006, and showed a significant decrease between 2005/2006 and 2010/2011.

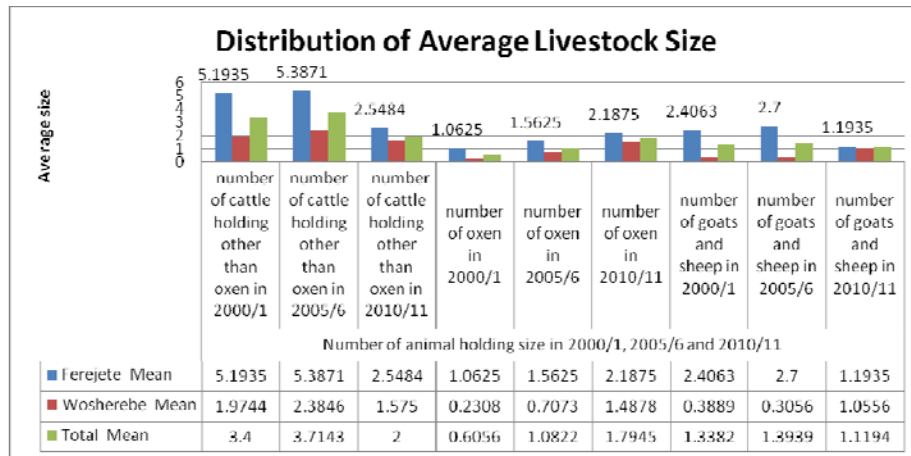


Figure 6. Distribution of Respondents' Average Livestock Size by Years
 SOURCE: Survey data by authors (2013).

According to Figure 6, the size of oxen holdings of the respondents increased between 2000/2001 and 2010/2011. As the respondents in the two KAs indicated, many farm households have replaced their cattle with oxen and a number of farm households increased their oxen holdings size with the increasing demand of agriculture. Figure 6 indicates that the average size of goat and sheep holdings of the respondents showed a slight increase between 2000/2001 and 2005/2006, but the number significantly decreased between 2005/2006 and 2010/2011.

Members of the focus group discussion also pointed out that the number of cattle had decreased significantly over the years. As most of the focus groups discussants and individual informants indicated, even though grazing land under individual as well as communal holding has been decreasing due to expansion of agriculture, farm households have continued to rear livestock as a means of strengthening their livelihoods. Changes in climate, reduction in size of land allotted to grazing, woodlots, and the emergence of some communicable diseases were identified as the causes behind the decrease in the number of animal holdings by individual key informants and focus group discussants.

3.1.4. Changes in Perennial Crop Farming

According to the agriculture sample survey which is conducted annually by the Ethiopian Statistical Agency, the area of land covered with *enset*, papayas, lemons, and oranges showed a decrease between the years 2009/2010 and 2011/2012 for SNNP and the Gurage Zone. According to the data, the area covered with *enset* for SNNP decreased by 71,771.8 hectares between 2009/2010 and 2011/2012. Thus, the land area covered with *enset* was about 289,496.4 hectares for the year 2009/2010 and it was about 217,724.64 hectares for the year 2011/2012.

As opposed to land covered with cereal crops, the area of land covered with perennial crops has shown a slight decrease between the years 2003/2004 and 2011/2012 for Gurage Zone of Southern region. According to Table 4, the land covered with *enset* in the year 2008/2009 was about 28,971.69 and decreased to 24,390.03 in the year 2011/2012.

Groups of farmers participating in focus group discussions were asked about the changes in the extent and patterns of land used for perennial crop farming for the years 2000/2001 and 2010/2011. Key informants as well as the focus groups maintained that conversion to perennial crop farming within the individual holdings was hardly the norm. Rather than converting already used land to perennial crop farming, farm households were found harvesting only from those same pieces of land over the years. Expansion of land covered with perennial crop farming was not significant compared to the cereal crop farms. As a result, the average size of land under perennial crop farming has not expanded over the years (2000/2001 to 2010/2011). Relatively speaking, rather than increasing, land under perennial crops has shown a slight decrease. Yet, the focus groups indicated that the size of land under *enset* has not changed significantly over the years.

Table 4. Land covered with *enset* by years for SNNP and Gurage Zone

Type of crops	Area covered in hectares for SNNPR by years				Area covered in hectares for Gurage Zone by years			
	2003/4	2008/9	2009/10	2011/12	2003/4	2008/9	2010/11	2011/12
Enset	-	196066.1	289496.44	217724.7	-	28971.7	25272.8	24390.03
Oranges	2120	601.74	1284.50	840.37	361	248.58	275.38	283.13
Papayas	881	1056.68	1293.56	1136.34	47	93.57	87.82	125.73

SOURCE: CSA Statistical Bulletins, 2004, 2006, 2009, 2010, 2011, 2012.

Unlike using lands for cereal crop farming, farmers were not seen tilling hitherto uncultivated lands for perennial crop farming. Rather, many farmers grow two or more perennial crops within the same piece of perennial crop farms. The reason for this trend, as indicated by the informants, is that farm households mostly used to grow perennial crops on those lands that have access to animal manure and/or that are fertile lands. These lands are either covered with perennial crops or could be lands near the homestead. Cultivation of perennial crops requires small piece of grounds, which can also support households' consumption. As a result, rather than expanding the area of perennial crop farms, individuals opt to intensively farm perennial crops. On the other hand, during the period of fieldwork, as shown by Plate 1, intercropping of crops was observed. Different perennial crops were grown on the same piece of land. For instance, farmers used the same plot to grow *chat* and coffee as well as other perennial crops. Plate 1 shows a plot on which *enset*, coffee, bananas, and maize are grown side by side.



Plate 1. Annual Crops Intercropped with Perennial Crops on a Farm in the Study Area

Photo credit: One of the authors.

Data from the sample survey also showed that, unlike the average size of cereal cropland owned by the respondents (which showed a significant increase for the years 2000/2001, 2005/2006 and 2010/2011) and average size of pasture land holdings of the respondents (which showed a slight decrease within the same years), the change in the average size of land

holdings under perennial crop farming between 2000/2001 to 2010/2011 was insignificant.

Table 5. Distribution of changes in average land use patterns covered with perennial crops in the years 2000/2001, 2005/2006, and 2010/2011

Kebeles	Statistic	Land use patterns		
		LCWPC ^{II} in 2000/1	LCWPC in 2005/6	LCWPC in 2010/11
Fereje KA	Mean	.4677	.4677	.4435
	Median	.5000	.5000	.5000
	% of total sum	24.2	23.5	23.1
Woshereba Thatasa	Mean	1.1098	1.1524	1.1159
	Median	1.2500	1.2500	1.0000
	% of total sum	75.8	76.5	76.9
Total	Mean	.8333	.8576	.8264
	Median	1.0000	.8750	1.0000
	N	72	72	72

SOURCE: Survey data by authors (2013)

The data indicates that with extensive cultivation of cereal/annual crops, the quality and productivity of indigenous perennial crops has been decreasing. This indicates that the natural environment is losing the benefits associated with cultivation of perennial crops and is also being affected by the extensive cultivation of annual crops. This calls for local-level efforts to ensure that food security is focused on crops that have a triple win (climate mitigation, adaption and improving life for the local people).

Data from the sample survey, as indicated by Table 5, shows that unlike the average size of annual croplands owned by the respondents (which showed a significant increase in 2000/2001, 2005/2006 and 2010/2011) and average size of pasture land holdings of the respondents (which showed a slight decrease over the last ten years), the change in the average size of land holdings under perennial crop farming over 2000/2001 to 2010/2011 was insignificant. As indicated by Table 5, the average size of land under perennial crop farming was about 0.83 hectares, 0.86 hectares and 0.83 hectares in 2000/2001, 2005/2006 and 2010/2011, respectively. The data indicates that the average size of land holdings under perennial crops in 2000/2001, 2005/2006 and 2010/2011 are almost equal. The one sample t-test also confirmed that changes were not observed in the means of farm households' size of land holding under perennial crops in the year 2000/2001 and 2010/2011. The test of the insignificance of difference in the average size of land covered with perennial crops in the year 2000/2001, 2005/2006 and 2010/2011 is presented in Table 6.

Table 6. Test of the insignificance of changes in respondents' perennial land

holding size between 2000/2001 and 2010/2011

	Test Value = 0.833 hectare					
	T	df	Sig. (2-tailed)	Mean Difference	95% Confidence interval of the difference	
					Lower	Upper
Land covered with perennial crops in 2010/2011	-.117	71	.907	-.00661	-.1189	.1057

SOURCE: Survey data by authors (2013)

Table 6 indicates that there was no significant difference in the mean size of respondents' land holdings under perennial crop farming in 2000/2001 and 2010/2011. Respondents' average size of land holdings under perennial crops did not increase between 2000/2001 and 2010/2011. The fact that the changes in the average size of land under perennial crops between 2000/2001 and 2010/2011 was insignificant, indicates that farm households in the study area have come to value annual crop farming more than they did previously. Significant portions of land that were previously covered only with *enset* were also intercropped with cereal crops such as maize (see Plate 1).

Agricultural extensification at the local level is not climate compatible development. Even though farm households have been increasing their productivity through extensification of cereal crops, this has a negative impact on climate in the long run. Farm households' focus on extensive cultivation of cereal crops increases the climate change challenge. As indicated by Kumar and Nair (2006), the dominance of perennial crops in a system is likely to have positive effects on soil fertility replenishment, soil and water conservation and microclimate improvement. When annual crops are replaced by perennial crops, negative environmental effects from agricultural practices, such as erosion, nutrient leaching and the emission of greenhouse gases, may be reduced (Borjesson 1999). The conversion of perennial croplands into annual croplands typically results in degradation of soil and water quality as well as dramatic shifts in soil flora and fauna and the ecosystem services they provide (MEA 2006; Bai *et al.* 2008 cited in DuPont *et al.* 2010).

3.1.5. Changes in the Average Size of Pasture and Woodland

Table 7. Distribution of changes in respondents' average land use patterns covered by pastures and eucalyptus trees

Statistics	Land use patterns in 2000/2001, 2005/2006 and 2010/2011
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		PL ^{III} in 2005/6	PL in 2000/1	PL in 2010/11	LCWE ^{IV} in 2000/1	LCWE in 2005/6	LCWE in 2010/11
Ferejete KA	Mean	.4853	.6458	.3160	.3045	.2614	.2608
	Median	.5000	.5000	.2500	.2500	.2500	.2100
	N	31	31	31	29	29	30
	% of total sum	59.8	53.6	93.7	50.7	47.9	52.4
	% of total N	47.7	46.3	44.9	41.4	42.0	42.9
Woshereba Thatasa	Mean	.2974	.4808	.0174	.2095	.2063	.1775
	Median	.2500	.5000	.0000	.1000	.1000	.1000
	N	34	36	38	41	40	40
	% of total sum	40.2	46.4	6.3	49.3	52.1	47.6
	% of total N	52.3	53.7	55.1	58.6	58.0	57.1
Total	Mean	.3870	.5572	.1515	.2489	.2294	.2132
	Median	.2500	.5000	.0000	.1000	.1700	.1000
	N	65	67	69	70	69	70

SOURCE: Survey data by authors (2013)

As indicated by Table 7, the average size of land holdings of respondents allotted to pastures in the two KAs that was 0.56 hectares in 2000/2001 was reduced to 0.39 and 0.15 hectares in the years 2005/2006 and 2010/2011, respectively. Similarly, farmer focus group discussants and individual key informants ascertained the widespread conversion of farmers' lands from pasture to farming between 2000/2001, 2005/2006 and 2010/2011. The informants confirmed that extensive areas of land allotted to pasture had been converted to annual crop farming in the study area. The other change noted in the land use patterns of the study area is the decreasing size of woodlands and grazing lands. As indicated by Table 7, changes in the size of land holdings allotted to woodlands were also observed in the study area. Analysis of the sample survey reveals that 72 per cent of respondents' land holdings allotted to pastures had been converted to other land use types by the individual and/or groups of users during the last decade. Similarly, data from focus group discussions and key informants indicated widespread conversion of farmers' lands from pasture to farming. Plate 2, which was taken during the fieldwork, shows an area of shrubs and woodlands being converted to annual crop farming (for *teff*).



Plate 2. Shrubs and Woodland Areas Are Converted into Annual Crop Farming
Photo taken by one of the authors.

This implies that shrinking of grazing land would force the livestock to move into upper slopes, hillside areas and roadsides. This, in turn, induces overgrazing and soil erosion, thus contributing to change in climate and variability. Extensification of agriculture over grazing and woodlands is negatively affecting climate. Therefore, extensification is not a CCD in the long run.

3.2. Forces behind Changes in Land Use Patterns

The forces behind the changes in land use patterns as identified by the informants can be summarised as:

- a) Physical attributes of the study area.
- b) Tenure insecurity.
- c) Demographic factors.
- d) Infrastructural development and better access to the market.
- e) Agricultural expansion and intensification strategy of the government.

In order to improve the productivity of smallholder agriculture, farm households have been continuously supported through technical and material provisions, and as result, agricultural lands expanded at the expenses of hitherto uncultivated lands. However, institutional gaps relating to tenure bring into question the issue of CCD. The data indicates

that farm households' engagement with such practices has been contributing to environmental degradation, thus causing changes in climate.

3.2.1. Tenure Insecurity

Tenure insecurity developed among farm households in relation to hitherto uncultivated lands, following the arrival of investors and the weakening of control over land by local-level organisations. The long-term relationship the community had with land created a deep-rooted sense of common ownership over land. However, in recent times, with the coming of investors to the area, farm households have begun to feel insecure regarding their access to hitherto uncultivated lands, hence began rushing to privately appropriate grazing, pasture and shrub lands beyond their homesteads, up to the edge of the river stream.

With the increasing demand for land by individuals and groups of users for *limat* (development), previously communally used lands were transferred to individual users and the control over land by local-level administration weakened considerably. Consequently, individual farm households have taken to tilling communally used lands adjacent to their farms.

Tenure insecurity is not only linked to the coming of investors, but the criterion set for land registration has also caused insecurity. At the beginning of land certification, it is made clear that a farm household will enjoy secure user rights over the land if, and only if, the owner is able to cultivate the land. As a result, farmers are forced to cultivate all their land holdings for fear of losing the land. Some farmers extend cultivation to the shrub, pasture and grazing lands adjacent to their plots, even extending to the streams. This practice contributes to changes in land use patterns, the overall consequence of which impacts negatively on climate.

3.2.2. Agricultural Extension Programmes

Analysis of the data collected indicates that perennial crops cultivated by many farm households, such as *enset*, *chat* and coffee, are not given due consideration within the agricultural extension and intensification package at the local level. Farm households in the study area are mainly provided with improved seeds of cereal crops such as wheat, maize and *teff*. As indicated by the informants, as far as the locality is concerned, agricultural expansion and intensification strategy mainly focuses on increasing the yield of annual crops but does not give much attention to perennial crops. Perennial crops that have the capacity of growing on small plots, have the potential of feeding a larger number of individuals and are also acknowledged as being environmentally friendly, have not been given sufficient attention by the agricultural extension and intensification strategy.

Although the focus groups agreed on the expansion of agricultural land for annual crop farming, there were significant differences among members of the groups regarding the overall importance of annual crops compared to

perennial crops. A clear difference was that between the opinion of the model and some of the ordinary farmers, on one hand, and women and elders on the other hand, within both focus groups from the two KAs. The first group (model and some of the ordinary farmers) stressed the importance of annual/cereal crops. On the other hand, the other group members (women and elders) highlighted the importance of perennial crops. A 61-year old informant stated:

These agricultural extension workers were misleading farmers. Perennial crops, especially *enset*, is the backbone of our lives. But individuals overlooked the importance of these crops. It is clear that the cultivation of annual crops, such as *teff* and maize, takes only about three to four months, and the cultivation of *enset* takes about seven years. But if we get no rain for about four months during the cropping season, we automatically lose all of the maize and *teff*. But if we face a problem of rain for a whole year or more, the *enset* survives and stays with us.

They also argued that the demand for cereal crops, such as maize, *teff* and wheat, has increased, but by their own nature, perennial crops are not easily marketable, hence farmers are more inclined towards the cultivation of cereal crops. Analysis of the data from the respondents indicates that technical and material provisions at local level, relating to agricultural extension programmes, need to be re-examined. It is noted that climate change responses require a more coordinated plan of action. Planning and capacity-building has to be integrated into local-level implementation in a coherent way. Responding to climate change requires consideration of the implications of types of agricultural practices. Beyond provision of high yielding cereal crops, such as *teff* and wheat, such support at local level should also incorporate the provision of high yielding perennial crops so as to minimise the impact of agriculture on climate change.

3.3. Contribution of Agricultural Extensification to Climate Change Challenge

The focus group discussants and individual key informants indicated that due to the declining size of lands allotted to grazing, farm households are continuously forced to graze their animals on small grazing lands but also on hillside shrubs and woodlands. Clearing of shrubs, grass and woodlands is increasingly being manifested, resulting in increased soil erosion and declining coverage of plant and shrub species.

Informants pointed out that changes in land use patterns have resulted in soil erosion, especially sheet and gully erosion, and gave examples regarding the occurrence of excessive soil erosion following extensive cultivation of annual crops within their vicinity. Soil erosion has increased with the expansion of annual crop farming. As indicated by Plate 3, land degradation in the form of sheet and gully erosion was observed on the annual crop fields and communally used grazing lands.



Plate 3. Farm and Grazing Lands Affected by Gully and Sheet Erosion in Study Area

Photo taken by one of the authors.

The survey respondents were asked whether the extent of land degradation has increased, decreased or showed no change following intensive/extensive agriculture by the farm households. As shown by Table 8, the overwhelming majority of respondents (89 per cent) responded by stating that the extent of land degradation in their plots has increased following the expansion of annual crop farming. The other 2.7 per cent of the respondents reported that no change has taken place in their plots.

Table 8. Respondents’ responses regarding extent of land degradation following extensification

Extent of soil erosion after HHs’ agricultural expansion		Per cent
	Increase	89.0
	Decrease	1.4
	Show no change	2.7
	Total	93.2
Missing	System	6.8
Total		100.0

SOURCE: Compiled from fieldwork data (2013)

Respondents were also asked if the size of grazing land they have is enough or is inadequate for feeding their animal holdings. The overwhelming majority of the respondents (93.2 per cent) reported that the grazing area is inadequate for feeding their animals. This has a number of implications for the degradation of land in the study area. As the size of grazing lands declines, farm households are forced to feed their livestock on small plots of grazing land, leading to overgrazing. On the other hand, as the size of lands allotted to grazing declines, farm households are forced to decrease the size of their animal herds. The decrease in size of animal herds also means less manure for fertilising the land, hence declining productivity. Moreover, due to lack of animal dung, households extensively engage in the extraction of firewood from the forest, leading to deforestation and land degradation.

3.4. Local Communalities' Perceptions of Changes in Climate

The focus group discussants and individual key informants agreed that climate change has occurred and is occurring. Increasing temperatures and changes in rainfall patterns were the most frequently cited indicators of climate change by respondents. Increase in temperatures, reduction in seasonal and annual rainfall amounts, increased rainfall intensity, increased occurrence of drought and floods as well as the disappearance of different kinds of plant and wildlife species were reported as the most apparent indicators of climate change and variability by the informants.

They were found to be well aware of the fact that extensive cultivation on shrub lands, woodlands and hillside slopes has resulted in degradation of the environment. Local people attributed climate change to both mismanagement of natural resources and religious beliefs. Informants during the focus group discussions and in-depth interviews indicated that the increase in population size led to expansion of farm lands, deforestation resulting from charcoal extraction and farming practices, and overgrazing of livestock on small grazing lands, thus changing the environment and contributing to climate change.

The survey respondents also highlighted various on-farm soil conservation measures being applied by the farm households. Seventy-three (86.3 per cent) respondents indicated that they employ on-farm soil conservation measures on their plots, while only 8.2 per cent of the respondents did not apply on-farm soil conservation measures in the course of extensive crop cultivation. The overwhelming majority (51 or 80.95 per cent) indicated that they practise contour farming and 31 (49.21 per cent) respondents mentioned cut-off drains while tilling the land for cultivation. In addition, 13.69 per cent of the respondents mentioned the use of soil bunds (locally known as *erken*) and about 24.66 per cent of the respondents indicated selective planting of trees within the farmland.

The focus group discussants in the two KAs indicated that farmers employ contour farming (practice of tilling the land along the contour line in order to reduce the runoff on a steep sloping area) in order to protect the land from sheet erosion, and they also construct cut-off drains towards the top part of the plot for protection from runoff. Cut-off drains (locally known as *booyie*) are one of the major land conservation measures practised by farmers. Moreover, to sustain the soil, farmers leave a few naturally growing trees on their farmlands in the course of tilling shrub, grazing and woodlands for annual crop cultivation. During focus group discussions at *Woshereba Thatasa* KA, a 42-year-old informant stated that cut-off drain ditches would be interconnected and directed into the right direction when neighbouring farmers reach an agreement. However, most of the focus group discussants at the two KAs indicated a lack of commitment among the farm households in reaching an agreement.

Although farm households have experience in employing different types of land conservation practices, the measures undertaken in the study area were not found to be effective in protecting the land from degradation. This is mainly because farm households take these land conservation practices as supplementary activities rather than as being indispensable activities to be carried out in the course of farming.

4. Conclusion

Significant land use/land cover changes have occurred following agricultural extensification practices by smallholder farmers. Agricultural extensification by farm households is causing excessive land use changes which also contribute to climate change challenge at the local level.

The long-term relationship the community members had with the natural resource base of the area created a deep-rooted sense of common ownership over those hitherto uncultivated lands. With the growing demand for land, portions of hitherto uncultivated land have been transferred to individuals and groups of new users. Thus, for fear of losing the hitherto uncultivated lands, many farm households have rushed to till lands that were previously used on a communal basis by the villagers. Farm households felt threatened and in order to affirm their right over the hitherto uncultivated lands, they extended cultivation onto these lands. The rising price of cereal crops, economies of time spent while harvesting as well as technical and material provisions by extension services have also played a significant role in bringing about major land use changes in the area.

Significant losses of natural trees, shrub lands and grasslands were observed in the course of farmers' engagement in extensive annual crop farming. Following extensive cultivation of annual crops at the expense of hitherto uncultivated grazing and shrub lands, hillside forests and shrub lands have been converted into grazing lands, thus fostering degradation of the environment and contributing to climate change and variability. The evidence indicates that extensification of agriculture is negatively affecting climate at the local level. In the long run, extensification cannot be climate compatible development.

Smallholder farmers in the study area were well aware of the changes in climate and variability. Increasing temperature, variability and reduction of rainfall patterns, loss of forest cover and wildlife loss were cited as indicators of climate change by the informants. They were also aware of the nexus between changes in land use patterns and consequent problems of environmental degradation.

Climate change responses require more coordinated efforts. Planning and capacity-building has to be integrated into local-level implementation in a coherent way. Responding to climate change requires consideration of the implications for types of agricultural practices. Beyond provisions of high yielding cereal crops, such as *teff* and wheat, local-level support should also incorporate provisions of high yielding perennial crops to minimise the

impact of agriculture on climate change. Therefore, governmental and nongovernmental organisations ought to give special emphasis to strengthening the capacity of farmers to incorporate the choice of crops, cropping systems, land management as well as soil conservation practices in their extensive/intensive farming.

Notes

1. Land covered with annual crops.
2. Land covered with perennial crops.
3. Size of pasture land.
4. Land covered with eucalyptus woodlots.

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Rethinking Inclusive Growth Framework in Oil and Natural Gas Politics in Tanzania: Opportunities and Challenges for Implementing LED

Dominick Muya

Abstract

Lack of an inclusive growth framework to contain the inherent friction between African states and local communities over resource exploitation can either create or exacerbate the conditions for violent conflict. This chapter assesses the opportunities and challenges for implementing a Local Economic Development (LED) plan as a tool for enhancing inclusive growth prospects from the most impoverished southern region of Tanzania, characterised by the tension between the local community and the government, following the discovery of oil and natural gas. The study relied on data obtained through the use of questionnaires and interview guides administered to stakeholders in Tanzania and secondary data analysis. Findings suggest several opportunities, including that the creation of LED enhances local ownership of investment as well as builds local expertise in relation to future resource explorations. The study also found several barriers that limit prospects for implementing LED as a tool for enhancing inclusive growth. Local community tensions characterised by violence instead of developmental rationality have dominated the area and become vehicles for political contestations between national and local politics. In this light, the study has advanced a number of recommendations, including a review of the country's coherent policy guidelines and legislation to enhance equitable growth for the local populace; building supporting institutions at the local level for sustainability of LED; formulating local peace committees in order to ensure the state of peace; and security as well as maintaining the sustainability of investments.

Keywords: Inclusive growth, local economic development plans, oil and natural gas politics, local community politics, national politics, Tanzania.

1. Introduction

In the current era of democratic transition in Africa, the relationship between African states and local communities over who should benefit from the exploitation of natural resources, such as oil and gas, has raised serious debates, which quite often end up in upheavals. These general observations have added urgency to explore whether inclusive growth framework can contain the inherent friction between African states and local communities over resource exploitation. Since there is little evidence to back up the success of inclusive growth framework in Tanzania, this

chapter sets out to explore whether implementation of Local Economic Development (LED) plans as a tool for enhancing inclusive growth can make a difference in managing the crises that occurred in 2014, between the locals from the most impoverished southern region of Tanzania and central government.

Discontent Mtwara residents wanted the government to use the fuel to stimulate their local economy first, and were angered by the government's decision to proceed with construction of a pipeline from Mtwara to the port city of Dar es Salaam, where the fuel is to be used to boost power plants and help end years of chronic power shortages. Specifically, the chapter sets out to fill the gap by assessing the opportunities and challenges for implementing LED plans as a tool for enhancing inclusive growth prospects in those areas.

Tanzania is drawing growing attention as a pivotal country in East Africa for oil and natural gas exploration, having led the region in terms of new discoveries of natural gas in 2012 (Ministry of Energy and Minerals [MEM] 2012). With known gas reserves of approximately 46.5 trillion cubic feet that are valued at about \$465 billion (MEM 2014), the potential to transform Tanzania's international standing and domestic electricity production is considerable.¹ The contemporary discovery mirrors a larger energy boom currently taking place in East Africa coastal waters that economists have termed as an "Eastern Eldorado" that is likely to rival West African resource giants such as Nigeria and Ghana. Impliedly, the expected revenue gains and investments from oil and natural gas discoveries could mean a decisive shift towards industrialisation for Tanzania's donor-dependent agro-economy as the country will soon become one of the leading global gas suppliers. Regardless of its massive natural resources endowment, Tanzania still remains one of the world's poorest countries (Sarris and Karfakis 2006; Aikaeli 2010; Central Intelligence Agency [CIA] 2011).

In a comparative analysis of literacy rates for persons of age 15 years and above, by region, the 2012 Tanzania census report demonstrates the low level of literacy rates in Lindi (68 per cent) and Mtwara (70.8 per cent) regions compared to other region (National Bureau of Statistics [NBS] and Office of Chief Government Statistician [OCGS] 2014). According to the Tanzania Mainland Poverty Assessment report, poverty is associated with the lower level of education of the household head, suggesting that education is strongly linked to income-generating opportunities (World Bank 2015). Impliedly, the relatively low level of literacy rates in Lindi and Mtwara regions signals the degree of poverty in those regions. Furthermore, analysis of the United Nations Development Programme (UNDP) Human Development Index (HDI) levels across 21 regions of Tanzania mainland, places both Lindi and Mtwara regions into a second category of localised HDI with medium tercile (Tanzania HDR 2014). With the low level of literacy rates, HDIs and the disparity in the levels of

welfare across geographical regions in the country, the tension between the local community and the government on the discovery of these resources can be expected.

The threat of conflict and instability in Mtwara and Lindi regions has added urgency to the search for collaborative and cooperative tools for enhancing inclusive growth. This chapter aims at undertaking an analysis which explains four issues. First, the chapter analyses the interaction between local communities and the state in the process of ownership, exploration, production, and utilisation of wealth from these resources. Second, it provides an assessment of why new emerging local institutions are vying for public authority in oil and natural gas in Tanzania. Third, the chapter discusses how the inclusive growth framework can contain the inherent friction between the state and local communities over resource exploitation. Lastly, it offers a survey of the opportunities and challenges for implementing an LED plan as a tool for enhancing inclusive growth prospects in the surveyed area.

Research on inclusive growth prospects of local communities surrounding oil and natural gas rich areas has not been adequately documented in Tanzania. Only a few studies provide an analytical and comprehensive survey on oil and gas related researches in Tanzania. For instance, some studies focus on opportunities and challenges of extraction of oil and natural gas (Moshi 2013); better framework to benefit the country from the natural gas sector (Kulthum 2013); managing natural resources - what citizens say (Twaweza and World Bank 2014); and fiscal implications of the offshore natural gas in Tanzania (IMF 2014). Other related studies in oil and gas include those undertaken by Simbakalia (2013); Shanghvi and Jingu (2013); Kibendela (2013); NORAD (2013); and Bukurura and Mmari (2014). In most past studies, the focus has been on issues relating to opportunities and challenges for the extraction of oil and natural gas in Tanzania on a commercial scale. Consequently, this study intends to fill the information gap on how the inclusive growth tool or an initiative, such as LED plans, can be used to bridge the gaps caused by the tension between the state and local communities in the politics of oil and natural gas ownership, production as well as utilisation of wealth generated in these areas.

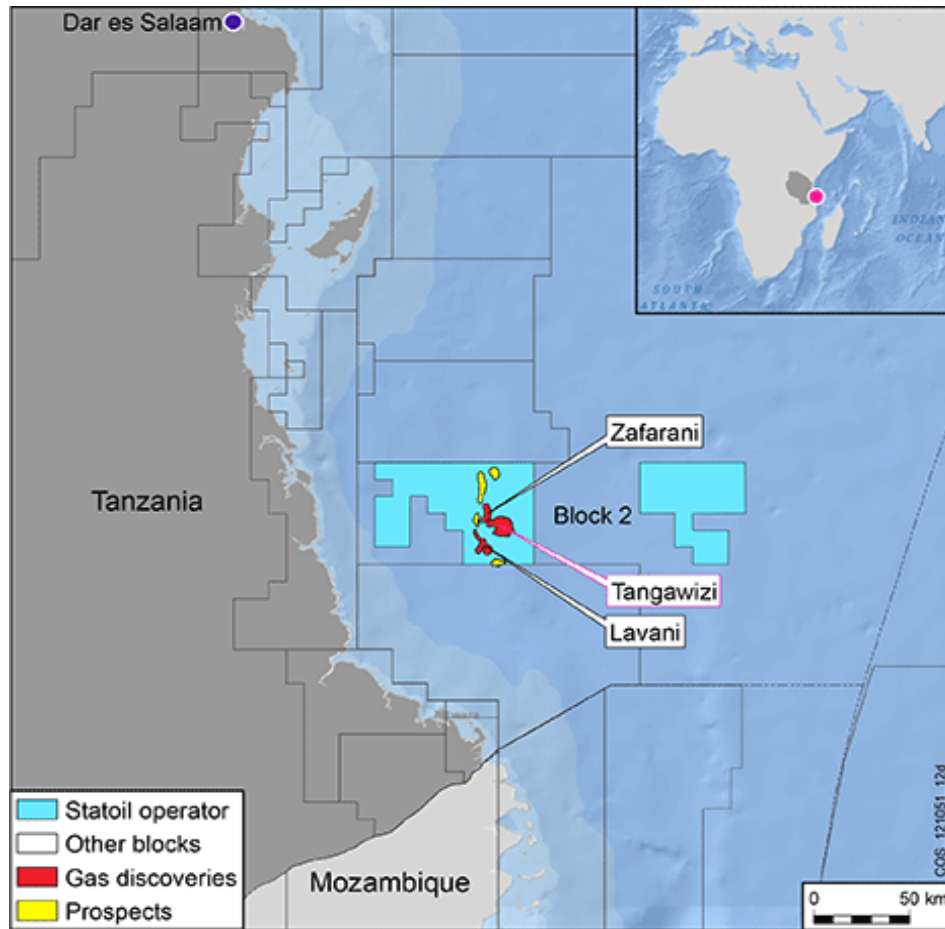


Figure 1: Map Showing Discovery of Oil and Natural Gas

SOURCE: Adopted from United Republic of Tanzania (URT), National Gas Policy [Draft 1] (2012).

2. Literature Review

2.1 The Politics of Oil and Natural Gas in Tanzania

“Man is by nature a political animal” (Aristotle cited in Heywood 2002, 1). Politics is exciting because people disagree. They disagree about how they should live, who should get what, how should power and other resources be distributed, and so forth. When this trend or terrain of disagreement exists between the central government and the local community, a more complex conflicting platform is evident. The tension between Tanzania’s government and her local communities in resource-rich areas raises issues for discussion. This includes not only questions on transparency associated with extraction, negotiation, contracting, and signing of agreement, but also the relevance of the existing models in supporting livelihoods of the local

communities. In a country such as Tanzania, where over 70 per cent of the people still live in rural areas, and 80 per cent of the people depend on agriculture and natural resources for their daily needs, the national politics in natural resource use is critical to the economy, at all scales. Consequently, the question of preparedness in exploiting natural resource potential and equity in the distribution of the national cake becomes of paramount importance.

At the policy level, the Tanzanian Constitution of 1977 provides that all natural resources belong to all Tanzanians, not just a few local communities. Retrospectively, the Tanzanian Constitution aimed at ensuring equity or fairness in distribution of the national cake emanating from any part of the country. The concern of equity in Tanzania since independence has been enhanced through introducing a home-grown philosophy/ideology of socialism known as *Ujamaa*. Accordingly, the main aim of *Ujamaa* was to redress inequalities in the country, and thus consolidate national cohesion. This was in recognition of the disparity of welfare across geographical regions due to historical, geological or climatic factors. *Ujamaa*, however, brought several successes and challenges.

Beginning in the 1980s, many African states, including Tanzania, adopted structural adjustment programmes that reduced the role of the central state in the provision of public goods (Shao 1993). It is undeniable that the reduced role of the central state in the provision of public goods has not only affected the delivery of public goods and services since then, but it has also increased the poverty gap amongst the local populace because several sectors in Tanzania, such as health and education, were underdeveloped.

The conflicting relationship between the local community and the central government, regarding who should benefit from the exploitation of gas, is a result of accumulated pains that can be traced to the past. Accordingly, the use of the returns from oil and natural gas to first stimulate the local economy, has been the ongoing debate for a while. For instance, in the study of Gaddis *et al.* (2014), it was argued that in recent years, direct transfers to citizens of some of the cash revenues from natural resources have been recommended as a means to fight poverty more effectively by highlighting the schemes in countries such as Alaska or Iran, while in Africa that situation is absolutely new. This raises a need to conduct further studies on the relevance and applicability of the cash revenues from natural resources to fight poverty more effectively in Africa. Currently, the main policy effort in Tanzania is poverty reduction. This means that allocation of national resources is not only to be informed by the need to stimulate high economic growth, but must respond to the need of different groups as manifested by the level of poverty.

2.2. From Inclusive Growth Prospects to LED Affirmative Programme

The rise of monetarism and new classical economics between the mid-1970s and the late 1980s shifted development theory towards the trickle-down proposition. Since then, the debates about growth, poverty and inequality have tended to revolve around the question of whether market-led growth is sufficient to eliminate poverty and reduce inequality (because benefits of growth automatically trickle down to the poor). By the start of the 1990s, the apparent failure of this strategy led to the emergence of pro-poor alternatives. This raised a debate from the Washington Consensus to inclusive growth strategies (Saad-Filho 2010). This study continues to shift the debate from the theoretical perspectives of inclusive growth to the empirical framework of implementing inclusive growth through LED Affirmative Programme. As such, the literature reviews not only the debate about inclusive growth, but also the strategic relevance of LEDs framework in terms of its opportunities and challenges felt by the local populace and other stakeholders in the surveyed areas.

At the conceptual level, inclusive growth is now well accepted as the key economic goal for developing countries (see Birdsall 2007). However, the concept of inclusive growth has different meanings for different people and institutions, at different times and in different places. According to the World Bank (<http://siteresources>), inclusive growth is not mainly about poverty reduction through economic growth but about everyone benefitting from growth.

While pro-poor places an emphasis on the poor benefiting and closing the gap between the poor and the better off, inclusive growth is about everyone benefitting. Likewise, the International Policy Centre for Inclusive Growth (IPC-IG) avoids presuming a connection between economic growth and levels of inclusion. The IPC-IG emphasises that tackling inequality is fundamental to inclusive growth (IPC-IG n.d). Similarly, the Organisation for Economic Cooperation and Development (OECD) emphasises a need to rethink growth as a means and not as an end (OECD 2013). This suggests that priority has to be made on the quality of growth over the quantity of growth, thus calling for new models and tools to measure progress and quality of living (OECD 2013). On the contrary, the United Nations Development Programme (UNDP 2010) perceives the concept of inclusive growth within the perspectives of putting human development first. The UNDP posits clearly that wellbeing and human development outcomes depend on more than growth.

For the purpose of this chapter, inclusive growth refers to the process and practice of promoting growth of the local populace or nation at large, by proactively planning and recognising both the formal and informal economy, increasing opportunities, improving access to employment, and creating not only new economic opportunities, but also ensuring equal access to the opportunities created for all segments of society, particularly for the majority of the poor. As such, inclusive growth has to address the

question of participation and benefit sharing. This conceptualisation is supported by Ramos and Ranieri (2013) who argue that participation without benefit sharing will make growth unjust and sharing benefits without participation will make it a welfare outcome. Hence, inclusive growth is contrasted to a “welfarist” approach that focuses on the (re)distribution of government taxes. This conceptualisation calls for an understanding of LED Affirmative Programme.

In this paper, LED is conceived as a process of strategic planning of local economic development initiatives through partnerships between central government, the local community, expertise in development and non-governmental organisations (NGOs) that focus on the specific local area’s potential, a community’s comparative advantage as well as opportunities for a given undertaking in a given geographical locality. Notably, this strategic plan will help create decent jobs and improve the quality of life for everyone, including the poor and marginalised (UN-Habitat 2005).

This requires understanding facts about citizens’ views on natural gas resources. In a bid to better understand citizens’ expectations, hopes and concerns regarding the recent gas discoveries, Twaweza and the World Bank, in 2013, sought the opinions of citizens from mainland Tanzania. The key findings from the Twaweza (2013) study were: 64 per cent of Tanzanians have heard about the discovery of natural gas, but almost the same proportion wished to be provided with more information. Most people are optimistic about the potential impact of natural gas, with four out of five believing that natural gas is good for them, their children and the country. While more than half (55 per cent) of Tanzanians support the redistribution of natural resource revenues, in terms of cash handouts to citizens, 20 per cent prefer most of the money being sent directly to citizens, 18 per cent prefer an equal split of revenue between the government and citizens, while 17 per cent prefer the government to receive the majority of the revenue in order to spend it on social services such as education, health and security.

The question on the distribution of the generated benefits has raised debates among decision-makers in the public sphere, scholars, local community members as well as politicians. This is because provisions of cash handouts to all citizens seemed unrealistic, and it was probably argued that this would raise expectations of the local community unrealistically. Arguably, lack of information can lead to unrealistic expectations about the benefits from natural gas. Without understanding the need for petroleum-related education and its investments, not only at the government or expert level, but also at the local community level, the new investment would not bring significant changes to Tanzania.

NORAD’s (2013) study systematises the needs required for petroleum-related education at a detailed skills level, indicating gaps in demand and supply.

Implementing LED requires local actors who are knowledgeable in the subject matter of LED and are proactive in changing societal expectations regarding the investments. NGOs are among actors who can play an important role in influencing the views and choices of the general public, including local communities, on issues related to oil and natural gas investments. Nelson (2007) bridges the gap between theory and practice by highlighting prospects and retrospectives of corporate social responsibility (CSR) in the intersections of various actors in the CSR value chain. Besides, little is known about the role of NGOs in initiating LED in societies where tension has emerged in connection with the discovery of oil and natural gas.

A growing body of literature shows that local communities in resource-rich areas are excluded from decision-making and policy-making processes, which leads to political frustrations (Moshi 2013). Albeit various scholars perceiving tension over oil and natural gas extraction differently, this chapter undertakes to analyse a triad relationship composed of African governments, global systems that inform international capital flow as well as the local community. For inclusive growth to bring the desired effects, there should be agreement amongst the actors (government, investors, NGOs, and local community) over issues related to the governance of the sector as well as extraction and distribution of wealth generated from the sector.

The overall assessment of studies on oil and natural gas prospects and empirical evidence drawn from previous interventions in Tanzania highlights a number of key shortcomings in the existing debate on the governance of the oil and natural gas sector and distribution of wealth generated from it. This has contributed to our understanding of the opportunities and challenges associated with the extraction of oil and natural gas. There is scant literature that provides a coherent account of inclusive growth prospects in the exploitation of oil and natural gas resources in Tanzania. The current study aims to fill this gap. Equally important, the study explores opportunities and challenges for implementing LED as a tool for enhancing inclusive growth prospects.

3. Research Methodology

The study was conducted in two southern regions of Tanzania, namely Lindi and Mtwara. The two regions were purposefully selected due to sharing several features — similarities in regional poverty trends, existence of both rural and income inequalities as well as the upheavals linked to the discovery of oil and natural gases in these areas. Both qualitative and secondary data were used to generate knowledge for this study. The study surveyed 120 local community members in the resource-rich areas of Lindi and Mtwara regions, through the use of a questionnaire. In addition, the study conducted 12 key-person interviews and four focus group discussions across two regions with similar antecedents of local community unrest resulting from the discovery of natural resources. While the qualitative data

was analysed using Ethnographic Content Analysis Techniques (ECAT), where constant comparison was employed for discovering emerging patterns, the quantitative data was analysed by using the Special Package for Social Sciences (SPSS) software.

3.1. Sampling

Both probability and non-probability techniques were employed in this study. The study used non-probability techniques to purposively sample 12 key informants within and outside the local community, surrounding resource-rich areas from both regions (Lindi and Mtwara). The decision to employ purposive sampling is based on the premise that careful selection of stakeholders in the policy-making process is a good criterion for matching interviewers with the respondents (Flick 2006). On the other hand, the study employed probability sampling to select a list of 120 members from the local community, to whom questionnaires were administered.

The choice of 120 respondents accounts for 10 per cent of the target population, which comprised 1,230 respondents who, according to media reports, had participated in regular upheavals that had resulted in loss of life in the regions. Thus, the sample was large enough to generalise with a high degree of confidence. Once the sample size was established, the respondents for the study were selected randomly, using the lottery method. Selected participants were informed about the purpose of the study by their respective leaders. On the day of the interview, the principal investigator was introduced to the selected respondents by their respective leaders.

3.2. Data Collection Process and Tools

3.2.1. Questionnaires

Structured questionnaires were utilised to collect data from a surveyed sample of 120 local community members. The purpose of using questionnaires was two-fold. First, it was used to collect quantitative information from the sampled local community in both southern regions of Tanzania. Second, it aimed to justify causal explanations for the findings as well as compare responses in the subgroups of a larger population. Questionnaires were used because they were more appropriate for collecting much information within a relatively short time. The questions in the structured questionnaire were brief and concise, allowing the respondents to provide quick and accurate information. The study was also sensitive to the need to translate and pre-test the questionnaire. The questionnaire was designed to collect information such as the interaction between local communities and the state in the process of ownership, exploration, production and utilisation of wealth from these resources; why new emerging local institutions are vying for public authority in oil and natural gas; how inclusive growth framework can contain the inherent friction between the state and local communities over resource exploitation; and the opportunities and challenges for implementing an LED plan as a tool for enhancing inclusive growth prospects in the surveyed area.

3.2.2. Focus Group Discussion Guide

The researcher conducted four focus group discussions (FGDs) across two regions with similar antecedents of local community unrest resulting from the politics of natural gas discovery. Of the four FGDs, two comprised of local community members of different ages and with different interests, while the other two comprised of NGO officials in the surveyed regions. The FGD guide was designed to enable the collection of in-depth information on the citizens' knowledge about natural gas resources, their expectations from the discovery of these resources, knowledge about inclusive growth and LED strategies as well as their perceptions of opportunities and challenges for implementing LED in their areas. The structured questionnaire and FGD guides were administered in Kiswahili. It was important to have questions in Kiswahili to allow for probing and to gather more insights from the study respondents as some of them were not very articulate English, hence could not fluently express some of the thematic issues of the study.

Focus group participants from the local communities were chosen from among willing respondents. Six (6) participants were included in each FGD. After each FGD session, participants were given feedback on the issues raised during the sessions, for instance, what had been revealed regarding their knowledge of natural gas resources, their expectations from the discovery of these resources, knowledge on inclusive growth prospects and LED strategies as well as their perceptions on opportunities and challenges in implementing LED in their areas and the way forward.

3.2.3. Interview Guide for Key Informants

The 12 key-person interviews included the following members: two officials/respondents from NGOs affiliated with the oil and natural gas tensions in Tanzania; two political leaders, each from either the ruling party or opposition political parties; two media analysts; two government officials in the region; two leaders/representatives from the local community; and two experts of LED initiatives. A semi-structured interview was used to collect data for this study. Whereas a structured interview has a rigorous set of questions which does not allow diversion, a semi-structured interview is open and allows new ideas to be brought up during the interview as a result of what the interviewee says. The purpose of using the interview guide or schedule is to enable the researcher to get more information first-hand and to clarify issues regarding the tension that was generated, following the discovery of oil and natural gas in the southern regions of Tanzania. This instrument was useful and appropriate for collecting information from key informants since it was used to supplement data gathered from questionnaires and documentation.

3.3. Data Analysis

Since both quantitative and qualitative research methods were employed in this study, a sequential data analysis was carried out with the qualitative

data being analysed before quantitative data. The qualitative data was analysed using ECAT, where constant comparison was employed for discovering emerging patterns. All the survey questionnaires were entered into the SPSS version 13 programme in preparation for data analysis.

3.4. Validity and Reliability of Research Instruments

Validity refers to ‘truth value’ of the findings. While in quantitative studies, validity is explained by a consistency of data collection instruments, in qualitative research, validity refers to the ‘trustworthiness’ of a study, or ‘accuracy’ of the findings, as best described by the researcher and the participants. Since this study is largely qualitative in nature, it ensured validity by enhancing ‘authenticity’, giving a fair, credible, honest, and balanced account of social life experienced by the people being studied in relation to the interaction between local communities and the state in the exploitation of resources; understanding how inclusive growth framework can contain the inherent friction between the state and local communities over resource exploitation; and discussing the opportunities and challenges for implementing an LED plan as a tool for enhancing inclusive growth prospects in the surveyed area.

Reliability entails consistency and dependability. In quantitative research, reliability of research instruments entails that under the same conditions when observations are repeated, data collected should produce similar numerical results. The numerical results should not vary because of the characteristics of the measurement process or measurement instrument itself (Neuman and Robson 2009). Although absolute reliability of data is hard to obtain, this research ensured reliability by clearly conceptualising constructs and formulating a precise level of measurement such as questionnaires and interview guides which are explicit, unambiguous and less complicated. The study also utilised multiple indicators, facilitated the proper training of research assistants and used pilot tests before undertaking data collection in the field.

3.5. Ethical Considerations

Informants were informed about the purpose of the research and assured of anonymity. All informants gave their written informed consent. During the interviews, the researcher maintained neutrality by not siding with the social, political or administrative group that was sought to exacerbate conflict in local settings. Additionally, while presenting the findings, the researcher ensured that the names and agreed identifiers of respondents did not feature in the final report. Their anonymity was ensured through the use of code of names agreed between the respondents and the researcher. In a situation where the use of English compromised the interview, the questionnaire was administered in Kiswahili.

4. Data Presentation, Analysis and Discussion

4.1 Introduction

In terms of the organisation of the study, three issues were investigated. First, the study explored facts about local community views on oil and natural gas resources. Second, it assessed local community knowledge on inclusive growth prospects and LED strategies. Lastly, the study assessed the opportunities and challenges for implementing LED plans as a tool for enhancing inclusive growth prospects from the most impoverished southern regions of Tanzania.

4.1.1. Local Community Views on Oil and Natural Gas Resources

Four out of five Tanzanians living in communities close to local resource-rich areas (80 per cent) indicate having heard about the gas discoveries, most of them during the past three years (2013-2015). As such, respondents are hopeful and optimistic that the new discovery of oil and natural gas will help fight their poverty, thus upgrading their living conditions.

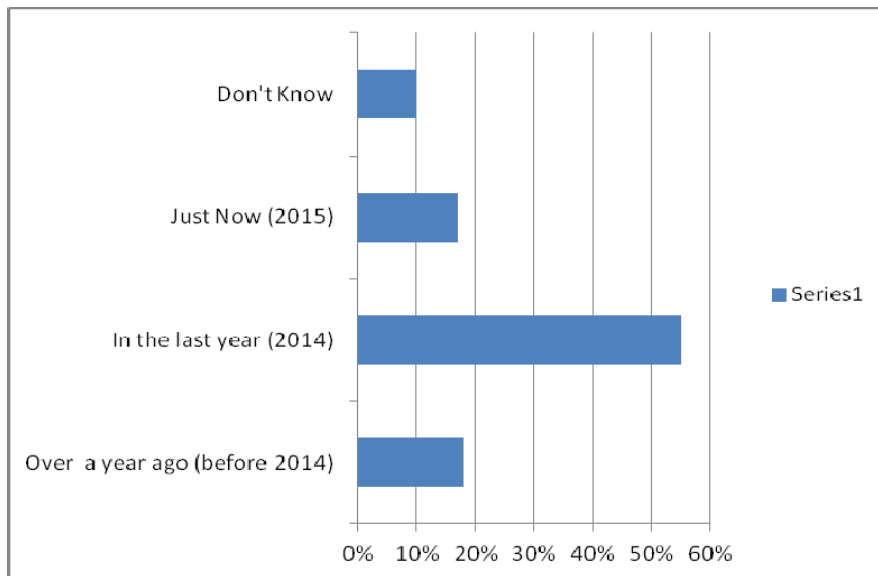


Figure 2. When Did You First Hear about the Discovery of Natural Gas Resources?
SOURCE: Generated from fieldwork data (2015).

Despite witnessing gas exploration and extraction processes, the majority of respondents (79 per cent) in the surveyed area felt that they were not well-informed about the prospects of natural gas. Figure 3 shows the responses of respondents regarding whether they had been involved by the government in the oil and natural gas sector.

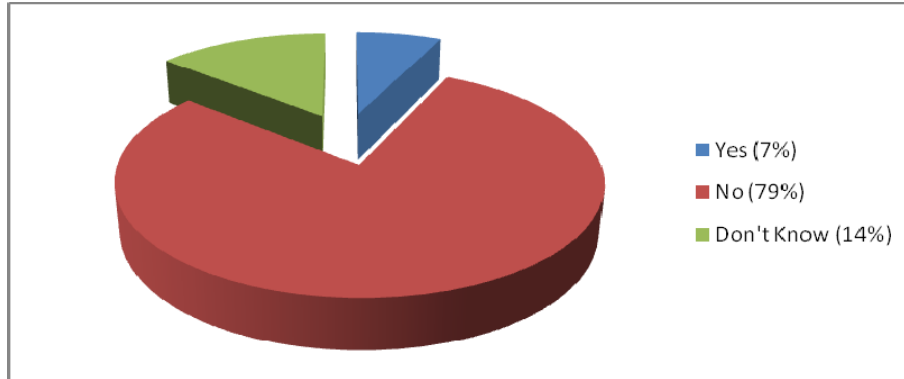


Figure 3. Responses on Whether or not Respondents Were Been Involved in the Governance of Gas Resources in Their Area

SOURCE: Generated from fieldwork data (2015).

Having been excluded from decision-making regarding natural resources, citizens have no idea about the potential harm to the environment and fear that resource benefits will not be shared equally. Hence, they doubt whether the nature of investment will add value to their livelihood opportunities. In supporting this statement, one community member living close to resource-rich areas stated:

Ah! A few days ago, I suddenly woke up to find private mining companies on sites close to us, without prior consultation or engagement. I am not sure whether we will be employed and get benefits that might come from the investments. Often, the police are used to protect the government and private companies at the expense of locals, who are frustrated at being ignored. This is unfair!

In responding to the question of how local communities were involved in the project, and the expectations and immediate benefits for residents of Lindi and Mtwara, Honourable Muhongo, the then Tanzanian Minister for Energy argued:

Mh!..This issue is the same in all countries. Expectations from poor communities is always high. In Tanzania, a large part of the population is poor and they assume that when oil and gas is discovered they will quickly become rich.

Prof. Muhongo went further to lament that the government is duty-bound to manage these expectations. However, it will do so according to the existing national policies. The amended Tanzanian Constitution of 1977 provides that all natural resources belong to all of Tanzania, not just a few local communities. This was the same with gold found in Lake Victoria.

Seldom does the discovery of huge oil deposits and natural gas ensure benefits to local communities through clearly articulated plans and

participation. Lack of information can lead to unrealistic expectations about the benefits from oil and natural gas. This raised concerns of having an affirmative programme to redress inequality perceived by the local community in resource-rich areas.

4.1.2. Local Community Knowledge on Inclusive Growth Prospects and LED

In recent years, inclusive growth has been a contested social construction at both policy and practice levels in Africa. The implementation of LEDs has been recommended as a tool for enhancing inclusive growth prospects as a means to fight poverty. The study asked the following question: Are you aware of the concept of inclusive growth prospects and its LED strategies? More than half (58 per cent) of community members living in resource-rich areas had either little or no knowledge at all on aspects related to inclusive growth prospects and its LED strategies. Several reasons account for poor knowledge of LED, including poor communication by national and local leaders, low level of formal education and poverty driftings facing the rural populace. On the contrary, a relatively high level of knowledge about LED was revealed among NGO officials during the FGD session. One of the NGO officials stated:

Ah! In our community people may not understand LED and its rationale simply because the government excludes us from decision-making regarding natural resources. However, in my view, the creation of LED in the areas will enhance local ownership, build locally driven expertise in relation to future resource explorations, therefore sustaining inclusive growth prospects in this area.

It is important to distinguish between being informed and being involved in decision-making. Although NGO officials at the grassroots were knowledgeable and aware about LED, their involvement in decision-making related to LED was not significant as they failed to impart their knowledge to the local communities surrounding them. The question of being knowledgeable on LED was also supported by a retired public official in Lindi region, who had this to say during an interview:

Mh! To my understanding, for an LED to succeed, one has to organise the effort; conduct a local economic assessment; develop the LED strategy (including vision, goals, objectives of projects and action plans); implement the LED strategy and review the LED strategy.

Against this statement, one respondent from one of the dominant religious groups in the area lamented thus, during the FGD session that involved only local community members:

Allah will give us our daily bread. This government does not fear God nor people. They can kill you anytime if they want to do so, to accomplish

their plans. We don't know LED or whatsoever! All that we want is equitable returns of natural resources that we have protected. Otherwise...

To recap from the objective, it has been revealed that while more than half of community members living in resource-rich areas had either little or no knowledge at all on aspects related to inclusive growth prospects and its LED strategies, a high proportion of NGO officials were knowledgeable about inclusive growth prospects. This would have been an opportunity for advancing local community welfare. On the contrary, there has been little effort to strategise LED initiatives by either the government or local actors from different sectors of the society, regarding oil and natural gas. Consequently, lack of initiatives, collaboration and even co-responsibility between the public and private sector for the LED initiatives of Lindi and Mtwara regions has given rise to feelings that the national government excludes the local community from earning returns from the investments.

Furthermore, the study explored respondents' knowledge about different forms of LED that had existed or are about to exist in resource-rich areas of Lindi and Mtwara. Table 1 and Figure 4 show respondents' responses to this question.

Table 1. Proposed LED strategies in impoverished resource areas

Proposed LED strategies	Lindi		Mtwara	
	Frequency	%	Frequency	%
Investment in public infrastructures at the local level	48	13.15	52	12.6
Investment in education at the local level	38	10.4	50	12.1
Investment in health at the local level	52	14.3	46	11.2
Building supporting institutions at the local level	46	12.6	54	13.1
Formulating local peace committees	23	6.3	26	6.3
Funding for training/expertise in resources Mgt at the local level	34	9.3	48	11.6
Establishing SACCOs at the local level/local entrepreneurship	48	13.15	54	13.1
Promoting pro-poor local economic development/job creation	58	15.9	56	13.6
Increase local competitiveness through partnership	18	4.9	26	6.3

SOURCE: Fieldwork data, 2015.

Note: N (Number of respondents in Lindi (60) and N (Number of respondents in Mtwara(60).

*Multiple responses were allowed

Table 1 and Figure 4 highlight proposed LED strategies for impoverished resource-rich areas. Table 1 shows that 58 (15.9 per cent) of respondents

from Lindi region and 56 (13.6 per cent) of respondents from Mtwara region emphasised promoting pro-poor local economic development as a strategy to promote their involvement in public investments of oil and natural gas in their areas. This is supported by Shao (2002), who argues that by the beginning of the 1980s, many African states, including Tanzania, adopted structural adjustment programmes that reduced the role of the central state in the provision of public goods, which increased the poverty gap. This implies that the local communities want the government to use the returns of oil and natural gas to first stimulate their local economy. This is supported by Gaddis *et al.* (2014), who state that in recent years, direct transfers to citizens of some of the cash revenues from natural resources have been recommended as a means to fight poverty more effectively by highlighting the schemes in countries such as Alaska or Iran, while in Africa that situation is new. This, however, contradicts the provisions of the Constitution of the United Republic of Tanzania, which asserts that all natural resources belong to all of Tanzania, not just to a few local communities. This requires policymakers to rethink about the relevance of national policies in developing the poor populace.

4.1.3 Opportunities for Implementing LED Plans in the Area

Results on the opportunities for implementing LED plans in the impoverished southern regions of Mtwara and Lindi are indicated in Figure 4, which shows respondents' responses.

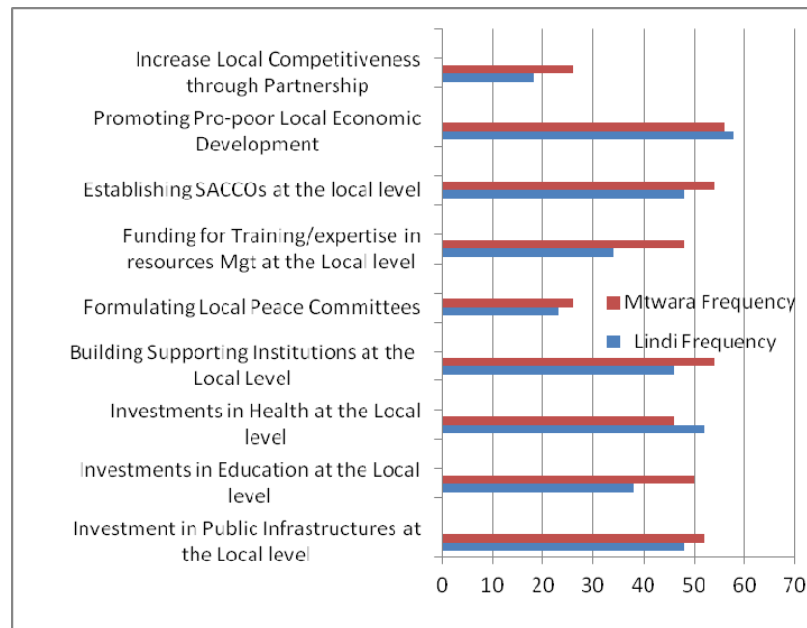


Figure 4: Opportunities for Implementing LED Plans in the Area
SOURCE: Generated from fieldwork data (2015).

Among the opportunities for implementing LED plans in the survey area was that the creation of LED promotes pro-poor local economic development; enhances local ownership; builds local expertise in relation to future resource exploration; increases local competitiveness through partnerships; and supports investment of public infrastructures such as roads, education and health facilities as well as local entrepreneurship in the resource-rich areas. Hence, LED will be strong pillars for enhancing inclusive growth prospects.

4.1.4 Challenges of Implementing LED Plans in the Area

This chapter has revealed several drivers that limit prospects for implementing LED as a tool for enhancing inclusive growth. Amongst these are the lack of coherent policy guidelines and legislation to enhance inclusive growth for the local populace, regarding the exploitation of the natural resources. Despite the existence of the National Natural Gas Policy of Tanzania of 2013, inclusive growth prospects in natural resource-rich areas are not mentioned. In that policy, Sub-Section 3.1.7 explains local content and capacity-building, whereby Tanzanians will be empowered to benefit from the natural gas industry through the employment and training of the local workforce as well as through investments in developing and procuring supplies and services locally. However, the policy is silent on strategic participation of the local populace in the natural gas value chain.

Likewise, CSR, a commitment by businesses to share benefits in a bid to contribute positively in the development process of the local community is neither well explained in terms of its contribution nor related directly to LED plans in the impoverished areas. If it will be offered, its path is the Local Government Authorities (LGAs) which are vested with different priorities. Apart from policy prospects, for sustainability of LED to occur in the projected area, building supporting institutions, governance and funding at the local level is inevitable. Who should be made responsible to monitor the implementation and prospects of LED? This remains a rhetoric question. Equally important, while some praise the rationality of LED in resource-rich areas, others question its relevance compared to the already existing policy framework of Opportunities and Obstacles to Development prospects implemented in Tanzania. Another challenge in implementing LED plans in the area emanates from the political polarisation of local communities associated with the politics of different national political parties.

Local community tensions, characterised by violence instead of developmental rationality, have dominated the area, and have *ipso facto*, become vehicles of political contestations of national and local politics, in an attempt to seek alternatives. In the same parameter, lack of political goodwill, preparedness and a roadmap for the implementation of LED in the area is another setback. This is because there are complexities involving national versus local community utilisation of resources. While the expectation from poor communities in resource-rich areas is always high

after the discovery of wealth, the Tanzanian Constitution considers all natural resources in the country as belonging to all Tanzanians, not just to a few local communities. Indeed, this should be debated.

4.1.5 The Emerging Local Institutions Vying for Natural Resources

In Tanzania, a large proportion of the population is poor, and they assume that when oil and gas is discovered, they will quickly become rich. The violent conflict over the government's decision to proceed with construction of a pipeline from Mtwara to the port city of Dar es Salaam, where the fuel is to be used to boost power plants to address power shortages, became the breeding ground for tension between the government and various local groups, such as youth and violent political-entrepreneurs, who fuelled these conflicts. The findings of this study indicate that the local community in Tanzania is changing in the way it responds to external pressures. In the past, rural areas were centres of peace. Although the government is duty-bound to manage the expectations of local citizens, locals are worried about being ignored and not being consulted in the governance process regarding oil and natural gas. Lack of information can lead to unrealistic expectations about the benefits from oil and natural gas. This has raised tension between local communities and the central government. Sadly, NGOs and the media have done little to inform locals about the prospects of oil and natural gas investments.

Furthermore, evidence indicates that the geopolitical landscape of national politics has, in recent years, shifted and extended to the local community politics, where national political parties spread their influence through their political organisations. As such, the local violence, for instance, in the Lindi and Mtwara regions, is influenced by these regions' external political affiliations and is a reflection of societal politics that operates at the national and regional levels.

5. Conclusion

In this chapter, it has been argued that implementing LED plans in the impoverished southern region of Tanzania is associated with several opportunities and challenges. The challenges are basically those associated with failure to implement LED. These include lack of coherent policy guidelines and legislation to implement LED in the communities surrounding resource-rich areas, and challenges in building supporting institutions. Opportunities include prospects in governance and funding of LED at the local level. Likewise, polarisation of the local community along the lines of national political parties has exacerbated the conflict. Arguably, local communities have *ipso facto*, become vehicles of the continuation of societal 'politics by other means'.^v

In addition, an important finding from this study is that in spite of existing challenges, several opportunities for implementing LED plans in the impoverished southern region are yet to emerge. This includes the availability of NGO officials who are knowledgeable on the subject matter of inclusive

growth and the implementation of LED strategies in the surveyed areas. Other opportunities include the promotion of pro-poor local economic development, enhancement of local ownership, building of local expertise in relation to future resource exploration, increase of local competitiveness through partnership, and supporting investments of public infrastructures such as roads, education and health facilities as well as local entrepreneurship in the resource-rich areas. Based on the study findings, the following are recommended. First, there is need to formulate coherent policy guidelines and legislation to enhance inclusive growth prospects for the local populace. Second, formulating local peace committees at the local level would help to enhance the sustainability of the investments. Third, it is necessary to put in place a preparedness plan for the implementation of LED in the area.

Notes

This came from the treatise of famous military theorist, Von Clausewitz conception of war as a continuation of politics by other means. In other words, war is not just an act but a means or tool of politics as the military and political objectives of a state are intertwined. Its relevance here is that student political formations in HEIs are used as tools to achieve the larger political objectives of their parent bodies in society. This came from reviewing an interview report with Hon. Prof. Muhongo, the former Tanzanian Minister for Energy and Minerals, in Chatham House, 2013

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