RESEARCH STUDY

Agro-industrial Development Policies

What Nexus to Climate, Food Security, and Trade?

Tanzania

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CUTS International

#1704

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Finally, it is our hope that the findings of this report will serve as an impetus to thought-provoking discussions on how implementation of agro-industrial development policies in Tanzania should take into account Climate, Food Security, and Trade linkages.

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Acronyms

ACRP	Agriculture Climate Resilience Plan
AMP	Agricultural Marketing Policy
ASLMs	Agricultural Sector Lead Ministries
CIA	Central Intelligence Agency
DoE	Division of Environment
EAC	East African Community
ESRF	Economic and Social Research Foundation
FAO	Food and Agriculture Organisation
FYDP	Five Year Development Plan
FYDP II	Five Year Development Plan II
GDP	Gross Domestic Product
GoT	Government of Tanzania
IIDS	Integrated Industrial Development Strategy
LDC	Least Developed Country
LGAs	Local Government Authorities
MALF	Ministry of Agriculture, Livestock and Fisheries
MDAs	Ministries, Departments and Agencies
MITI	Ministry of Industries, Trade and Investment
MKUKUTA	Mkakati wa Kukuza Uchumi na Kupunguza Umaskini Tanzania
MNRT	Ministry of Natural Resources and Tourism
MoFP	Ministry of Finance and Planning
NAP	National Agriculture Policy
NAPA	National Adaptation Programme of Action
NCCS	National Climate Change Strategy
NEMP	National Environment Management Policy
NFNSP	National Food and Nutrition Security Policy
NSGRP II	National Strategy for Growth and Reduction of Poverty
NTP	National Trade Policy
PCF	Product Carbon Footprint

SADC	Southern Africa Development Community
SAGCOT	Southern Agriculture Growth Corridor of Tanzania
SIDP	Sustainable Industries Development Policy
SMEDP	Small and Medium Enterprises Development Policy
TAFSIP	Tanzania Food Security Investment Plan
TBS	Tanzania Bureau of Standards
TDV 2025	Tanzania Development Vision 2025
TFDA	Tanzania Food and Drugs Authority
UNIDO	United Nations Industrial Development Organisation
URT	United Republic of Tanzania
VPO	Vice President's Office

Executive Summary

Tanzania has begun implementing its second five-year development plan with a keen focus on industrialisation for economic transformation and human development. The plan acknowledges the fact that most of Tanzania's agricultural exports continue to be in raw form, mainly owing to a weak agro-processing industrial base. The plan provides reference to privatised key agro-processing industries, such as leather, which have not performed as per expectation, resulting in continued export of raw produce. With efforts to promote agro-processing in the country, the link between climate, trade, and food security cannot be understated. The government has introduced several national policy frameworks that will support effective implementation of the national development plan agenda.

This study, therefore has attempted to identify and fill knowledge gaps on agro-industrial development-related policies, and how they pertain to climate change, food security, and trade linkages in Tanzania. Specifically, six items of inquiry have been investigated in this study. Firstly, how agro-industrial policy at the regional and national level addresses climate change, food security, and trade were investigated. Secondly, the missing links and prospective policies that should be put in place to mainstream climate change, food security, and trade linkages through agro-processing were identified. Thirdly, it identifies and understands the role of gender in climate change, food security, and trade linkages in agro-industrialisation. The study also identifies the challenges of mainstreaming climate change, food security, and trade linkages into policy to support the agro-processing industry. Moreover, the study aims to identify and understand the challenges and opportunities of the agro-industrial sub-sector in the East African Community (EAC) region; and to investigate how national plans are aligned with the EAC regional policies and strategies of agro-processing.

The findings show that there are strong relationships between agro-industry, trade, food security, and climate change which are not acknowledged sufficiently in policy, because they are not known despite their contributions and effects to the economy. Agro-industrial development does not only increase the quality of our food products, but also promotes trade as it ensures and stimulates demand for the processed goods both in national and international markets. There are several spillovers emanating from the linkages between agro-industry, trade, food security, and climate change which are not well known, and little effort is made to build on or make use of the benefits or opportunities emerging from these linkages for the benefit of the people in Tanzania and other countries in the EAC.

This study provides recommendations and conclusions that, if taken on, would eventually contribute to having a concise framework that encompass all stakeholders, including the government, non-state actors, farmers, processors, traders, manufacturers, and even environmentalists. In doing so, we believe this report will contribute to the sustainable industrialisation agenda.

Chapter 1

Introduction

For many years, agriculture has been considered as the backbone of the Tanzanian economy. The Economic Survey (2015) shows that the sector contributed 29 per cent to the Gross Domestic Product in 2015, and is a source of livelihood to over 80 per cent of the population (Figures 1.1 and 1.2) (CIA World Factbook, 2014). The sector is therefore important to Tanzania's immediate and long-term economic and social development goals.

Figure 1.1: Employment in Agriculture, 1991, 2001-2002, 2006-2007, 2014

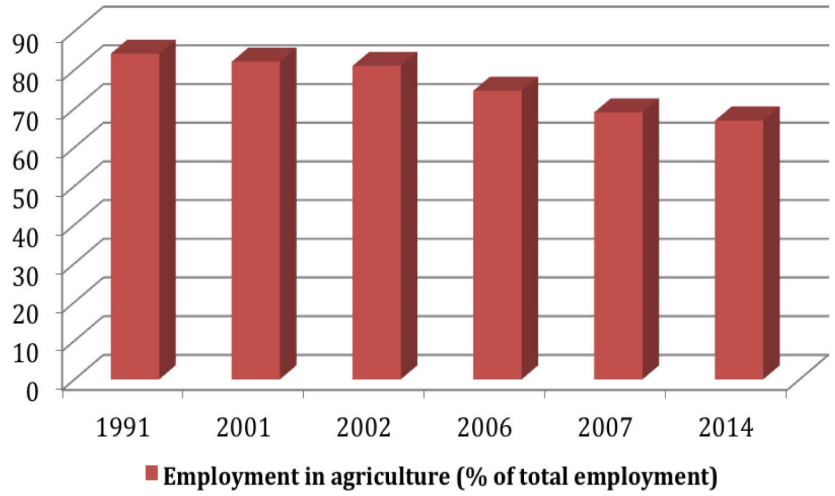
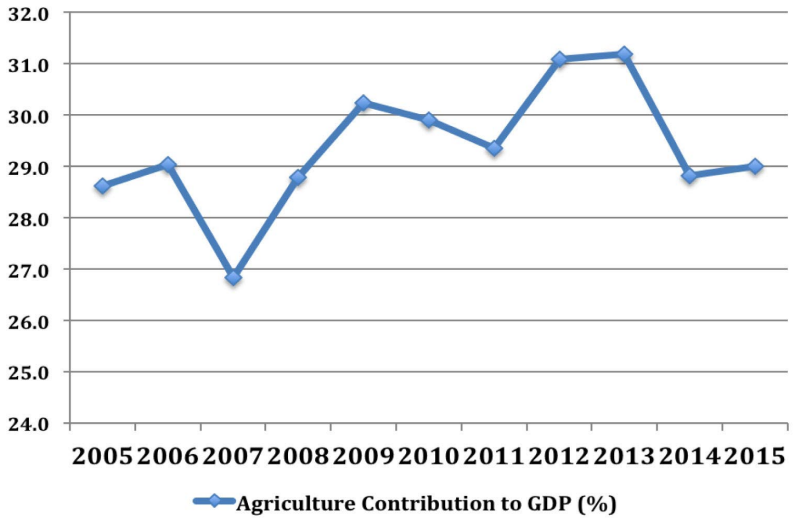


Figure 1.2: Agriculture contribution to GDP, 2005-2015



The agricultural sector is composed of a number of sub-sectors, namely crops, livestock, forestry, and fishery. According to the Economic Survey (2015) data, the crop subsector has been the leading contributor to the agricultural GDP, with an average share of 55 per cent for the period 2005 to 2015. The relative contribution to agricultural GDP by other sub-sectors of livestock, forestry, and fisheries for the same period averaged 29, 9 and 7 per cent, respectively (Figure 1.3).

Small-scale subsistence farmers, who operate on an average of 0.2 to 2 ha per farmer, as well as traditional agro-pastoralists and fishers dominate the country's agriculture, which employs 74 per cent of the population. Smallholders use over 80 per cent of the arable land, and only about 1.5 million ha is under medium and large-scale farming.

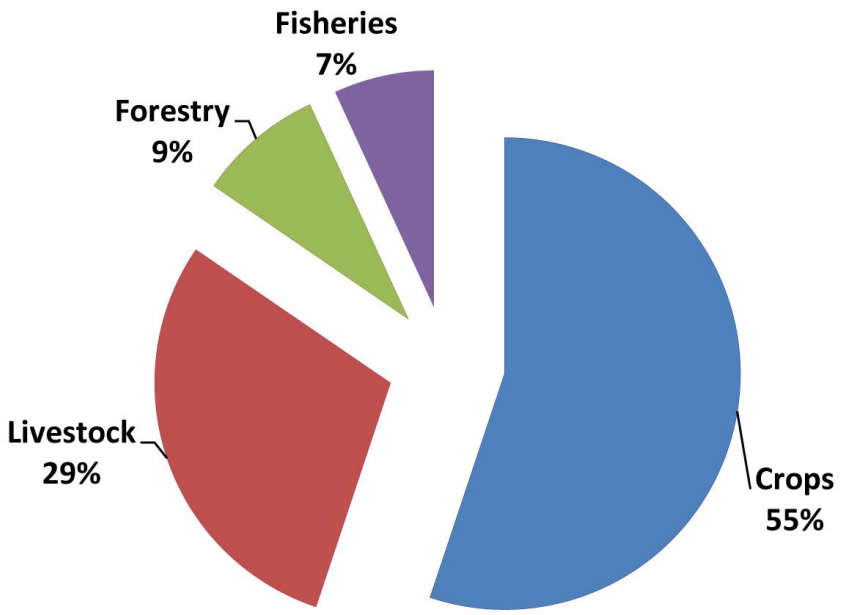
The country has 95.5 million ha of land area, out of which 44 million ha are classified as arable land; however, only 27 per cent of the arable land is under cultivation (URT 2013). Likewise, out of the 50 million ha suitable for livestock, only 26 million ha are under use while the rest cannot be accessed due to tsetse fly infestation, unsuitable vegetation, and hostile terrain. Tanzania is also rich in water resources, which permits irrigation. About 29.4 million ha are assessed as potential for irrigated agriculture, of which 2.3 and 4.8 million ha are regarded as high and medium potential, respectively. However, although it has been on the increase and has doubled over the past 10 years, the area under irrigation by 2012 was only 450,392 ha, which is about 1.2 per cent of the potential land area for irrigation.

With regard to forest cover, the country has about 38.8 million hectares of forests, which is about 41 per cent of the total land area. The majority of Tanzanians remain dependent on agriculture for their economic welfare and livelihood. Currently, the sector absorbs over 74 per cent of the national labour force.

(a) Agriculture Growth Performance

Based on the Economic Survey 2015 report, between 2006 and 2015, the agricultural sector average annual growth performance was 3.6 per cent, with only 2008 registering a high of 7.3 per cent, while the remaining years averaged below 4 per cent (Table 1.1). Generally, the country has not been able to achieve the first Five Year Development Plan (FYDP I, 2011/2012-2015/2016) target of 6 per cent annual growth, signifying the challenges this sector has

Figure 1.3: Key Agricultural sub-sectors



Source: Economic Survey, 2015

continued to face in spite of all the efforts made. Although crops are the major contributor to agricultural GDP, they have registered an average of 3.2 per cent growth over the same period, with forestry (4.4 per cent) and livestock (4.2 per cent) performing better, and fisheries recording the lowest growth rate of 2.8 per cent.

According to the Economic Survey (2015) report between 2011 and 2015, rice and cassava production registered positive performance, with rice registering 15.2 per cent growth as production increased from 1,461 tonnes in 2011 to 1,937 tonnes in 2015. Cassava registered 17.9 per cent growth in production, from 1,549 tonnes in 2011 to 1,962 tonnes in 2015.

It is worth noting that Tanzania is endowed with suitable agro-climatic conditions that allow a broad range of diverse agricultural production. However, the country is still importing large quantities of agricultural and food products that could be produced within the country. For some products, the potential is simply not exploited due to lack of infrastructure for commercialisation and processing. Although, market access is becoming an opportunity with the creation of free trade areas at regional level and with preferential trade agreements with certain countries and regions.

The demand for food and agricultural products is changing in unprecedented ways. For example, according to FAO and UNIDO (2009), increases in per capita incomes, higher urbanisation, and the growing numbers of women in the workforce engender greater demand for high-value commodities, processed products, and ready-prepared foods. To some extent, the many problems of poverty, low productivity, inadequate infrastructure, and poorly integrated markets faced by Tanzania are exacerbated by an under-developed agro-industrial sector. Little attention has usually been paid to the value chain through which agricultural commodities and products reach the final consumers within the country. This neglect has tended to result into enormous potential losses in value addition and employment opportunities (UNIDO, 2013).

The agro-industrial sector is hereby defined as a subset of the manufacturing sector that processes raw materials and intermediate products derived from agriculture, fisheries, livestock, and forestry. Thus, as according to FAO (1997) and UNIDO (2009), the agro-industrial sector is taken to include manufacturers of food, beverages, and tobacco; textiles and clothing; wood products and furniture; paper, paper products and printing; and rubber and rubber products. In turn, agro-industry forms part of the broader concept of agri-business that includes suppliers of inputs to agricultural sector, including fisheries and forestry sectors and distributors of food and non-food outputs from agro-industry.

Table 1.1: Agricultural Growth Performance in Percentage (2006 – 2015)

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	AVERAGE
Agriculture sector	2.3	2.9	7.3	4.2	3.4	1.9	3.2	4.0	3.4	3.2	3.6
Crops	-2.0	-1.6	7.8	4.0	5.8	2.8	4.2	5.0	3.2	3.3	3.2
Livestock	7.4	8.7	7.6	5.3	1.2	0.1	1.8	2.2	3.6	3.9	4.2
Forestry	7.4	6.4	3.6	5.2	3.4	3.3	3.5	4.7	5.1	1.0	4.4
Fisheries	2.8	0.9	7.2	0.0	0.9	2.7	2.9	5.5	2.0	2.6	2.8

Source: Economic Survey, 2015

(b) Female Participation in Agro-industrial Development Activities

Women make important contributions to the agricultural and rural economies in Tanzania. However, the exact contribution, both in terms of labour and income generation, is often difficult to establish. Women play a significant role in the agricultural labour force and in agricultural activities, although to a varying degree. Consequently, their contribution to agricultural output is undoubtedly extremely significant, although difficult to quantify with accuracy. It has often been claimed that women produce 60 to 80 per cent of food (SOFA team & Doss, 2011).

Despite the fact that they have a significant role and contribution, women are generally less able than men to participate in economic opportunities because they face a work burden that men do not. In most societies, women are responsible for most of the household and child-rearing activities as well as looking after small livestock, despite the fact that norms differ by culture and over time. This additional work burden is unpaid and limits women's capacities to engage in income-earning activities, which often require a minimum fixed time to make it profitable.

(c) Climate Change Threats

Like other third world countries, Tanzania has started to experience significant climate variability and climate change. The average temperatures are projected to increase between 1.9°C and 3.6°C, while sea level is projected to rise between 65 cm to one meter; rainfall is said to decrease in the dry season and it is expected to increase during the rainy season, leading to a growing risk of floods, water shortage and related conflicts, and rising temperature (Orindi and Murray 2005, Yanda and Mubaya 2011, NAPA 2007). In addition, changing rainfall affects agricultural production and availability of water resources, which threatens lives, livelihoods, and food security for millions of poor people.

Climate change profoundly affects the conditions in which agricultural activities are conducted. These additional risks on agricultural production directly translate into additional risks for the food security and nutrition of the people who directly depend on agriculture for their food and livelihood. They also have an impact on food and nutrition security of distant populations through price volatility and disrupted trade.

Although not at alarming levels, agro-industrial development and production are heavily dependent on fossil fuels, and therefore increase greenhouse gas emissions which exacerbate climate change.

(d) Potentiality to Trade

Development of agro-industrial policy will lead to the improvement in trade activities as most of the agricultural tradable goods will have increased in value and quality. Trade ensures the constant supply of food and that promotes food security because it allows and facilitates movement of food products from surplus to deficit points.

1.1 Statement of the Problem

There are strong relationships between agro-industry, trade, food security, and climate change which are not acknowledged sufficiently, because they are not well known despite their impacts on the economy. Agro-industrial development does not only increase the quality of food products, but also promotes trade as it ensures and stimulates demand for the processed goods in both national and international markets. Climate change negatively affects agricultural performance, leading to low production, food and nutrition insecurity, and low participation in trade.

There are several spillovers emanating from the linkages between agro-processing, trade, food security, and climate change which are not well known, and little effort is made to build on or make use of the benefits or opportunities emerging from these linkages. Conversely, there are limited or no efforts to address spillover costs emanating from the negative effects of these linkages on livelihoods of Tanzanians. It is therefore important to understand these spillovers and respond to them through

adaptation or mitigation, by way of taking them into account or integrating them into national and sub-national policies and plans to ensure sustainable agro-industrial development in Tanzania.

Agro-industry development does not only increase the quality of food products, but also creates employment and income, especially in the rural areas where agricultural activities play a dominant role. Furthermore, agro-industry boosts trade by improving the availability of processed food.

1.2 Objectives and Rationale

The main objective of the study is to identify and fill knowledge gaps in agro-industrial development-related policies, which are also correlated with climate change, food security, and trade linkages in Tanzania.
Specifically, this inquiry is intended to:

1. Determine how agro-industrial policy at the regional and national level addresses climate change, food security, and trade;

2. Identify missing links and determine which policies should be put in place to mainstream climate change, food security, and trade linkages into the agro-processing industry;

3. Identify and understand the role of gender in climate change, food security, and trade linkages in agro-industrialisation;

4. Identify and understand the challenges of mainstreaming climate change, food security, and trade linkages into agro-processing industry;

5. Identify and understand the challenges and opportunities of the agro-industrial sub-sector in EAC region; and

6. Investigate how national plans are aligned with the EAC regional policies and strategies for agro-processing

The findings and recommendations of this study are pertinent to informing Tanzanian agro-industrial development, owing to the growing knowledge gap on linkages and relationship between agro-industry, trade, food security, and climate change. As noted earlier, there are opportunities and risks associated with these linkages which are not known, and are not utilized or mitigated for the benefit of the people. This research has therefore been an attempt to address this discrepancy.

Chapter 2

Methodology

2.1 Selection of the Focus Crops

This case study focuses on two crop sub-sectors, namely rice and cassava. The choice of the crops is based on the following criteria:

(a) Effect of or vulnerability to climate change

Rice and cassava in Tanzania are both closely associated with climate change in different ways. Changes in climate variability in Tanzania are significant in agriculture, among other sectors. Rice and cassava are among the major crops linked directly or indirectly to the vagaries of climate change in the country. Rainfall variability, droughts, and floods are the most common consequences of climate change. Among the responses attempted by the Government include the promotion of drought resistant crops, such as cassava, and the use of irrigation in order to ensure stable growth in rice production in the country.

(b) Gender Perspectives in Agro-processing, Production or Marketing of Products

Gender inequality is an important feature in agriculture. Gender difference in agriculture is evident in terms of access, control, and ownership of land to marketing of raw and processed produce. One of the key challenges is gender-based inequalities in access to and control of productive and financial resources, which inhibit agricultural productivity and undermine resilience and sustainability efforts. In addition, there is an unevenness in burden-sharing of environmental and climate hazards, as well as a high dependence on natural resource-based livelihoods for women. This is closely related to the limited capacity of planners and policy-makers at all levels to mainstream gender and integrate agro-industry with trade, food security, and climate change into policies, plans, programmes, and budgets, which are critical to close gender gaps in agriculture and other growth sectors.

In Tanzania, despite the constitutional decree on gender equality, gender differences remain a serious challenge in agriculture, where men and women carry out different types of work; have different levels of access to resources; and are unequally rewarded for their contributions to the agricultural system, with women typically having less access and lower incomes (Rubin, 2010 in CARE Tanzania, 2010). In cassava value chains, men are more involved in plowing, planting, weeding, digging, peeling, and drying. In contrast, women are dominant in plowing, planting, weeding, bird scaring, and husking in rice value chains.

Key issues around gender captured in the study include, but are not limited to, the following:

(i) Level of female (participation in the value chain) i.e. production, processing and marketing;
(ii) Level of ownership of the factors of production (land, labour and capital);
(iii) Ownership of the final products/ outputs;

(iv) Income level from agriculture activities;
(v) Decision making in terms of income distribution, production, processing, and marketing;
(vi) Challenges faced in the production and processing; and
(vii) Sources of capital.

(c) High Relevance to Food Security in terms of Direct Consumption or Boosting Income Baskets

More than 80 per cent of the poor population lives in rural areas, and almost all of them are involved in the farming sector. Land is a vital asset in ensuring food security. Both rice and cassava are among the main food crops in Tanzania, in addition to maize, sorghum, millet, wheat, beans, potatoes, and bananas. Rice and cassava are therefore among the top food security crops in Tanzania. Cassava, like sorghum, is a government priority crop that has the potential to significantly improve food security and the incomes of smallholder subsistence farmers, especially those that live in dry areas where maize production has declined owing to low rainfall. Note that cassava is a drought-resistance crop. In addition, cassava has great potential as a cash crop through the sale of seeds (stems and cuttings), cassava leaves, and roots.

(d) Marketability of the Product in Export Markets

Both rice and cassava supply chains from the farmer to the final consumer is long, and takes many forms along the way. Rice and cassava are sold either to the local up-country traders, or buyers from Dar-es-Salaam, which constitutes the biggest local market. Alternatively, these products are taken directly to Dar-es-Salaam by producers. Local traders act as facilitators between many local producers and a few Dar-es-Salaam buyers. Officially rice and cassava are among the major food crops exports. However, there is also significant cross-border trade taking place between Tanzania and neighbouring countries.

2.2 Choice of the Study Area and Data Collection

This study was conducted in the two districts of Mkuranga in the coastal region and Mvomero in the Morogoro region. The two regions are among the leading producers of cassava and rice in the country. According to Cuddeford (2013), cassava is grown in all regions of Tanzania. The main growing regions are Mtwara, Lindi, Tanga, Coastal, Ruvuma, Shinyanga, Mara, Mwanza, and Kigoma. Zanzibar is also famous for cassava production. The two regions and districts in the study are located in the Eastern Zone.

Apart from review of relevant literature, interviews were conducted in Dar es Salaam where the Ministry of Agriculture, Livestock and Fisheries (MALF), Ministry of Industries, Trade and Investment (MITI), Ministry of Natural Resources and Tourism (MNRT and the Division of Environment (in the Vice President's Office) (DoE VPO) are located.. The respondents included government executives, Local Government Authorities (LGAs), farmers, traders (exporters), processors, and transporters. These consultations were carried out using individual questionnaires for different categories of respondents. Discussions mainly focused on production, processing, and marketing of the two crops, as well as relevant policies of agro-industrial development that ensure sensitivity to climate change, food security, and trade linkages.

2.3 Sampling and the Sample Size

A total of 41 farmers, 19 traders and 18 processors from the coastal region were consulted, and 43 farmers, 18 traders and 16 processors from the Morogoro region were interviewed. Ten Local Government Authorities (LGAs) formed the study sampling population, out of which one LGA from each of the two regions were purposively sampled.

Table 2.1: The Sampling Frame and the Sample Size			
Population	**Sample**	**Population**	**Sample**
A: Morogoro Region		**B: Coast Region**	
Gairo DC	Mvomero DC	Bagamoyo DC	Mkuranga DC
Kilombero DC		Kibaha DC	
Kilosa DC		Kisarawe DC	
Morogoro Rural DC		Mafia DC	
Morogoro MC		Mkuranga DC	
Mvomero DC		Rufiji DC	
Ulanga DC			
Note: CC = City Council, DC = District Council, and MC = Municipal Council			

Level two sampling involved the selection of households (farmers), traders, and processors in each of the two selected district councils. The total of 80 households in the two sampled districts of Mvomero and Mkuranga were selected. However, the survey team managed to interview 84 farming households, which is equivalent to a response rate of 105 per cent. The number of households was calculated using the formula below to quantify a proportion of the population, where a confidence level of 95 per cent with error margin of around 2.5 per cent was used. Based on the Tanzanian 2012 population census, total number of households in the surveyed LGAs is 447,953. Among these households, nearly 10 per cent are rice and cassava farmers, out of which nearly 80 households were sampled based on the specified confidence level and margin of error. This approach has assumed that the population of farmers growing rice and cassava is normally distributed, with 50 per cent propositions in calculating the optimum sample size.

$$n = \frac{\frac{z^2 \, x \, p(1-p)}{e^2}}{1 + (\frac{z^2 \, x \, p(1-p)}{e^2 N})}$$

Where:

- N = *population size*
- e = *margin of error*
- z = *z-score*
- p = *proportion of population*
- n = *calculated sample*

Table 2.2: The Sampled Households				
	Districts	**Sampled Households**	**Sampled Traders**	**Sampled Processors**
1	Mkuranga	40	20	20
2	Mvomero	40	20	20
	Total Sampled	*80*	*40*	*40*
	Total Interviewed	*84*	*34*	*37*
	Total Response Rate (%)	*105*	*85*	*93*

Principal investigators and enumerators spent a total of ten days in the field. There were three principal investigators and two enumerators. While principal investigators mainly took a supervisory role and conducted key informant interviews, each enumerator was scheduled to complete at least four questionnaires per day. Thus, at least 80 households were expected to be interviewed in allocated ten days, but the team managed to collect data from a total of 84 households, 34 traders, and 37 processors.

2.4 Analytical Framework

Information collected during the survey was processed using Microsoft Excel and SPSS computer programmes, and comparable responses summarised by category. Immediately after the survey, data was cleaned and organised for analysis. Data analysis entailed calculations of various statistical parameters, such as frequencies and cross tabulation. These were subsequently used for comparison, as well as to explore how agro-industrialisation is linked to agriculture, trade, and climate change. Female involvement along the value chain of the two crops was also explored.

Chapter 3

The Policy and Legal Frameworks in Tanzania

The country's agricultural and industrial policies and regulations are essential if agro-processing and trade are to feed and improve the competitiveness of Tanzania and East Africa in the midst of the vagaries of climate change. This chapter is therefore an attempt to present an overview of the current policy framework for gauging whether or not existing policies are supportive enough to transform agro-industries, improve trade and food security, and manage climate change in the country.

The Government of Tanzania and its respective MALF and MTI ministries and the DoEVPO have adopted a number of policies, strategies, programmes, and regulatory frameworks to govern agro-industry, trade, food security, and climate change. In addition, Tanzania's agro-industrial policy framework is integrated in a number of other policies related to agro–industries, such as the 2013 National Agriculture Policy (NAP), the 2003 Small and Medium Development Policy, the 2003 National Trade Policy, the 1992 National Food and Nutrition Security Policy, and the 1996 Sustainable Industrial Development Policy. One of the primary objectives of the 2013 NAP is to address challenges that continue to hinder the development of the agricultural sector, including weak agro-industries. Other challenges include low productivity, over-dependence on rain-fed agriculture, inadequate agriculture support services, poor infrastructure, low quality of agricultural produce, inadequate participation of the country's private sector in agriculture, environmental degradation, as well as crop pests and diseases.

It should be noted that these policy and legal frameworks are well linked to and drawn from the national umbrella policy framework, namely the second National Strategy for Growth and Reduction of Poverty (NSGRP II) or MKUKUTA II, the Five Years Development Plan II (FYDP II), and the Tanzania Development Vision 2025 (TDV 2025).

The government recognises that the majority of crops in the country are marketed in raw form with little or no value addition. Agro-industrialisation, therefore provides an opportunity for promoting agro-processing, thus increasing incomes and creating jobs along the value chain through the expansion of forward and backward linkages in the economy. In light of this, the government has resolved to promote agro-enterprises because they have the potential to provide employment through such activities as handling, packaging, processing, transportation, and marketing of food and agricultural produce. In addition, rural economic growth through agro-processing and the growth of commercial agro-industries have an added advantage of slowing the acceleration of rural-urban migration. Note, however, that agro-processing in Tanzania is constrained by a limited supply of energy to rural areas, inadequate raw materials, inappropriate machinery, outdated technology, and limited skills.

A number of reforms such as KILIMO KWANZA Resolve, the Tanzania Food Security Investment Plan (TAFSIP), the Southern Agriculture Growth Corridor of Tanzania (SAGCOT), the Feed the Future Programme, and the Bread Basket Initiative have been initiated and implemented in the agricultural sector. The reforms aim at creating an enabling environment for ensuring household food security; stimulating both domestic consumption as well as exports; addressing the impact of climate change; as well as improving agricultural productivity, profitability, farm incomes, and alleviating rural poverty.

The National Trade Policy was adopted in 2003 to stimulate and encourage value-adding activities on primary exports as a means of increasing national earnings and income flows. Naturally, this objective matches well with the need to expand agricultural production, promote agro-industries, and therefore manage the natural environment to mitigate the impacts of climate change.

Tanzania attaches great importance to the growing need to protect and conserve the natural environment and has consistently upheld environmental conservation measures (NTP 2003, NEP 1998). Nevertheless, the capacity to administer and enforce implementation of environmental regulation is weak and frequently violated, allowing the continuation of the degradation of the environment, which compromises the sustainability of its resource base. The push for economic transformation and attainment of higher rates of growth tend to lead to environmentally degrading production practices. This highlights the need for pro-active measures to mitigate against the emergence of environmentally harmful production practices in Tanzania. As a response to this alarming trend, the government has been strengthening institutions entrusted with the execution and enforcement of environmental laws and regulations. Priority measures include the mainstreaming of environmental issues into the national development agenda. Environmental policies and simplified guidelines have been adopted and new measures will be put in place to ensure consideration of the natural environment in formulating and implementing future growth strategies.

Judging from an overview of the policy framework in Tanzania, there are conducive and supportive government policies, despite some gaps.

Chapter 4

The Link between Agro-industrialisation and Food Security, Climate Change, and Trade

This chapter investigates the relationship between agro-industrialisation on one hand and food security, climate change, and trade on the other. This analysis helps to gauge the extent to which agro-industrialisation affects food security, climate change, as well as trade.

(a) Agro-Industrialisation and Food Security

In recent years, governments at the national, regional, and continental level – in collaboration with international organisations, donors, and NGOs – have implemented numerous initiatives and projects to support both industrialisation and food security. The interest in industrialisation as a strategy for development has increased significantly, confirmed by the proliferation of national strategies, regional agreements, and international meetings to discuss the topic. The number of initiatives to promote food security is large as well.[1]

While industrialisation and food security are both topics currently at the centre of the development debate, they are rarely mentioned together. Discussions and interviews with processors and farmers of cassava and rice in Mkuranga and Mvomero districts acknowledged that there are considerable linkages between agro-industrialisation and food security. Agro-industrialisation is viewed as the best means of adding value, especially to crops with low shelf-life, such as cassava; hence, enabling households become food secure for a long time. In addition, through agro-industrialisation or agro-processing, farmers are better placed economically to increase their incomes owing to the improvement in the quality of their products and the development of new derivatives, such as flour, cassava crisps, etc. As a result, farmers are in a position not only to sell raw products, but to diversify through processing a range of products.

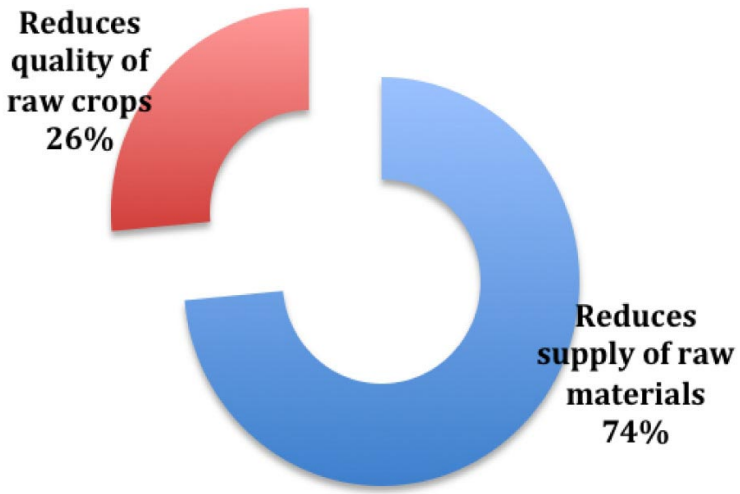
However, an unstable supply of agricultural crops to processors poses major challenges in promoting agro-processing to support food security. In order for this to be rectified, processors were urged to develop deeper relationships with farmers in helping them diversify their livelihoods. This was observed in Mkuranga where UKAYA Farm, a well-established processor, is regarded as a friend to most cassava farmers, as they buy cassava directly from farmers at very reasonable prices. This assures farmers of a reliable market.

(b) Agro-industrialisation and Climate Change

Climate change affects each part of the production system, with differing magnitudes on yields and quality, for example. It also affects different players along the value chain, such as farmers, transporters, processors, as well as traders. However, results from the focus group discussions revealed that rain patterns have changed in both Mkuranga and Mvomero. For

1 http://www.dagliano.unimi.it/20130502/industrialfood/

Figure 4.1: Effects of Climate Change to Processors



instance, during 1980s and 1990s, *Masika* rain season in Mvomero regularly started from March to June, followed by the dry season from July to August, and *Vuli* from September or mid-October onward. However, this seasonality is no longer reliable as the rains have become either scarce or heavy. Although cassava is considered to be a climate-resilient commodity, it was found that high temperatures and little rains have adverse effects to the quality and quantity of cassava production.

With such changes in climate, processors face increasingly inconsistent supplies of agriculture products from farmers. This eventually increases the prices, and in the case of cassava, makes it less profitable to process as the demand for processed cassava products is relatively insignificant compared to processed rice. This study concludes that climate change negatively affects the efforts made in value addition of agricultural commodities, largely owing to the increase in costs.

(c) Agro-industrialisation and Trade

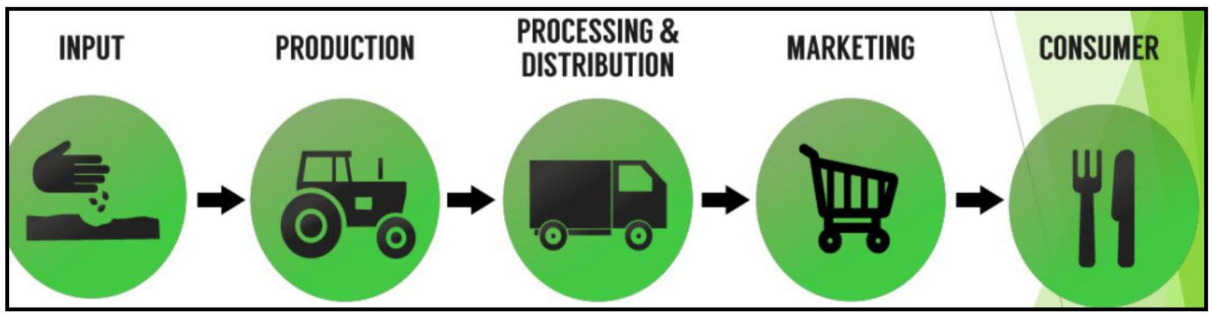
Processors also reported the market to be one of the major impediments they face in selling their products. Notably, most of the farmers were not interested in processing their commodities owing to the unreliability of markets for processed products. For instance, a farmer and chairperson of Njopeka Processors Association relayed that most cassava farmers have an interest in processing their crops, as they know it fetches better prices; however, there is no reliable market for them to send these products, hence they decide to continue selling raw cassava.

4.1 Overview of Agro-industries in Tanzania

Khalfani (2015) explains that agro-industry can broadly be understood as post-harvest activities involved in the transformation, preservation, and preparation of agricultural production for intermediary or final consumption. Like other developing countries, population growth in Tanzania is becoming predominantly an urban phenomenon, which increases the role of agro-industry in linking food production and end-user consumption. In other words, agro-industry is a process of transforming primary agricultural produce into processed commodities for the market.

Not only does the agro-processing sector constitute post-harvest activities, it also involves artisanal, minimally processed, and packaged agricultural raw materials, as well as the industrial and technology-intensive processing of intermediate goods, and the fabrication of final products derived from agriculture.

Figure 4.2: Agro-Industry Value Chain



Source: Khalfani (2015)

Currently, most of the crops produced in Tanzania are sold unprocessed to traditional and world markets, where they are processed and gain value. This situation is worsened as the prices of raw commodities are usually very low in the world market, and are prone to erratic fluctuations. In the 1970s, Tanzania invested quite heavily in the construction of spinning and textile mills; however, most mills have since closed down owing to various reasons. Those remaining have now been privatised, and it is envisaged that the new owners will bring textiles back into production. There is a lot of room for construction of new modern textile and spinning mills, which will enable the production of cotton yarn and clothing for both national and international markets (Keenja, 2001).

In the 1970s, the government also initiated two rubber plantations located at Kalunga and Kihuhwi in Kilombero and Muheza districts, respectively, as source of materials for its tyre manufacturing plant in Arusha, General Tyre Ltd. The government has transferred the two rubber plantations to the National Development Corporation for redevelopment of the plantations in partnership with the private sector (National Development Corporation).

There are eleven cashew-processing factories, which have remained inoperative since 1996 when the last factory was closed down. There are some efforts to explore the possibility of establishing small-scale facilities at the village level so that some of the cashew nut processing can be undertaken more locally (Keenja, 2001).

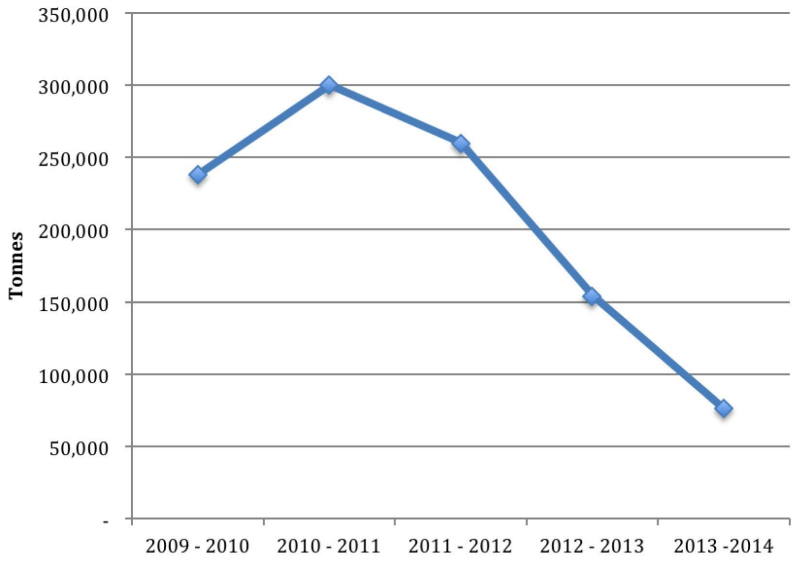
Another group of crops that need processing are fruits, which could prepare juices and jams, and tomatoes. Every year, large quantities of fruit and tomatoes go to waste in Dar-es-Salaam, Morogoro, Coast, and Tanga regions owing to the lack of processing facilities. Currently, there are two small factories in Iringa. More factories are needed in Tanga, Kibaha, and Iringa to cope with current fruit production, which is likely to increase in response to the availability of reliable markets and adequate price initiatives. The possibility of exporting fruits to regional, European, and Asia markets is yet to be explored, and the private sector has been encouraged to look into the ways of exploiting this possibility.

4.1.1 Cassava and Rice Agro-processing in Tanzania

(a) Cassava

According to data from the Coast Regional Commissioner's Office, cassava production has decreased since the start of 2010. However, the research team was later informed by the Mkuranga District Agriculture Officer that regional records might not be capturing the porous nature of the border between Mkuranga and Rufiji. The team was further informed that as most of this data is captured at the market where farmers meet with traders, Rufiji acts as the major market for cassava. In this case, most of what is harvested in Mkuranga goes through Rufiji district and is therefore captured by Rufiji district markets rather than Mkuranga markets.

Figure 4.3: Cassava Production Trend in Mkuranga, 2009-2014



In regards to processing, the study found that the pace of cassava processing industries is low, with farmers still selling raw cassava to middlemen rather than processing it themselves. Several reasons were provided, such as the lack of ready markets, poor infrastructure, and power shortages.

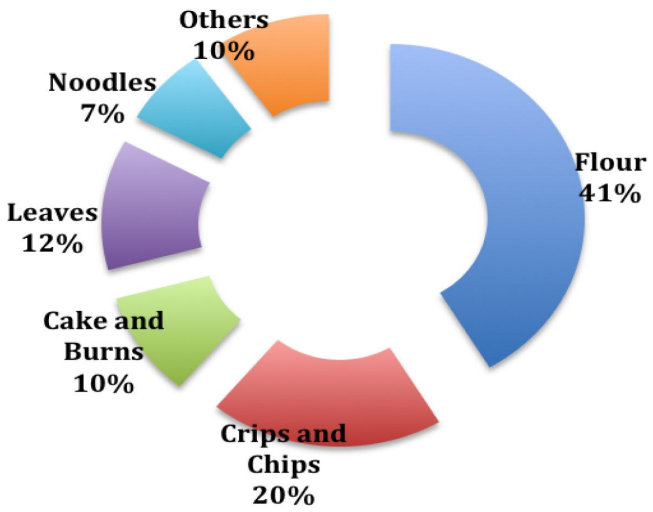
The lack of advanced tools and machinery proved to be among the top impediments facing processors. The use of manual machines, such as chippers, and local drying methods using canvas or elevated tables points to the need to invest in advanced and modern technology (Figure 4.4).

With limited levels of technology, it is evident that the majority of processors would be able to easily process cassava into flour and chips, which do not require sophisticated technology.

Figure 4.4: Agro-processing machines and technology of Cassava in Mkuranga District

Source: ESRF

Figure 4.5: Processed Cassava Products



(b) Rice

Mvomero district is involved in rice production and processing. Several processing centres were found, though unevenly distributed, as some wards have to share processing mills. State-owned farms, such as the National Agriculture and Food Corporation (NAFCO) in Dakawa Morogoro, are currently privatised to TANRICE where the majority of farmers are engaged as members of the scheme.

To a larger extent, when compared to cassava, rice in Mvomero district involves husking, sorting, and milling. Little is known on the other products that are produced from the processing of rice, apart from the insignificant amounts of rice flour being produced for women to make rice fritters (*vitumbua* in Kiswahili). The majority of processors process the crop to produce white rice (67 per cent), husks (25 per cent), as well as brown rice and rice flour (4 per cent each) (Figure 4.7).

Similar to cassava processing, rice processors also rely on traditional drying methods (Figure 4.8). Most of the processors lack the required grading and milling machines that can produce more products at the required standards. This could be the reason as to why processors fail to process the products in large quantities.

Figure 4.6: Type of Milling Machines used in Mvomero District

Source: ESRF field (photos)

Figure 4.7: Processed Rice Products

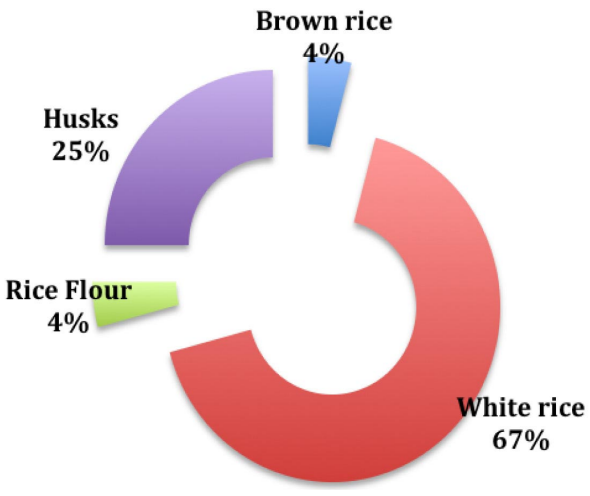


Figure 4.8: Traditional Rice Drying Methods

Source: Field

4.2 Policies on Agro-industrial Development, Climate Change, Food Security, and Trade

4.2.1 Policy Adequacy

The policies and legal framework for agro-industrial development are supportive, judging from the available policy documents (NAP, NTP, SIDP, NFNSP, and NEP) and the long list of strategies, programmes, and agro-industrial-specific regulations. In other words, in terms of existing policies and regulations, Tanzania has made progress despite the fact that the country has not been able to sufficiently translate these policies and regulations into practice. What is contained in the policy documents and different regulations does not match what takes place on the ground. This achievement is obviously a necessary condition, albeit sufficient. The following are some of the relevant policies and plans that affect agro-industrial development and attempt to take into account climate change, food security, and trade linkages.

a. National Agriculture Policy (NAP) (2012)

The NAP provides the direction for agricultural development, promoting increased production and productivity of agricultural produce, agro-processing, agro-exports, and increased farmer incomes, so as to promote food security and accelerate the attainment of national development goals. The policy also attempts to modernise and commercialise agriculture in Tanzania by facilitating input and output supply chains, making market systems work better for the welfare of rural producers, and to facilitate wealth creation.

The policy also puts a focus on climate change, calling for the establishment of optimal balance between the utilisation of natural resources for agriculture development and the protection of natural resources for the benefit of human welfare. To address environment and climate change issues pertaining to the agricultural sector, the government has put the following policy statements forward:

i. In collaboration with relevant ministries, coordination of sustainable environmental early warning and monitoring systems shall be strengthened;

ii. The Government in collaboration with other stakeholders shall strive to improve adaptation measures to climate change effects and deal with all the risks involved;

iii. Public awareness on sustainable environmental conservation and environmentally-friendly crop husbandry practices (sustainable agriculture) shall be promoted;

iv. The Government shall enforce environmental laws and regulations that minimise environmental degradation as a result of agricultural activities;

v. Activities that enhance the carbon storage capacity, such as conservation agriculture and agro-forestry shall be up-scaled;

vi. Public awareness on the opportunities of agriculture as a potential carbon sink or carbon market mechanisms shall be established according to international protocols; and

vii. Efficient use of renewable natural resources shall be strengthened

b. Agricultural Marketing Policy (AMP) (2008)

The MITM, in collaboration with other key stakeholders including the Agricultural Sector Lead Ministries (ASLMs), jointly formulated the AMP with an overall objective to facilitate strategic marketing of agricultural products that ensure fair returns to all stakeholders based on a competitive, efficient, and equitable marketing system. The Policy also recognises the necessity of improving the agricultural marketing capacities by facilitating financing, promoting cooperatives, associations and groups, improving marketing infrastructure, providing timely and adequate agricultural marketing information services and intelligence, management of risks, investing in agro-processing, as well as marketing research and development (URT, 2008). The AMP further acknowledges the complexity that exists between agriculture marketing and the environment, but points out that all environmental matters in all agricultural marketing-related interventions will be mainstreamed.

c. National Climate Change Strategy (NCCS) (2013)

Launched in 2013, the NCCS looks into a broader natural resource base to address issues pertaining to climate change. The main goal of this strategy is to provide Tanzania with the ability to efficiently and effectively adapt to climate change shocks, and participate in global efforts towards mitigation in order to achieve sustainable development. The strategy provides interventions in adaptation and mitigation on climate-related shocks that affect social, economic, and physical environments. The 2004 National Environmental ACT provides the basis of the implementation arrangement for this strategy, with special emphasis on the agricultural sector covered in its strategic goal 'to enhance the resilience of agricultural sector to climate change for sustainable livelihoods'.

d. Agriculture Climate Resilience Plan for 2014-2019 (2014)

In 2014, the Government of Tanzania introduced the Agriculture Climate Resilience Plan (ACRP) for 2014-2019. This plan follows after the launched NCCS in 2013, which has set out strategic interventions for climate change adaptation measures. The plan identifies and responds to the most urgent impacts posed by climate variability and climate change to the crop sub-sector. The ACRP also serves as a roadmap for mainstreaming climate change within current agricultural policies, plans, and practices, as well as identifying gaps where new investments may be needed. In order to mitigate climate change impacts on agriculture, the plan calls for improved agricultural water and land management; accelerated uptake of climate smart agriculture; protection of the groups most vulnerable to climate change; and strengthening knowledge and systems to target climate action.

e. Integrated Industrial Development Strategy (IIDS) 2025 (2011)

The IIDS recognises the industry's contribution to human development and employment creation for economic transformation and sustainable economic growth. These are critical to the enhancement of the drive towards commercialisation and industrialisation. It focuses on improvement of wealth, as the industrial sector can play a central role in post-harvest systems, processing, value addition, and the production of diversified products for local, regional, and international markets. The policy

also recognises the positive impacts under climate change, such as the need for retooling and transformation of carbo- intensive industries, application of cleaner and energy efficient technologies and processes, reduction of by-products and waste, and recycling.

Despite the fact that most policies acknowledge the importance of agro-industries, none clearly acknowledge and pronounce the linkages between agro-industries, trade, food security and climate change. The outcome of these linkages are not pronounced by these policies, and therefore they are not known resulting in limited awareness, and yet a number of opportunities and drawbacks are evident.

Potential spillovers benefits or opportunities are not pronounced, and efforts by the Tanzanian Government and other partners to tap into and build on existing opportunities are lacking. Efforts to mitigate potential spillover costs resulting from these linkages are also lacking, despite the growing magnitude of such costs. For example, risks and uncertainties on agricultural productivity owing to changes in climate variability, drought, and floods are posing a serious threat in Tanzania and the EAC region. However, responses in terms of strategic interventions to address these risks and uncertainties, such as scaling up irrigation schemes and agricultural financing, are lacking. The post-harvest losses in Tanzania are very high, especially in the horticulture sub-sector. However, the requisite strategic responses, such as agro-processing and the establishment of market outlets, are limited. Climate change has made it possible in some parts of Tanzania, such as the Njombe Region, to grow tropical commodities such as fruits, vegetables, and flowers, which did not grow in the past. However, efforts to support and capitalise on such opportunities are absent. Existing policies and regulations are silent on these relationships. They neither acknowledge the emerging benefits and costs, nor strategise on how to utilise the opportunities and mitigate the spillover costs emerging from these linkages for the benefit of the people.

This is an alarming gap, which is partly explained by the fact that these linkages, and particularly the emerging opportunities and negative aspects, are relatively recent. New challenges call for policy reviews to mainstream and integrate the resulting spillovers.

Note that agro-processing has recently been earmarked as a priority in Tanzania owing to its advantages, such as employment creation, greater profit and trade potential through value addition, and more opportunities for women who are the dominant players in agriculture . Other motives include resolve to recover lost rural-based industries in the country, and adopt the FYDP II, whose theme is nurturing industrialisation for human development.

Since 1996, Tanzania's national policy frameworks draw from the umbrella National Development Vision 2025 (TDV 2025). Under the TDV 2025 is the second National Five Years Development Plan (FYDP II) for 2016/17 to 2020/21. Below FYDP II are the sectoral policies, strategies, and programmes. National policy frameworks are aligned with EAC regional policies and strategies for agro-processing in terms of policy statements. Tanzania's NAP, NTP, Small and Medium Development Policy, National Food and Nutrition Security Policy, and Sustainable Industrial Development Policy all clearly point out the need to make use of the EAC's industries to open up new trade areas. The NAP, for example, observes that while the focus on increased production and productivity is important, in view of the fact that Tanzania is part of the global economy, there is a need for the re-orientation and harmonisation of policies to take advantage of existing and future domestic, regional, and international market opportunities (URT 2013).

While national policies are aligned with the EAC regional policies and strategy of agro-processing in terms of policy statements, very little has been translated in to practice. In other words, policy implementation failure is the most predominant challenge. In the past, there have been tendencies of hesitation at the national level to implement

regional agreements or protocols on the pretext that the government has a moral obligation to protect the interest of its citizens.

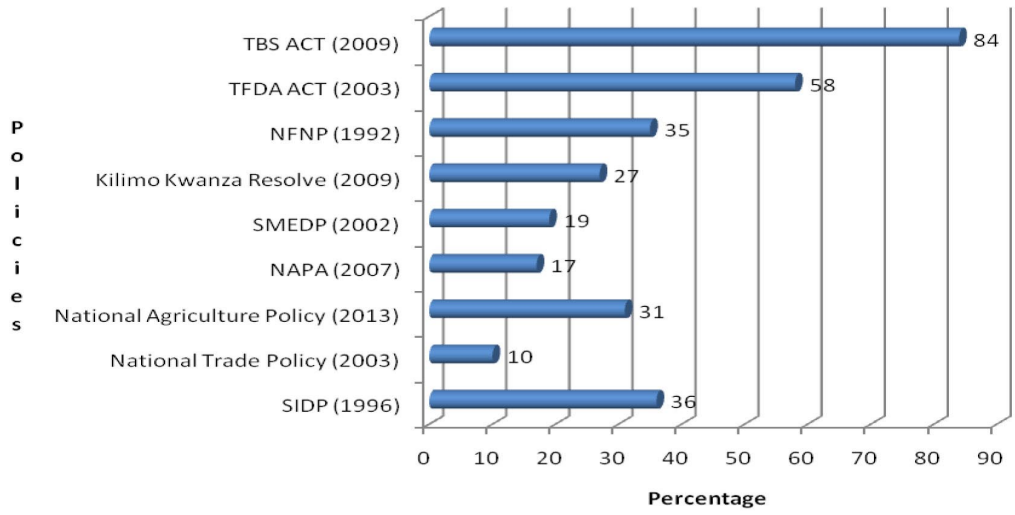
Current efforts to revive agro-industries are timely and pertinent. The revived promotion of agro-industries in Tanzania is inspired by the fact that it creates job opportunities, promotes trade and exports of high value products, ensures food security, promotes a clean and healthy environment, and supports the diffusion of technology. Rural industrialisation, for example, is a measure in place to diversify rural incomes and thus address chronic poverty (Mashindano et al 2014). There is a need to build a strong rural-based processing industry and build the skills and competencies of rural inhabitants so that they are gradually absorbed in the expanding agro-processing industry. Rural industrialisation has the potential to transform the less-productive agrarian rural economies through backward and forward linkages with agriculture. As noted earlier, local industrialisation through the promotion of agri-business and agro-processing activities would contribute directly to poverty reduction by providing jobs to the lower-income workforce within the rural economy; promoting trade by adding value to the primary agricultural products; enhancing food and nutrition security; reducing transportation costs of raw materials, thus reducing the Product Carbon Footprint (PCF)[2]; and increasing overall agricultural productivity and growth.

4.2.2 Policy Knowledge Gaps

Existing policies and legislations are not routinely reviewed, and there is no systematic and effective system to sensitise and create public awareness. The majority of farmers, traders, processors, exporters, and other population segments in Tanzania are not aware of domestic or EAC agro-industrial development-related policies and regulations associated with climate change, food security, and trade.

While there are no guidelines or rules as to when a particular policy or legislation should be reviewed, the government should undertake periodic reviews through responsible Ministries, Departments and Agencies (MDAs), opposed to the current system that initiates a review in response to an event. For example, Tanzania's first agricultural policy that was formulated in 1983 – during the centrally planned economy – was reviewed 14 years later in 1997 to accommodate market-led macro- and sectoral policy reforms of the mid-1980s and 1990s. Initiatives by the Ministry of Agriculture to

Figure 4.9: Awareness of Government Policies and Legislations by Farmers, Traders, and Processors



2 PCF is the sum of greenhouse gas emissions related to a product across its entire life cycle from raw material acquisition to production, distribution, consumer use and waste disposal or recycling, or parts thereof

review the 1997 Agricultural and Livestock Policy started in 2006, and the new policy has since been enacted in 2013.

Figure 4.1 presents the percentages of the respondents who are aware of different government policies and legislations. From the survey, it was noted that processors are more concerned with policies and legislations that permit them to do business rather than those which can increase their opportunities to improve competitiveness. About 84 per cent and 58 per cent of the respondents were aware of the TBS Act and TFDA Act, respectively, while only 35 per cent, 27 per cent, and 19 per cent were aware of the National Food and Nutrition Security Policy (NFNSP), the Kilimo Kwanza Resolve, and the Small and Medium Enterprises Development Policy (SMEDP). Responses reflected that other policies were not widely known: National Adaptation Programme of Action (NAPA) (17 per cent), NAP (31 per cent), NTP (10 per cent), and the SIDP (36 per cent).

Despite being operational for many years, the majority of stakeholders do not explicitly know the roles and functions of the government regulating agencies, namely the Tanzania Food and Drugs Authority (TFDA) and the Tanzania Bureau of Standards (TBS). The inconsistent TBS and TFDA standards/criteria for registration of products leads to the duplication of efforts and costs, especially for traders and processors, thus discouraging processing and marketing of processed products.

Product registration fees charged by the TFDA are high when compared to the incomes of the small-scale processors. The processors also complained that the fees charged for a TBS Mark Certificate are high and that the procedures required before one can acquire such a license are lengthy and tedious. In regards to the TBS, regulations are restrictive to processors and traders, being strict on the distortion of product standards, which could face a fine amounting to TZS. 50,000,000 (about USD$ 29,400), 6 years in jail, or both. In addition, the services of the TBS are not decentralised, thus leading to higher costs incurred by rural processors that have to travel all the way to the TBS headquarters in Dar-es-Salaam in search of services. When traders and processor weigh all the costs and time against expected returns, they resort to illegal or informal operations.

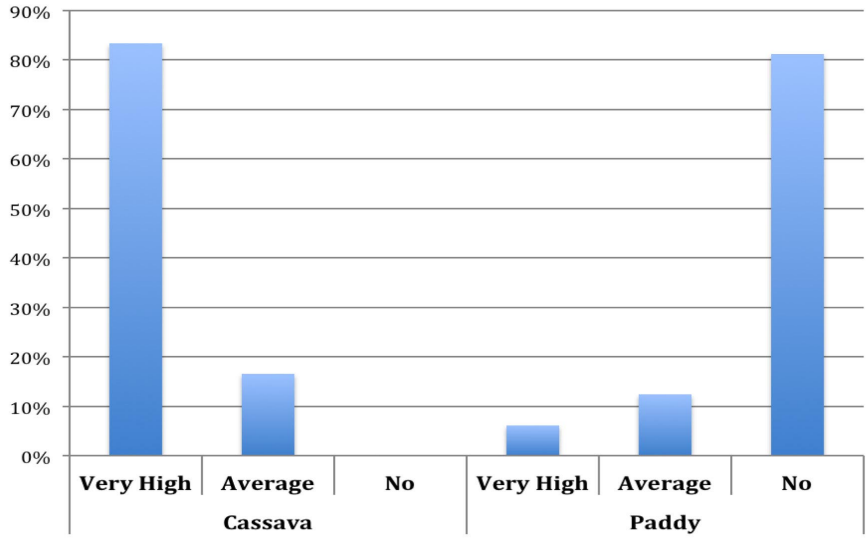
This limitation or gap is not unique to farmers, traders, and processors alone. Some LGA executives also indicated the lack of sufficient knowledge on agro-industrial related policies and other policies on food security, trade, and climate change.

A number of measures have been taken by the government in Tanzania, including the adoption of agro-industrial policy to address climate change, food security, and trade. These measures include the formulation and adoption of various policies and the associated regulations including NAPA, NFNSP, SMEDP, NAP, NTP, and the National Environment Management Policy (NEMP). Tanzania has not yet formulated a policy, which specifically addresses the challenges of agro-industries in the country. Agro-industrial operations are only integrated in other closely related sectoral policies, as mentioned previously. In addition, Tanzania is faced with policy implementation failure rather than policy failure. In other words, with exception of the Agro-industry Policy, most other associated policies are in place, but they are not implemented fully or properly. Thus, the biggest missing link in Tanzania is that policies in place are not implemented, and the associated regulations are not enforced.

4.3 Gender Perspectives in Agro-processing of Cassava and Rice

Agriculture is a principal source of livelihoods for the Tanzanian population, and women play an essential role in agricultural production. Most evidence show that, women in Tanzania take charge of weeding, harvesting, processing, and storage of less profitable food crops, such as beans, cassava, sweet potato, rice, and millet. Tasks in which men tend to favour include site clearing and land preparation, and heavy-labour tasks such as the construction of fences, and profitable activities such as marketing of high-value food crops and cross-border trade.

Figure 4.10: Level of Female Involvement in Processing



The findings show that women are more highly involved in agro-processing activities of cassava than rice in Tanzania. Responses indicated that 83 per cent of cassava processors confirmed that women were highly involved in their activities, compared to 81 per cent of rice (paddy) processors who revealed that women were not involved in processing but rather formed part of the trading stage (Figure 4.10). The reasons for disparity in female involvement for the two crops is mainly owing to the nature of the processing activities involved, with cassava requiring a lot of careful processes compared to rice.

It was also found that in cassava production, men are generally responsible for land clearing, ploughing, and planting, while women are often involved in weeding, harvesting, transporting, storage, and processing. For the case of rice, the data show that women participate in all stages of rice production; however, their main roles are concentrated in planting of rice seeds, weeding, and shooing away birds during the ripening phase.

Climate change has negatively affected the growing of both crops in both regions. The awareness on climate change issues and how it affects their activities is quite impressive despite low literacy rate.

In Mvomero, there have been unpredictable rainfall and flooding periods that have affected the production of rice in the district. Most farmers have started to adapt traditional irrigation farming schemes so as to continue with production.

Women and men play different roles in guaranteeing food security for their households and communities. While men grow mainly field crops, women are usually responsible for growing and preparing most of the food consumed in the home.

In Mkuranga for instance, women carry out most home food processing, which ensures a diverse diet, minimises losses, and provides marketable products. They process cassava into chips, which can be easily stored for a very long period of time. They prepare various products such as flour, bans, and noodles that are healthy for the household and wider community. Women are more likely to spend their income on food. Women, therefore, play a decisive role in food security and dietary diversity.

The participation of women in trading activities is almost negligible. Men are mostly involved in trade, either in terms of transporting raw crops or selling processed or unprocessed agricultural products. According to a group discussion with women from the Mvomero district, it was explained that men are responsible for searching for markets and selling rice. Women do not participate in trading activities, and if they do it is a very small number.

Chapter 5

Conclusions and Recommendations

5.1 Conclusions

This study attempted to identify and fill knowledge gaps in relevant policies on agro-industrial development to ensure sensitivity to climate change, food security, and trade linkages in the EAC. The preceding analysis shows that to date, Tanzania has not formulated and adopted a robust and recognised agro-industrial policy, despite the fact that since independence in 1961, the country has made massive investments in agro-industries, and agricultural, trade, food security, and sustainable industry-related policies exist to achieve more effective, profitable, and sustainable agro-industry.

Agro-industries have a close association to climate change, trade, and food security. These linkages have tended to bring about synergetic spillover benefits as well as spillover costs, which both affect the economy and livelihoods of Tanzanians in different ways. The formulation and adoption of policies and regulations related to agro-industries, climate change, trade, and food security represent a significant milestone for the government. All of these policies acknowledge the importance of promoting agro-industries. However, they are not clear enough in demonstrating and emphasising the outcomes of the linkages between agro-industries, climate change, trade, and food security.

It is also important to acknowledge that the progress made thus far is a necessary condition, but not a sufficient one, for Tanzania's development. While most policies acknowledge the importance of agro-industries, none of them clearly outline the targeted outcomes of linkages between agro-industries, trade, food security, and climate change. The results of these linkages are not pronounced by the policies and they are therefore not widely known by key stakeholders, and yet a number of opportunities and drawbacks from these linkages are evident.

Potential spillovers benefits or opportunities are not pronounced, and efforts by the government and other partners to tap into and build on opportunities are lacking. Efforts to mitigate potential spillover costs resulting from these linkages are also lacking, despite the growing magnitude of such costs. For example, risks and uncertainties on agricultural productivity owing to climate variability, drought, and flooding pose a serious threat in Tanzania and the wider EAC region. Unfortunately, responses in terms of strategic interventions to address these risks and uncertainties, such as scaling up irrigation schemes and agricultural financing, are lacking. Post-harvest losses in Tanzania are very high, especially in the horticulture sub-sector. However, the requisite strategic responses such as agro-processing and the establishment of market outlets are limited. Climate change has made it possible in some parts of Tanzania to diversify and grow tropical commodities not possible in the past. However, efforts to support and capitalize on such opportunities are absent. Overall, existing policies and regulations are silent on these relationships. They do not acknowledge the emerging benefits and costs, and fail to strategise how to better utilise opportunities and mitigate the spillover costs emerging from these linkages for the benefit of the people.

It is also important to underscore that while national policies and strategies are aligned with EAC regional policies, little has been translated in practice. Hence, policy implementation failure is the greatest challenge to overcome, particularly as it continues to affect the performance of both national and EAC regional policies.

5.2 Recommendations

The study provides the following recommendations:

i. **Provide guaranteed market access to agro-processors:** The study realised that the majority of farmers and agro-processors were in high demand of reliable markets for their products. For instance, cassava farmers were willing to process their raw cassava only if the market is in place. This then calls for concerted efforts by both the government and private sector to ensure that the market for local agro-processed commodities is available.

ii. **Monitor quality of inputs for agriculture production and outputs:** The study calls for regulatory authorities to make sure that they monitor the quality of inputs for agricultural production as well as outputs, and take measures when standards for inputs are violated.

iii. **Promote direct linkages between food manufacturing factories and farmers:** As most of the farmers and agro-processors' demand for a guaranteed market, the study calls for deliberate measures to be taken to ensure that food factories are directly linked with farmers. For instance, cassava processors recommended that these factories purposely introduce products containing cassava so as to promote the use of the product.

iv. **Improve and expand services to farmers and processors:** Service providers such as government extension services, NGOs, and the private sector should improve service delivery so that farmers increase the quantity of agricultural products to meet the requirements of processors and consumers in the market.

v. **Sensitisation campaign is vital for consumers to buy locally processed products:** There has been an overall perception that imported products are of higher quality than locally–produced and processed products. However, in order for agro-processing to be effective, it is critical that consumers see the importance of buying locally-processed commodities. Domestic consumption will strengthen agro-industrial production.

Thus, this study calls for the Tanzanian Government and its partners to urgently call for policy reviews to reflect the new emerging challenges related to opportunities and drawbacks resulting from these linkages. Although policies relevant to agro-processing industrial development are cognizant of climate change, food security, and trade, it is apparent that they do not provide solutions to address the resultant impacts of inter-linkages between these issues. This gap result in either missed opportunities to promote positive aspects, or opportunities to reduce negative impacts as a result of promoting the agro-processing industry without being cognisant of these linkages. The recent Agriculture Climate Resilience Plan for 2014-2019 will serve as a roadmap to mainstream climate change within current agricultural policies, plans, and practices, as well as identify gaps where new investments may be needed. This plan needs to be carefully reviewed so as to take into account climate change, food security, and trade linkages, with a particular focus on their impacts on agro-processing industry. There is a need to tap into the opportunities emerging from these linkages, and find ways to mitigate spillover costs. Furthermore, the Government and its partners should ensure that the knowledge gap is narrowed by spreading awareness of national policies and regulations relating to these issues, as well as the objectives and pathways of these policy linkages.

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How can agro-processing development in Tanzania become more climate-aware, trade-driven and food security-enhancing? This study explores this question and provides policy options for coherently harnessing the full potential of Tanzania´s still nascent agro-industry despite climate change.

In an ideal scenario, trade policies should ensure the availability of inputs despite climate change, markets for the processed products and access to cleaner technologies; while climate change policies support this effort through targeted adaptation and mitigation initiatives. The role of international trade and climate negotiations in framing the policy space for such policies should not be overlooked.

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