CASSAVA VALUE CHAIN ANALYSIS IN MKURANGA DISTRICT COAST REGION IN TANZANIA

HAJI MIRAJI KIHWELE

A DISSERTATION SUBMITED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE IN AGRICULTURAL ECONOMICS OF THE SOKOINE UNIVERSITY OF AGRICULTURE. MOROGORO, TANZANIA.

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ABSTRACT

The aim of this study was to conduct cassava value chain analysis in Mkuranga district. The data was collected from 90 farmers, 15 farmer processors, 7 service providers and 30 traders from different markets located in Mkuranga district Coast region, Temeke, Ilala and Kinondoni Municipal in Dar es Salaam region. Structured questionnaire was used to collect data from farmers' while for other categories of respondents the appropriate checklist was used to gather information concerning their participation in cassava value chain. Both quantitative and descriptive analysis was applied. Statistical package for social sciences (SPSS) and Microsoft excel statistical soft ware used for analysis. The results show that the key actors of cassava value chain include research institutions, input suppliers, farmers, processors, small traders, brokers, wholesalers, retailers and consumers which play different roles in cassava value chain. The study also found that, cassava is constrained by production, processing and marketing but on the other hand cassava from Mkuranga has a lot of market opportunities in the district itself, urban, regional and international markets. Gross margin analysis show that farmers', wholesalers and retails have the gross margin ratios of 20%, 39%, and 38% respectively. In dry cassava value chain, farmers have a gross margin ratio of 41.1% when they sell to retailers and gross margin ratio of 52.12% when they sell direct to consumers. Farmers gross margin is affected by distance from the market, year of experience in cassava business, planting style, cropping style and farmer' organization in cassava production activities. The study concluded that dry cassava value chain is more efficient and highly potential compared to fresh cassava value chain for development in Mkuranga district. The study recommends that development of dry cassava value chain is vital and therefore calls for efforts from all development stakeholders in cassava value chain to focus on it.

DECLARATION

I, Haji Miraji Kihwele, do hereby declare to the Senate of Sokoine University of Agriculture that this is my own original work done within the period of registration and that it has neither been submitted nor being concurrently submitted in any other institution.

Haji Miraji Kihwele
(MSc. Candidate)

8/11/2012
Date

The above declaration is confirmed by

Dr. D.M Gabagambi
(Supervisor)

08/11/2012
Date

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DEDICATION

This work is dedicated to my beloved late father Ives Marche, as the one who had an idea of supporting my higher learning studies before his death in 2004.

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LIST OF ABREVIATIONS

ASDP	Agriculture Sector Development Program
CIAT	International Centre for Tropical Agriculture
DADP	District Agriculture Development Plans
FAO	Food and Agriculture Organisation
FAO STAT	Food and Agriculture Organisation Statistical database
GM	Gross Margin
GMA	Gross Margin Analysis
http:	Hiper Text Transfer Protocol
IITA	International Institute of Tropical Agriculture
MAFC	Ministry of Agriculture Food Security and Cooperatives
MDC	Mkuranga District Council
MMA	Match Maker Associate Limited
MVIWATA	Mtandao wa Vikundi vya Wakulima Tanzania
NBS	National Bureau of Statistics
PELUM	Participatory Ecological and Land Use Management
PTF	Presidential Trust Fund for self reliance
SACCOs	Savings and Credit Cooperative Societies
SPSS	Statistical Package for Social Sciences
TADENA	Tanzania Development Navigation Trust
TASAF	Tanzania Social Action Fund
TAWLAE	Tanzania Association of Women in Agriculture and Environment
TC	Total Cost

TR	Total Revenue
URT	United Republic of Tanzania
VCA	Value Chain Analysis
VECO	Vredesailanden Country Office
VICOBA	Village Community Bank
www	World Wide Web

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background Information

Cassava *(Manihot esculenta Crantz)* is a starchy root crop that has been cultivated in tropical America for more than 5000 years. Introduced to Africa and Asia by Portuguese traders during the 16th Century, it is now grown in over 90 countries and provides food and livelihood for 500 million people in the developing world (Poulter, 2000 cited by Mutakubwa, 2007).

Some of the key characteristics of the crop are its efficiency in producing carbohydrate, its tolerance to drought and to impoverished soils, even though it thrives on fertile, sandy-clay soils, and its high flexibility with respect to the timing of planting and harvesting. For these reasons, cassava plays an essential role for food security, especially in those regions prone to drought and with poor soils. It is the world's fourth most important staple after rice, wheat and maize and is an important component in the diet of over one billion people. (Barton,2000, and Van der Land and Uliwa (2007). The second most important utilization of cassava worldwide is feed. Cassava has also various industrial uses, particularly as starch for breweries, wood and textile industry.

Over 50% of the current global cassava production is grown in Africa and nearly 70% of the continents' output is harvested in Nigeria, the Democratic Republic of Congo (DRC), Ghana and Tanzania (Van der Land and Uliwa, 2007).

Cassava in Tanzania is mainly a subsistence crop where 84% of its total production is utilized as human food, making it second after maize in importance as food crop though in

some regions it is the primary staple crop. The remaining amount (16%) is for other uses such as animal feed, alcohol brewing, starch making and for export. The average yield of cassava in Tanzania is 2.0 metric ton/ha on dry weight basis. This is well below the continents' average yield of 3.3 ton/ha and the average yield of 4.7 ton/ha of Africa's largest producer, Nigeria. In 2004/05, annual total production of cassava in Tanzania was 1.85 million metric tons on dry weight basis while in 2005/06 total production of cassava was estimated to be 2 million metric ton (ratio of wet to dry is 3:1) (Van der Land and Uliwa, 2007). According to MDC (2007), it is estimated that there are 50 000 households in Mkuranga district, producing an average of 4 ton of cassava per annum from an average of 1 hectare of land.

The essence of the Value Chain Analysis is to improve strategic learning in enterprise development. Specifically, it treats the enterprise not as a singular (autonomous) entity but as part of an integrated chain of economic functions and linkages across geographic boundaries. It emphasizes on the diverse interrelationships among market opportunities, constraints and directives at various levels of the supply chain and at different levels of influence from which specific value addition takes place.

1.2 Problem Statement and Justification

According to Kaganzi *et al.* (2006), Tanzania produces about 6.8 million ton of cassava annually (on wet weight basis), which is 5.5% of total world cassava production (or 14% of Africa's). From that information, Tanzania is leading in cassava production in East Africa followed by Uganda, and lastly by Kenya. In Tanzania, cassava is produced by smallholder farmers in many places including Mkuranga District in the Coast Region. The

government recognizes cassava as a food security crop, but little or no effort has been done in resource allocation to commercialize it. Consequently, cassava farmers face the problem of marketing the surplus production.

On the other hand, Tanzania has untapped domestic demand for cassava from the apparel industry, cassava flour for human consumption, and cassava chips for livestock feed processing industry. There is also huge unexploited regional and international market for cassava pellets to Kenya, Rwanda, and Democratic Republic of Congo and China.

Despite these market opportunities, cassava farmers in Tanzania are unable to access them. This is due to some critical constraints that mitigate farmers from taking advantage of opportunities available to them. These constraints include poor transport infrastructure, inefficient marketing systems, weak producer organizations, poor coordination, lack of appropriate technologies for value addition especially processing technologies and inadequate government support services.

For example, cassava producers in Mkuranga District complain about lack of profitable markets. On the other hand, buyers and processors complain about inadequate supply, poor quality, inconsistency, and unreliable supply. Cassava value chain analysis is important in order to provide information that would help to tackle constraints highlighted above. Value chain analysis can be helpful in addressing various issues related to market of a particular product so as to have producers' access to markets. In addition, it can address issues related to quantity (volume), consistency, pricing, margins, market and marketing.

However, there is little information available on cassava value chain in order to help farmers and other stakeholders to clearly understand and address the problem existing in Mkuranga district. Thus the purpose of this study is to analyse the value chain for cassava sub sector in order to improve it with the final goal of improving the livelihoods of small-scale farmers in the study area.

1.3 Objectives

1.3.1 Overall objective

The overall objective of this study is to undertake value chain analysis for cassava in Mkuranga district.

1.3.2 Specific objectives

i. To carry out cassava sub sector mapping in which key actors, their roles, their interrelationship and the product flow in the existing cassava value chain is identified.
ii. To carry out cassava profitability analysis for all actors along the value chain.
iii. To identify constraints that affects the functioning of cassava value chain and existing opportunities in the study area.

1.4 Hypothesis

This study was guided by one hypothesis stated as follows: Cassava profitability along the value chain is in Mkuranga District is unequally distributed.

1.5 Limitation of the Study

The study had a lot of challenges especially during data collection. This is due to the fact that cassava farmers lack uniform units in selling their products. Thus information

collected had to be converted in standard units through observation or asking some people who are well informed on those units with relation to standard units. They use units like stake (one–third of the vehicle), kiroba, lumbesa and vehicle. This made estimation of yield per unit area a tedious work.

1.6 Organization of the Report

This report is organised into five chapters. The first chapter is introduction which covers background information, problem statement, objectives, and hypothesis sections. The second chapter is literature review which covers important literature relevant to the study. Chapter three is research methodology which covers description of the study area, research design and data analysis. The fourth chapter presents results of the findings and discussion. Chapter five covers the conclusion and recommendations made from the study findings.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Importance of Cassava to the Livelihood

According to Kaganzi *et al.* (2006), cassava is a vital food security crop because it is reliable, producing life-sustaining yields when unfavourable climatic conditions cause cereal and pulse crop failures. Kaganzi *et al.* (2006) further reported that cassava produces more food energy per unit of cultivated land than any other staple crop in Sub-Saharan Africa, and it provides an inexpensive source of carbohydrates for urban residents, whose numbers are on the increase every year. It was further reported that cassava grows well on marginally fertile soils. Its edible tuberous roots can be left unharnessed in the ground up to 4 years depending on cassava species or variety, which makes it an ideal reserve crop for consumption or for sale to meet unforeseen household expenses.

2.2 Cassava Production and Consumption

2.2.1 Global perspective

Worldwide, cassava is planted on about 16 million hectares, with 50% in Africa, 30% in Asia, and 20% in Latin America. Total root production is around 152 million ton (Lundy *et al.*, 2006). According to Barton (2000), almost 70% of world cassava productions are concentrated in five countries, namely Nigeria, Brazil, Thailand, Indonesia and the Congo Democratic Republic. World cassava production increased from 1984 to 1994 at a rate of 2.2% a year, the same as in the previous decade, reaching 164 million ton in 1997 or 60 million ton more than in 1973–1975. That increase relied mostly on an area expansion (1.8% a year) while the contribution from yield increases was small (0.4% a year). Nigeria

with an output of 38 179 000 ton is the world's leading producer of the crop, followed by Brazil and then Indonesia (Barton, 2000).

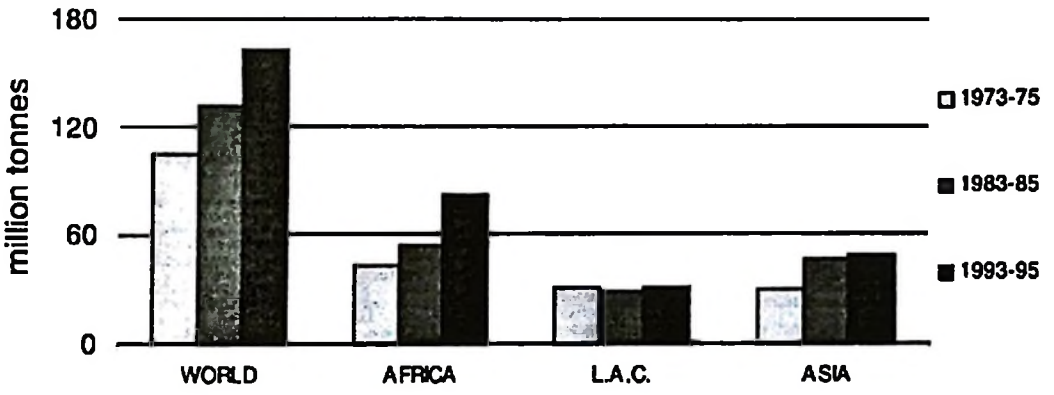

Figure 1: Cassava production in different regions

Source: Barton (2000)

Much of the rise in global cassava production since the mid-1980s was concentrated in Africa where the sector experienced a real boost. Much slower growth was observed in Asia and in Latin America and the Caribbean over that period, at less than one percent per year. While in the latter region this represented a reversal from a falling trend recorded between 1974 and 1984, for Asia it contrasted with the vigour that had characterized the sector in that period, when producers were responding to an expanding demand for export.

Cassava yields vary with cultivars, season of planting, soil type and fertility. With improved varieties and under good management practices, they can reach 20–25 ton/ha. Under the most prevalent farming methods, cassava yields are much lower. In 1994, they averaged 9.9 ton/ha worldwide, little changed from the 9.5 ton/ha reached in

1984. Although the productivity is higher in Asia and in Latin America and the Caribbean, yields have shown a tendency to stagnate in the two regions, in contrast with the positive trend observed in Africa, where they remain, nevertheless low.

Worldwide cassava is mostly used for human consumption, while in some areas particularly in Asia and Latin America it is used commercially for the production of animal feed and starch-based products (IITA, 2004). Cassava is also applicable in many industrial uses to produce types of products such as food, confectionery, sweeteners, glues, plywood, textiles, paper, biodegradable products, monosodium glutamate, and drugs. (www.cassavabiz.com). Appendix 6: summarises different use of cassava for human and animal feed.

2.2.2 Cassava production and consumption in Africa

Over 50% of the current global cassava productions are grown in Africa although the crop is cultivated in 39 countries, stretching through a wide belt from Madagascar in the Southeast to Senegal and to Cape Verde in the Northwest. Nearly 70% of the region's output is harvested in Nigeria, the Congo Democratic Republic, Ghana and Tanzania (Barton, 2000). Cassava yields in the region vary from a high 18.5 tonnes per hectare in Cameroon to a low 5.3 ton/ha in Angola. At the regional level, they averaged 8.2 ton/ha in 1994, little changed from the 7.3 ton/ha in 1984 (Van der land and Uliwa, 2007).

In Africa, cassava is a basic food staple in a number of countries including Angola, the Congo Democratic Republic, the Republic of Congo, Ghana and Tanzania, where per caput consumption surpasses 200 kg/year. It is also an important foodstuff in Benin, the Central African Republic, Cote d'Ivoire, Liberia, Mozambique, Nigeria and Togo. Cassava

is processed mainly for human consumption, with women responsible for most of the related activities. Although feed accounts for only 6% of total utilization, this share has been rising in recent years, in parallel with livestock production. Cassava leaves are also eaten as a vegetable in central Africa.

Although cassava is a basic staple for diet in the main producing countries, also is used as an important source of cash incomes, as farmers sell a sizeable share of their output. In other parts of the region it is cultivated for security purposes as a food reserve in case of failure of the other basic crops and is often harvested as needed, since farmers take advantage of the root aptitude to keep stored under ground for up to 24 months (Van der land and Uliwa, 2007).

2.2.3 Cassava production and consumption in Tanzania

Tanzania is self sufficient in terms of cassava. According to Van der land and Uliwa 2007, Tanzania is among the largest producers of cassava in the world and the fourth largest producer in Africa after Nigeria, Democratic Republic of Congo and Ghana. The average yield of cassava in Tanzania is 2.0 metric ton per hectare on dry weight basis. This is well below the continents' average yield of 3.3 ton/ha and the average yield of 4.7 ton/ha of Africa's largest producer, Nigeria. In 2004/05, annual total production of cassava in Tanzania was 1.85 million metric ton on dry weight basis while in 2005/06 total production of cassava was estimated to be 2 million metric ton. The average acreage of cassava fields ranges from 1.5 to 2.4 acres per house hold with variation from place to place. Major farm implement used by smallholder farmers for cultivating cassava is the hand hoe.

According to the Ministry of Agriculture and Food Security in Tanzania, the most important production regions in Tanzania are Mtwara, Lindi, Coast, Dar es Salaam, Shinvanga, Tabora, Mwanza, Rukwa, Kagera, Kigoma and Mara. The Lake Zone is the main producing cassava growing area with Mara and Mwanza regions leading nation wide (MAFC, 2007).

Fig. 2: bellow shows cassava production levels and trends in Tanzania since the year 1998/99 to the year 2004/05. It can be noted that cassava production had been very low from 1998/99 to 2000/01 but increased rapidly in the year 2001/02 where it attained maximum production of 3 420 550 ton. In the following year production levels decreased to 2 843 530 ton and started again to increase steadily. In Fig. 2, it can also be observed that productivity per unit area was very low (with 0.98 ton/ha) in the year 1998/99 but continued to increase progressively to the maximum of 2.87 tons/ha in the year 2001/02. In the year 2002/03, productivity per unit area decreased rapidly to 2.16 Tons/Ha and the trend started again to increase up to 2.44 ton/ha in 2004/05. Generally, area under cassava was increasing between 1999/00 and 2004/05 while production also experienced the same behaviour expect in 1998/99. The trend could be due to marketing strategy, effective agricultural policy and agronomical factors such as soil fertility rainfall cassava value chain merits (MAFC, 2007).

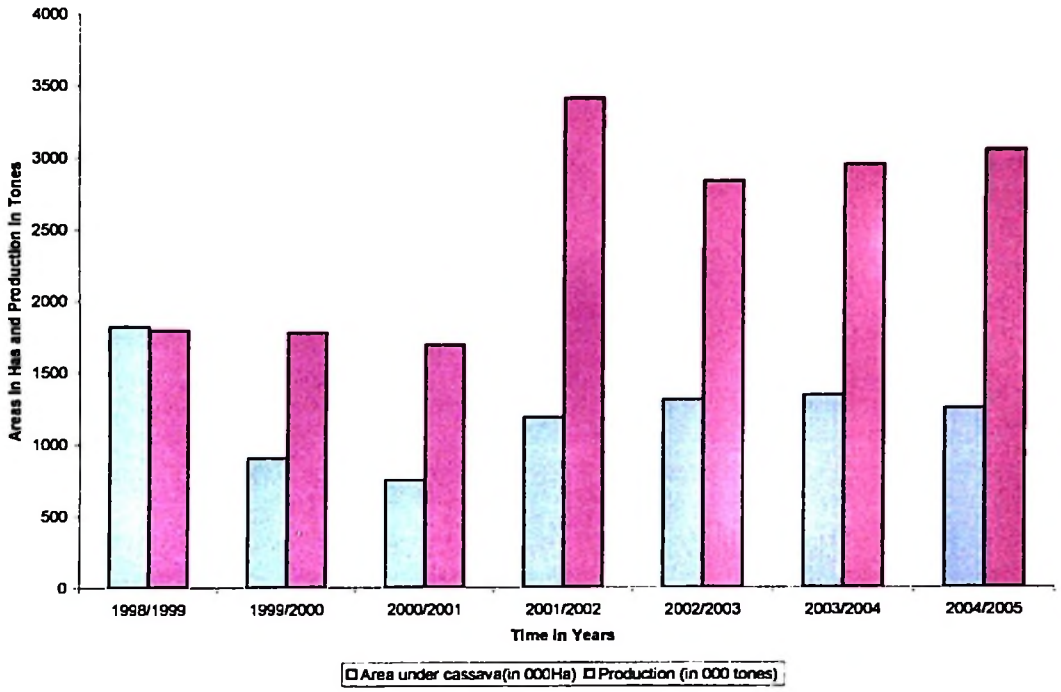

Figure 2: Cassava production levels and trends in Tanzania from 1998/99 to 2004/05

Source: MAFC (2007)

2.2.4 Cassava production in Mkuranga district

Mkuranga district depends on Agriculture as the main stay of its economy. The district has approximately 2432 sq km of land, out of which 1934 sq km (79.5%) is arable land suitable for cultivation. Most of the rural communities are engaged in the food and cash crops production on small-scale basis. Individual farmers or households cultivate cassava, cashew nut, coconuts, maize, paddy, sweet potatoes, and a variety of vegetable crops. Cassava is mainly grown for subsistence but some is sold in Dar es Salaam markets. Cassava is the most important major reserve food crop grown in the district. The cultivation of this crop is emphasized by the government authorities because it can withstand adverse weather conditions. Cassava becomes important as food during periods

of poor rainfall as it is the result of poor harvest of other supportive crops like paddy and maize (MDC, 2009).

Appendices 7, 8 and 9 indicate cassava production in Mkuranga for the period between 1998/99 and 2004/05. Appendix 7: shows that cassava is the dominant crop as compared to other food crops produced in the district for the whole period. Appendix 8: shows cassava production levels and trends in Mkuranga District between the year 1998/99 and 2004/05. It indicates that cassava production had been fluctuating between 1999 and 2005. The district produced 165 000 ton of cassava in the year 1998/99 increasing rapidly to 219 880 ton in the year 1999/00. The production level, however, dropped in 2001/02 and 2002/03 to 171 512 ton and 163 863 ton respectively. The production started to increase again in 2003/04 and 2004/05. The statistics with reference to Appendix 8: shows that cassava production in Mkuranga district is 8.83 tons/ha. Appendix 9: shows that Mkuranga district is the leading cassava producer in the Coast region for the whole period except in the year 2003/04 where Rufiji district was leading (NBS, 2007).

2.3 Constraints to Cassava Sub sector Development

2.3.1 Production constraints

Cassava is a tropical crop which is easy to propagate and high yield if good production and management are practised. However, a number of constraints have impaired cassava productivity in many areas. These constraints include low fertility of the lands where cassava is normally grown, the low application of inputs and the relatively slow dissemination of improved cassava varieties adapted to local conditions and tastes. Adverse climatic conditions *i.e.* prolonged droughts in many parts of Africa, and insect,

pests and disease outbreaks e.g. the recurrence of infestations by the cassava mealybug (CMB), green spider mite (GSM) and outbreaks of African cassava mosaic virus (CMV). Indeed, it has been estimated that pests, including weeds, reduce yields by almost half, while the African CMVs alone is estimated to lower them by between 28% and 40 percent (Van der land and Uliwa, 2007).

Another constraints related to production is that, the production of cassava is dependent on supply of good quality stem cuttings. The multiplication rate of these vegetative planting materials is very low compared to grain crops which are propagated by true seeds. In addition, cassava stem cuttings are bulky and highly perishable as they dry up within few days (IITA, 2004).

Research responses include the development of integrated pest management strategies and Cassava Mosaic Diseases resistant varieties is needed to stimulate cassava sub sector development. It is stated that, to overcome the constraints and direct cassava towards market orientation requires building resource and institutional capacity at all levels of research, production, processing, marketing and utilisation with the necessary policy and support from both the private and public sectors (Food net,2001 and ASARECA, 2003 cited by Mutakubwa,2007). This calls for development stakeholders including research institutions to analyse and develop clear strategy in a highly collaborated manner to overcome these constraints. For example, due to infestation of Cassava Mosaic Virus in the Lake zone which entered from Uganda, Ari Ukiriguru developed 18 new varieties of which 6 were fully accepted by farmers' and the disease was contained. These are high yielding and disease tolerant varieties suitable for the different agro ecological zones in Tanzania.

2.3.2 Processing and marketing constraints

Marketing of cassava presents some unique challenges due to the characteristics and the nature of the crop. It is highly perishable and bulky product to transport and market it before some initial processing. Due to perishability and bulkiness of the crop, farmers are most likely to sell cassava in fresh form at farm level due expense of transport and processing in which they can't afford. If possible, farmers sell cassava roots in processed form rather in fresh form. This shows that cassava processing is an important factor in marketing since it improves palatability, quality, shelf life and makes product easier to transport and market. The commercial marketing system of cassava depends on the product forms, consumer preference and price. (Nweke *et al.*, 1998 cited by Mutakubwa 2007).

Processing of cassava in Tanzania is mainly into fermented and non-fermented products in order to obtain flour for both marketing and consumption using rudimentary traditional methods. The outcome of this is low appeal, quality, reduced shelf life and high cyanogens residues among others. These problems can be alleviated through appropriate processing and packaging techniques (Nweke *et al.*, 1998 cited by Mutakubwa 2007).

In the Lake zone Tanzania, cassava processing is constrained by low adaptability of improved processing technology due to capital constraints, in adequate access to reliable water and in adequate accessibility to drying equipment and tools (Van der land and Uliwa, 2007).

2.4 Review of Analytical Tools

2.4.1 Value chain analysis model

According to Kaplinsky and Mike (2000), A value chain can be defined as the full range of activities which are required to bring a product or service from conception, through the

different phases of production (involving a combination of physical transformation and the input of various producer services), delivery to final customers, and final disposal after use.

Value chain analysis (VCA) is a method for accounting and presenting the value that is created in a product or service as it is transformed from raw inputs to a final product consumed by end users (Submarian, 2007).

This feature of the VCA lends to its completeness as strategic tool in exploring different alternatives strategies for poverty reduction. Also value chain analysis seeks to understand the various factors that drive incentives, growth and competitiveness within a particular industry and identify opportunities and constraints to increasing benefits for stakeholders operating throughout the industry (AsiaDHRRA, 2008).

VCA includes the following steps; Choose sector(s) to asses, analyse the market, map the value chain, measure the performance of the value chain and establish benchmark and analyse performance gaps of the value chain (focusing on government and market failures). VCA typically involves identifying and mapping the relationships of four types of features: (i) the activities performed during each stage of processing; (ii) the value of inputs, processing time, outputs and value added; (iii) the spatial relationships, such as distance and logistics, of the activities; and, (iv) the structure of economic agents, such as suppliers, the producer, and the wholesaler. Value chains can become complex when they reflect multi-stage production systems with multiple types of firms operating in different locations in one country or multiple countries around the world (Subramanian, 2007).

2.4.2 Components of value chain analysis model

The Value Chain Analysis model is shown in Fig.3 it tries to integrate analysis of commodity supply chain and that of the associated enabling environment. Hence as shown in the figure, the value chain analysis model comprises the following analytical entry points. Value chain actors, value chain supporters, and the value chain influencers (the enabling environment) as explained below.

2.4.2.1 Value chain actors

Value chain actors are those who directly deal with the production, processing, packaging, trading etc. of a product. Usually they own the product for some time as it travels along the chain. They directly deal with the products, *i.e.* produce, process, trade and own them (Hellin and Meijir, 2006). The value chain actors who actually transact a particular product as it moves through the value chain include input suppliers (e.g. seed suppliers), farmers, traders, processors, transporters, wholesalers, retailers and final consumers (Subramanian, 2007).

2.4.2.2 Value chain supporters

Value Chain supporters are people and companies who provide services to the value chain actors such as improving capacities of producers and small agro-businesses, ensuring access to information, knowledge and know how, and linking numerous but small producers with markets. These are services provided by various actors who never directly deal with the product, but whose services add value to the product. (Hellin and Meijir, 2006). These includes research institutions, financial institutions, private sector development firms, extension agents, facilitating NGOs, lobby and advocacy organizations, farmer associations, crop boards, and cooperatives unions.

2.4.2.3 Value chain influencers (Enabling environment)

These are regulatory framework, policies and infrastructures (at the local, national and international level) that affect value chain. The environment for value chain development is influenced by people, organizations and institutions that are responsible for setting up and managing the regulatory framework. A favourable and enabling business environment provides economic and political stability, ensures low costs for business transactions, and allows for efficient business operations, which lead to greater innovation and creativity (Hellin and Meijir, 2006).

These include monetary policies, different sectoral ministries policies (like agriculture, livestock, land, health, industries, trade, and marketing.), taxation and tariffs, public goods like roads and bridges, local and international laws (like Fair competition Act, The Law of contract, Warehouse receipting Act and Companies Act.) and regulations e.g Bureau of standards, Environmental, Animal health, Food safety, GATT agreements, HACCP standards, EurepGAP and standards. According to Shepherd (2007), Mozambique reduced export taxes on raw cashews, leading to a surge in exports of raw nuts and times for domestic processors. From 2001 the policy was changed, giving renewed encouragement to processors and establishment of village-based primary processing with donor and NGO support. Considerably has been made but this could be jeopardized if there were further changes in the export tax policy.

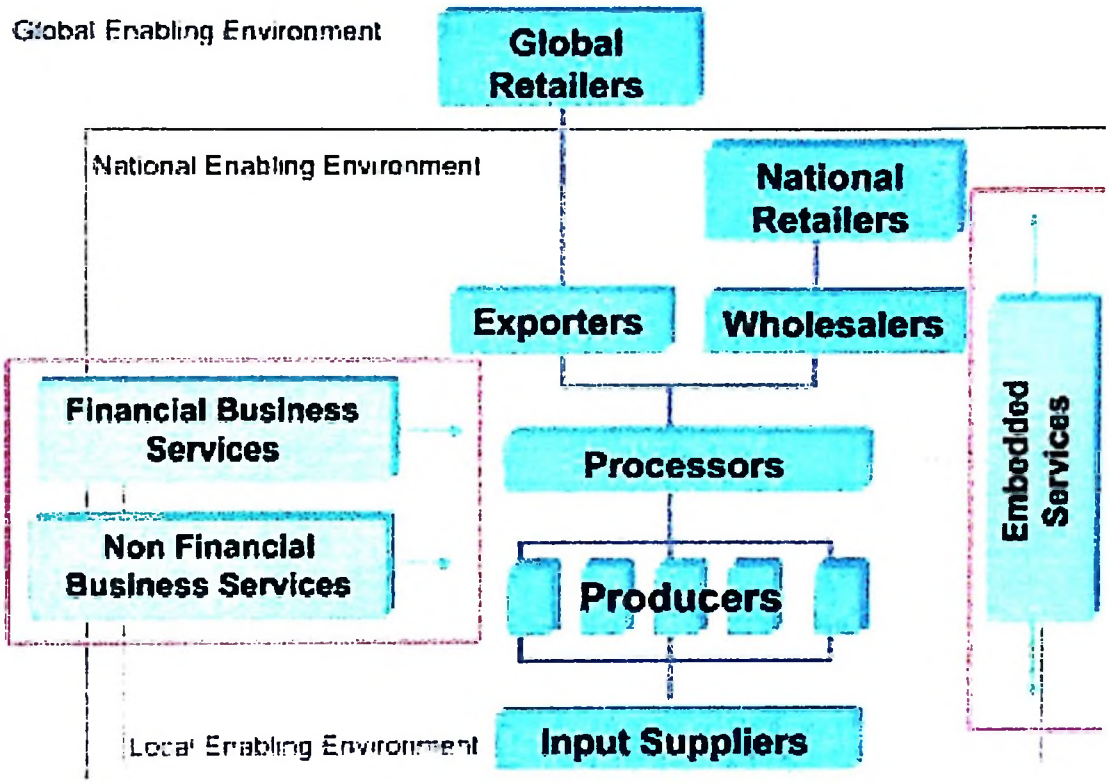

Figure 3: Value chain analysis model

Source: Ruduner (2007)

2.4.3 Gross Margin Analysis model

The use of gross margins became widespread in the UK from about 1960, when it was first popularised amongst farm management advisers for analysis and planning purpose. To understand the concept of Gross margin requires first to distinguish between variable and fixed costs. Variable costs are those costs that increase or decrease as output changes, while fixed costs are those costs that do not change as output is changed (Cramer *at al.*, 2001 cited by Mashimba 2007). Common examples of variable costs in crop production include seed, fertilizer and pesticide while examples of fixed cost include farm machinery and implements e.g. tractor, land and family labour.

According to Makhem *et al.*, 1986 cited by Mashimba 2007, gross margin of farm activity is the difference between the gross income earned and the variable costs incurred. The use of gross margin in this study was employed to analyse operational efficiency of cassava marketing system in Mkuranga.

Principally, Gross Margin model takes the following form:

GM = TR – TC.....(1)

Where,

GM = Average Gross Margin (Tsh/Kg)

TR = Average total revenue (Tsh/Kg)

TC = Average total variable cost (Tsh/Kg)

According to Firth and Lennartsson, 1999 there are some important limitations to the use of gross margins analysis in crop production which include the following:

(a) Comparison of gross margins between enterprises with different fixed cost structures can be misleading, particularly when conventional variable costs have been substituted by fixed costs in the organic context e.g. weed control by herbicides replaced by mechanical weeding.

(b) It is often inappropriate to consider the economics of a single enterprise, such as organic vegetables, outside the context of the whole farm rotation, which will often include fertility building crops. This phase of the rotation may be considered a part of the costs of achieving high returns for potatoes or carrots. Also certain inputs applied on a rotational basis, with residual effects on subsequent crops such as

organic manures need to have their costs spread over the whole rotation. It is unrealistic to expect their costs to be carried by the individual enterprises to which they were first applied.

2.5 Previous Studies on Value Chain Analysis

FAO (2003) in conducting a study tilted Value Chain Analysis: A case study of Mangoes in Kenya. The study aimed to examine factors preventing development of the mango supply chain in Kenya. The study used PRA method to identify constraints which hinder development of mango supply chain, and examines future development prospects. The study observed that despite the existence of considerable potential and a steady growth in yields over the last decade, development of the Kenyan mango supply chain faced a number of structural problems that have a negative effect in the country, both in terms of foregone potential income and employment opportunities and in terms of reduced availability of locally produced high quality fruits. However this study did not take into account the profitability analysis of different actors in the mango supply chains.

Van der land and Uliwa (2007) in their study aiming at conducting Cassava value chain analysis in the Lake Zone. They used value chain approach in which they intended to highlight the dynamics of the cassava sub sector/value chain in terms of actors, roles and interrelationships, factors affecting the growth and competitiveness (constraints & opportunities) of the various supply channels. Also they used gross margin analysis in profitability analysis of chain actors. Data was collected by interviews through focused group discussion and desk top review of various past experiences of different cassava stakeholders in the Lake zone. The study found that cassava sub sector in the Lake zone is

constrained by diseases, poor infrastructure, inadequate access to appropriate technologies, labour constraints, and insufficient capital to invest, distorted market information and inadequate organization at especially farmers level. It was also found that supply chain of dry cassava chips can be profitable for all actors in the chain and that non of the actors is making excessive profits. Although this study take into account some of quantitative analysis to undertake profitability analysis of all actors in the value chain. But it fails to establish what factors contribute to the gross margins especially at farmers' level.

CHAPTER THREE

3.0 RESEARCH METHODOLOGY

3.1 Description of the Study Area

3.1.1 Location

The study was conducted in Mkuranga District and the associated cassava markets in the Coast and Dar es Salaam Regions. Mkuranga District is one of the six districts that form the Coast Region and is located about 50 km from Dar es salaam City. Mkuranga District is bordered by Dar es Salaam City to the North, the Indian Ocean to the East, Rufiji District to the South, and Kisarawe District to the West. It is a relatively small district, covering 2432 sq km or 243 200 ha, which is about a quarter of the size of Bagamoyo and about the size of the Zanzibar Islands. Out of this total area, an area of 1985 sq km or 198 500 ha equivalent to 81.6% is land area for settlement and agriculture, and 447 sq km (44 700 ha) is covered by Indian Ocean. Land covered by natural reserved area is 10 560 ha. Administratively, Mkuranga district has a total of 101 villages, 15 wards, and 4 divisions. The district has about 90 km of coastline, extending from the Temeke to the Rufiji Districts. Like much of coastal Tanzania, the district is endowed with coral reefs, mangrove forests, and coastal fisheries (MDC, 2008).

According to (NBS, 2007), Mkuranga district is the largest cassava producer in the Coast region. Together with higher production levels, its proximity to Dar es salaam region where there is large number of individual and industrial cassava consumers make it potential for cassava value chain development. That being the case, many national and international organisation including VECO, MVIWATA, TAWLAE, CARITAS, TADENA and IITA have developed programmes to support value chain development in

Mkuranga district. It was argued that cassava value chain analysis in Mkuranga district will create a better focus for these organisations in their interventions. That fact was a rationale for choosing Mkuranga district for cassava value chain analysis.

3.1.2 Agro ecological zones

Topography of Mkuranga district is divided in two main agro ecological zones which are the Coastal belt and Upland zones. Each of the two zones is characterized by its own features. The coastal belt zone is covered by Shungubweni division, and parts of Kisiju and Mkuranga divisions. This area is characterized by sandy soils which have low water holding capacity, high water table and poor soil fertility. The upland zone is covered by Mkamba and parts of Mkuranga division and is characterized by loamy sand soils which are suitable for agriculture.

3.1.3 Climate

Mkuranga District experiences a bimodal rainfall patterns. The short rains (Vuli) occur in October to December, and long rains (Masika) is from March to June. Normally the long rains are more reliable and more evenly distributed than the short rains. The annual rainfall ranges from 800 to 1000 mm. The district is highly humid and hot with an average temperature of 28°C throughout the year. The annual maximum temperature is 38°C while the annual minimum temperature is 18°C (MDC, 2008).

3.1.4 Population

According to the National population and housing Census of 2002, the district has a total human population of 187 428 of which 91 714 (48.9%) are male and 95 714 (51.1%) are female. Based on the district population growth of 3.5% per annum, it is estimated that by the year 2008 the district would have reached a total population of 230 038 of which 110

418 (48%) are male and 119 620 (52%) are female. However, the district population density is estimated at 77 people per sq km and a total of 42 937 households with average of 4.4 household size (MDC, 2009).

3.1.5 Economic activities

Mkuranga district depends on Agriculture as the main source of its economy which concludes that Agriculture is a dominant economic activity in the district. About 80% of its population are engaged in crop production (cash and food crops), livestock keeping, fisheries and forest production activities. Most of the people in Mkuranga district are engaged in subsistence agriculture, growing cassava, cashew nut, maize, paddy, coconut, huskers, sweet potatoes, leguminous, and horticultural crops like pineapples, mangoes, passions, water melon, oranges, lemons, tangerines, sweet and hot papers. Livestock keeping is the second after crop production, where by it is dominated by indigenous cattle, goat, sheep and chickens. Fishing activity is practised by about 1500 fishers found along the coast. Few people are also engaged in forest production where they produce timber, charcoal, firewood, catchments values, bee keeping and medicines (MDC, 2009).

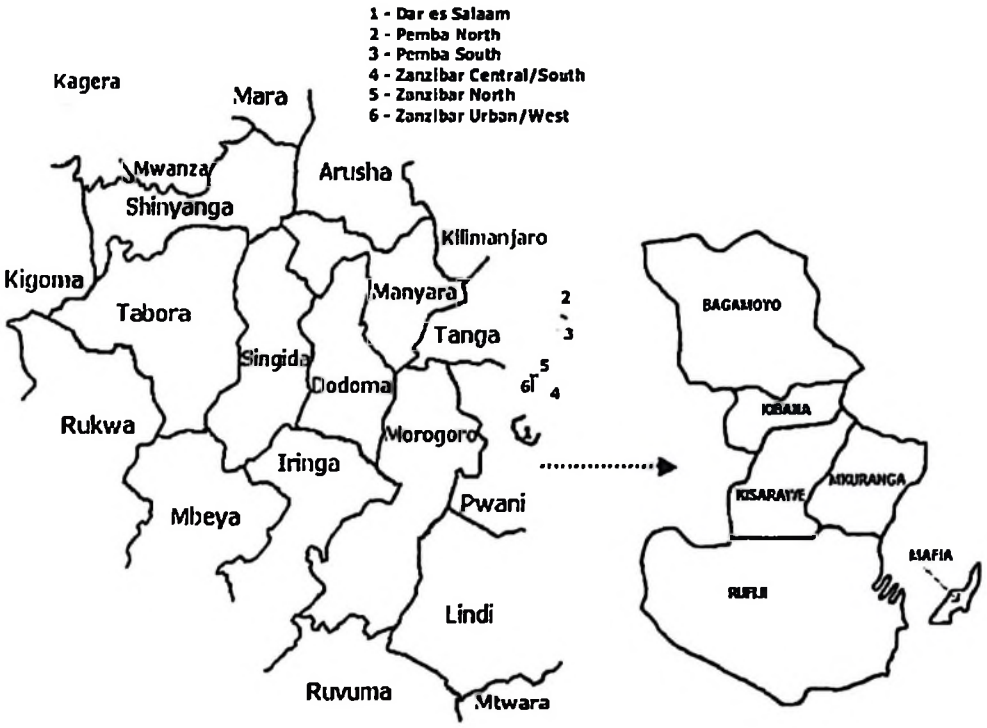

Figure 4: Map of Tanzania, Coast region and the Mkuranga District

Source: Torell *et al.* (2006)

3.2 Research Design

A cross sectional research design method was used in this study for data collection, which means a broad sampling of cassava producers (farmers), traders, processors, and development partners taking into consideration age, gender, education and income levels.

3.3 Sampling Procedures

Combinations of multistage, purposive and simple random sampling techniques were employed to select a sample of 90 smallholder farmers for the purpose of this study. Two divisions were selected and in each division, three villages were drawn from different

wards based on cassava production. That is, out 4 divisions of Mkuranga District three divisions were selected for the purpose of the study. In each village, a simple random sampling was employed to select 15 household.

Purposive sampling method was adopted to select 5 cassava traders in Mkuranga market and 25 cassava traders in the markets located in Dar es Salaam region to make a sample of 30 traders. For the case of cassava traders, large number of the respondents (25) were taken in markets located in Dar es salaam that include Buguruni, Temeke stereo, Kariakoo, Tandale and Mbagala markets. This is due to the fact that these are bigger markets compared to Mkuranga markets and large amount of cassava from Mkuranga is traded in these markets. Purposive sampling was also adopted to select other potential stakeholders in the value chain of cassava in Mkuranga District. The stakeholders included a sample of 3 service providers (Microfinance institutions), and 4 development partners (See Appendix.5). Production and processing groups were also selected for the purpose of discussion with processors. These groups have processing machines received as grant from TAWLAE.

3.4 Data Type and Sources

For the purpose of accomplishing this study, both types of data namely primary and secondary data was used. Primary data was collected by different methods including, questionnaire guided interviews, and consultation with key stakeholders. The study was participatory in nature involving cassava farmers, traders, processors, and other development support entities in the value chain. Secondary data entail available data relevant to the study. This type of data was obtained through document review from various sources including publications, books, reports and journals from Sokoine National

Agriculture Library (SNAL), Internet website, Ministry of Agriculture Food Security and Cooperatives and Mkuranga District Council libraries. In Mkuranga district, information was obtained in the district departments especially in District agriculture and livestock development office and planning department office.

3.5 Data Collection Methods

The survey was carried out into two phases. Phase one was done to pre test data collection tools *i.e.* questionnaire. This was achieved through interviewing 5 farmers in Mwanambaya village of Mkuranga district. The pre tested sample was not included to the sample of 90 farmers. The aim of pre testing was to test the validity of the tool and to modify whenever need arises. After the pre testing, some corrections were done before its final administrations. The second phase was mainly based on conducting main survey. The main activities during the survey consisted of identifying, interviewing and meeting various stakeholders in Mkuranga district and Dar es Salaam.

3.6 Data Collection Tools

3.6.1 Structured interviews

Structured questionnaire was used to interview farmers, in the selected villages for the purpose of collecting primary data. The interviewer had to ask questions in a face-to-face contact in order to fill the question of interest. The questionnaire comprised a mixture of both open and close-ended questions.

3.6.2 Key informant interviews

Key informant interviews are essentially qualitative interviews, and are carried out with interview guides that list topics and issues to be covered in a session' (Kumar, 1993 cited

by Da Silva *et al.*, 2007). The checklist was used to guide discussion with some actors and service providers for cassava value chain in Mkuranga.

3.6.3 Direct observation

Observation was used to supplement other data collection methods. Thus observation was used to tie together the discrete elements of data gathered by other methods especially units of measurement in yield and areas that farmers are cultivating.

3.7 Data Processing

Responses from the survey were edited in order to ensure that the collected data from the field were accurate, consistent, and uniformly entered and are well arranged to facilitate coding and tabulation. After editing, the data was coded and entered into an appropriate computer spread sheet.

3.8 Data Analysis

3.8.1 Descriptive analysis

Statistical Package for Social Science (SPSS) was used to compute descriptive statistics such as percentage, means, range, and standard deviation that was used to present the results for the purpose of describing data qualitatively.

3.8.2 Quantitative analysis

The quantitative analysis for this study involved the use of gross margin analysis and regression analysis as explained in the following sections. Microsoft excel was used to calculate gross margin along cassava value chain for the purpose of comparison between different actors.

3.8.2.1 Gross margin analysis

Gross margin analysis was used in this study to establish relative economic profitability of cassava grown by farmers for all actors at different levels of the value chain. This was done in addressing the third specific objective of the study. The Gross Margin model looks as follows;

$GM = TR - TC$.....(2)

Where,

GM = Average Gross Margin (Tsh/Kg)

TR = Average total revenue (Tsh/Kg)

TC = Average total variable cost (Tsh/Kg)

3.8.2.2 Regression analysis

The linear regression analysis was used to test to what extent the Gross Margins are statistically dependent on the variable of interest. This was done in addressing specific objective number three so as to test which variables and at what extent they contribute to farmers' gross margin in cassava business. According to Mashimba 2007, Regression model is the common theoretical proposition in economics which states; change in one variable can be explained by reference to changes in several variables.

Linear regression model takes the following form;

$Y = \alpha + \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + e$.....(3)

Where;

Y =Gross Margin per acre

X_1 =Cropping style

X_2 =Planting style

X_3 =Distance from the market (Km)

X_4 =Experience in farming business (Years)

X_5 =Farmer organisation in cassava production

α =Constant term

e =Error term

β_1, β_2, β_3, β_4, and β_5, are the coefficients for independent variables X_1, X_2, X_3, X_4, and X_5 respectively. These coefficients indicate the degree to which family labour, farm size, access to extension officer, cropping style, planting style, farm yield, distance from the market, experience in farming business and farmer organisation in cassava production affect the Gross Margin.

CHAPTER FOUR

4.0 RESULTS AND DISCUSSION

4.1 Respondent's Social-economic Characteristics

This section examines the socio economic characteristics of the respondents in the study area. The socioeconomic characteristics examined in this section include age, gender, level of education and marital status. This section presents the results of their distribution in percentages and frequency. Also the section, describe the association of these socio economic characteristics with cassava value chain in Mkuranga district.

4.1.1 Age of the respondent

Table 1: below shows that, the respondents that were interviewed were falling in the range of age between 21 to 70 years. About 84.4% of the respondent fall in the age of 21 to 60 years which is referred to as economic active population. The remaining 15.6% of the respondent were in the old age category that is 61 to 70 years. Respondents in this category had small fields of cassava which is almost cultivated only for subsistence. They were complained that they don't have any assistance from their children and grand children since they migrated to Dar es Salaam to engage in non agricultural activities.

4.1.2 Gender of the respondent

The result in Table 1: below shows that about 34.4% of female and 65.6% of male participate in cassava production in Mkuranga district. This indicates that cassava production in Mkuranga district is gender biased mostly practiced by males. This is probably due to the fact that women have other responsibilities to take care for their family other than cassava production. In cassava sub sector, women are highly engaged in

cassava processing than cassava production. The statement is supplemented by my personal observation of many women members involving cassava producer and processor groups rather than in cassava producer groups.

4.1.3 Level of education

It was found that about 71.1% of the respondents had attained formal education while the remaining 29.9% did not attained formal education as indicated in Table 1: below. This narrates that if all farmers' have equal motivation to innovation adaptability in cassava production, education can not be a constraint factor to cassava production in Mkuranga district. This is due to the fact that a farmer with formal education is likely to be taught and understand innovations from an extension agent.

Table1: Distribution of respondents according to social economic characteristics

Variable	Categories	Frequency	Percentage
Age of group	21-30	5	5.5
	31-40	32	35.5
	41-50	24	26.7
	51-60	15	16.7
	61-70	14	15.6
	Total	**90**	**100**
Gender	Female	31	34.4
	Male	59	65.6
	Total	**90**	**100**
Level of education	0 years	26	28.9
	1-7 years	60	66.7
	8-12 years	4	4.4
	Total	**90**	**100**
Marital status	Single	1	1.1
	Married	79	87.8
	Widowed	6	6.7
	Divorced	1	1.1
	Separated	3	3.3
	Total	**90**	**100**

4.2 Effect of Socioeconomic Variables on Cassava Farming Variables

4.2.1 Effect of age on farm size, yield and gross margin

The results from cross tabulation found to have significant association between the age of the respondents and farm size, yield and gross margin (Table2). The majority of the respondents from all age categories have farm size of 0-2 acre, yield of 2-3 ton and gross margin of less than Tsh 50 000. These results suggest that farm size, yield and gross margin do not depend much on age of the respondents.

4.2.2 Effect of gender on farm size, yield and gross margin

There is no effect of gender on farm size, yield and gross margin per acre as shown in the Table 3. Since women have so many activities to perform at home it was expected that less time is dedicated for farm activities which is a result of having less farm size, yield and gross margin per acre compared to men. However, this was not revealed in this study since regardless of gender, majority of respondents are having farm size of 0-2 acres, yield of 2-3 tons per acre and gross margin of less than Tshs 50 000 per acre.

4.2.3 Effect of education on farm size, yield and gross margin

Results in Table 4 shows that there is no effect of education in farm size, yield and gross margin per acre. Educated members are expected to be more productive since they are exposed and more likely to put into practice all skills they have in production practice and have better results. This was not observed in the study area since majority of respondents regardless of education fall under farm size of 0-4 acre, yield of 2-3 ton per acre and gross margin of less than Tshs 50 000 per acre.

Table 2: Effect of age on farm size, yield and gross margin

Cassava farming variables		Age 21-40	41-60	>60
Farm size (Acre) n=90				
0-2	N	20	17	10
	%	50	47.22	71.43
3-4	N	17	14	3
	%	42.5	38.89	21.43
5-6	N	2	5	1
	%	5	13.89	7.143
7-8	N	1	0	0
	%	2.5	0	0
Yield (Ton) n=90				
<2 tons	N	1	1	0
	%	2.5	2.78	0
2-3 tons	N	30	34	11
	%	75	94.44	78.57
> 3 tons	N	9	1	3
	%	22.5	2.78	21.43
Gross margin/Acre (Tsh) n=90				
<50 000	N	28	27	10
	%	70	75	71.43
50 000-200 000	N	12	8	4
	%	30	22.22	28.57
>200 000	N	0	1	0
	%	0	2.78	0

Table 3: Effect of gender on farm size, yield and gross margin

		Gender	
		Female	**Male**
Farm size (Acre)			
0-2	N	18	29
	%	58.06	49.15
3-4	N	12	22
	%	38.71	37.29
5-6	N	0	8
	%	0	13.56
7-8	N	1	0
	%	3.23	0
Yield (Ton) n=90			
< 2	N	1	1
	%	3.23	1.69
2-3	N	25	50
	%	80.65	84.75
> 3	N	5	8
	%	16.13	13.56
Gross Margin/Acre (Tsh) n=90			
< 50 000	N	23	42
	%	74.19	71.19
50 000-200 000	N	8	16
	%	25.81	27.12
> 200 000	N	0	1
	%	0	1.69

Table 4: Effect of education on farm size, yield and gross margin

		Education		
		0 years	**1-7 years**	**8-12 years**
Farm size (Acre) n=90				
0-2	N	9	37	1
	%	34.62	61.67	25
3-4	N	14	18	2
	%	53.85	30	50
5-6	N	2	5	1
	%	7.69	8.33	25
7-8	N	1	0	0
	%	3.85	0	0
Yield (Ton) n=90				
< 2	N	0	2	0
	%	0	3.33	0
2-3	N	24	49	2
	%	92.31	81.67	50
>3	N	2	9	2
	%	7.69	15	50
Gross margin/Acre (Tsh) n=90				
< 50 000	N	21	41	3
	%	80.77	68.33	75
500 00-200 000	N	5	18	1
	%	19.23	30	25
> 200 000	N	0	1	0
	%	0	1.67	0

4.2 Cassava Sub sector Mapping

A sub-sector encompasses all the firms that buy and sell from each other in order to supply a particular set of products or services to final consumers. It may include farmers, processors, input suppliers, exporters, retailers and can be defined by a particular primary or finished product or service and the market e.g. spices for regional markets and chillies for local markets (Mnenwa, 2009). According to Vermuelen *et al.* (2008), mapping is not limited to actors but also goes further to policies, legal and institutional framework that influence the functioning of the value chain and the inclusion or exclusion of small scale producers.

For the purpose of this study sub sector mapping was done in order to identify key actors, their roles, their inter relationship, market segments (types of products produced and marketed), and product flows (marketing channels) in the study area.

4.2.1 Cassava sub sector actors and their roles

In cassava sub sector mapping a number of key actors identified include input suppliers, farmers, village brokers, small traders, traders, processors, retailers and consumers. Their roles, characteristics and interrelationship of those actors are described in the paragraphs below and Fig. 6.

4.2.1.1 Input suppliers

The study found that planting material is the only input needed in cassava production. It was found that CARITAS are the only suppliers of cassava planting materials in Mkuranga district. They collect planting materials developed by research centres and

supply to farmers freely (with out payment) for manipulation. In some villages where research was conducted e.g. Kolagwa and Mwanadilatu villages, farmers' reported that they received cassava planting material of Kikombe variety from CARITAS which was developed in Zanzibar. Each farmer received small amount of planting material and was required to plant in a small portion (kitalu) for manipulation so as to have enough planting material for the coming year.

4.2.1.2 Famers

Farmers are the primary cassava producers in the study area with production area ranging from 1-6 acre and average of 1 ha per farmer intercropped with other crops as 71.1% of farmers reported that they intercrop cassava with other crops like cashew nuts, banana, coconuts and pineapple. They produce about four types of cassava varieties which are Kiroba, Cheupe, Cheusi and Kikombe of which Kiroba variety is dominant since 88% of farmers use Kiroba variety. The roles of farmers in cassava production include land preparation, cultivation, planting, and weeding (3 times) where by hand hoe and bush knives (panga) are the only means of production.

The study found that there are three types of farmers who are producing cassava in the study area. The first type of farmers is those who produce cassava individually i.e. they did not belong to any cassava producer group. The second type of farmers is those who belong to cassava producer groups. Most of farmers who were interviewed they fall to this category as 66% reported that they are members of cassava producer group. The third type of farmers is those who belong to cassava producer and processor group and they integrate both cassava production and processing activities.

However the second and third category does not differ a lot in terms of cassava farming practices with the first one since the farmers of this group reported that they belong to cassava group for the purpose of learning and exchanging ideas, skills, knowledge and experience but they don't have group farm or any collective action in production, processing or marketing each member produce, process or sell cassava on his or her own. These cassava groups were formed by different organizations that were promoting and currently promoting commercialization of cassava crop (cassava transformation from subsistence to commercial farming). These organizations include TADENA, TAWLAE and MVIWATA. Among those organization MVIWATA and TAWLAE still exist in Mkuranga district for implementation of 3 years VECO Tanzania project entitled Increased Income and Food Security for Organized Farming Families.

4.2.1.3 Village broker

It was found that there are brokers in the villages who play the role as middlemen in linking farmers to buyers in the markets for a commission. Usually the village broker lives in the village or nearby village. The village broker is usually contracted by traders from Mbagala, Kariakoo, Temeke stereo, Buguruni, Tandika markets. He/she is the one who find farmers and sometimes persuades farmers to sell their cassava. After having farmers who are willing to harvest and sell cassava he/she make a call to traders to come and collect the product. The contracts between brokers and traders are usually informal (verbal) and are based on trust. In most cases the brokers are given money by the buyers in advance to enable them to pay cash to farmers when buying. Farmers reported that some times these brokers give them money 1 up to 3 months before harvesting which enable them to undertake some activities like weeding. Purchase prices and commission are

usually agreed between the brokers and buyers in advance. The agreed prices are the basis for negotiations between brokers and farmers. It is a common practice for the brokers to negotiate lower prices with the farmers so as to reap substantial difference between the buyer's price and the farmers' prices. The difference usually is made part of the commissions to the brokers. Farmers further reported that even if brokers are so exploitative they have no way because if they bring cassava to the market without brokers they did not have an opportunity to sell their products.

4.2.1.4 Wholesalers

These are big traders who buy cassava in bulk quantities from farmers and sell it to retailers in Dar es Salaam markets. They also play an important role of bulking the products and deliver them to the retail outlets. The traders use motor vehicles as the means of transport. This study identified one type of traders of cassava from Mkuranga district. These traders are the one trading in fresh cassava from Mkuranga to Dar es salaam markets. Most of them are based in Dar es Salaam markets like Mbagala, Temeke stereo, Tandale, Tandika and Buguruni Markets. They receive information from the village broker on the availability of the products. The roles played by this type of traders include harvesting, bulking and transporting, loading, offloading and marketing the produce.

4.2.1.5 Cassava processors

Cassava processors are also important chain actors in Mkuranga district. They play an important role in transforming cassava from its raw form. In most cases cassava processors are farmers themselves. That is they are farmers that integrate both cassava production and processing activities and they usually belong to cassava producer and

processor group. They use locally made equipments but some time modern graters and chippers as processing tools. Also there are few large processors that buy partial processed products from farmers like chips for cassava flour and for animal feed.

4.2.1.6 Retailers

Retailers are also important market players in the cassava value chain in Mkuranga district. They purchase cassava from traders and processors and retail them to the consumers in different markets and product forms. The retailing points for cassava flour and its products (ugali, burns, cakes, spaghetti) from Mkuranga are small shops/kiosks and restaurants in farmers' locality and Mkuranga town. The retailing points for fresh cassava and its products (boiled and roasted cassava "chipsi dume" products) from Mkuranga are small markets in Mkurnga town, Dar es Salaam urban markets, around road side and restaurants.

4.2.1.7 Consumers

These are the important market players who are final users of cassava and cassava products in their different forms. They play an important role in cassava value chain in Mkuranga district since all the chain actors identified work hard in the chain to satisfy them. They purchase cassava from traders, processors or retailers depending on the rout in which cassava is passing. Most of these consumers are found in Dar es Salaam urban and Mkuranga town.

During this study, two types of consumers were identified. The first type are household consumers who purchase cassava flour from small shops/kiosks for various uses including making ugali, burns, cake and spaghetti for home use. This type of consumer also buys

fresh cassava from local, urban markets and around road side for home use especially during the holly month of Ramadan. The second type of consumers that were found are the one who purchase the ready made cassava products like ugali, cake, burns, spaghetti, roasted cassava, and boiled cassava from restaurants.

4.1.1.8 Other actors

There is a number of institutions and non governmental organization promoting cassava sub sector in Mkuranga. Currently, there is a program undertaken by VECO –Tanzania in partnership with a number of organization and institution that include MVIWATA, TAWLAE, PELUM Tanzania, and Mkuranga district council. The programme started in the mid of 2008 and it is aiming at empowering farmers to participate actively and profitably in cassava market chains. Farmer empowerment is done through service provision on strengthening farmer organization, production and post harvest practices, entrepreneurial and business plan development skills and linking farmers to markets. However, before this programme there was another organization known as TADENA promoted cassava production in Mkuranga where a number of issues were intervened before the project phased out in 2007.

4.2.2 Product differentiation and distribution channels in Mkuranga district

4.2.2.1 Product differentiation

It was observed that there is a wide range of cassava products marketed by farmers in Mkuranga district in which one is dominant and others are present in very small quantity regardless their greater potential. These products include fresh cassava, chips for animal feed, cassava flour and cassava starch. Fresh cassava is dominant compared of all products

traded in the area because of the intermediaries who are handling larger quantity of cassava produced in Mkuranga district. This suggests the possibilities of oligopolistic conditions in fresh cassava marketing. However, there are farmers and processors who add value in fresh cassava to get cassava flour and chips for animal feed although this is in very small quantity as it was reported by farmers and processors during discussion. This study had much emphasis on fresh cassava and cassava flour so as to understand both products and have better recommendations for cassava value chain development. Table 5: and Appendix 10: suggests that it is lucrative for farmers to deal with cassava flour compared to fresh cassava.

4.2.2.2 Distribution channels

Distribution channels are possible outlets in which cassava moves from farmer to the ultimate consumer. This study identified three main principle cassava distribution channels in Mkuranga distict as presented in Figure 4:

Channel 1 is the leading channel which handles more than 80% of cassava produced in Mkuranga district. This channel deals with fresh cassava and it involves cassava selling by farmers' to middle men who are living in the villages and communicating with traders who are staying in Mkuranga and Dar es Salaam markets. These middlemen sell cassava to traders who are going to sell to retailer who sell cassava to the ultimate consumer for different uses.

Channel 2 deals with cassava flour and it involves selling of cassava flour from farmers to retailers who are selling to ultimate consumer. These farmers are integrating both cassava

farming and processing from fresh cassava to chips and finally chips to cassava flour at farm level.

Channel 3 also deals with chips for cassava flour and chips for animal feeds but it also involves farmers who are doing both farming and value addition. The difference between channel 2 and channel 3 is that farmers are doing only partial processing at farm level while final processing is done by large processors before distribution to the final consumer. Some farmers are selling cassava chips for human feed which is processed to cassava flour, packed and branded by large processors. Some time they blend cassava with cereals before packing and selling so as improve nutritional status of cassava. Other farmers are selling cassava chips for animal feed to large processor of animal feed. Chips for animal feed are obtained from unpeeled cassava or poor grade of cassava chips prepared for human feed. Channel 3 is the case of Power Foods Ltd in Kawe Dar es salaam who is buying cassava chips for human feed. Another for this channel is Farmers centre in Ilala and A to Z in Kimara Dar es salaam who are buying cassava chips for animal feed. This channel has big potential for farmers to make profit although it was reported that farmers are constrained by the issue of volumes, consistency and quality especially when it comes to an issue of chips for human feed. This could be the reason why this channel exists in very small quantity.

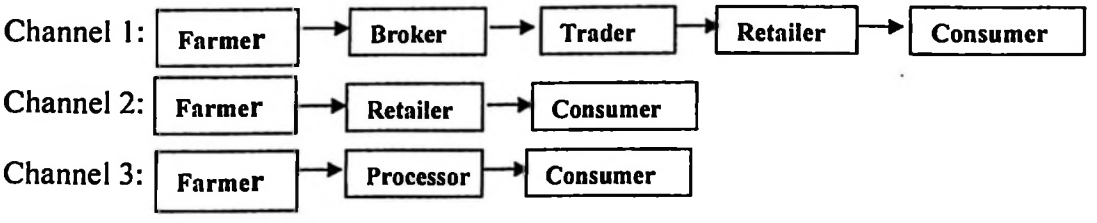

Figure 5: Cassava product distribution channels

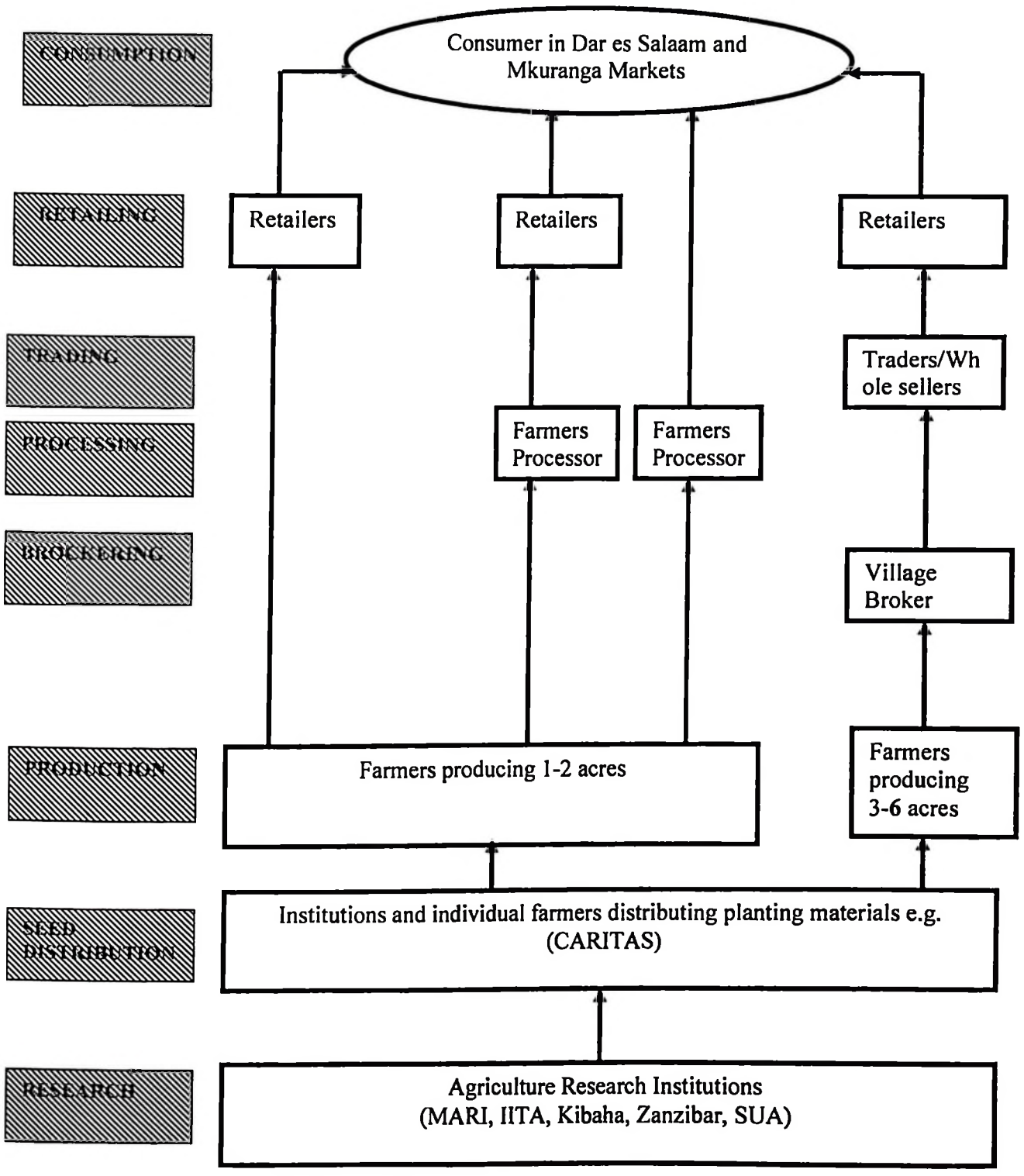

Figure 6: Cassava sub sector map in Mkuranga district

4.3 Profitability Analysis

The overall objective of the value chain analysis is to determine equitable distribution of the profits between the value chain actors and hence recommend development practitioner to develop value chain with equal distribution of profits between value chain actors. The result from the gross margin analysis tries to show the distribution of benefits for different actors in fresh cassava value chain in Mkuranga district. The analysis shows that there is unequal distribution of profits between all actors in fresh cassava value chain.

Farmers are the lowest in earnings the profit with gross margin of 19.9% (Table 5). Wholesalers and retailers have a gross margin of 39% (Table 6) and 38% (Table 7) respectively. The above calculation highlight that fresh cassava is not profitable for all actors in the chain and hence is not potential for value chain development in Mkuranga. The comparison of gross margin between different actors in dry cassava value chain was not done since this chain is insignificant in Mkuranga district.

However, there are few farmers who integrate cassava production with processing activities. These farmers they sell their product in very small retail shop in their locality or direct to consumer in their locality or Dar es Salaam region. Appendix 10 presents the gross margin analysis of these farmers who integrate cassava production and processing and they process cassava flour. The result as presented in Appendix 10 shows that farmers have a gross margin ratio of 41.1% when they sell to retailers and gross margin ratio of 52.12% when they sell direct to consumers. These results show that the dry cassava value chain is potential for development in Mkuranga district. The following section shows in detail the profitability analysis of different actors in cassava marketing.

4.3.1 Farmers

Farmer Profitability analysis of the cassava sub sector in Mkuranga was done with three assumptions. The first assumption is that the unit of land is one acre of land and the second assumption is that only explicit costs are incurred by farmers that lead to accounting profit. Example of implicit costs that was ignored is the purchase of planting materials as they reported that they use planting material from their field by cutting it from stem after harvesting. However, they need to replace after some time at a cost of Tsh 35 000 for one acre. The third assumption is that farmers sell cassava at farm gate where he/she does not incur the cost of transportation, harvesting, bulking, loading and offloading. This is due to the reason that during the survey farmers reported that they do not incur those cost since buyers come with their worker to do those task.

Based on those assumptions, the profitability analysis has shown that farmer can make a loss of Tsh. 62 000 or a maximum profit of Tsh 224 000 per acre. But in most cases, the profitability analysis has shown that farmer can make a profit of Tsh 32 272 per acre based on the above assumptions. But if implicit cost were considered it would be demonstrated that farmers make economic loss in the production process. This would be a reason of why there is no significant improvement in livelihood occurs at farm level. For example if implicit cost like cost of planting material were considered, farmers would have additional cost of Tsh 35 000 and his/her profit will decrease at that amount.

Table 5: Farmers' gross margin for fresh cassava value chain in 2007/2008 season

S/N	Item	Amount
A	Area under cassava (Acre)	2.57
B	Total production (Kg)	6891
C	Yield = B/A (Kg)	2681.3
D	Farm gate price (Tsh/Kg)	60.3
E	Total revenue = B×D (Tsh)	415 527.3
F	Total revenue/acre D/A = E/A (Tsh)	161 683.8
G	Cost of land cleaning (Tsh)	23 744.4
H	Cost of cultivation (Tsh)	26 233.3
I	Cost of weeding (Tsh)	66 000
J	Cost of planting (Tsh)	13 433.3
K	Total variable Cost/Acre = G+H+I+J (Tsh)	129 411.1
L	Gross margin/Acre =F-K (Tsh)	32 272.67
M	Gross margin ratio =L/F×100 (%)	20

4.3.2 Traders

Table 3: bellow shows the results for gross margin analysis of traders in fresh cassava value chain in Mkuranga district. The gross margin analysis was done based on one trip of a vehicle with 6 tons (6000Kg) capacity. So in this calculation, a trip is referred to as a vehicle with 6000 Kg capacity.

Table 6: Traders/Wholesalers gross margin for fresh cassava value chain in Mkuranga district

Item	Amount
Harvesting	15 000
Bulking and uploading	15 000
Transport	60 000
Levies	3000
Offloading	10 000
Brokering	10 000
Communication	5000
Offloading	10 000
Total marketing cost	128 000
Quantities per trip (Kg)	6000
Product purchase/trip (buying price) (Tsh)	360 000
Total cost (marketing+buying cost) (Tsh)	488 000
Total cost/Kg (Tsh)	81
Total revenue/trip (Tsh)	800 000
Total revenue/Kg (Tsh)	133.33
Gross margin/Kg	52
Gross margin ration (%)	39

4.3.3 Retailers

Table 4: below presents the gross margin of retailers in fresh cassava value chain in Mkuranga. The gross margin was calculated based on quantities handled by retailers for one trip which is one bag of cassava of approximately 100 Kg. Another important factor is that retailers buy cassava from wholesalers at 14 000 Tsh for a bag of cassava (140 Tsh/Kg), transporting at 1000 Tsh and sell at 250 Tsh/Kg.

Table 7: Retailers gross margin for fresh cassava value chain in Mkuranga

S/N	Item	Amount
1	Quantities/trip (Kg)	100
2	Transport cost (Tsh)	1000
3	Purchase cost (Buying price	14 000
4	Levies	500
5	Total cost	15 500
6	Selling price	250
7	Total revenue	25 000
8	Gross margin	9500
9	Gross margin ratio (%)	38

4.3.4 Processors

Appendix 10: presents the gross margin for farmers that integrate production and processing activities. The gross margins were calculated and presented in Appendix 10 based on the assumption that transformation ration of fresh to dry cassava is 3:1.

4.4 Regression Analysis

Regression analysis was done to find variables that contribute to the difference in gross margin between farmers for fresh cassava value chain. This was done for addressing specific objective number two. During this analysis, the variables included were cropping style, planting style, distance from the market, experience in farming business and organisation in cassava production. The mean values, units and expected sign of coefficient of the variables used in the regression model are presented in Appendix 11.

4.4.1 Model results

The result as presented in Table 8: indicates the factors that affect farmers' gross margin analysis for fresh cassava value chain in Mkuranga district. The R-square for regression model shows that 62.6 % of the variation in factors that affect gross margin was explained by the variables that were fitted in the regression model. The remaining 37.8% of the variation in factors that affect gross margin of farmers in fresh cassava value chain was explained by variables that were not fitted in the regression model. This indicates that the regression model was strong enough to explain the relationship between dependent and independent variables.

Table 8: Regression model results

Variable	Unstandardized Coefficients		Standardized Coefficients	T-value	Sig.
	B	Std. Error	Beta		
(Constant)	39893.468	16 273.492		2.451	.016
CS	40016.333	9381.599	.424	4.265	.000*
PS	13372.494	8602.052	.156	1.555	.124
DFM	-424.469	206.699	-.148	-2.054	.043**
EFB	-372.301	233.611	-.109	-1.594	.115
OCP	34321.700	6760.255	.390	5.077	.000*

R^2=62.6% F=27.43

Note * Significant at 1% ** Significant at 5%

Dependent Variable: Gross Margin per acre (Tsh)

4.4.2 Variable effect in the regression model

The results in Table 6: indicates that distance from the market had negative linear relationship and significant at (P<0.05) with farmers' gross margin in cassava value chain with a beta coefficient of 1.48. This suggests that as distance from the market increase by 1 unit, farmers gross margin decreases by 0.148 units. The reason behind is that as you increase distance from the market, transportation cost for traders who buy cassava from farmers will also increase as a result farmers will be given low price to cover transportation cost and gross margin for farmers will decrease accordingly.

Cropping style and planting style had positive linear relationship with farmers' gross margin in fresh cassava value chain with a beta coefficient of 0.424 and 0.156

respectively. However, only cropping style was highly significant at (P<0.01) as shown in Table: 6 below. From these results it can be observed that farmers who use mono cropping system and use recommended spacing requirements had better gross margins than those who intercrop cassava with other crops and do not use recommended spacing requirements.

Farmer organisation in cassava production had positive linear relationship and highly significant at (P<0.01) with a beta coefficient of 0.39. Also this indicates that farmers that produce cassava and organised in producer groups had higher gross margins than those who were not belongs to cassava producer groups. This is due to the fact that farmer who belong to cassava producer group have a better chance to learn and exchange ideas, skills, knowledge together with experience concerning cassava production. Experience in farming business had negative linear relationship with farmer gross margin in fresh cassava value chain.

4.5 Challenges and Opportunities

4.5.1 Challenges

4.5.1.1 Poor agronomic practice

The study findings show that farmers in Mkuranga district are characterised by poor agronomic practice. In this category of agronomic practice, the respondents were asked to describe their planting style and cropping style. The result from Table 9: shows 58.9% of the respondent reported that they use their traditional planting style that is they do not use recommended spacing and planting techniques. In view of cropping style, about 71.1% (Table 9) of the respondent reported that they practice intercropping where by they intercrop cassava with other crops like pineapple, coconut, cashew nut and banana.

However, the recommended cropping style is monocrop with recommended spacing of 80–100Cm between and within rows while the universal recommended plant population of 10 000 to 15 000 plants per hectare depending on climate, soil type, soil fertility, variety and end use of tuberous roots. Cassava is recommended to intercrop with only tubers since it improves soil fertility and do not fight with cassava for food. Good planting techniques involve proper selection of planting materials and good orientation of planting. Good planting material is the one which is health, thick with age of 8-18 months, length of 20-30 Cm, and 5-7 nodes. The recommended orientation of planting is half of the cutting length deep in the soil with its base cut at 60^{o} and planted at an angle of 45^{o} in straight lines. (www.iita.org).

The tendency of not using planting style and intercropping cassava with other crops tends to reduce plant population as a result of low productivity of cassava per area. Table 9: bellow illustrates the distribution of farmers according to farming system in Mkuranga district.

Table 9: Distribution of respondents according to agronomic practice

Variables	Category	Frequency	Percentage
Cropping style	Intercropping	64	71.1
	Monocropping	26	28.9
	Total	**90**	**100**
Planting style	Otherwise	53	58.9
	Recommended spacing	37	41.1
	Total	**90**	**100**

4.5.1.2 Poor farming tools

It was reported by farmers that cassava production practices in Mkuranga district involves land preparation, cultivation (tillage), planting and weeding. The production tools for all of these activities are hand hoe and bush knives due to lack of capital to purchase and utilize modern technologies. To tackle this problem, farmers are choosing one of these two options. Some farmers tend to take the first option that is to reduce their farm size to the extent that they can be able to work with all production activities involved with the available equipments. The majority of farmers tend to take the second option that is to increase farm size but applying minimum land cleaning, cultivation and reduce number of weeding to one or two while the recommended number of weeding for cassava is three times. Both of the two options, affect cassava production in the district but the later also affect productivity/area and product quality. Minimally cleaned and cultivated land is associated with hard soils, shrubs and tree roots, low drainage and inadequate water filtration capacity all of which are constraints to producing quality cassava.

4.5.1.3 Weak farmer organisations

The presence of strong farmer organisation is very important for horizontal chain coordination and taking roles like dissemination of marketing information, bulking, processing, packaging, branding and collective marketing. In addition, it can be used as a control centre of quality before delivery to the final consumer. Strong farmer organisation can create space for farmers to air voice for lobbying and advocacy on any issue that affect chain in all aspects starting from production, processing and marketing.

However, cassava value chain in Mkuranga district is constrained by weak farmer organisation. There is no any collective action from production, processing and marketing

of cassava products. Farmers that belongs to producer group reported that they belong to cassava group for the purpose of learning and exchanging ideas, skills, knowledge and experience but they don't have group farm or any collective action or strategies in production, processing or marketing each member produce, process or sell cassava on his or her own.

4.5.1.4 Labour constraint

The production of cassava in Mkuranga district is constrained by insufficient labour. Old people who in most cases own huge amount of land can not increase their farm size due to lack of labour force. In most cases hired labour is very expensive as result people can afford to hire. This is due to the fact that Mkuranga district is very close to Dar es Salaam city so that many young people are migrating to town and not engaging in production.

4.5.1.5 Diseases and rodents

Cassava production in Mkuranga district is also constrained by diseases, rodents and pests as it was reported by farmers. The common diseases affecting cassava in the study area include Cassava Mosaic Diseases (CMD), Brown Steak while the common rodent affecting them is bush pig. The availability of bush pig is due to the presence of bush farms owned by people who are living in town and no action is taken to develop them.

4.5.1.6 Processing constraint

Cassava processing industry in Mkuranga is still in adequate as far as is constrained by a lot of factors. The processing constraints include lack of processing units (centres), inadequate capital to invest for processing activities including cost of machinery and drying equipments. However, even where processing equipments are available the technicality (managerial skills) of running them is very low.

4.5.1.7 Marketing constraint

Cassava sub sector is constrained by poor marketing system attributed by illegal weights measurements, and in adequate market information. Market performance has identified some signs of market inefficiencies in Mkuranga District and Dar es Salaam markets. One of the indicators of market inefficiency relates to the inappropriate weights and measures used in the market. In buying and selling cassava, no standard units were used. For instance farmers sell cassava in either polythene bags (kiroba) filled normally or excessively (lumbesa) or in pick-up units. These units are highly variable susceptible to cheating for weak actors (farmers). Another important indicator of market inefficiency relates to marketing margins and farmers' share of the final price. The result of this study indicated higher gross margins for other actors, while farmers' gross margins were significantly very low and they reap small amount of share of the price paid by consumers implying there is abnormal profits to other marketing agents. The interviewed farmers' reported that they have no access to market information concerning cassava which affects their decision making in selling cassava in a profit. But they are really needed to have information on the market and price for their cassava.

4.5.1.8 Lack of capital

Lack of capital is another crucial constraint affecting farmers' and other actors in cassava value chain in Mkuranga, Farmers reported they fail to get loan from the bank because agriculture has very risk and not preferred to be loaned by the formal financial institution. Another reason pointed by farmers as to why they don't get loans for financing agriculture is lack of collateral for the loan. The only collateral they have is land which its ownership is not yet legalized to be accepted by the bank. To deal with the situation, other farmers

have established informal financial institution like SACCOs and VICOBA like Muhogo SACCOs in Mwanambaya village, Mwambao SACCOs in Mkuranga village and Myumbu SACCOs in Njopeka village which was visited during this study. Through these organizations, it was easier to get loans from their own savings and loans from other financial institution like Presidential Trust Fund for self reliance (PTF) who trusted these SACCOs. However these institutions have weak leadership and managerial skills.

4.5.2 Opportunities

4.5.2.1 Presence of research agency, government and NGOs

A number of research institutions which are engaged in the production of improved varieties with disease tolerance character like Kiroba variety are present in Mkuranga and nearby. Mikocheni Agriculture Research Institute has its branch in Mkuranga district. Other institutions that include Kibaha sugar and tubers research institution and International Institute for Tropical Agriculture (IITA) are very near with Mkuranga district. The presence of these institutions is an opportunity especially in the production of disease free planting materials based on their experience.

Another opportunity is the presence of service providers like CARITAS in input supply, MVIWATA in strengthening farmer organization and Mkuranga district council for extension service provision.

4.5.2.2 Local, Regional and International unexploited markets

Mkuranga district has a lot of market opportunities in the district itself as the population is growing very rapidly. Other opportunities include urban markets, regional and international markets. Many processing industries that use cassava products in Tanzania

which in most cases are located in Dar es Salaam and close to Mkuranga, buy cassava from Lake Zone and Rufiji district. Other processing industries import cassava from Nigeria, Thailand and Mozambique to feed their industries. The transaction cost for these buyers to buy cassava from all areas is very high compared if they could buy it from Mkuranga district implying that development of well good cassava industry in Mkuranga is potential for farmers to earn income and improve their livelihood.

Table 10: Potential market opportunities for cassava in Dar es Salaam markets

Name of company	Type of product used	Quantity (Tons)/Month	Price/Ton
NIDA Textile Mill	Starch	30	USD 350-400
Karibu Textile Mill	Starch	10	USD 300-400
Berger Paints	Starch	10 – 20	NA
International Biscuits	Flour	50	NA
Farmers' centre	Chips	NA	Tsh. 130 000 to 150 000
	Dry leaves	NA	Tshs 50 000
Shoprite	Flour	NA	USD 300 to 500

Source: TAWLAE (2007)

CHAPTER FIVE

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 Conclusions

The main objective of this study was to undertake a value chain analysis for cassava sub sector in Mkuranga district. Specifically, the study aimed at carrying out cassava sub sector mapping in which key actors, their roles, their interrelationship and the product flow in the existing cassava value chain is identified, to carry out cassava profitability analysis for all actors along the value chain and finally to identify cassava sub sector constraints and opportunities that affects the functioning of cassava value chain in the study area. From the detailed analysis of the cassava value chain conducted in Mkuranga district, this study has the following important conclusions.

The analysis of the first specific objective concluded that, the key actors of cassava value chain include research institutions, input suppliers, farmers', processors, brokers, wholesalers, retailers and consumers. They almost play different important roles. Research institutions are involved in development of new improved cassava varieties with high yield and disease resistant characteristics while input suppliers are involved in the supply of planting materials developed by research institutions. Farmers are in involved production of cassava in producer groups or individually while processors play an important role in dry cassava value chain to transform cassava from fresh cassava to cassava flour. Brokers are involved in linking farmers to wholesalers while retailers and wholesalers play an important role of buying and selling cassava. Consumers are the one who consume the produce to make sure that the other actors' roles exist in the market chain.

There are two cassava value chains currently existing in Mkuranga district which are fresh cassava and dry cassava (cassava flour) value chains with 3 distribution channels (product flows). Fresh cassava value chain is dominant and has little sense of profitability to all actors compared to dry cassava value chain. Dry cassava value chain is still very low but is very potential for interventions due to its profitability to all actors.

The analysis of constraints and opportunities concluded that cassava sub sector in Mkuranga district is critically constrained by production, processing and marketing constraints. Production constraints include poor agronomic practice, low level of technology for means of production (poor farming tools), inadequate labour force, diseases and rodents and poor belief that cassava is for marginalized people and not for cash. The pprocessing constraints include lack of processing units (centres), inadequate capital to invest for processing activities including cost of machinery and drying equipments. Marketing constraints include poor marketing system, lack of market information and lack of marketing centres. However, Mkuranga has a lot of market opportunities in the district itself, urban markets, regional and international markets.

The analysis profitability for all actors along the value chain has concluded the following. The marketing system in fresh cassava value chain is highly inefficient due to unequal distribution of profits between all actors along the value chain. Farmers are the lowest in earnings the profit with gross margin ratio of 20%. Traders have the highest gross margin ratio of 39% while retailers have gross margin ratio of 38%. The gross margin of farmers is affected by cropping style, planting style, distance from the market, experience in cassava farming business and farmer' organization in cassava production activities as

observed in the regression analysis. Another indicator of un equal distribution in fresh cassava value chain include poor weight measures (no standard units) used in the in the transaction i.e. polyethene bags (kiroba and lumbesa), Vehicle (Toyota pick-up and Toyota canter) and farm area. In buying and selling cassava, no standard units were used. This has resulted farmers to have the lowest gross margin since they are cheated by these weight measures.

However, in dry cassava value which currently exists in very small amount shows that farmers' have a gross margin ratio of 41.1% when they sell to retailers and gross margin ratio of 52.12% when they sell direct to consumers. Hence dry cassava value chain is efficient and highly potential for value chain development in Mkuranga district.

5.2 Recommendations

After a detailed analysis of cassava chain in Mkuranga and following the above conclusions made from this study, the researcher seeks to recommend the following. The recommendation goes to different actors including research institutions, government, and development entities engaged in cassava value chain in Mkuranga.

i. Research institutions

Disease outbreak is one of the constraints affecting cassava productivity and quality in Mkuranga district. In order to overcome this problem, this study strongly recommend that research institutions like MARI, Kibaha and IITA and SUA should continue to conduct research in order to come up with highly improved cassava varieties that have high yield and disease resistant characteristics. This will improve production levels and quality of

cassava produced in Mkuranga district so as to meet the demand of the market currently existing. Also the research activities should include soil research since in some areas, Kiroba variety is perceived to be highly resistant but in other areas the situation is different. May be it is due difference in soil types.

ii. Government

A lot of market opportunities are present for cassava in the local, regional and global markets for farmers to earn cash. However, still there are still some people including decision makers who believe that cassava crop is still for highly marginalized people or for relief during hunger period. So this study recommends the government to promote the crop and set first priority in resource allocation so as to improve production, processing and marketing of cassava and ultimately improve the living standards of the people. To improve production and quality the government should concentrate to train farmers on modern cassava production techniques and post harvest practices which will help farmers to adopt proper farming system (cropping and planting style) and use of improved cassava varieties (planting materials). In the area of processing, the government should help farmers through DADPs and TASAF to introduce processing centers that include processing machines, equipments and infrastructure (building, water and electricity) so as to add value of their products and earn more money. The area of improving cassava marketing requires government efforts to improve road conditions and market centers where buyers and farmers can meet with buyers direct so as to minimize transaction cost involved with other actors like brokers whose roles becomes reluctant and hence increase the profit of farmers.

iii. Development entities

Fresh cassava value chain which currently dominates cassava sub sector in Mkuranga is not profitable to all value chain actors especially farmers. The dry cassava value chain is highly profitable and potential for cassava value chain development. So this study strongly recommend all development entities in cassava value chain intervention, to concentrate on dry cassava value chain as the area of intervention and forget about fresh cassava due to its potential for high profit. The intervention should mainly focus on the formation and strengthening farmer organizations (groups and networks) so as to produce, process and market together in large quantities in order to meet the market demand (quantity, quality, consistence and reliability of supply) and enjoy economies of scale. They should offer market access facilitation that include dissemination of market information (find market information and make farmers informed to make valid decision and proper planning) and linking farmers to buyers (identifying potential buyers linking them to negotiate and make buying arrangements). The facilitation of these development entities should also concentrate to train farmers to develop their entrepreneurship skills in order to change their mindset from subsistence to market led production (commercial farming).

Since lack of capital is one of the crucial constraint affecting farmers' and other actors in cassava value chain in Mkuranga, it is wise for this study to recommend these development entities to intervene the establishment and strengthening (improve running and management) of SACCOs, SACA and VICOBA so as to improve savings and availability of funds to finance production, processing and marketing of cassava.

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APPENDICES

Appendix 1: Farmers' Questionnaire for Cassava Value Chain Analysis in Mkuranga District

A. IDENTIFICATION VARIABLES

QUESTIONNAIRE NO.	
DATE OF INTERVIEW	
WARD	
VILLAGE	
NAME OF RESPONDENT	

B. DEMOGRAPHIC CHARACTERISTICS

1. Sex of the respondent.....
2. Age of the respondent.....
3. Level of education ..... (years)
4. Marital status

a) Single (b) Married (specify polygamy/monogamy) (c) Living together (d) Separated (e) Widowed (f) Divorced

5. What is your occupation? 1=Employed 2=Farmer 3=Business man
6. Year of experience in your occupation ..... (years).
7. What is the number of people in your household?

Household size	Male	Female	Adults (18 years and above)	Children (under 18 years)	Number of people participating full time in farming activities

8. What type of your household?

1= Male headed house hold 2= Female headed house hold.

9. What is estimated part of your income per year goes into

1.Spending.....2.Saving.....

B: CASSAVA PRODUCTION ASPECTS

10. How big is your land? ..... (acres)

11. What amount of your land do you use for cassava?.....(acres)

12. Do you have access to your extension officer? 1=Yes 2=No.

13. Do you use mono cropping or inter cropping? 1=Monocropping 2=Intercropping

14. Do you use any recommended spacing between cassava vines (planting material)?

1=Yes 2=No

15. If the answer is "yes" in the question 14 above, please specify spacing

.....(include units)

16. In according to 2007/2008 season how much of your harvested cassava was

Sold.....Rejected.....used for Food..... (Specify units)

17. How long does it takes from cassava planting to harvesting?..... (years)

18. What type of farm power do you use to cultivate your land?

1= tractor 2= animal power 3= hand hoe 4= others

(specify).....

19. What are the names of cassava varieties you planted in field?.....

20. What main inputs do you use in cassava production? (fill the table below)

S/N	Input name	Quantity/acre (specify units)	Cost/value(Tsh/acre)
1	Seedlings (cassava vines)		
2	Fertilizer		
3	Herbicides		
4	Others (Specify)		

21. Have you ever faced any shortages or other difficulties in obtaining inputs? 1=Yes

2=No.

22. In addition to inputs what are other main costs involved in cassava production? (fill table below)

S/N	Cost item	Cost/Value (Tsh/acre)
1	Land cleaning	
2	Land cultivation (tillage)	
3	Planting	
4	Weeding	
5	Harvesting	
6	Others (Specify)	

23. What do you consider to be the main challenges in cassava production?

1 .....

2 .....

3 .....

24. Do you produce cassava in groups or individually?

1= In group 2=Individually

C: MARKET ACCESS AND PROFITABILITY ASPECTS.

25. Where do you sell your cassava? 1= at the farm 2=at the market 3= at the road side

26 How far is the marketplace where you sell most of your cassava ..... Km

27. What means of transport do you normally use to send cassava to the market

1=headload 2=bicycle 3=Cart 4=Motorcycle 5=Car .....

28. How long does it take to travel to the market? ..... (Minutes)

29. How much does it cost to transport cassava to the market (include taxes and necessary personal expenditure on route .....

30. How is the demand for your cassava? 1=weak 2= moderate 3=strong

31. What was your selling price for cassava last year? (specify the unit of measurement).

S/N	Type of product	Farm gate price	Market price
1	Fresh cassava		
2	Chips		
3	Flour		
4	Starch		

32. How is the price established in the market? Explain.

33. In addition to transport what other activities do you perform along the marketing chain for cassava?

S/N	Activity	Cost of item

34. What main challenges do you encounter in cassava marketing? (Rank the most 3 challenges by order of importance)

Constraint	**Rank**	**Constraint**	**Rank**
Roads		Telephone and communication	
Electricity		Warehouses	
Water		Market	
Taxes		Road blocks	

C: BISINESS DEVELOPMENT SUPPORT SERVICES

35. Do you receive any service that support cassava trading in your area? 1=Yes 2=No

36. If yes, fill in the table below appropriately:

Service provider	Type of support	Conditions attached, if any

37. If no what kind of support service do you prefer as far as your business is concerned?

.....

.....

38. Do you get market information? 1=Yes 2=No

39. If the answer in question 37 above is 'yes', indicate the source and type of market information for each type of product.

Type of product	Type of market information	Source

40.If no what kind of market information do you prefer as far as your business is concerned?

.....

.....

41. Is the market information that you get sufficient to influence your decision? 1=Yes 2=No

42. If the information is insufficient, what are the missing aspects? (Clearly specify)

.....

43. Did you have access to any savings and credit facility to finance your cassava production. 1=Yes 2=No

44. If the answer is no for the qn above, what are the reasons?

.....

THANK YOU FOR YOUR COOPERATION

Appendix 2: Checklist of Issues for Discussion with Traders of Cassava from Mkuranga District

1.Background information	a. Location b. Years in operation c. Type of commodities traded d. Other activities apart from cassava trading activity
2.Volumes and sources of cassava	a. Volumes of cassava purchased per month b. Volumes of cassava required per month c. Areas from where cassava is purchased d. Relative importance (in terms of volumes, quality, and regularity of supply) of different supplying areas. e. Sources of suppliers' e.g. individual farmers, farmer group/association, rural vendors/collectors, or processors.
3. Prices, buyers and transactions	a. Current purchasing prices for cassava (specifically the form in which you are purchasing) b. Current selling prices for cassava (specifically the form in which you are selling) c. Buyers of cassava (e.g. traders, super markets, retailers, consumers) d. Product requirement of different buyers (volumes, quality, and regularity of supply) e. Places of purchase (e.g. farm gate, at the market, or at your own store) f. places of sale g. Negotiation process with suppliers and buyers (who determine the prices) h. Relationship with buyers or suppliers (credit, transport, technical support)
4.Support services	a. Transport (means of transport used, ownership, availability, cost if rented) b. Market information (type, sources, reliability, and problems) c. Credit (sources and their relative importance, cost, frequency

	and problems) d. Other support services
5. Marketing costs	a. Main marketing costs (labour, transport, interest on loan, handling, packaging, storage, taxes, rent, communications, product losses e.t.c)
6. Policies and regulations	a. Key policies and regulations affecting his/her cassava trading business (registration, taxation, credit, subsidies to producers, certification e.t.c) b. Recommended changes in policy and regulations
7. Constraints and opportunities	a. Key constraints to the development of the cassava trading business b. Possible solutions to these constraints. c. Key cassava trading business opportunities.

THANK YOU FOR YOUR COOPERATION

Appendix 3: Checklist of issues for discussion with staff of government and development entities for Cassava Value chain Analysis in Mkuranga District

1. Background	Date of interview Name of the institution Location Name of the respondent Position of the respondent Role/functions of the institution related to cassava production, marketing or processing.
2. Data for the past five years	Number of households involved in production of cassava at the district Areas under cassava cultivation at district level Types of cassava varieties planted within the district Production volumes
3. Strategies, policies, regulation and programmes for the cassava sub sector	On paper; objectives, responsibilities, implementing agencies, activities, e.t.c Level of achievement in enforcement (policies and regulations) and implementation of the programmes Impacts on the production, marketing and processing
4. Constraints	Key constraints to development of the cassava sub sector (production, marketing, and processing in the district
5. Opportunities	Key opportunities regarding the sub sector (production, marketing and processing)

THANK YOU FOR YOUR COOPERATION

Appendix 4: Checklist for discussion issues with leaders of SACCOs for Cassava Value Chain Analysis in Mkuranga district

1. INTRODUCTION.

DATE OF INTERVIEW	
NAME OF SACCOs	
LOCATION	
NAME OF THE RESPONDENT	
POSITION OF THE RESPONDENT	

2. INTERVIEW QUESTIONS.

1. Who are your members?
2. How many members do you have?(Male/Female/Total)
3. What are the membership conditions?
4. Are you registered?
5. What is your area of coverage?
6. What is your financial position? Was there any target in previous year?
7. Did you succeed to meet your target?
8. What is the source of your funds?
9. What are the types of services you provide to your customers?
10. For each service you provide:

- Who are your major customers? (Male/Female/Total).
- What are the procedures for getting the service?
- What are the conditions for getting the service?

11. Do you apply different procedures for different categories of your customers such as large scale, medium, small businesses; organizations/groups and institutions?
12. Do you receive applications for loans from farmers, traders and small businesses? How often in a year?
13. What are the interest rates, collateral and repayment procedures for the loans provided to farmers, traders and small businesses?
14. How do you determine interest rates?

3. CONLUSIONS

15. What is your general opinion, view or comment on accessibility of financial services to farmers, traders and small businesses?

16. What do you think can be done to improve the link between farmers, traders and small businesses to the financial institutions?

THANKS FOR YOUR COOPERATION

Appendix 5: Sample size of the respondents in different categories for cassava value chain analysis in Mkuranga District

Sample size of farmers' household by Ward and village in Mkuranga district.				
Ward	**Village**	**Male**	**Female**	**Total sample**
Lukanga	Njopeka	8	7	15
Mkamba	Lupondo	12	3	15
Bupu	Mamdimpera	9	6	15
Kisiju	Sotele	10	5	15
Tambani	Mwanadilatu	10	5	15
Mkuranga	Kolagwa	10	5	15
	Total	**59**	**31**	**90**
Sample of farmer – processor by ward and village in Mkuranga (Members of production and processing groups)				
Ward	**Village**	**Group name**	**Number of farmers**	
Tambani	Mwanambaya	Umaumiko	5	
Mkuranga	Dundani	Tupendane	5	
Kisiju	Sotele	Jikwamue	5	
Total			**15**	
Sample size of traders by market location in Dar es Salaam and Mkuranga				
Market location	**Wholesalers**	**Retailers**	**Small traders**	**Total**
Mkuranga	0	2	3	5
Mbagala	0	5	0	5
Temeke stereo	4	0	0	4
Buguruni	6	0	0	6
Tandale	0	5	0	5
Kariakoo	0	5	0	5
Total	**10**	**17**	**3**	**30**

Sample of service providers and development entities for cassava value chain in Mkuranga	
Name of institution	**Number of respondents**
TAWLAE	1
MDC	2
MVIWATA	1
Muhogo SACCOs	1
Mwambao SACCOs	1
Myumbu SACCOs	1
Total	**7**

Appendix 6: Cassava industrial application

S/N	INDUSTRY	APPLICATION
1	Alcohol and medical industry	Cassava chips are an alternative source of raw material for producing liquor as well as medical and industrial alcohol.
2	Textile industry	Cassava starch is used in three stages of textile processing: to size the yarn to stiffen and protect it during weaving, to improve colour consistency during printing, and to make the fabric durable and shining at finishing
3	Paper industry	Modified cassava starch is used in the wet stage of paper making to flocculate the pulp, improving run rate and reducing pulp loss. Native and modified cassava starches are also used in the coding and sizing of paper, improving the strength, binding codings to the paper, and controlling ink consumption to improve print quality
4	Plywood industry	Glue made from cassava starch is a key material in plywood manufacturing. The quality of plywood depends heavily on the glue that is used.
5	Glue industry	Cassava starch is a very important raw material in making glue. Cassava starch–based dextrates are excellent adhesives and are used in many applications including pre-gummed papers, tapes, labels, stamps, and envelopes.
6	Biodegradable products	Cassava starch can be used as a biodegradable polymer to replace plastics in packaging materials.
7	Pharmaceutical industry	Native and modified cassava starches are used as binders, fillers, and disintegrating agents for tablet production.
8	Food industry	**Sweetener** Glucose and fructose made from cassava starch are used as substitutes for sucrose in jams and canned fruits. Cassava-based sweeteners are preferred in beverage formulations for their

		improved processing characteristics and product enhancing properties. **Monosodiumglutamate** Cassava starch is a common source for making monosodium glutamate in Asia. It is used to enhance flavour in food, e.g., Ajinomoto. **Confectionery** Modified cassava starch or starch derivatives are used in confectionery for different purposes such as thickening and glazing. Cassava starches are widely used in swests such as jellys and gums.
9	Animal feed industry	Cassava roots can be processed into chips and pellets which can be used in compounding animal feed for cattle, sheep, goats, pigs, poultry, and farmed fish. The cassava leaves are also a good source of feed for livestock.

Source: www.cassavabiz.com

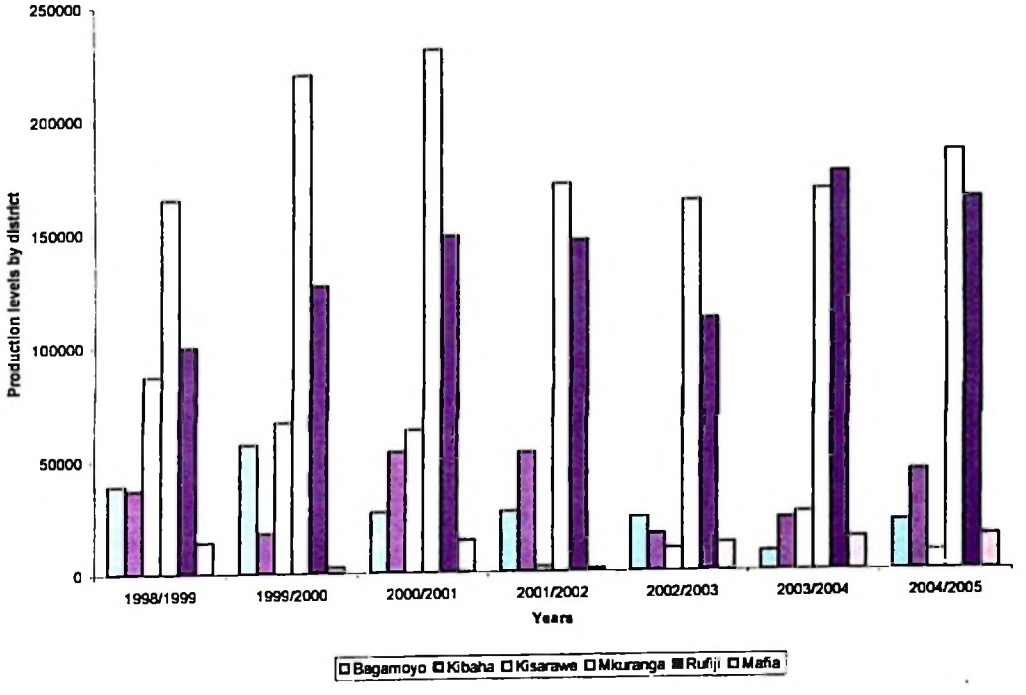
Appendix 7: Production levels (tons) for major food crops in Mkuranga district between 1995 and 2005

Type of Crop	Years						
	1998/1999	1999/2000	2000/2001	2001/2002	2002/2003	2003/2004	2004/2005
Maize	5 646	6 342	16 914	4 051		4 715	9 772
Paddy	20 413	2 297	13 759	3 850		5 812	14 463
Cassava	165 000	219 880	230 874	171 512	163 863	168 638	185 529
Legumes	4 594	1 531	3 215	1 050	306	1 762	2 012

Appendix 8: Cassava production (tons) trends in Mkuranga district between 1999 and 2005

Year	Area under cassava (Ha)	Production levels (Tons)
1998/1999	16 130	165 000
1999/2000	19 000	219 880
2000/2001	21 900	230 874
2001/2002	22 968	171 512
2002/2003	22 100	163 863
2003/2004	23 045	168 638
2004/2005	25500	185 529

Appendix 9: Cassava production (tons) by district in Coast region between 1998/99 and 2004/05



Appendix 10: Farmer - processor gross margin analysis for dry cassava value chain in Mkuranga district

Item	Amount when they sell to retailers	Amount when they sell direct to consumers
Area under cassava	2.57	2.57
Total cassava produced	6891	6891
Total cassava processed	2297	2297
Total cassava processed/Acre	893.77	893.77
Selling price/Kg	800	1000
Total revenue	1 837 600	2 297 000
Total revenue/acre	715 019.46	893 774.32
Cost of production per acre	129 411	129 411
Farm yield	2681	2681
Fuel cost/Kg	3	3
Fuel cost/Acre	8043.97	8043.97
Labour cost for pealing, washing and drying/Kg	40	40
Labour cost for pealing, washing and drying/Acre	107 252.92	107 252.92
Packaging cost/Kg	50	50
Packaging cost/Acre	134 066.15	134 066.15
Transport/Kg (Tsh)	5.00	5.00
Transport/Acre (Tsh)	4468.87	4468.87
Storage/ (5% of the total rev.) (Tsh)	35 750.97	44 688.72
Total cost (Tsh)	418 993.88	427 931.62
Gross margin/Acre	296 025.58	465 842.70
Gross margin ratio (%)	41.40	52.12

Appendix 11: Mean values of variables used in the regression model.

Variable	Variable code	Status of variable	Unit	Expected sign of coefficient	Mean	Std. Error
Gross Margin per acre	GM	Dependent	Tsh	+	38993.33	4413.08
Organization in cassava production	OCP	Independent	Dummy	+	.66	.05
Experience in farming business	EFB	Independent	Years	_	23.00	1.32
Planting style	PS	Independent	Dummy	+	.41	.05
Cropping style	CS	Independent	Dummy	+	.29	.05
Distance from the market	DFM	Independent	Km	_	73.11	1.54