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**INTRA-HOUSEHOLD GENDER ANALYSIS OF CASSAVA (*Manihot
esculenta crantz*) VALUE CHAINS AMONG SMALLHOLDER FARMERS IN
TANZANIA**

by

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A thesis submitted in fulfilment of the requirements for the degree

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Dedication

To the Almighty God, He who does not fail nor disappoint!

Declaration

I declare that this PhD thesis entitled, ‘Gender and Cassava (*Manihot esculenta crantz*) Value Chains: An intra-household analysis of smallholder famers in Tanzania’ is my own original work and has not been submitted for a degree at this institution and any other tertiary institution. I also declare that all the sources cited and quoted have been indicated and acknowledged by means of complete references.

Name: Blessing Masamha

Signature.....

Date.....

Ethics statement

As the author of this thesis, I declare that for the purposes of carrying this research, I obtained research ethics approval acknowledging that I have complied with all the ethical standards required. The approval was done by the University of Pretoria Research Ethics Committee and the Tanzania Commission for Science and Technology (COSTECH).

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Abstract

Title: **Intra-household gender analysis of cassava (*Manihot esculenta crantz*) value chains among smallholder farmers in Tanzania.**

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This study examined intra-household gender inequalities in the cassava value chains in Tanzania with the aim of enabling women to escape poverty and food insecurity through enhanced women empowerment and participation in cassava value chains. This is because women in developing countries are often omitted from key parts of the agricultural value chains. In contrast to global high value chains, traditional food value chains such as cassava and associated gender relations as well as power dynamics within households have received little attention. A reason for this tendency is because much of the value chain studies have ignored intra-household gender dynamics and concentrated much of their investigations on the macro level without taking a gendered analysis at the micro level. A convergent mixed-methods design was adopted which consists of a quantitative strand and qualitative strand being conducted independently of each other, with the integration of the two strands occurring at the interpretation stage. Data were collected from Kigoma, Zanzibar, Mkuranga and Geita through structured interviews conducted with 228 farmers, triangulated with key informant interviews, direct observations, repeated household visits, and desk review. Descriptive statistics and thematic content analysis were used to analyse quantitative and qualitative data respectively. Biprobit and ordinary least squares regression models were used to estimate the determinants of women's participation in cassava cultivation and marketing in Tanzania.

The findings reveal that there are weak linkages within the cassava value chain, which were highly gendered. While the production and processing nodes of the cassava value chains were dominated by women and children, women were not well-integrated within high value nodes such as marketing in urban areas and cross-border trading, which were dominated by men. Transportation of cassava to highly lucrative markets was also dominated by men. Women were confined to local weekly markets with low prices while men dominated as middlemen and urban marketers. Cassava processing was conducted at the household level as well as within small-scale cooperatives, with the major portion of this work being done by women. Supporting institutions were found to be involved in the supply of cassava planting material, training, and the provision of processing equipment. Both men and women were not accessing credit and extension support. In general, men played a prominent role in the control of resources, marketing, and income. The mapping of cassava value chains could help to identify avenues for upgrading capacities, reducing gender inequality, and enhancing women's participation in marketing and income control.

Empowering women is an objective of global development policies. The 5DE Disempowerment indices for women and men were 0.95% and 0.14%, respectively. Areas of disempowerment for women included inputs in productive decisions, limited membership of groups with social functions, very limited access to credit and associated decision-making power, limited autonomy in production, and a heavy workload with very little leisure time. However, women were empowered in the domain of resources, which entailed joint ownership and decision making. Marital status and educational levels are significantly associated with women's empowerment. Policies to improve women's empowerment need to focus on securing ownership of resources and access to and use of credit.

Women in developing countries are often omitted from key parts of the agricultural value chains. Several variables were significant in influencing decision of women to engage in cassava farming, these include Land size (LAN^2), religion ($p = 0.013$), location (REG), ownership of (BICY) and the number of dependents in the household (DEP). Factors that were significant in influencing the quantities of cassava produced by women were marital status (STAT), region (REG) and land (Ln LAN) whilst for men it was REG and age (Ln AGE). In the marketing node variables' quantity of cassava produced (CAVA) and ownership of radio (RAD) were significant ($p < 0.005$) explanatory variables in influencing women to participate as sellers in the cassava value chain. In the same marketing cassava value chain node, distance to an all-weather road (DIST), quantity of cassava (CAVA) produced were significant ($p < 0.05$) determinants. Policies for improving women's land rights and infrastructure would help to promote their participation in cassava production, processing and marketing. Improved methods of delivering extension information would also improve women's participation in the cassava value chain markets.

A conceptual framework was developed for analysing and 'disentangling' the effects of the following contextual factors on marginalised women within cassava value chains: (1) policy and institutional contexts, (2) political and economic contexts, (3) cultural and religious elements, and (4) the climate and environmental contexts were developed. The conceptual framework provides an account of gendered value-chain analysis that seeks to combine a detailed and nuanced understanding of household social relations, changing gender roles, resource ownership as well as benefit sharing linked with broader political, economic and climatic contexts within

which they are situated. The Colfer and Minarcheck (2013) conceptual framework on gender and forest resources management was used as the guiding framework for the household gender based conceptual framework. The components of the developed conceptual framework were explained in terms of how women and households are affected and also how each element affects the cassava value chain. The framework was designed to highlight the importance of gendered interactions at the micro scale through an analysis of the changing roles, responsibilities and bargaining power of women and men participating in the cassava value chain. It will be useful for policymakers and development practitioners engaged in formulating strategies that can enhance equity for both men and women within the cassava value chain. It can also facilitate the identification of possible strategies and development interventions for upgrading cassava value chains.

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List of acronyms

COSTECH	Tanzanian Commission for Science and Technology
FGD	Focus group discussion
GDP	Gross Domestic Product
GDI	Gender Development Index
GEM	Gender Empowerment Matrix
IITA	International Institute of Tropical Agriculture
MCDGC	Ministry of Community Development, Gender and Children
NSGD	National Strategy for Gender Development
SDGs	Sustainable Development Goals
UNDP	United Nations Development Program
UNHCR	United Nations High Commission for Refugees
WAEI	Women in Agriculture Empowerment Index
WID	Women in Development
ZARI	Zanzibar Agriculture Research Institute

Definitions of terms

Gender refers to socially constructed roles and status of women and men, girls and boys. It is a set of culturally specific characteristics defining the social behaviour of women and men, and the relationship between them. Gender roles, status and relations vary according to place (countries, regions, and villages), groups (class, ethnic, religious), generations and stages of the lifecycle of individuals. Gender is, thus, not about women but about the relationship between women and men.

Cassava is the cheap food energy, significantly central to food security among women smallholder farmers whose access to arable land is mediated by a number of social factors.

Value chain refers to the process of documenting and analysing the operation of a value chain, and usually involves mapping the chain actors and their associated roles as well as calculating the value added along its different nodes. In this study the analysis adopts a gendered approach in which intra-household gender dynamics are considered to be the main drivers of gender inequality in cassava value chains.

Gendered value chain analysis is a methodology that describes existing gender relations in a particular environment, ranging from within households or firms to a larger scale of community, ethnic group, or nation, and organises and interprets, in a systematic way, information about gender relations to clarify the importance of gender differences for achieving development objectives.

Household in this context is defined as a social unit of those who dwell under the same roof a composed of children, dependents and a household head who maybe either a woman or a man. This implies that the household can be *defacto* or *dejuri* female-headed. The household can also be male-headed which was common across the study sites.

Smallholder farmer refers to farmers who own small pieces of land and engage in small scale subsistence farming. They are mostly constrained in terms of inputs use, market participation and availability of arable land.

Empowerment in this study, it is defined as the process of awareness and capacity-building, which increases the participation and decision-making power of smallholder farmers in cassava value chains and may potentially lead to transformative action.

Mixed Methods involves the collection, analysis and integration of qualitative and quantitative data to generate meta-inferences. In this study, a quantitative dominant status was adopted, with qualitative data being used at the interpretive stage to support the quantitative data.

Macro level entails the consideration of national domestic economy, policies and national systems that affect the cassava value chain functioning.

Micro level considers gendered division roles of production, reproduction and power dynamics within households along the cassava value chain.

Chapter 1

Introduction

Science starts only with problems.....[Karl Popper]



Fig1.1: Women in their cassava field in Zanzibar

1.1 Introduction

This study used a value chain approach (VCA) as a tool for investigating gender inequalities in cassava food value chains. The study also adopted a gendered analysis of cassava value chain at the household level, mapping different gender roles, positions, control of productive resources and decision-making roles, determinants of participation in the value chain, and the benefits sharing patterns as influenced by the intra-household gendered power dynamics in resource allocation. It also investigated the enabling environment or factors that either facilitate or hinder women's participation in cassava value chains, hence the movement of cassava along its value chain. This study was conducted in major cassava producing regions of Tanzania that includes the Zanzibar (Unguja Island), the Coastal regions (Mkuranga), Geita (Lake Region) and Kigoma. A mixed-methods approach was employed to investigate gender dynamics at the household level in cassava food value chains in Tanzania.

A substantial amount of scholarly literature on gender and agriculture value chains has concentrated much on global high value chains; however, little attention has been paid to intra-household gendered analysis in low value chains such as that of cassava. This is because most extreme variations occur at the household level (micro level). Most studies have tended to focus attention at the value chain level of high value crops, thereby neglecting low value crops, and they have also failed to consider how in turn the functioning of cassava value chains impact on gender roles and relations within the households. Hence this study adopted the household as a unit of analysis, since it is the unit where extreme decision-making variations that affect participation in value chains are made. Findings from the study provide significant contributions in terms of literature and gender disaggregated empirical data on gender roles, positions of certain gender groups, empowerment and participation at the household level in the cassava value chain. Likewise, results from this study provide empirical evidence on the distribution of benefits and gains according to gender at the household level in the cassava value chain. The study also provides us with a basic understanding needed for designing and implementing appropriate development programmes and policies to address gender inequalities particularly for women in the cassava value chain. Similarly, the findings are crucial for development agencies and policymakers so that they can have appropriate intervention strategies at the household level as well as informed gender sensitive policy decisions by the government.

The study is also useful to the different key actors in the value chain, such as input suppliers, distributors, processors, traders and more importantly the smallholder farmers. The results of the study will enhance improved household income and improved food security among smallholder farmers in Tanzania. Traditional staple food VCA helps improve the understanding of the following: socio-economic and livelihoods situation of women; cassava production situation of target area, and market functioning and market relationships among the different chain stakeholders. The study has significance in policy terms, particularly with the current food security focus, changing climate conditions and the search for crops that may be tolerant to low precipitation and survive climatic uncertainty. Also, poverty reduction among women through cassava production is important to ensure household food security and the improved standard of living within households.

This Chapter is organised as follows: It begins by providing a background to the study where literature on the significance of cassava and agriculture and how gender roles are shaped is documented. This is followed by the statement of the problem which unravels the gender related constraints and also the research gap on intra-household gender dynamics within the cassava value chains. This section provides scholarly evidence of the attempts that were made by other studies and where they left as well as the assumptions that are considered central to this study. After this the research questions and objectives are itemised. The structure of the thesis is presented next, giving a brief outline of what each of the nine chapters contains and what it tries to achieve and contribute to the thesis.

1.2 Background to the study

Between the 1940s and 1990s, debates on agriculture ‘productivity and the productivity growth of farming’ centred much on modern and progressive farming, often defined in terms of shifts from traditional and subsistence-oriented production to modern and commercial agriculture (Scoones, Devereux, & Haddad, 2005; Wolmer & Scoones 2000), agricultural intensification, adoption of technological transfer approaches (Cousins & Scoones 2010), and more importantly, the production of high value crops for export earnings. These issues in agrarian development are no longer given much policy attention as the post-2010 development discourse became dominated by food security and poverty reduction concerns after the majority of the world

leaders committed themselves to achieving the Sustainable Development Goals (SDGs). All this is evident in policy prescriptions, research and development initiatives geared at the production of drought tolerant crops like cassava to achieve food security and eradicate extreme poverty and hunger at the household level.

A substantial amount of gender-oriented scholarship has consistently demonstrated the lack of access to productive resources, particularly land, and tended to associate this with persistent poverty among women (see, for example, Agarwal 1994; Izumi 1999). But in sub-Saharan Africa, cassava is cultivated on small farms often in fields that are to be set aside as fallow and often cropped on marginal soils, replacing crops that require greater soil fertility and cultivation (Hillocks, Thresh & Bellotti 2002). Such aspects make cassava, although generally considered cheap food energy, significantly central to food security among women smallholder farmers whose access to arable land is mediated by a number of social and cultural factors (Westby 2008). Moreover, cassava's all year round availability and its tolerance to extreme ecological stress conditions; make it a suitable crop for Africa given the changing climatic conditions (Westby 2008). The crop is also suitable for the present farming systems, since it is commonly intercropped with early maturing annual crops such as maize, beans and vegetables.

Cassava is important, because of its low cost and efficient production of food energy and availability throughout the year. The crop is also suitable for incorporation within prevailing farming systems, as it is commonly intercropped with early maturing annuals such as maize, beans, and vegetables. Its abilities to tolerate extreme tropical conditions, adapt to poor soils, and to be intercropped with various annual crops (like groundnuts, maize, and beans) makes it a strategic staple food crop, especially for poor rural households (Hillocks, Thresh, & Bellotti 2002). Of late, cassava has attracted the attention of funders, policymakers, and researchers, who work on issues of food security and sustainable food systems, because of its potential application as a mitigation measure against the effects of changing climatic conditions in most African countries. Research also suggests that cassava could be used to bridge income and poverty gaps in countries like Tanzania (Agricultural Sector Development Strategy 2001).

In Tanzania, the majority of the small holder farmers use traditional technology such as planting low yielding varieties of crops, and rarely apply fertilizers to boost yields. The effect of using

poor agricultural inputs is often low crop yields and hence food insecurity (Agricultural Sector Development Strategy 2001). This scenario is associated with the production of most crops in Tanzania where cassava is not an exception. Figure 1.2 depicts cassava fresh roots production (metric tons) and the percentage of national production during the 2007/2008 season in Tanzania. The map shows that regions such as Mwanza, Kigoma, Ruvuma, Lindi, Tanga as well as Zanzibar were the major cassava producing regions during the 2007/2008 season.

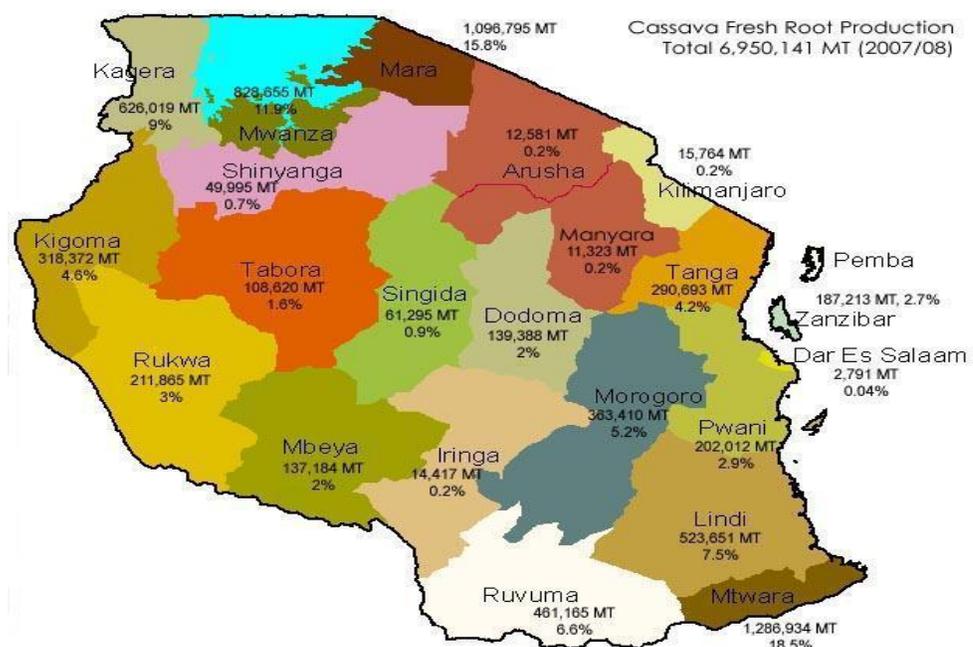


Fig1.2: Regional production of fresh cassava roots (metric tons), and percentage of national production of Tanzania in 2007/2008 agriculture season.

According to the map (See Figure 1.2), the highest cassava producing regions are Mtwara in the south (18.5%) and around Lake Victoria that is Mara and Kagera which contributed 15.8 per cent and 9 per cent of national cassava production respectively. Cassava was least produced in central regions like Dodoma, Singida and Manyara.

1.2.1 Significance of agriculture in Tanzania

Agriculture is a fundamental driver of economic growth and poverty reduction in many developing countries, including Tanzania. The Tanzanian agricultural sector which is dominated

by subsistence smallholder farming, whose productivity is low, employs about 75 per cent of the active labour force (Farnworth 2011). The cassava crop contributes on average, around 15 per cent to the Tanzanian national food production basket, and is second only to maize (Mtambo 2007). All in all, agriculture contributes 27.8 per cent the country's GDP (Farnworth 2011). Tanzania's population is predominantly rural, with the 2012 Population and Housing Census putting the rural population at about 80 per cent of Tanzania's almost 45 million inhabitants.

Various crops are grown in Tanzania, including maize, cassava, beans, banana, rice, and groundnuts. Rice is widely grown in swampy areas for commercial purposes for income generation within the household. Maize and cassava are grown for consumption within households for calorific value whilst the surplus is sold to generate income for use within households (Mtambo 2007). Bananas are also grown for consumption and may be sold in times of need and when in surplus. Much of these crops are intercropped: for example beans are often intercropped with cassava and maize and sometime cassava is intercropped with groundnuts. With changing climatic conditions, farmers have begun to favour drought-tolerant crops such as cassava for providing calorific household food security and income. Marketing studies have also established that cassava is an important trade commodity in central, western and eastern Africa, particularly in informal trading relationships with neighbouring countries (Tollens, Demont & Swennen 2004). The crop is cultivated on small plots, often in fields set aside as fallow areas, and frequently in marginal soils, replacing crops that require greater soil fertility. Its cultivation contributes significantly to food security and poverty alleviation among smallholder farmers (Hillocks, Thresh and Belloti 2002).

1.2.2 Understanding the cassava value chain

Kaplinsky and Morris (2000) define value chains as 'a full range of activities that are required to bring a product or service from conception, through different phases of production (involving a combination of physical transformation and the input of various producer services), delivery to final consumers and final disposal after use'. Literature also refers to a value chain as a structure of physical, economic and social transactions between individuals and organizations engaged in raw material transformation into end products." Generally, the chain of activities gives the products more added value than the sum of the added values of all activities.

Cassava value chain development in Tanzania is envisaged to contribute to sustainable improvement in the general welfare and livelihood of farmers and processors in the cassava sector by raising incomes of farmers, processors and local marketers and at the same time increasing food security (Mtambo 2007). Understanding the structure of the value chain and the inherent intra-household gender dynamics, and how it can be improved are important in improving food security and people's livelihood in rural areas, particularly for women. Marketing studies have established that cassava is an important commodity in Central, Western and Eastern Africa trade, particularly between the DRC, Republic of Congo, Republic of Central Africa, Angola, Tanzania, Rwanda, Burundi and Uganda through informal trading (see, for example, Mitchell, Keane & Coles 2009; Njingulula 2010).

One of the strengths of holistic gendered value chain analysis and development approach is its potential for consideration of men and women's participation at every stage of agricultural chains (Coles & Mitchell 2009). In their 2010 publication, Coles and Mitchell have argued that resources, abilities and achievements for men and women are often inequitable. The levels of participation and gains are shaped at the household scale by gendered divisions of labour, time budgets, and decision making, and at the value chain level by differential access chain functions, services and resources and by gender related power disparities in chain management (Farnworth *et al.* 2015). Gender also plays a dominant role in ultimate consumption decisions, which have a considerable impact on the total value creation and opportunities for primary producers in agro-commodity chains (Ramamurthy 2004; Pelupessy & Van Kempen 2005).

Understanding the value chain is a crucial step towards developing any commodity of interest such as cassava. Moreso, clearly mapping out the gender specific roles within a value chain is necessary for putting in place effective interventions and policies for improving production and productivity of cassava for poor women. Therefore, the gendered value chain approach provides a framework to analyse the nature and determinants of competitiveness in value chains in which smallholder farmers can participate. Value chains are not gender neutral, but exist and operate within a given social context that affects the distribution of resources, benefits, and opportunities for both women and men especially at micro level.

1.2.3 Women in agriculture and cassava value chains

Women are said to focus more on subsistence agriculture and to be primarily responsible for farming for household use, with a particular focus on those products that contribute to immediate household level food security such as cassava (Cavendish 2000). The use and access rights to natural resources, including land are often differentiated along gender lines. In many societies, women have fewer ownership rights than men (Agarwal 2010). Hence women are frequently limited to decision making with regard to natural resources management and agricultural value chains included (Sunderland *et al.* 2014). Women are estimated to comprise about 43 percent of the agricultural labour force in developing countries agriculture (FAO 2011). In the United Republic of Tanzania, women also play a critical role in agricultural production, and especially in subsistence agriculture. In Tanzania, women are slightly the majority in agriculture (52%) compared to men (48%) as well as in petty trade (55% versus 45% respectively). Generally men dominate in non-agricultural activities such as manufacturing, mining; construction, transport, and finance (Shayo 2015).

Rural women face many challenges that directly impact their ability to enjoy the benefits of their work in agricultural chains. There are considerable risks for women compared to men in both traditional low value and agro-export commodity chains in developing countries (Nakazibwe & Pelupessy 2014). Women experience disadvantages ranging from more casual work, less pay and worse working conditions than men to physical and sexual exploitation (Greenberg 2013). Cognisance of these challenges facing women, Nakazibwe and Pelupessy (2014) assert that more research needs to be done to show how women could increase their participation as well as empowerment in the agro-commodity chains, especially in developing countries where the traditional and current conditions differ considerably from the developing world. This is because the existing literature on gender in agro-commodity chains lack analytical treatment of gender inequalities in low-value chains, decision making on household expenditures, differences among women, and the impact of women engagement in commercial agriculture on household nutrition (Nakazibwe & Pelupessy 2014).

During the pre-colonial period in the then Tanganyika, rural women were predominantly involved in a variety of agricultural activities. Their involvement was, however guided by some factors that include prevailing social, economic and cultural norms and practices with regard to women's specific roles and positions both at household and community levels, type of household headship (matrilineal or patrilineal) customary rules on clan land especially where chiefs and clan lineage were actively respected. Shayo (2015) also reported that during the colonial period, there was the introduction of the cash economy, formal employment and tax systems that forced peasants including both men and women to grow cash crops. During this period, it was mostly men who were employed both in the plantations and settler farms that were introduced mostly for growing cash crops as well as few industries that were introduced to produce consumable products such as beer, meat and cigarettes.

Even after the attainment of Tanzania's political independence in 1961, the distribution of men and women across the economic and agricultural sector in Tanzania has continued to be uneven (Shayo 2015). Generally men are the majority and they dominate non-agricultural activities such as manufacturing, construction, transport, and finance. This was also observed in some study areas like Geita where men were mostly involved in gold mining as compared to agricultural activities.

Generally, most women in rural areas are more actively involved in food crop production (primarily maize, cassava, rice, banana, beans and vegetables) and in the processing of agricultural products than men. Table 1.1 provides a summary of gender division of labour in agricultural activities in most Tanzanian rural communities. Further, women bear the burden of domestic tasks (productive and unproductive) that are often laborious, time-intensive, and energy-consuming. These include processing food crops, providing water and firewood, and caring for the elderly and the sick.

Women play an essential role in agricultural production (Leavens & Anderson 2011).The agriculture sector is regarded as female-intensive, meaning that women comprise a majority of the labour force in agriculture (54%) (Mmasa 2013). There are over 15 million smallholder

farmers in Tanzania, and at least half of these are women (Nyomora, Kanyeka, & Nduguru 2012). Most of these smallholder farmers cultivate between one and three hectares, with limited access to modern farming equipment, inputs and improved varieties (Mmasa 2013). Agriculture also constitutes a greater proportion of 81 per cent for women in terms of their economic activity as compared to men (73%). In rural areas alone, the percentage rises to 98 per cent for women. In light of these statistics on the role of women in agriculture, the Minister of Community Development Gender and Children argued that:

There should effective programs and policies to empower African women and allocate more resources towards gender equality and women's empowerment.¹

Information from the review of a report by Shayo (2015) showed that in general, most women in rural areas are more actively involved in food crop production primarily on staple food crops such as maize and cassava as well as in the processing of agricultural products than men. This attests to women dominating most agricultural activities in rural communities of the country (see, also Table 1.1).

¹Honorable Sophia M. Simba, Ministry of Community Development, Gender and Children (MCDGC) - 7 April, 2011.

Table1. 1: Gender Division of Labour in Rural Agricultural Communities in Tanzania

Task	Male (%)	Female (%)	Total (%)
General Production	44	56	100.0
Food Crop Production	25	75	100.0
Land Tilling	44	56	100.0
Sowing	26	74	100.0
Weeding	30	70	100.0
Harvesting	29	71	100.0
Marketing	27	73	100.0

(Source: Adapted from a Report by Shayo (2015))

In Tanzania, an important dimension of gender analysis is the examination of daily, seasonal and spatial patterns of work of men, women and children in domestic, agricultural enterprise and livelihood activities (Shayo 2015). In most rural areas in Tanzania there is a clear pattern of participation and division of labour between men and women that is not uniform, but varies from place to place depending on the type of economic activities and local cultural norms and values. The daily work pattern of women and men differ substantially especially during the rainy season. In general, women were found to work longer hours and have more varied tasks and responsibilities compared with men (Shayo & Martin 2009).

These responsibilities range from productive to reproductive roles. In households where they can afford breakfast, the woman prepares breakfast. Otherwise, for the majority the usual practice is to go to the farm directly. Both men and women stay on the farm until midday when they both come back home for lunch which is prepared by the women. After afternoon meals, both men and women rest for a while before going back to their respective farms until around 5 or 6pm in the evening. The women collect firewood and vegetables and perform other household chores.

Thereafter, women go back to their respective homes to attend other household chores, while men go out to socialise and visit relatives. As was observed in Mpanyani village, it was reported that some men can stay out until past ten o'clock or later when there are social events such as the world soccer cup. The interaction of gender, age and land and crop management can be complex and is closely related to household structures.

For cultivation of crops, men and women have joint plots (usually husband and wife together) or separate plots – the latter being more common in female headed households and in polygamous households (Shayo & Martin 2009). Separate plots for men, women and children were more common in the Lake Zone, but were also found in the Southern Zone in Masasi District. Separate plots can afford women more direct control over the land and the yields generated from it, in most cases. Cassava is grown by both men and women in family farms or on men or women only managed farms. Women headed households usually manage their own land and crops; and young people in a household may have their own plots (Shayo & Martin 2009). Both men and women are involved in livestock rearing, particularly small stock in the case of women. In women headed households, they have the liberty to dispose of their livestock and decide on their use of income. In communities near water, men's activities included fishing and irrigation farming of horticultural crops. In the Lake Zone, both men and women are involved in production of cassava.

However, men are responsible for cultivating land and marketing produce while women are predominantly responsible for more regular tasks such as planting, weeding and cassava processing. A similar picture was reflected in the Eastern Zone where men mainly carry out the heavy agricultural tasks (e.g. land clearing, ploughing and ridging) at the beginning of the season, while women are more involved with tasks, particularly weeding, which are carried out over the whole of the cropping season (Shayo & Martin 2009). The involvement of women in such regular tasks such weeding throughout the cropping season means that women have limited time for leisure and visiting relatives and friends. Some of the activities that are more likely to be done by men were land clearing and tillage, while women specialised more in cassava processing activities, as reported in the Lake Zone. Children assist with some activities such as peeling or

washing. However, processing and packaging activities are done by women only in order to guarantee quality of the final product.

Men were increasingly becoming involved in cassava processing activities. Cassava roots are perishable and they easily get spoiled within three to four days after harvest. They are also heavy, because of the high moisture content (nearly 70%). In addition, cassava roots contain cyanogenic glucosides which break down to form hydrocyanic acid (HCN) that is toxic and poisonous if consumed in large amounts. Processing of cassava root tubers is necessary to reduce the moisture content and weight and to improve product storage, enhance flavour and reduce the HCN potential. Cassava traditional processing methods are very effective in reducing the HCN potential to safe levels, if properly carried out. It is mainly women who carry out processing of traditional cassava flour. Gender specialisation in cassava value chain activities appears to be more marked in the Lake Zone than the Eastern or Southern Zones of Tanzania, especially in the processing node (Shayo & Martin 2009).

Most of the cassava farming activities carried out by men that include cassava cultivation are labour intensive, but short term, whereas those of women are more routine and time consuming. Given the importance of women's tasks in the management of the cassava crop, including women in training is vital for cassava development programmes to be effective in enhancing food security and alleviating poverty among smallholder farmers' rural households (Shayo & Martin 2009). However, women's work patterns, cultural norms and values present serious logistical challenges to finding appropriate times and locations for training them in cassava value chain activities.

In all regions, labourers are hired to assist with field operations such as weeding and harvesting, although in the Southern Zone this has been observed to be restricted to the relatively better off families who employ hired labour during land clearance, tilling, weeding and harvesting. In most families, the common practice is for their own children to assist in almost all these activities (Shayo & Martin 2009). This is purposely done in order to develop and impart knowledge and

skills to the children for use in future. In the Lake Zone smallholder farmers employ hired labour to assist with cassava harvesting and processing tasks. The cost of hiring labour varied from village to village and was negotiated between the farmer and labourer.

Both men and women hired labour for weeding, harvesting and to some extent processing of cassava root tubers. Women use part of their incomes from other income generating activities such as vegetable production and livestock rearing to cover these costs (Shayo & Martin 2009). In some areas of Lake Zone (Kagera region) and some locations in Mtwara in Southern Zone, the practice of collective labour was common for some activities in cassava production. For example in Mtwara area, participants undertaking communal labour for harvesting were provided with food and allowed to take home pieces of left-over cassava. No cash payment is provided to those who participate in this communal activity.

Men are dominant in marketing in the Lake Zone and in other zones more men than women are involved in agricultural trade, selling cassava, fish, cashew, rice, maize and sesame in local weekly markets and road sides marketing. In all villages, women tend to play greater roles in household activities performing productive and reproductive roles. Responsibility for family health care, appears to be shared, however, child care duties and water and firewood collection still fall mainly on women, although these roles are beginning to change in some communities with men taking responsibility of some of the chores such as fetching firewood and water.

In the Southern Zone where water is scarce, women can struggle in carrying out these roles. However, despite these changes, men are still dominant in relation to land ownership and control and decision making, particularly the utilisation of incomes from family farms and or other income generating activities, including those of women. Gender roles are changing however, particularly with the increase in female headed households in Tanzania. For example, in the Fumagila village (Mwanza) women reported that about one third of the households are headed by women (Shayo 2015). These include widows (90%) and a few mature women who are not

married but have children. Nationally the percentage of rural households which are female headed has increased from 16.7 per cent in 1991/92 to 23 per cent in 2007

Women's participation as office holders in organisations that support farmers as well as in cooperatives tends to be more limited in Tanzania. A much similar example is in the Zimbabwean context, where despite the fact that women constitute 75 percent of the members in the Zimbabwe Farmers Unions, only 5 percent of the management and decision making officials are women (Shayo 2015). Contrary to the situation in Tanzania and Zimbabwe, the largest numbers of women decision makers are found in the Sudan, where 14 percent of the office holders in agricultural cooperatives are graduate women. Generally, in Africa, few women hold policy-making positions at the national level and those that do, tend to be concentrated in social ministries such as education, health and women affairs.

The predominant patriarchal system, customs and traditions that discriminate against women in resource ownership and decision making continue to perpetuate gender inequalities, and institutional aspects within the agricultural sector of most developing countries such as Tanzania. It is against this background that this study seeks to address the gender gap within the cassava value chains with particular focus on the household level. Cognisant of the macro level guiding policy frameworks within which the cassava and gender aspects are situated, a micro level study is done identifying the cassava value chain actors and changing gender roles within rural households.

1.3 Statement of the problem

Gender patterns of resource allocation at the household level results in gender inequalities in cassava value chain participation, empowerment and sharing of benefits. This eventually results in poverty and food insecurity among smallholder farmers, and women in particular (Ahmadu & Idisi 2014). This is attributable to the non-unitary household preferences that differ along gender axis within households. One of the conceptual weaknesses that are evident in the current body of literature is the masking of power struggles and inequities within households (Dunaway 2001). Because intra-household gender inequities have been ignored women have been transformed into

appendages of households, eventually excluding them from the agriculture commodity value chains participation. Women's lack of mobility and thus lack of access to productive resources, as well as social norms, impede their interaction with cassava traditional food value chain actors. They are often excluded in horizontal linkages for example relationships within one organisation, group of producers or self-helping groups as well as in vertical linkages for example with buyers and suppliers.

In most developing countries such as Tanzania, women tend to be less integrated in agriculture value chains than men, since they are often lacking access to land and capital, which restricts their participation in agriculture value chains. Hence most decisions regarding the production and the distribution of yields and benefits are left to the male head of the household thereby making it difficult for women to share the benefits proportionally (Nakazibwe & Pelupessy 2014). These gender inequities arise from disparities in access to factors of production, land in particular and education, gender disparities, inequities in time budgets, gendered labour markets and power imbalances or cultural norms that affect participation of individuals in decision making. The extent to which men and women gain from their involvement in agricultural commodity value chains is governed by a complex set of factors, many of which are gender related (Coles & Mitchell 2011).

The majority of the agriculture value chain studies have restricted their analysis at value chain level and have failed to identify the underlying issues that cause gender inequalities at the household level (Coles & Mitchell 2011). Hence, this study will restrict its focus to the micro (household) level to address this gap. Similarly, Nakazibwe and Pelupessy (2014) highlight that most existing research has concentrated on the agricultural nodes of modern high value chains and lacks a gendered conceptual foundation addressing household power dynamics. Moreover, scarce attention has been given to traditional staple crops such as cassava, and feedback effects of gender relations on the chain especially at the household level. There is no empirical evidence on the extent to which cassava value chain affect the way in which men and women participate and gain (Coles & Mitchell 2011).

Likewise, most of the studies on agriculture commodity value chains like those by Me-Nsope and Larkins (2015); Ahmadu and Idisi (2014); and Coles and Mitchell (2011) have been reporting changes experienced by smallholder farmers in terms of yields, prices, sales, and incomes; they rarely investigated whether these changes resulted in improvements in empowerment (decision making) as well as the benefits for women and individual household members (which is the focus of this study). According to Me-Nsope and Larkins (2015), studies that systematically investigate gender issues along agriculture commodity value chains are nearly non-existent. Few studies that exist for example Snapp, Blackie and Donnavan (2003), mostly focused on the production stage of the value chain only. Most studies have been focusing on the nature of the commodity as it goes through the chain which is not an exhaustive view of who benefits and who loses from transactions along the chain (Nakazibwe & Pelupessy 2014). This is because the way value chains operate can affect some social groups negatively although these value chains offer opportunities for men and women through better market linkages and employment opportunities (Mutua, Njuki & Waithanji 2014). Lack of gender desegregation makes it difficult to examine how men and women are affected differently so that gendered inequalities can be addressed (Nakazibwe & Pelupessy 2014).

Previous studies on value chains and gender explored the employment and retail ends of a buyer-driven chain, using the horticulture value-chain linking Chile and South Africa to Europe (Barrientos, Dolan & Tallontire 2001). Jeckoniah, Mdoe and Nombo. (2013) analysed onion value chain to determine its impact on gender roles, relations and distribution of income in the onion value chain in Tanzania. They found that women participation in marketing of onion is constrained by many factors including limitation on movement placed by their husbands and male partners. Men have the control of income from coffee production in Uganda in spite of the big share of women's work in organic and fair trade production (Mayoux & Mackie 2007). Very limited research has been done to explore the gendered approach to the impact of cassava value chain and market linkage among smallholder farmers.

At the core of this study is an examination of different assumptions that I argue are key to cassava playing a role in poverty reduction and food security for poor women. Firstly, value chains are embedded in a social context and the functions and operations of the chain actors

cannot be isolated from the gender roles (Rubin & Manfre 2014). Value chain operations; in turn influence gender roles and relations (Rubin & Manfre 2014). Thirdly, gender equity and value chain competitiveness are mutually supportive goals. Research has indicated that gender inequalities are costly and inefficient (Rubin & Manfre 2014). Finally, the study assumes that unitary household preferences do not exist within households, hence the inequalities along gender axis in the cassava value chains are assumed to exist.

1.4 Research questions

The study is framed into one broad question and four minor research questions which seek to draw answers on issues regarding gender inequality and cassava value chains

1.4.1 Main research question

How does improved women empowerment and participation at various cassava value chain nodes enable women and men to escape gender inequality at the micro (household) level?

1.4.2. Minor research questions

- Who are the main actors in the cassava value chains? What position and roles do women and men occupy within the cassava value chain in Tanzania? How does the functioning of cassava value chains impact on intra- household gender dynamics?
- Do women have access and control (decision making) over productive resources, benefits and time at micro level in the cassava value chain in Tanzania?
- What are the most important determinants of women participation in the cassava value chain and market linkages in Tanzania? How are the cassava value chain benefits (gains) distributed along gender axis in smallholder farming systems of Tanzania?
- Under what circumstances can women and men participate and be empowered at the household level within a cassava traditional food value chain?

1.4.3 Main objective

The value chain approach is used to conduct an intra-household gendered analysis of roles; position, resource ownership, decision making; participation; household power dynamics and benefit sharing among cassava smallholder farmers. Improved participation and empowerment particularly for women in agriculture value chains results in food secure households and reduced poverty levels for the rural marginalised households.

1.4.4 Specific objectives

- To identify and characterize cassava value chain nodes and key chain actors, service providers, facilitating organizations and map intra-household gender implications for the purpose of identifying opportunities and constraints for discerning appropriate interventions;
- To determine the level of decision making and control (empowerment) of production, resources, income, leadership and time by men and women using the 5DE empowerment sub index of the WEAI in the cassava value chain among smallholder farmers in Tanzania;
- To analyze the factors influencing the participation of women and men in the cassava value chain as influenced by household gender dynamics among smallholder farmers in Tanzania; and
- To develop an intra-household gender based cassava value chain conceptual framework (model) at the micro level among smallholder farmers.

1.5 Organization of the thesis

This study comprises of nine chapters. The study adopts a structured approach, with each chapter focusing on addressing a specific research objective in detail:

Chapter One provides the introduction of the study detailing the statement of the problem understudy, covers the research questions, objectives and the underlying assumptions. It is in this chapter that an in-depth background on the significance of agriculture to the Tanzanian economy, cassava value chains and gender is done to illuminate the research gap and justification for the study. The chapter also provides an outline of the structure of the thesis. The chapter ends by providing a list of definition of terms which were considered key building blocks to this thesis.

Chapter Two deals with the critical review of relevant literature for this study. Throughout the review of literature, attempt is made to provide a conceptual framework in which gender inequalities in the cassava value chain can be conceptualised and analysed. The framework also

considers how various cassava value chain actors interact to influence decision making and participation at household level. Throughout the analysis, emphasis is placed on the position and role of women in securing food security and poverty eradication within the smallholder farming sector. A scholarly review of cassava value chains, women empowerment and factors affecting participation of women in cassava value chains are done to tease out the gender gap among smallholder farmers in the neglected cassava value chains.

Chapter Three shares a detailed a presentation of the study design, sampling methods and techniques, data collection and the data analysis methods used. This chapter explains how the data collected and it also provides an explanation of whether the data collected managed to answer the research questions. It is in this chapter that the ethical clause is outlined giving the details of how respondents were handled ethically. It finally gives an account of the challenges that were faced during field work and how they were handled.

Chapter Four: This chapter takes an in depth characterisation of the case study sites. A detailed explanation of the climatic conditions that are common in Tanzania in general and in the specific case study sites of Geita, Kigoma, Zanzibar and Mkuranga are presented. The characterisation of soils and farming activities in the case study sites is also documented in this chapter. Major livelihood activities practised by women and men in the respective study sites were also explained in this chapter.

Chapter Five is an attempt to understand the cassava value chain map and the enabling environment, detailing gender roles within households and the roles of various actors in the cassava value chains in Tanzania. This chapter disentangled the different nodes of the cassava value chains into inputs supply, production, harvesting, processing, transportation and marketing. At each node the implications of intra-household gender dynamics are examined, underpinned by the Harvard analytical conceptual tool of activity profile within the cassava value chains. In this chapter, a cassava value chain map is developed depicting how various actors, channels and cassava products move along the different cassava value chain nodes.

Chapter Six investigates women and men's empowerment (decision making; control of resources; benefits sharing and allocation of time budget) using the five domains of empowerment (5DE) sub-index of WEAI at the household level in the traditional cassava value chains. Empirical evidence is used to describe the five domains and the ten indicators of the 5DE sub-index of WEAI. The 5DE domains and indicators are then used to compute the 5DE disempowerment index for men and women in Tanzania. The access and control profile of Harvard Analytical conceptual framework guided this chapter to determine the extent to which men and women control productive resources and assets owned. It provides an in-depth view of gender inequalities due to gender power dynamics in the household and other exogenous factors. The chapter also provides empirical evidence of the relationship between household characteristics and 5DE empowerment index.

Chapter Seven focuses on the participation of women and men in the traditional cassava value chain at micro level. As outlined in Chapter 2, it adopts the guiding Harvard Analytical tool of examining influencing factors within the cassava value chains. The study therefore, analyses the major determinants of women and men engaging in cassava production and decisions to participate either as seller or buyer in cassava value chain markets using a biprobit model. Ordinary least squares regression is also used to determine factors influencing the quantity of cassava produced and the quantity of cassava sold on the market. The Heckman's procedure is employed for selectivity bias in this chapter.

Chapter Eight provides a household level based conceptual framework illustrating the interaction of actors, regulations, shocks, others exogenous factors affecting the functioning of cassava value chain at the household level. Drawing from the Harvard Analytical framework underpinning this study, the Colfer & Minarchek (2013) conceptual framework on gender and forest resources management was applied to develop the micro level gender based conceptual framework useful in cassava value chains and related fields.

Chapter Nine outlines the conclusions and the recommendations based on the empirical evidence on cassava value chain mapping, women empowerment, determinants of women and men participation in the cassava value chains. Concluding remarks from the conceptual framework developed were also outlined. The chapter gives a summary of the findings and draws conclusions from them as well as the recommendations. The chapter pulls together the emerging themes and their implications for policy detailing how the policy frameworks can be implemented and the benefits that emanates from such policies. This chapter also gives insights for further study.

Chapter 2

Literature review on cassava value chains, gender and agriculture policy framework in Tanzania

A good literature review is comprehensive, critical and contextualised

(Hofstee 2011)

2.1 Introduction

This chapter is a review of relevant literature. The objective of the literature review is to develop an analytical framework. As such, the chapter provides a detailed explanation of the Harvard Analytical Framework adopted by the study. The chapter also deals in great detail with gender dynamics within the cassava value chain. These include issues pertaining to the value chain structure, gender roles, women participation and empowerment. The chapter then provides an analysis of women's control of resources, decision making and bargaining within the household. The chapter also takes a broad review of factors affecting the participation of women agriculture value chains. The rest of this chapter is organised as follows: The first section gives an account of the conceptual framework upon which the study is grounded, followed by the reviewing of literature for the sections of value chains and value chain analysis. The detailed review of cassava value chains, gender and cassava value chains, women empowerment and factors influencing participation of women in the cassava value chains follow the first section.

2.2 The conceptual framework

According to De Janvry and Sadoulet (2009), the impacts of agricultural growth and development on poverty reduction and the promotion of food security may be at least three times greater than the combined impacts of other economic sectors within developing countries. As reflected in the UN Sustainable Development Goals (SDGs) for 2015, most contemporary discourses on global development centre on issues of food security, poverty reduction, and gender inequality. This study adopted a conceptual framework that brought together a gender focus at the household level with a pro-poor value chain approach to analyse, in a coordinated manner, a comprehensive range of cassava-related activities and constraints relating to input supplies, production, processing, governance, supporting infrastructure, and credit and marketing. As the study focuses on addressing the gender gap in the cassava value chains in smallholder farming systems, it adopts the Harvard Analytical Framework as the guiding frame of analysis.

The Harvard Analytical Framework is also one of the earliest frameworks to systematically consider both women and men and their different positions in a societal set up (Rubin *et al.* 2009). The framework is premised on the principle that allocating resources to women as well as men in development efforts makes economic sense and will make development itself more efficient (Rubin *et al.* 2009). One of the fundamental aspects to Harvard Analytical framework is the adequate data collection at the individual and household levels in three components that is activity profile, access control of resources and benefits and the determining factors (Rubin *et al.* 2009). This study is premised upon the Harvard Analytical Framework since it looks at household power dynamics in the context of cassava value chain at the micro level. Empirical evidence was therefore, gathered at individual and household levels focusing on resources access and ownership, engagement and participation in cassava production, gender roles and cassava activity profiles.

This framework is also referred to as the gender roles framework. It argues that there is economic case for allocating resources to women as well as men. According March, Smyth and Mukhopadhyay (1999), the Harvard Analytical framework is used as a matrix for collecting data at the micro level in mapping the work and resources of men and women in the cassava value chain and highlighting their differences. This framework is therefore, the most relevant to this study, since my main focus is on household (micro level) gender dynamics and also that it emphasises gender roles investigation in agriculture value chains.

2.2.1 Harvard Analytical Tool: Activity profile

One of the key tools of this framework is the assessment of the activity profile which identifies all relevant productive and the reproductive tasks of women and men in the cassava value chain thereby addressing questions like who does what and how (Rubin *et al.* 2009). In the process, household time budgets are also investigated. This was adopted in this study where the specific roles of women and men were identified in Chapter 5. This activity profile also provided grounding for investigating the time domain for women and men to contribute to the five domains of empowerment (5DE) sub index of women empowerment in Chapter 6. It therefore provided a platform to assess the time burden for women and men at the respective study sites in

Tanzania. The intra-household activities of women and men determine how resources are owned and also how benefits from the cassava value chains are shared.

2.2.2 Harvard Analytical Tool: Access and control profile

Another key analytical tool of this framework is the access and control profile. In this context, there is the identification of resources women and men use at each cassava value chain node and determination of who does the decision making within the household (Rubin *et al.* 2009). This entails determination of who controls the use of resources such as land and also the benefits derived from the selling of cassava products. According to this study, women empowerment will be investigated in Chapter 6 using the five domains of empowerment (5DE) sub index of the Women Empowerment in Agriculture Index (WEAI) to determine how women control resources, allocate time and control the benefits. Determination of access and control of resources within households gives a picture of gender inequality since individual preferences within a household are different as such those with power would use it prop up their preferences (March *et al.* 1999).

2.2.3 Harvard Analytical Tool: Influential factors

This tool allows for the determination of factors which influence the differences in participation of women and men in the cassava value chain. Factors influencing control of productive resources such as land, equipment and cash are examined as well as asset ownership, basic needs and decision-making power. The primary purpose of investigating these factors is to consider which of the factors affect women's and men's activities or resources and how they in turn can affect them within their households. The intention is to assist in identifying external challenges and opportunities and anticipate the required inputs to make the value chain beneficial to the marginalised women. Such factors include among others community and social hierarchy, demographic factors, institutional structures, economic factors and education and political factors. These factors are also necessary for development interventions to take into consideration in strengthening and upgrading cassava value chains. These factors are extensively dealt with explained in Chapter 7 of this study.

The value chain concept was propounded and popularised in 1985 by Michael Porter in the ‘*Competitive advantage*’, a seminal work on the implementation of competitive strategy to achieve superior business performance. As already alluded to in Section 1.1.3, the term value chain can also be defined as “all activities that are requisite for bringing 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 consumers, and final disposal after use” (Kaplinsky & Morris 2000). Similarly, Kumar *et al.* (2011) define a value chain as a range of activities that are required to bring a product from its conception, through its design, sourcing of raw materials and intermediate inputs, processing, marketing and distribution, to the final consumer.

The term ‘chain’ denotes the fact that cassava products are a result of a series of activities and services from the field to the market with men and women taking various responsibilities. The complex network of activities carried out by different actors in the cassava value chains mean that attention must be paid to the activities that people are involved in, particularly those of women and how they are linked together through services such as processing, transportation, banking services, marketing, and value chain governance. Although the flow of goods is crucial in value chains, other determinants of value chain participation particularly for marginalised women such as credit or financial flows, changes in ownership rights of productive resources and assets, as well as markets need to be considered (Coles & Mitchell, 2011).

Riisgaard *et al.* (2010) report that adopting the value chain approach as a development strategy provides an opportunity for all actors at each cassava value chain node to understand each other’s functions and the activities involved in a coordinated manner. This approach increases the viability, visibility, voice and market share of the various actors; and identify and correct barriers and gender gaps that cause intra-household gender inequalities. This is particularly so in marginalised and low value chains such as that for cassava where intra-household gender dynamics play an important role in the ownership of productive resources, decision making and sharing of benefits. The gendered analysis of cassava value chains at household level helps in generating corrective value chain interventions aimed at creating or enhancing horizontal

relationships (among actors within the same level in value chains) and or vertical relationships (among actors in different levels of a value chain) with an aim of improving returns and increasing efficiency (Riisgaard *et al.*2010).

These value chain interventions by various actors may include formation of new value chains, forging or strengthening new links within an existing value chain, increasing the capabilities of marginalised women to improve the levels of value chain participation and minimising the possible negative impacts of value chain operations on vulnerable gender group within households (Riisgaard *et al.* 2010). The typology of value chains can either be market-driven or relation-based depending on the form of governance they adopt (Farnworth 2011). Market driven value chains are those for whom price is the determinant of who the key actors will be and how long their transactional relationship will last (e.g. local wet markets in rural areas for crops such as tomatoes and cassava).

The cassava value chains are classified as market driven value chains, since the supply of the products determines who the actors are and the activities are determined by the seasonal availability of the product. Value chains that are classified as relational value chains are those in which the lead actors, such as buyers in contract farming cash crops and or intermediaries (exporters) in tea, coffee and horticultural trade determine the transactional framework within which other actors will work, resulting in producer-driven, buyer-driven, or intermediary-driven relational value chains respectively (Riisgaard *et al.* 2010). This is common for high value crops and global agriculture value chains.

2.2.4 Value chain analysis

Rubin *et al.* (2009) describe value chain analysis (VCA) as “the process of documenting and analysing the operation of a value chain, and usually involves mapping the chain actors and their associated roles as well as calculating the value added along its different nodes.” In this study the analysis adopts a gendered approach in which intra-household gender dynamics are considered to be the main drivers of gender inequality in cassava value chains. In the context of global value

chains, value chain analysis is also perceived as a means of understanding trade at the global level (Riisgaard *et al.* 2010) as well as strengthening systemic competitiveness (Kaplinsky & Morris 2000).

Considered in the context of traditional food value chains, it aims at understanding the structure and operation of the perceived cassava inputs supply, production, harvesting, processing and marketing of cassava among smallholder farmers and other key value chain actors. The main focus is on women and how they control resources, make decisions, access benefits and participate in the cassava value chains in Tanzania. It identifies vertical and horizontal components in a system of stages or nodes of physical transformation processes that are inter-linked by transactions that occur between the different nodes (Mayoux & Mackie 2007). The value chain is a holistic approach because it pays attention to the complex interactions of activities and actors, income, value added across the chain and how these affect women and men and also how in turn the actors are affected by the functioning of the cassava value chains.

Application of the value chain approach for examining the development of agriculture commodities has been identified as an important strategy for enhancing efficiency and coordination. It also plays a critical role in enabling policymakers, development practitioners, donors, and academics to develop an understanding of cassava production methods, processing and marketing, and the gender and power dynamics between actors at the levels of both the household and the value chain (Kaplinsky & Morris 2001). This is because the use of a value chain approach enables the identification of gaps and interventions that can benefit marginalised groups such as women and the poor (Coles & Mitchell 2011).

2.3 Cassava as a strategic staple food crop

2.3.1 Importance and contribution of cassava to food security and economy

Cassava (*Manihot esculenta* Crantz) is an important crop in many African farming systems. It does not only play an important role in food security, but also serves as an income generating crop. It was introduced to Africa in the 16 to 18th century, but it took until the 20th century for

production to seriously take off (Hillocks 2002). The total world cassava utilisation is projected to reach 275 million tons by 2020 (Westby2008) with some researchers estimating the number closer to 291 million tons (Westby2008). Africa is the largest producer of cassava constituting about 62 per cent of the total world cassava production. Nigeria is leading the world with 19 per cent of the global market share (Hillocks2002). East Africa (Tanzania, Kenya, Uganda, Rwanda and Burundi) accounts for 11 per cent of total production of cassava in Africa (Fermont 2009).

Cassava contributes an average of 15 percent to the Tanzanian national food production basket and is second to maize, which is the leading staple food crop (Mtambo 2007). According to ASDS (2001), cassava could be used to bridge the income poverty gap in Tanzania. Cassava production plays a crucial role in food security for both the rural and urban realms contributing to inefficient product movements (Collinson *et al.* 2000). Tanzania, which has a typical African agro-based economy, was selected for the study. In this country, approximately 80 percent of the population depends on small-scale farming for their livelihoods and around 20 percent of the GDP is derived from the agricultural sector (Eskola 2005). Cassava is mostly produced in the following regions in Tanzania: the coastal, northern, eastern, and lake regions, as well as in Zanzibar (Kapinga *et al.*2005).As already alluded to earlier in chapter one, Figure 1.2 illustrates the quantity of cassava produced in the various regions of Tanzania.

2.3.2 Cassava crop production

In sub-Saharan Africa, cassava is cultivated on small farms often in fields that are to be set aside as fallow and often cropped on marginal soils, replacing crops that require greater soil fertility and cultivation. Such aspects make cassava, although generally considered cheap food energy, significantly central to food security among women smallholder farmers whose access to arable land is mediated by a number of social factors (Westby 2008). Moreover, cassava's all year round availability and its tolerance to extreme ecological stress conditions, makes it a suitable crop for Africa given the changing climatic conditions (Westby 2008). The crop is also suitable for the present farming systems, since it is commonly intercropped with early maturing annuals such as maize, beans and vegetables. Cassava is mostly cultivated in the humid forest zones and

the sub humid savanna regions of Africa and South America, as well as in some parts of Asia (Westby 2008).

Over the last 10 years, annual yields of cassava tubers have increased by 1.18 percent annually, while production has increased by 0.67 percent annually (FAO 2011). Cassava yield estimates range from 6.5 to 12.0 tons per hectare between countries (Faostat FAO2009). Within the Great Lakes Region, it is the most important staple food crop in terms of total production, followed by maize, sweet potato and cooking bananas. Production of cassava is concentrated in two contrasting agro ecological zones: the mid-altitude area in the Great Lakes Region and the coastal zone of Tanzania and Kenya (See Figure 1.2). Cassava's importance as a strategic crop is becoming more pronounced in many vulnerable countries in Africa, especially as cassava roots require few inputs and can tolerate dry weather conditions. These attributes are supporting long term programmes for the commercialisation of cassava as a food crop, principally in a processed form, and are also behind government food-security initiatives with the support of international donors.

Harvesting cassava is labour-intensive and almost exclusively non-mechanised in Africa. This activity has serious implications on the gender roles of women in households since planting, weeding, processing and harvesting are predominantly done by women in smallholder farming systems. Since the shelf life of fresh cassava will perish within two days after uprooting, farmers sometimes choose to delay or stagger the harvest until they have buyers for the cassava, hence the harvesting predominantly follow a piece meal approach (Westby 2008). Limited processing facilities and sometimes markets contribute to the piece meal approach to the harvesting of cassava. In the process farmers experience very high infield post-harvest cassava losses while the crop is being kept in the field waiting to be harvested. This is particularly a burden for women farmers both in food provision for their households who have no time to relax or time for leisure (Hillocks, Thresh & Belotti 2002).

2.3.3 Cassava processing

2.3.3.1 Peeling of cassava tubers

Cassava root tubers are bulky and therefore, require processing to increase shelf life and make it easier to transport to distant markets. Cassava tubers must be peeled, chipped, soaked or fermented, dried, and sometimes grated. Peeling represents the most labour-intensive unit operation of the cassava value chains, non-mechanised and traditionally done by women and sometimes children. The process of peeling represents a critical stage in terms of food safety as the process removes the outer periderm of the root, where the highest concentrations of poisonous cyanogenic compounds lie (Abbas 2008).

When women farmers are able to efficiently and effectively chip, grind, and dry cassava, they are better able to trade with bulk purchasers in local markets such as the middlemen and have higher bargaining power after having added value to the tubers. Improved incomes will be realised when farmers, particularly women are able to guarantee processed cassava for products that are high-quality inputs and have a long shelf-life to their customers (Hillocks, Thresh & Belloti, 2002). Peeling of cassava roots, for both domestic and industrial purposes in Africa is still not mechanised. The process is labour intensive, time consuming and unsuitable for large volumes of tubers. However, the process may be suitable for smallholder cassava producers where cassava yields are usually manageable. According to Akosua and Bani (2007), the traditional methods of peeling cassava results in an average of about 6.1 percent loss of viable cassava.

2.3.3.2 Grating of peeled cassava

This procedure is done in order to reduce the size of tubers responsible for increasing surface area for drying and extracting the starch from the root. Grating is often mechanised in West Africa as well as some parts of East Africa such as in Tanzania (Abbas 2008). In places where grating is not mechanised, the step represents an extremely labour-intensive component of the value chain. Graters have been successfully introduced in Nigeria and are now widespread. In Tanzania, graters have been introduced, but are common among small scale cassava cooperative processors owing to affordability challenges. Grating has been commonly associated with

women especially when it is done manually (Abbas 2008). In cases where grating machines are used, men also become involved in the process for the maintenance of machines as well as additional man power where women are not capacitated.

2.3.3.3 Drying and dewatering

Cassava root tubers are bulky, with 70 percent water by volume. Because of this, the processing of cassava should involve drying as a critical step for many processed cassava products such as flour. The process is usually sun drying. Solar dryers and other mechanised methods are usually used in cooperative processors especially in Tanzania. Sanni *et al.* (2007) reported that more efficient flash and rotary dryers with appropriate capacity for African scale of cassava production have been developed recently in Nigeria. Currently, farmers rely primarily on the sun for drying their cassava, although there are seasonal challenges which result in poor drying in times of cold weather. It is during this period that farmers, particularly women experience post-harvest losses as reported by Haggablade *et al.* (2008); farmers in Zambia experience reduced marketing of cassava as low as 20 tons in January when it is rainy season compared to 150 tons of cassava sold during the August to October when it is dry season. This has serious implications for women in particular given that cassava is widely grown by women for immediate household calorific needs. It is therefore, important that investigations be done to determine how men and women bargain within households on their gender roles.

2.3.3.4 Cassava products

Cassava is consumed in various forms across Africa. The majority of cassava is consumed either as fresh roots or as traditional processed products such as *gari* and *fufu* in Nigeria. Processing is important, because of the perishability of the fresh roots, which limits marketing. For example, Ugandans consume 80 percent of their cassava crop largely in raw form (i.e., cooked fresh roots), while Nigeria uses most of its cassava in processed forms. Traditional uses of cassava fall into nine categories as identified in literature: cooked fresh roots (that include pounded fresh cassava, locally known as *fufu* in Ghana), cassava flours: fermented and unfermented, granulated roasted cassava (*gari*), granulated cooked cassava (*attieke*, *kwosai*), fermented pastes (*agbelima*,

fufu in Nigeria), sedimented starches, drinks (with cassava components), leaves (cooked as vegetables) and medicines.

High quality cassava flour (HQCF) is of particular interest, because it can be used as a substitute for 10 percent or potentially more wheat flour in pies, pastries, cakes, biscuits, and doughnuts and has some industrial applications. In Tanzania small milling companies report sales to supermarkets of a ton of HQCF daily (Abass 2008). A cassava distributor in Tanzania estimates that the demand for animal feed comprised of 70 percent cassava chips reaches 5MT/day and likewise the demand for animal feed with 60 percent cassava pellets is 20 MT/day (Abass 2008).

In Tanzania, Shayo and Martins (2009) reported that across all study sites there were five common forms in which cassava was consumed, including cassava leaves, fresh roots, dried roots (grits and chips) and cassava high quality flour and traditional cassava flour. In all sites we found the following: In all households the consumption of cassava leaves as a vegetable (kisamvu) consumed together with cassava stiff porridge, 'ugali wa muhogo' or rice is very common in all households regardless of type (male or female headed), income (rich or poor) level of education, age or ethnic group. Cassava leaves have a nutritive value similar to other dark green leaves and is an extremely valuable source of vitamins A (carotene) and C, iron, calcium and protein (Abbas 2008).

The high consumption of cassava leaves in most households in the Southern Zone helps men women and children to acquire protein in addition to 25 of the vitamins and minerals (Shayo & Martins 2009). Women and girls are predominantly involved in the preparation of cassava leaves, traditional cassava flour and 'ugali wamuhogo'. Generally, cassava leaves are prepared by pounding them into pulp with a pestle and mortar, before boiling them in water along with groundnuts, and coconut juice or peas. This pounding, washing and boiling process eliminates cyanogens from the leaves and makes them safe for human consumption. In most villages in the Southern Zone, women prepare fresh roots of sweet cassava for breakfast. In some families, men and women of all ages and ethnic groups eat raw cassava roots of sweet varieties as a snack between meals (Shayo 2015). Some sell them in order to get income.

In all households, fresh roots of sweet cassava are roasted (mostly by women and girls) on an open fire while preparing food, or are boiled in water or fried in oil. The latter is common among petty traders (mostly men of all ages) who do it for sale. Across the sites visited, in most households (including male and female headed) cassava roots are processed and stored as dried roots. These dried cassava roots are locally known as makopa and are either stored in the house for later household use or marketed as chips, grits and traditional flour. There are two types of preparing dried cassava roots; one method involving fermentation and the other not fermenting. Fermentation is done through soaking of peeled fresh cassava roots for three to four days to enable the cyanide to come out.

Afterwards, the fermented cassava is dried in the sun by both women and men. Non fermented cassava is not soaked, but requires peeling, grating and pressing to remove the cyanogens before sun drying. Most of these activities are done by women. Peeling cassava roots are particularly laborious, and it is estimated that the task has a labour requirement of 20 persons per day, per hectare for cassava root peeling). Traditional cassava flour prepared without fermenting or grating/pressing is harmful because of the high content of cyanogens. Cassava grits or chips are milled into traditional cassava flour by women and girls at home by pounding with a pestle and mortar a few hours prior to the preparation for the evening meal. Some women's processing groups were making different snack products from the TCF (Shayo & Martins 2009).

2.3.4 Types of food value chains

Food value chains are categorised into four groups based on the participants and their interactions, markets targeted and the types of products that offered to the end consumers (Gómez & Ricketts 2013). These value chain categories are namely: 'modern'; 'traditional'; 'modern-to-traditional; and 'traditional-to-modern'. Wet markets, in turn, can include large, regional markets that function like distribution hubs, or smaller, local, weekly markets with more limited product assortment. These small weekly markets characterise Tanzania's smallholder agriculture production and marketing. Product availability in the FVCs tends to be seasonal.

2.3.4.1 Traditional food value chains

By western standards, value chains in developing countries are often considered to be primitive, fragmented, and made of multi-layered systems, particularly at the village and regional levels (Heilbron & Roberts 1995). This is particularly true with regards to the traditional food value chain, which comprises of small farmers, collectors, and wholesalers at the upstream levels. Traditional food value chains have been observed in the local banana traditional markets nearby and to several smaller central markets in and around South India. In South India, bananas form an important source of farmers' regular income as they can be harvested throughout the year. Traditional FVCs are common in small rural markets located close to the production regions. Such rural markets include those of Kigoma and Mkuranga and also those in Zanzibar.

The products that are delivered by traditional FVCs also travel longer distances to reach urban consumers primarily in lower-income neighbourhoods (Ruben, Boselie & Hualing 2007) like the transportation of cassava products from Kakonko to Mwanza and other urban markets in Kigoma town. Traditional FVCs are hypothesised to contribute to household food security and poverty reduction by increased access to staple food as well as increased sales of cassava products. Therefore, they reduce undernourishment, primarily in rural, remote markets by facilitating access to staple foods (Gómez & Ricketts 2013). This typically characterises cassava whose primary production is to meet dietary family needs and sold in times of surplus. Nutritional availability of traditional FVCs may be highly seasonal. In modern food value chains domestic and multinational food manufacturers procure primarily from commercial farms and sell through modern supermarkets outlets. Consumers in traditional food value chains (FVCs) follow long-lived patterns and most often purchase food directly from smallholder farmers and traders in regional and local wet markets, or from a network of traditional retailers that include independently owned, 'mom and pop' corner stores, street vendors or road side stands (Reardon, Spencer & Berdegue 2010; Gorton, Sauer & Supatpongkul 2011; Ruben, Boselie & Hualiang 2007). This applies to the cassava crop which is grown mainly by smallholder farmers and sold on road sides; middlemen buy and conduct cross border trading as well.

2.3.4.2 Modern-traditional food value chains

The modern-traditional food value chains involve a process where domestic and multinational food manufacturers sell through the network of traditional traders and retailers (for example the ‘mom and pop’ stores) (Gómez & Ricketts 2013). The traditional-modern food value chains involve supermarkets and food manufacturers sourcing food from smallholder farmers and traders. This chain results in increased income opportunities in high value crops and livestock as well as increased production and diversification (Gómez & Ricketts 2013).

2.3.5 The cassava traditional food value chain

Cassava is one of Africa’s most important food crops. It is the second most important staple food crop after maize in Sub-Saharan Africa, particularly in western, central and eastern Africa. This crop is widely consumed, because of its high calorific value and because it is the cheapest source of energy (Howeler, Lutaladio & Thomas 2013). Following cassava’s introduction into Sub-Saharan Africa in the 16th century, its high levels of resilience and adaptability to a wide range of ecological conditions have ensured its sustained production over many generations in this region (Pendera *et al.* 2004 ; Adebayo *et al.* 2010). Its low input requirements make it a particularly appropriate crop that can be produced by marginalised groups with a lack of resources such as smallholder women farmers. Cassava augments the incomes of farming households, generating employment opportunities, and can potentially benefit women as a result of reduced food prices as well as more convenience for traditional products. Nweke *et al.* (2002) indicate that cassava is not just a women’s crop; the more commercialised it becomes, the greater men’s participation in its production.

The ongoing transformation of agri-food systems in Africa, including cassava, with the increasing involvement of men, necessitates the conduct of a value chain analysis with a gender focus for understanding the structure and drivers behind cassava production, processing, marketing, and governance. This is because studies have revealed that access to and control of different nodes along the cassava value chain may be highly gendered (Quisumbing *et al.* 2014). This also implies an unequal distribution of benefits and burdens from participation in a value chain. Farnworth (2011) argues that value chains may be very short, as in the case of the cassava traditional food value chain, wherein producers and consumers either live within walking

distance of each other or the distances between them may be much greater, with produce being transferred between continents. Value chains are, therefore, categorised according to their associated decision making and control mechanisms into market driven and relational chains. Market driven chains are characterised by long-term relations between the participating actors, and the key governance mechanism is the market price for produce. All of the actors compete with no specific support provided for market access. Three categories of relational chains have been identified as: buyer driven, producer driven chains, and intermediary driven value chains (Farnworth 2011). Transactions within all of these chains occur within the framework of the value chain approach. Consequently, incentives are established to promote desired behaviour and the focus is on linking households to growing markets, so that they can earn incomes to purchase additional food. This may lead to the diversification of their diets and reduce their reliance solely on their own production for their food security. Figure 2.1 illustrates the cassava food value chains based on literature from banana value chains as demonstrated.

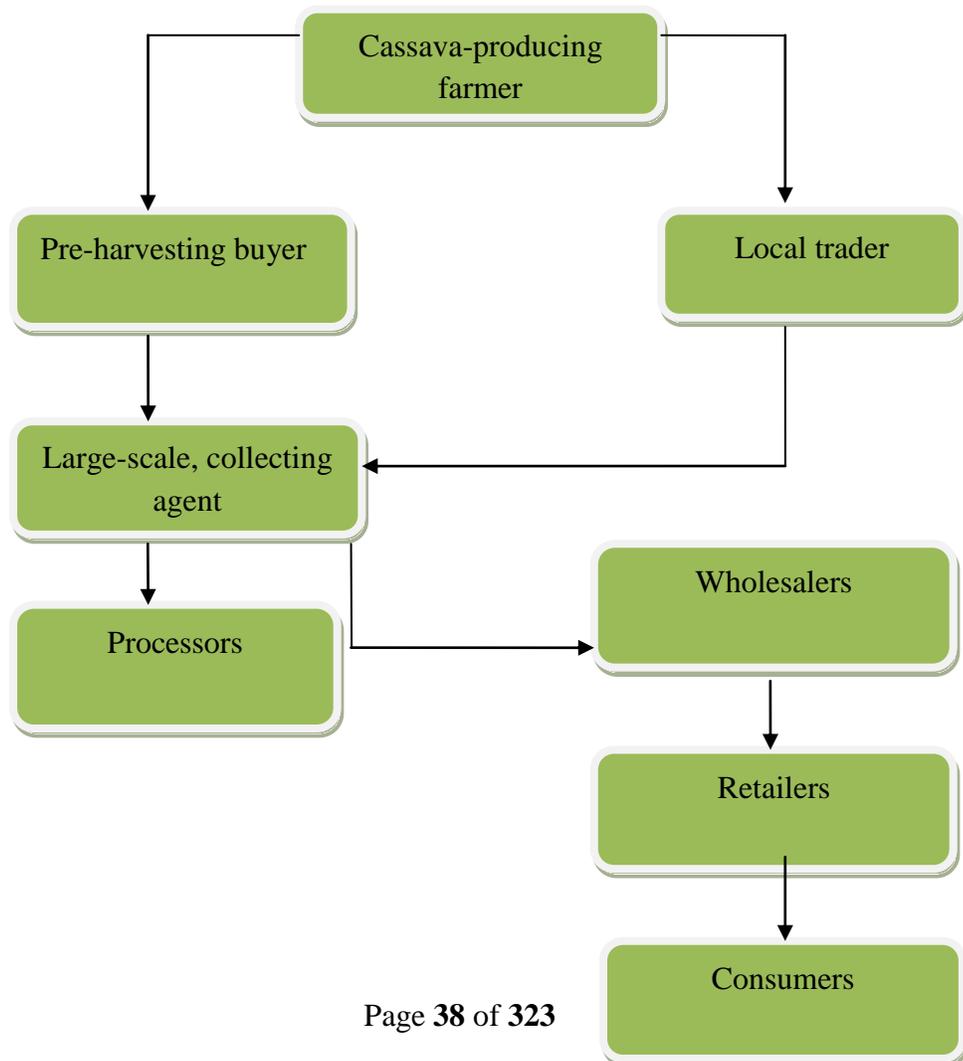


Fig 2.1: Traditional food value chain for cassava

In traditional food value chains, smallholder farmers sell their cassava regularly whilst still in the field to middlemen bulk contractors or to local traders. Bulk middlemen collect cassava root tubers and take them to urban distant markets and sometimes to other countries. Sometimes the local traders sell their produce at local wet markets. These markets are active only on selected days, once or twice in a week. On these days, sellers and buyers come to the cassava markets to sell and purchase cassava and other agricultural products. Cassava root tubers are graded based on subjective assessment of parameters such as weight and appearance. Middlemen buy cassava root tubers from the local smallholders at very low prices and get commission when they remit to the central buyer. The bulk buyer will then transport to urban markets where they sell to wholesalers. The bulk buyer may also sell the produce to the processors especially cooperative cassava processors. The cassava wholesalers may process the tubers before transporting them to destination markets to the retailers. The retailers will then sell the cassava products to consumers. The traditional value chain is depicted in Figure 2.1 above.

2.3.6 Agriculture food value chain governance

Gender also plays a strategic role in poverty alleviation in Tanzania. In the mid-1990s, the Government instated the Vision 2025 development strategy, which set out the national vision to attain human development and a fully developed economy. The principal goal is the development of Tanzania into a middle-income country by the year 2025. Key to this are the processes of moving to a more industrialised society and increasing productive agricultural

activities; emphasising livelihood improvement; peace, stability and unity; guaranteeing good governance; providing education and ensuring economic competition. Vision 2025 includes reference to the importance of gender equality and women's empowerment in socio-economic relations, political life and overall culture, in order to improve livelihoods and guarantee equal access to education and healthcare.

Despite the fact that men and women play a key role in the agricultural sector, they have been experiencing a variety of problems. Women especially those in the rural areas feel that they have been neglected in the planning of economic policies that affect their livelihood especially agriculture. This has exacerbated gender inequality and significantly compromised the impact of policies designed to raise household output and income especially with particular reference to strategic food crops such as cassava. Women and men need to be made more visible in economic analysis by institutionalising gender awareness in cassava value chains. This is necessary especially in terms of allocating productive resources to both men and women for purposes of enhancing agricultural productivity. However, most published data on rural economic activities have tended to underestimate the role of women in at the household level, food processing and other productive as well as reproductive activities. The collection of accurate gender-disaggregated information in cassava value chains will improve agricultural production and food security. Findings from a report by Shayo (2015) provide the following extract about the challenges faced by smallholder farmers:

.....limited capacities in terms of knowledge on various gender aspects including gender relations and gender roles among rural people in relation to resource allocation hinders effective women participation in agricultural activities. In most rural areas, resource allocation within the household is rarely equal. Some studies on gender-role assessment needs among rural women in Tanzania examined the power relations which govern men and women's access to, and control over, resources and showed remarkable gender differences. However, most agricultural programmes in support of women in agriculture tend to focus on the following issues: policy planning and research; training in gender analysis for government officials and agricultural extension agents and the establishment of coordinating mechanisms among the various bodies and organizations working with rural women; direct assistance to rural women; and projects focusing on ways to increase women's productivity

and income and thus household food security. Very few studies have focused on the influence of power relations among rural women and its effects on agricultural productivity in Tanzania.

Gereffi *et al.* (2001) built a theoretical framework to explain the mode of governance of a value chain to a combination of complexity of transactions, ability to formally describe transactions, and the competency of the supplier base, the combinations of which result in different coordination structures of value chains. There are five types of governance patterns in the global value chain approach. They are hierarchy, captive, relational, modular, and market, which range from high to low levels of coordination and power asymmetry.

Market: Market linkages are not completely transitory, as it is a typical kind of spot market; they persist over a time, with repeated transactions as in the case of traditional food value chains where repeated transactions are done at local wet markets. The essential point is that the costs of switching to new partners are low for both parties (Gereffi *et al.* 2001).

Modular value chains: Typically, suppliers in modular value chains make products to a customer's specifications, which may be more or less detailed. However, when providing 'turn-key services' suppliers take full responsibility for competencies surrounding process technology, use generic machinery that limits transaction-specific investments, and make capital outlays for components and materials on behalf of customers (Gereffi & Korzeniewicz 1994).

Relational value chains: In these networks, there are complex interactions between buyers and sellers, which often create mutual dependence and high levels of asset specificity. This may be managed through reputation, or family and ethnic ties. Many authors have highlighted the role of spatial proximity in supporting relational value chain linkages, but trust and reputation might well function in spatially dispersed networks where relationships are built-up over time or are based on dispersed family and social groups (Gereffi & Korzeniewicz 1994). The cassava food value chains are best classified under this category, since the interaction of customers and the suppliers (smallholder farmers) develop a mutual relationship especially in cases where the customer comes and buys the root tubers whilst they are still in the field prior to harvest. This is because a mutual relationship would have developed between the buyer and the farmer.

Captive value chains: In these networks, small suppliers are transitionally dependent on much larger buyers. Suppliers face significant switching costs and are, therefore, ‘captive’. Such networks are frequently characterised by a high degree of monitoring and control by lead firms. These types of value chains, however, do not apply to traditional food value chains where there are no lead firms and the suppliers are not captive since they can easily switch to a different market (Gereffi *et al.* 2001).

2.3.7 Constraints to cassava value chain development

There are many constraints hindering the efficiency of the cassava value chain, the two most important being perishability of the fresh roots and the presence of cyanogenic compounds in cassava. Because of its perishability, fresh cassava is mainly sold locally within the required shelf life of 2-3 days after harvesting. While some processing strategies have been developed in cassava producing areas in western Africa, the resulting added value has remained low (Coulibaly, Arinloye & Abdouloulaye 2014). The strategies or processing methods that have been developed are aimed at extending the storage period of cassava tubers. Thus, their shelf life is extended after they have been dried, chipped, or converted into cassava flour, enabling their marketing over greater distances, including neighbouring countries. However, because of the presence of cyanogenic compounds in cassava, it is susceptible to physiological deterioration after the roots are harvested.

This means that roots that have been harvested more than 48 hours previously have little market value. Consequently, the range over which fresh roots can be marketed is limited (Coulibaly *et al.* 2014). Studies by Coulibaly *et al.* (2014) and PIND *et al.* (2011) have also shown that the cassava value chain is dominated by men. West African studies of cassava have revealed that it is processed into a wide range of products. Processing occurs during different stages of the chain, commencing at the farm level up to the community level. It includes peeling, boiling, steaming, slicing, grating, soaking or seeping, fermenting, pounding, roasting, pressing, drying, and milling (Coulibaly *et al.* 2014).

2.4 Gender and agricultural value chains

Gender is used to describe all the socially given attributes, roles, activities, and responsibilities connected to being a male or a female in a given society. Our gender identity determines how we are perceived, and how we are expected to think and act as women and men, because of the norms and values of the society (March, Smyth, & Mukopadhyay, 1999). Similarly, Njuki *et al.* (2011) define gender as:

“...the socially constructed roles and status of women and men, girls and boys. It is a set of culturally specific characteristics defining the social behaviour of women and men, and the relationship between them. Gender roles, status and relations vary according to place (countries, regions, and villages), groups (class, ethnic, religious), generations and stages of the lifecycle of individuals.”

Gender is, thus, not about women but about the relationship between women and men (March *et al.* 2009). A gendered VCA is a methodology that describes existing gender relations in a particular environment, ranging from within households or firms to a larger scale of community, ethnic group, or nation, and organizes and interprets, in a systematic way, information about gender relations to clarify the importance of gender differences for achieving development objectives (Rubin *et al.* 2009). In this context a gendered value chain approach is adopted to investigate and document intra-household gender relations that contribute to the gender gap along the cassava value chains in Tanzania.

Cassava value chains exist and operate within a given social context that affects the distribution of resources, benefits and opportunities. Gender relations, particularly within rural households that primarily depend on subsistence agriculture, affect and are affected by the ways in which cassava value chains function. Gender is thus an important aspect of value chain analysis. Value chains offer tremendous opportunities to men and women through better market linkages and employment opportunities. At the same time, the way these value chains operate can affect some groups negatively especially women in circumstances where the gender gap widens. For example, transnational corporations can take advantage of existing gender inequalities in

bargaining power to cut production costs by employing large numbers of women at low levels of value chains and for minimum or lower than minimum wage (Gammage, Manfre & Cook. 2009).

Analysis of some of the barriers to entry and opportunities presented by different value chains for women can lead to an understanding of the possible value chain interventions that have an income as well as an equity focus in their outcomes. Understanding women's position in a value chain, how changes in a value chain might affect gender inequality, and the main constraints for women in terms of gaining from value chain participation, require one to place gender in the context of intra-household bargaining and of broader social processes (Parpart 2002; Wyrod 2008). It is necessary to remain attentive to the local context, including the diverse notions of masculinity that might challenge or support women's empowerment (Parpart 2002; Wyrod 2008). At the household, the level to which women engage with a value chain is not only affected by men but also affects men similarly to the extent that men's engagement in value chains affects women in certain ways. Thus, gender relations at the household level play a key role in determining the extent to which men and women interact within a value chain. Degrees of participation and gains are shaped at the household level by gendered divisions of labour or time budgets.

2.4.1 Gender power dynamics in agricultural commodity value chains

Within the literature, the concept of gender has been defined as the social and cultural characteristics ascribed to men and women in relation to their roles, responsibilities, rights and entitlements, and other privileges (March *et al.* 1999). In addition, gender can serve as a conceptual tool for identifying the different cultural and societal roles, responsibilities, constraints, and expectations placed on both women and men that affect their abilities and incentives to participate in agricultural value chains. This results in different levels of participation and benefits sharing among women and men. As recognised in the literature, the meanings ascribed to gender are not static, but reveal changes over time and space that are linked to changing social, economic, cultural, and political contexts (March *et al.* 1999).

Women are estimated to comprise about 43 percent of the agricultural labour force in developing countries' agriculture (FAO 2011). According to Barrientos *et al.* (2001), a gender approach

helps to unpack in more depth the ways in which value chains operate at different levels especially in relation to:

- how networks to the agents gain access to the chain as employees or entrepreneurs;
- how opportunity surfaces for upgrading within the chain;
- how gender inequality influences economic rents; and
- how to facilitate different forms of governance.

One of the strengths of value chain analysis and development's holistic approach is its potential for consideration of men and women's participation at every stage of agricultural supply chains (Coles & Mitchell 2011). Coles and Mitchell (2011) attribute this to resources, abilities and achievements for men and women which are often inequitable (Coles& Mitchell 2011).

2.4.2 The role of women in cassava value chains

At the household level the cassava value chain reflects different gender roles for men and women in the various cassava value chain nodes and activities as listed in Table 2.1. Women are typically found in low status work and at the bottom of the value chain due to their position in household decision making and control of resources. The percentage of share of gendered division of labour in the cassava value chains from a study in six African countries namely Tanzania, Nigeria, Uganda, Ghana, Congo and Cote d'Ivoire were summarised in Table 2.1. Women dominated most of the labour intensive cassava value chain nodes of weeding, harvesting, transportation and processing whilst men dominated the once off tasks of clearing the fields and ploughing using draught power. In the context of cassava value chains in Tanzania, the implications of these gender roles on women's control of productive resources and benefits sharing are investigated. Further investigations were made to determine how household gender power dynamics are affected and also how they influence the functioning of the cassava value chains to the benefit of food security and poverty alleviation among women.

Table 2.1: Percentage contribution of labour disaggregated by gender in the cassava value chains for six African countries

Activity	Men & Women	Men	Women
	(%)	(%)	(%)
Clearing	5	86	9
Ploughing	17	60	23
Planting	19	45	36
Weeding	23	34	43
Harvesting	13	36	51
Transportation	13	19	68
Processing	20	4	75

Women constitute about 53 percent of the labour force in the agricultural sector of developing countries. Apata (2013) found that as a key source of labour, women play a pivotal role in agricultural production. However, gender inequality is a significant barrier to the participation of women along successive nodes of the cassava value chain (Coles & Mitchell 2011). Therefore, it is important to understand how each gender participates in and benefits from the cassava value chain to develop ways of overcoming this barrier. Power and hierarchy are key issues that feature in gender relations. Moreover, these relations are constituted and supported by family, culture, state and market institutions and can be cooperative, contradictory, or conflicting (Kabeer 2005). A value chain approach can be used to address issues of gender inequity within households and markets. This can be achieved through an understanding of how factors such as access to assets,

educational differences between males and females, and the nature and value of economic activities affect the ways in which men and women participate in and benefit from value chain activities (Coles& Mitchell 2011; Apata 2013; Butterworth, Abdulsalam-Saghir& Martin 2008).

In smallholder farming contexts, women are typically positioned as producers at the bottom of the agriculture commodities value chain. There are several factors that hinder their ability to assume more profitable roles as buyers, sellers, and processors (Farnworth 2011). Because women's productive and reproductive roles consume a considerable amount of time, they have little or no time left for processing and marketing their cassava produce. Farnworth (2011) has argued that women's lack of literacy, mobility, and numeracy skills preclude them from developing effective negotiation skills with other value chain actors. They are also hindered from using modern communication technologies such as mobile phones to support decision making and enhance their participation in, and resulting benefits from, the cassava value chain. Women involved in agriculture typically have less access to productive resources and lower incomes (CARE 2010; PIND, MSDF & LAPO 2011).

Gender shapes the participatory and functional behaviours of men and women at various nodes of the cassava value chain. Gender-defined roles and relations within value chains, and within households, affect men's and women's access to productive resources, decision making, access to financial services, control over incomes and direct involvement in payment systems (Sebstad & Manfre 2011). These also influence access to and use of new technologies, inputs, and services. Gender norms within society further influence the participation of individuals in social and commercial networks that enhance information flow, relationship trust, and cooperation between actors within the cassava value chain.

Literature have observed that strategies to improve women's positions and functioning within value chain relationships would need to focus on ensuring that women are more visible to other value chain stakeholders, for example, by facilitating their interactions with input suppliers, processors, and other buyers, as well as through the establishment of formal agreements between

buyers and women farmers (Farnworth 2011). In their study of a cassava leaves value chain in Mkuranga, Andersson *et al.* (2016) found that although the chain was dominated by women, their participation within different nodes of the chain and the distribution of benefits were highly gendered. This finding warrants an investigation of gender roles and relations along the cassava value chain. Within higher value agricultural value chains, women often participate in less visible and poorly acknowledged nodes that entail low-skilled and low-paid work. Consequently, the economic gap between women and men continues to widen (KIT, Agri-Profocus & International Institute of Rural Reconstruction, 2012). This study therefore, aimed at mapping the roles of women and men, as well as those of other specific actors, in the traditional cassava value chain, and to identify entry barriers, including the lack of an enabling environment.

2.4.3 Women's empowerment in agriculture

Empowering women is broadly viewed as a process of creating awareness, consciousness, choice, resources, advocacy, agency and active participation considered to enhance women's ability to make strategic life choices (Charmes & Wieringa 2003). Anderson & Siim (2004) observe that empowerment is "the process of awareness and capacity-building, which increases the participation and decision-making power of citizens and may potentially lead to transformative action." The importance of women in agriculture cannot be overemphasised: Slater (2001) reports 64.2 percent and 55 percent of women are involved in urban agriculture in Nairobi and Harare, respectively. These statistics show that more effort needs to be channelled towards investigating and enhancing women empowerment in agriculture.

2.4.4 Status of women's empowerment within households

There is a substantial body of evidence indicating that household members do not act in unison when making decisions or allocating resources (Alkire *et al.* 2013). The non-pooling of resources within households creates a gender gap in the control of agricultural inputs, which has considerable implications for productivity. Women tend to make significant contributions to food production and processing, but men make more decisions for the farm and control productive resources (Ogunlela & Mukhtar 2009). In south India, male tasks in the agricultural cycle include clearing fields, ploughing, transplanting and marketing while the most critical operations of

sowing, weeding, transplanting, harvesting and processing are performed by women (Smriti 2011).

As reported by Sikod (2007), observations from Cameroon showed that women were more vulnerable to risks of poverty and food insecurity, because they traditionally have less decision making power and less control over production and household assets than men. Because power dynamics at the household level are skewed in favour of men, it is of paramount importance that women are empowered to enable them to improve the household's nutrition, control resources, and access incomes and benefits that accrue within the cassava value chain (Andersen & Siim 2004). Hence, there is a need to understand and address gender inequality in the context of decision making.

Decision-making roles, participation, and benefit-sharing differ between rural women and men with respect to commodity value chains and market linkages (Quisumbing *et al.* 2014). Most rural women, especially in remote and non-cash cropping areas, are excluded from the social capital available within farmers' organisations, workers' unions, and community networks that can enhance productivity and growth (Quisumbing *et al.* 2014). Few studies on value chains have examined who benefits and who loses from transactions conducted along the chain (Nakazibwe & Pelupessy 2014). Nakazibwe & Pelupessy (2014) further observe that more research needs to be done to explore how women can be empowered within agro-commodity chains, especially in developing countries where traditional and prevailing conditions differ considerably from those in the developed world.

According to Sunderland *et al.* (2014), women frequently have limited roles in decision making with regard to natural resource management. Empirical evidence from previous studies suggests that increasing women's control over resources has positive effects on several important development outcomes such as the nutrition, education, and the well-being of a family. For example, in Côte d'Ivoire, Hoddinott and Haddad (1995) and Duflo and Udry (2004) found that women's access to a greater share of cash income significantly increased the share of the

household budget allocated to food and other important social amenities such as clothing and shelter. Doss (2006) has shown that in Ghana, women’s shares of assets, particularly farmland, significantly increased budget allocations for food expenditure. A substantial body of evidence also suggests that greater control exerted by mothers over resources improves child outcomes, particularly in the areas of nutrition and education. Based on empirical evidence presented in other studies, we hypothesise that at the household level, men are solely responsible for decision making in terms of production and time budgeting related to the cassava traditional food value chain.

Table2.2: Women’s employment and control over income in Tanzania

	Southern Zone	Lake Zone	Eastern Zone	Urban	Rural
Percentage of women employed who decide themselves on use of the income	44.8%	45.8%	66.4%	78.4%	44.7%
Percentage of women employed who decide jointly on use of their income	18.3%	45.4%	17.4%	14.4%	31.0%
Percentage of women employed where someone else decides on use of their income	36.9%	8.8%	16.2%	7.6%	24.3%

(*Tanzania Demographic and Health survey 2004/05 <http://www.nbs.go.tz/dhs/index.htm>)

According to the Tanzania Demographic and Health survey of 2004/5, the Southern Zone and Lake Zone have less than 50 percent of employed women who have the prerogative to decide on the use of their own income. This compares with 66.4 percent for the Eastern Zone and the national average of 60.1 percent with higher rates being recorded in the urban areas. This shows that in general women in Tanzania have limited decision making with regards to the income they get from employment or other income generating activities (Shayo & Martins 2009). This

therefore, implies that women even in agriculture commodity value chains are not able to decide on their earnings.

In the Lake Zone, joint decision making is the same as individual decision making, while in the Southern Zone, about 36.9 percent of women had the decisions made on their behalf by someone else. Literature has it on record that the decision making autonomy of women is highest on food and health care issues, and lowest on large purchases. These women empowerment issues may be attributed to a number of issues that include the level of education of women, culture, and the existing policy framework regarding the position of women in Tanzania. The Southern Zone and Lake Zone have higher percentages of women without education and lower female literacy levels than other zones such as the Eastern Zone (Shayo & Martins 2009).

2.4.5 Measuring women empowerment in agriculture value chains

Several indexes have been developed to measure the extent of women's empowerment. These indexes, including those from the United Nations Development Programme (UNDP) Gender-related Development Index (GDI) and the UNDP Gender Empowerment Measure (GEM), were developed considering gender gaps in the assessment of human development. The GDI and GEM indexes have their own strengths and weaknesses, as highlighted by Beteta (2006) and Klasen (2006). Klasen (2006) argues that following their introduction more than a decade ago, the GDI and GEM indexes have not had the anticipated impacts associated with measuring and promoting gender-sensitive development. This is because of the conceptual underpinnings of these indexes, as well as data gaps and associated problems that constrain comprehensive coverage. The measures do not meet the demands of policymakers and advocate for an easily understandable and internationally comparable composite measure of gender gaps, especially in the area of agriculture. Beteta (2006) critiques the GEM index, arguing that it is an incomplete and biased index for women's empowerment. While it measures inequality among the most educated and economically disadvantaged, it fails to include important non-economic dimensions of decision-making power at the household level. More recently, Alkire *et al.* (2013) developed the Women's Empowerment in Agriculture Index (WEAI) aimed at addressing weaknesses of the GDI and GEM and quantifying women's empowerment in agriculture. The WEAI entails a

multi-dimensional view of the domains of women's empowerment within agriculture and differs from previous measures of women's empowerment in that it captures control over resources (agency) within the agricultural sector.

2.5 Women participation in the cassava value chains

2.5.1 The role of women in the cassava value chain

Dunaway (2014) observes a “glaring absence of women from commodity chains.” In general, women in sub-Saharan Africa, Southern Asia, and South-East Asia are entitled, in theory, to dispose of the products and income derived from their economic activities as they choose. However, in practice, they are often constrained to use these to meet their responsibilities to cover certain kinds of expenditures, as determined by their husbands or by prevailing norms imposed by men. The decline in prices of traditional export crops has led men to move increasingly into the domains of staple food crops as well as previously neglected fruit trees thereby compromising the position of women (Coles & Mitchell 2011). This suggests that there is an urgent need for interventions to improve women's participation in agricultural commodity chains as well as their ownership and control of productive resources.

Cultural stereotypes about men and women's work determine what roles women can play in cultivating crops and marketing their products. Coles and Mitchell (2011) reported that the levels of participation and gains in agricultural commodity value chains are shaped at the household scale by gendered divisions of labour, time allocation, as well as decision making with respect to household productive resources. Participation at the value chain level is influenced by differential access to chain functions, services and resources, and by gender related power disparities in value chain management (Coles & Mitchell 2011). Consequently some the key issues that are addressed by this study pertains to the absence of women from agriculture value chains for traditional commodities such as cassava and the examination of the determinants of micro level decisions that affect women's participation within cassava value chains.

Previous efforts to revitalise smallholder agriculture failed partly, because they overlooked the role of women and the negative effects of gender inequality on productivity. This failure is not

surprising as women constitute, on average, 43 percent of the labour force in most developing countries, ranging from 20 percent in Latin America to 50 percent in eastern Asia and sub-Saharan Africa (Manfre *et al.* 2013). However, despite women's significant contribution to the agricultural sector and household nutrition, they lack mobility and consequently access to markets.

Moreover, social norms constrain their interactions with actors within the traditional cassava food value chain. They are often excluded from horizontal linkages such as relationships within an organisation, a group of producers, or self-help groups, as well as from vertical linkages such as those between buyers and suppliers. Most decisions regarding the production and distribution of yields and benefits are left to the male head of a household, consequently making it difficult for women to acquire a proportionate share of the resulting benefits (Nakazibwe & Pelupessy 2014). Gender inequities arise from disparities in access to factors of production, land in particular as well as education. Gender disparities in time budgets ('time poverty'), and power imbalances or cultural norms also affect participation of individuals in decision making (Coles & Mitchell 2011).

2.5.2 Status of women's participation in agriculture value chains

Hill and Vigneri (2014) demonstrate that gender-specific constraints relating to the production and marketing of cash crops and also staple food crops have important implications for the participation of men and women in agricultural growth and development. Women's participation in smallholder agriculture is mediated by their access to productive assets. As a result, women's inherent lower access to land, credit, social networks, and information in comparison to their male counterparts can limit their opportunities to enter into more competitive value chains. Gendered education systems also affect the way men and women benefit from their participation in agricultural value chains through limited income for women as they perform lower skilled activities and are less able to access market and financial information (Coles & Mitchell 2011).

Women also have less access to training and are, therefore, unable to upgrade their skills and knowledge. Manfre and Rubin (2012) found that women's participation in value chains is constrained by their lack of access to land and credit. They further found that women's control over land lags behind that of men, with their personal plots typically being smaller and of poorer quality than those of men. Both customary and private property regimes tend to privilege men's land holdings (Food and Agriculture Organization of the United Nations 2011). In separate studies conducted in Kenya, Masakure and Henson (2005) found that 61 percent of contract farmers cultivating vegetables were women. However, low levels of participation of women farmers have been reported within rice, sorghum, and sunflower cultivation schemes in Uganda (Elepu & Nalukenge 2009), and in Senegal's export trade in French beans (Maertens & Swinnen 2009). Differential access to labour, inputs, information, and training influence the extent to which farmers are able to upgrade their practices and continue to participate in value chains. Participation in value chains of women as well as men are enhanced when they are able to actively engage in group discussions and activities (van Ingen, Kawu & Wells 2002).

Pierce, Achdiawan and Roshetko (2016) identify several impediments to women's involvement in landscape management in southern Sulawesi. These include their low educational levels, lack of access to child care to be able to travel or attend meetings, generalised time constraints and cultural and domestic prescriptions, including taboos or discomfort relating to travel. From this review we can hypothesise that educated women with household decision-making power who own resources such as land, have access to good infrastructure, are close to the market, belong to social groups (cooperatives), and have access to loans and extension information are well placed to participate in cassava production and marketing.

2.5.3 Factors affecting participation of women in cassava value chains

In our analysis, the choice of women to participate in the cassava value chain was defined by the main cassava producer variable. The main cassava producer in a household was the choice of the husband, wife or joint, which was defined by the outcome of cassava being planted in that particular household. Age may influence participation in the cassava value chain through various channels such as experience, access to resources, and risk preferences. Hence, the expected

direction of the effect of age is ambiguous (Zamasiya *et al.* 2014). Household size is an indicator of the amount of available labour for production activities as well as of household food consumption levels. The expected sign for household size is, therefore, positive as we would expect a larger household to produce more for their consumption if they are efficient. Distance to the market negatively influences both a household's decision to participate in the cassava value chain and the amount of cassava produced (level of participation). The greater the distance to the market, the higher the transport costs and the lower the profit margins and benefits (Omiti *et al.* 2009).

Religion also affects women's decisions to participate in the cassava value chain, as different beliefs instil varying gender roles. The effect can, therefore, be either positive or negative. According to Martey *et al.* (2014), marital status affects an individual's access to information resources. We would expect married household members to be more willing to participate in the cassava value chain, as they are strongly concerned about their households' welfare and food security, which consequently influences their positive decision to participate and increases their level of production (Martey *et al.* 2014). We hypothesised that education would have a positive effect on the decision to participate, as it enables individuals to make independent decisions and act on the basis of that decision, while increasing their ability and tendency to cooperate with others and actively participate in group activities.

Access to information positively influences farmers' decisions to participate in the cassava value chain. Knowledge of input prices, extension advice, and ready markets enable farmers to make informed decisions in the cassava value chain. Ownership of assets, such as mobile phones and radios, has a positive effect on participation in the cassava value chain as information is easily accessed using such devices. Land availability has an indirect positive effect on farmers' willingness to engage in cassava production, as household heads with more land are able to produce more for household consumption as well as for marketing. Most studies have found that a positive relationship exists between farm size and the decision to participate in agricultural activities). Literature has also reported that membership of the household head in an association or group increases the household's ability to access information that is critical for decision

making relating to production and marketing. This is because most farmer groups are engaged in group marketing and bulk purchasing of farming inputs such as seeds, fertilizers, and chemicals.

2.6. Chapter summary

This chapter analysed literature on key concepts that guided this study. It builds a theoretical framework from broad theoretical literature. Firstly, it explained how the Harvard analytical framework guided this study and its relationship with the main objectives of characterising the cassava value chain, determining women empowerment, women participation and the development of the household gender based conceptual framework. The review of relevant literature on cassava value chains and empowerment of women revealed important gender gaps where women were disempowered and needed further investigations for example access and ownership rights of productive resources such as land is one of the most important aspects that need to be addressed.

Also emerging from the review of literature is the intensive and less remunerated tasks performed by women in the processing stages of cassava which has negative implications on their time budgets and benefit sharing. Literature gaps were also identified with regards to women participation in the cassava value chains where several factors such as education, extension services, policy framework and support from organisations such as financial institutions, research institutes and the government. A review of existing gender analysis conceptual frameworks revealed the masking of intra-household gender power dynamics which pointed to the need for a framework that considers the household as a unit of gender based analysis in the cassava value chains.

Chapter 3

Research approach and methodology

If you are going to pose yourself a problem and then come to the conclusion about it, you have to do something to come to the conclusion. That 'something' is your method

(Hofstee 2011)

3.1 Introduction

In research, the fundamental characteristic of the scientific method is empiricism – knowledge that is based on observations (Cozby 2005). Therefore, the data that form the basis about the conclusions on gender and cassava value chains are systematically collected governed by a number of rules that are explained in this chapter. The study problematised gender inequality in cassava food value chains at household level and made a gendered analysis focusing on gender roles, women empowerment and participation in the cassava value chain as influenced by certain household gender dynamics. As highlighted in section 1.4, the intention of this study is to enable women to escape poverty and food insecurity through improved resource ownership, decision making, market participation and control of income in the cassava value chain. This can be achieved through a thorough review of the socio-political and economic policy framework as well as an in-depth investigation of how individuals within households control resources, participate in various cassava value chain nodes, allocate time, bargain and control income. The focus of this study was therefore, framed into one major objective and four specific objectives, which guided the research approach and methodology adopted and presented in this chapter.

The research approach adopted in this study disentangled cassava value chain nodes to investigate the gender inequality at each value chain node at the household level. The approach uses literature and key informant interview information at the national and community levels linking them to their implications on individual households involved within the cassava value chains. The study therefore, adopted a mixed-methods approach, incorporating both qualitative and quantitative designs to gather data at different levels in Tanzania. The chapter thus, describes and explains the research design, sampling, data collection methods and data analysis techniques used in this study. The study was divided into the macro level and micro level of research. The macro level in this context focused more on gender and agriculture policy issues in Tanzania whilst the micro level focused entirely on individual household cassava farming activities as influenced gendered power dynamics within the households.

3.2 Research design and sampling

The research design adopted in this study is descriptive study. This is because it involved the examination of three case study sites together with the naturalistic observation as well as a household based survey. A mixed-methods approach was employed where both quantitative and qualitative data were collected using a range of research techniques. Thus, the research design involved the collection, analysis and integration of qualitative and quantitative data (Guetterman *et al.* 2017). The primary purpose of mixed methods was to integrate both qualitative and quantitative data to generate meta-inferences (Figure 3.1) beyond what either each approach could have achieved alone or produce well validated conclusions. Mixed methods also allowed for the exploration of a range of confirmatory (verifying knowledge) and exploratory (generating knowledge) research questions concurrently within the same study phase (Teddlie & Tashakkori 2009). In this particular study, the convergent mixed-methods design was adopted which consists of a quantitative strand and qualitative strand being conducted independently of each other and the integration of the two strands mostly occurred at the interpretation stage when the results of the two approaches were brought together (Guetterman *et al.* 2017).

This approach was adopted in this study, where quantitative data from the household survey was supported by qualitative data from desk review, key informant interviews and focus group discussions. The mixed-methods approach used the concurrent time order dimension in which both the qualitative and the quantitative strands are conducted at approximately the same time (Christensen, Johnson, & Turner 2015). The quantitative dominant status was the paradigm emphasis adopted whereby the quantitative data was mainly used to address most research questions and hypotheses and then supported by the qualitative data where applicable. Qualitative research focuses on people behaving in a natural setting and describing their own world in their own words while quantitative research tends to focus on specific behaviours and attributes that can easily be quantified (Cozby 2005). Qualitative research is also more focused on individual people, local groups for intensive case studies; therefore there is little interest in obtaining results that are broadly generalisable.

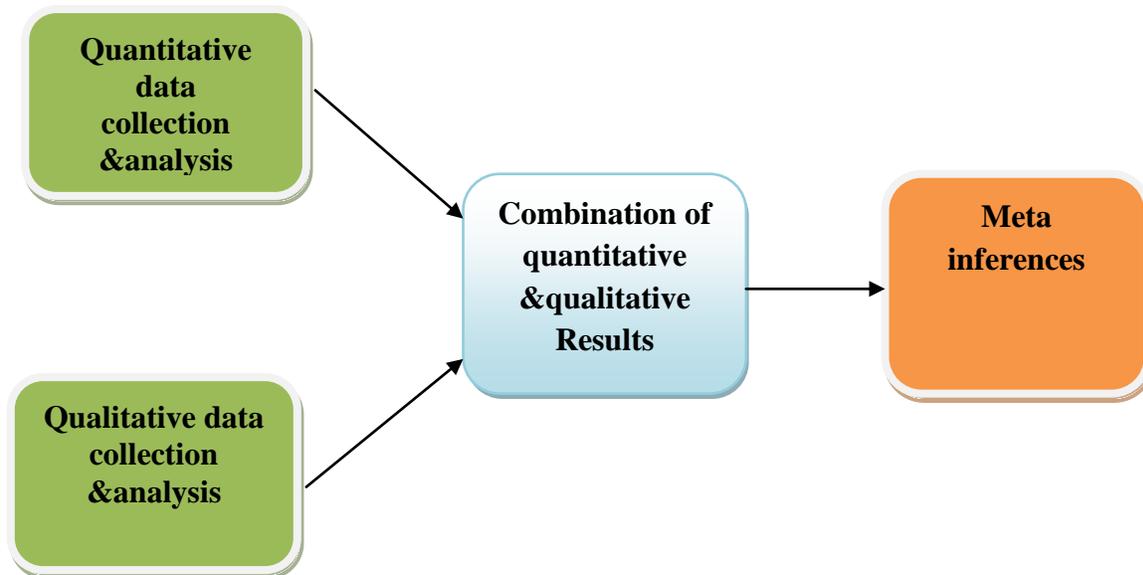


Fig3.1: Conceptual model of integration approach in a convergent mixed-methods Design

A mixed methods approach has been used in the pigeon pea value chain studies in which gender relations and the implications for income and food security in Malawi were determined (Mensope & Larkins 2016). In the process, the following methods were used:

- focus group discussions,
- key informant interviews and;
- structured interviews.

Andersson *et al.* (2016) also employed a mixed-methods approach in a study on implications of gender on a cassava leaves value chain in the Mkuranga district of Tanzania. This method was also adopted in the dairy value chain project in Bangladesh and also in the gendered analysis of dairy production and food security in Mozambique (Rubin 2016). In addition, mixed methods were employed in a study on intra-household analysis of gender differences in climate change adaptation strategies and participation in group-based approaches in rural Kenya (Ngigi, Mueller & Birner 2017).

Similarly, Dito (2011) used a mixed-methods approach in a study on intra-household bargaining and resource allocation in developing countries, where the study involved the use of household based survey and focus group discussions as a qualitative strand. For the purposes of this study, the macro and meso levels were combined and considered as one level. The macro level entails the consideration of national domestic economy, policies and national systems whilst the meso level considers the gender laws, norms, rules, systems and gender differentiated entitlements and access (Kanji & Barrientos 2002), as they affect the cassava value chain. The micro level considers gendered division roles of production, reproduction and power dynamics within households along the cassava value chain. These two levels were considered as argued by Kanji and Barrientos (2002) that gender analysts emphasise that the strategic behaviour and individuals within households must be linked to wider social processes, institutions and power structures to have a comprehensive gender analysis of food value chains.

Hence in a gendered value chain analysis, there is need to link the macro and micro levels through the meso level institutions which include public service (infrastructure) and markets taking cognisance of the guiding gender norms, rules, custom systems and entitlements. At the macro level, purposive sampling was used to identify key informants for specific themes of interest. A multi-stage sampling procedure was employed at the micro level where major cassava producing regions and districts were purposively sampled, and cluster sampling was then used to select cassava producing villages within the selected districts. Simple random sampling was finally employed to select the individual household heads that were interviewed. This approach managed to generate enough qualitative and quantitative data that were useful in addressing questions on gender roles, actors involved, women empowerment and women participation in various cassava value chain nodes.

3.3 Macro-level research

The study began with the analysis of food security agricultural development policy and gender policy in Tanzania. As part of macro-level research, data were also gathered directly from key informants. This level of the study focused on agriculture and gender policy analysis at national level, which also includes the analysis of the socio-political and economic context under which

the policy was framed, as well as the analysis of the influence and interactions between cassava value chain stakeholder groups. Community engagements were also done with key informants to capture information regarding norms, customs and rules governing gender roles and ownership of key resources such as land within households. The data collection techniques that were employed at this level included a desk review (secondary data) and key informant. Table 3.1 shows the qualitative methods and the respondents that were interviewed during the study.

3.3.1 Desk study

This study involved the review of previous studies and policy documents on gender and agriculture in Tanzania. This included strategic government documents, commissioned research reports, academic articles, and to some extent policy briefs. Tanzanian agriculture policy documents and strategies on gender and agriculture were reviewed and they gave insights on institutional framework which governs gender and agriculture development. The Tanzanian National Strategy for Gender Development (NSGD) highlighted major issues of concern to gender inequality at the same time exposing the challenges that are faced. Such policy concerns included areas such as decision making and power, economic empowerment, food security and nutrition as well as community participation which were topical areas in this study. The Government policy on agricultural marketing of 2008, national agriculture policy of 2013 and the policy brief on women's participation in agriculture were reviewed to provide a pointer on government's thrust concerning production and marketing of agricultural produce.

Reports from IITA on cassava production, processing and marketing were also instrumental in providing direction on cassava producing areas, and other technical expertise with regards to processing and marketing. A report by Shayo (2015) on gender differences in earnings (wage gap), time use, and type of occupation, work conditions and access to employment in the cassava value chain in Tanzania were also reviewed. The report provided information on details regarding employment related issues within the cassava processing enterprises or groups, working conditions and time use patterns as well as other related activities. This information was useful in giving key details on women empowerment and the roles of women in the processing and marketing nodes of cassava value chains. The review of policy documents and reports gave

insight about the key actors in the cassava value chain and their roles hence it significantly contributed to the mapping of the cassava value chain. Useful information was obtained regarding the institutional framework and how it influences the behaviour of men and women within households through the socially constructed norms and values.

3.3.2 Key informant interviews

Key informant interviews have been widely used in the field of development. In this context, they enabled us to acquire expert knowledge on key issues such as gender and agriculture upon which the study is grounded. Key informants were also useful in providing information pertaining to the value chain governance that is how institutional set-ups influence the cassava value chain map. They also provided information that guided the other techniques such as structured interviews. For instance, agricultural extension officers would provide information on the location of smallholder cooperative cassava processors. This technique was key to investigating issues pertaining to policy, input supply, cassava processing and to some extent marketing, particularly when we were targeting actors such as large scale buyers.

I conducted key informant interviews with resource people, whose knowledge of gender issues; cassava production, processing and marketing were valuable to the study. I selected key informants based on their knowledge, willingness and experience of the subject area and also their availability. A total of twenty-three (23) key informants were identified and interviewed. These included two agronomists (2) who provided information pertaining to input supply; planting, cassava diseases, effects of drought weeding, harvesting and processing of cassava; agricultural economist regarding agricultural policy issues, marketing and processing; large scale cassava buyer; a scientist from IITA, and a local inputs supplier.

The agricultural economist provided information regarding agricultural policy issues, gender and agriculture as well as marketing of crops. The agronomist provided information concerning agronomic practices involving cassava, challenges such as diseases, drought as well as extension information. The large scale buyer and input supply were useful with information regarding local input purchasing, local cassava marketing and processing channels, local gender dynamics in

marketing as well as the challenges faced in buying inputs, processing and marketing. Each interview was conducted face-to-face and lasted approximately 45-60minutes in duration. There were guiding open-ended questions which also allowed the responded to explain other issues and even bring in new relevant ideas that may not have been asked. One characteristic of these interviews is that the respondents were self-motivated and enjoyed the discussion to such an extent that they provided useful and authentic information.

Table3. 1: Qualitative data collection respondents and methods

Value Chain Node	Data Collection Method	Women	Men	Total
Policy Issues	Keyinformant interviews; Desk review	2	3	5
Research	Key informant interview		2	2
Input supply	Key informant interviews; Desk review		4	4 3
Farmers	Key informant interview	6	4	10
Producers	Focus group			4
Processors Cooperative	Focus group			4
Large scale middlemen	Key informant interviews		2	2

Key informant interviews were done to agricultural economists (3) in Dar es Salaam; gender specialist (1), agricultural extension officers (3), director agricultural extension (1) at Kizimbani research institute in Zanzibar. In Geita two agricultural extension officers were interviewed

3.4 Micro-level research

My study is primarily reliant on data that are collected at the micro level as guided by the Harvard Analytical Conceptual Framework which emphasises the collection of household level data in a gender analysis. This is because it is at the micro-scale that the most extreme variation exists within the household, because there are no unitary household preferences which are mainly divided along gender axis. The micro level scale is also the scale with the most power to affect people's behaviour, since this is shaped by power struggles within households and therefore I argue that this is the scale at which we need to focus considerable attention. Within this scale, we have opted to examine women's and men's domestic roles and how the intra-household power dynamics influence control of resources, benefits sharing and participation in cassava value chain nodes.

Table3.2: Location of study sites and the sample sizes selected in each village.

Region	Village	Location(GPS Coordinates)	Women	Men	Total
Kigoma	Kasanda	S03.37688 ⁰ E030.87839 ⁰	10	13	23
	Kiziguzigu	S03.32078 ⁰ E030.92135 ⁰	19	16	35
	Itumbiko	S03.28812 ⁰ E030.97750 ⁰	10	12	22
	Kanyonza	S03.24418 ⁰ E031.00304 ⁰	3	12	15
Zanzibar	Bumbwini	S03.56197 ⁰ E032.58999 ⁰	16	6	22
	Mkokotoni	S05.96960 ⁰ E039.19642 ⁰	13	3	16
	Kilombero	S06.01650 ⁰ E039.32409 ⁰	16	9	25
	Mtakawani	S06.06242 ⁰ E039.33350 ⁰	9	1	10
	Kizimbani	S06.08483 ⁰ E039.26603 ⁰	10	7	17
Mkuranga	Kiimbwanindi	S07.326883 ⁰ E039.07260 ⁰	3	7	10
	Kiperu	S07.26264 ⁰ E039.18809 ⁰	3	17	20
	Kikoo	S07.34266 ⁰ E039.13721 ⁰	5	8	13
Total	12 Villages		117	111	228

At the household level this study was grounded on rural people's own reports of their livelihoods and cassava value chain activities in their households. A case study approach was used to investigate information on the profile of cassava production, processing enterprises focusing

mainly on types of resources owned, different gender positions, roles and responsibilities, stages involved in cassava processing activities, packing and storage facilities, as well as the sources of water and energy. Structured interviews, direct observations, extended household visits and focus group discussions were used to collect data at micro level.

Multistage random sampling was employed following purposive sampling of study sites. Simple random sampling then followed in each village to select the respective household heads for interviewing. A list of farmer names involved in cassava production was compiled by the agricultural extension officers' who were stationed in each respective study area. Simple random sampling was then employed to select the final respondents in each village. The study adopted the participatory research approach that involved focus group discussions and extended household visits. This approach enabled sequential reflection and action carried out by the local people as well as enabling them to plan, share and analyse their knowledge of their local environment and conditions.

The enumerators as well as the focus group discussion moderators were experienced Agriculture Extension Officers who were stationed in the respective study areas. The recruitment of extension officers enabled us to get consent from farmers easily at the same time building trust with the communities, allowing us to collect reliable data. Farmers were comfortable to share their information with an extension officer they had a long standing relationship with. From each study area four enumerators were engaged constituting of both male and females.

3.4.1 Survey

Christensen *et al.* (2015) define a survey as a non-experimental research in which individuals are interviewed about their attitudes, activities, opinions and beliefs. This procedure uses a standardised protocol, usually a questionnaire in which each respondent is presented with the same set of questions. In this study, the face-to-face structured interview method was used by visiting the interviewee homestead. A total of 228 farmers constituting of 111 men and 117 women (see Table 3.2), were sampled using simple random sampling from a population of 450

farmers. Simple random sampling made sure all the farmers in the respective villages had an equal chance of being selected to ensure that there is high generalisation of the findings.

Each household was allocated a number and corresponding numbered cards were placed in a hat and randomly picked. Structured interviews have been used in collection of quantitative data such as banana yield (Jagwe, Machethe & Ouma 2010), quantity of products sold (Zamasiya *et al.* 2014) and also collection of specific information about individuals. In this study, this technique was used to gather information pertaining to cassava yield, the quantity of cassava sold, market distance and most of household characterisation variables (years spent in school, number of dependents, household size) that had a direct influence on various cassava value chain nodes such as market participation.

Structured questionnaires were administered to household heads (women and men) to collect quantitative data on cassava production variables such as yielded; the amount of income obtained and other quantitative variables. The Tanzanian Ministry of Agriculture and Extension officers from each study site were recruited as enumerators after being trained together with their field supervisors to assist during data collection. All the enumerators and supervisors were fluent native Swahili speakers, Tanzania's national language for easy communication with respondents. The questionnaires were piloted in each study area and some sections of the questionnaire were adjusted to suit the specific field conditions of each area. The questionnaires were written in English and the enumerators were able to translate to Swahili as they administered the questionnaires with no difficulty. The main sections of the questionnaire included household characteristics, farm practices, marketing aspects and gender and cassava cross-cutting issues(see Appendix 1).

3.4.2 Direct observations

This method is important in ethnographic data collection research such as in this particular study. By using this method I became an active participant through interacting, interviewing and observing the behaviours of women and men within their households. This was possible for me during the survey data collection phase in all the three study sites as well as during the repeated household visits in Mkuranga. Direct naturalist observation involved the systematic noting and

recording of activities, behaviours and physical objects to obtain a rapid overview of the socio-economic information on households. Cozby (2005) argues that this study technique has roots in anthropology and is currently widely used in social sciences to study many phenomena in all types of social and organisation settings like in this study where women's and men's social and economic settings are studied.

A researcher uses naturalistic observation when he or she wants to describe and understand how people in a social or cultural setting live, work and experience the setting (Cozby 2005). I used the covert observation technique in which women and men were not aware that they were being observed so that they would not change their behaviour and setting. During the field observations, the field assistants (agriculture extension officers) helped with directions, explanations and native language (Swahili) conversion into English. This technique was employed to get information concerning household composition, religion, demographic data, field conditions, environment and household assets available such as bicycles, solar panels, livestock and type of houses.

Observations were also made with regards to the cropping activities, since fields were also visited. Farming practices, types and quality of cassava processing enterprises, cassava processing equipment, socio-economic and cultural facilities available within households or communities as well as environmental aspects were observed and recorded during the study. Direct observations were done for entire period of three weeks spent on structured interviews in both Kigoma and Zanzibar. In Mkuranga direct observations took a period of six months since the repeated household visits that were done over six months also involved direct observations each time I visited the households. Information gathered through this technique was used to supplement the information obtained from FGDs and structured interviews. By entering, participating and reflecting as an ethnographer, I managed to understand and document the *emic* perspective and the objective *etic* perspective regarding intra-household gender dynamics in the context of cassava value chains.

3.4.3 Focus Group Discussions (FGDs)

Focus group discussions (FGDs) are used in circumstances where a researcher wants to test a finding or position within a group to generate rich and in-depth perspectives on a well-defined topic (Rubin 2016). In this study this technique was used to solicit information regarding household power dynamics in ownership and control of resources, decision making as well as sharing of benefits derived from the cassava value chains. Andersson *et al.* (2016) used FGDs to in a study on cassava leaves value chain in Mkuranga and generated reasonably comparable results to this study. Data from focus groups were used to complement the information obtained from structured interviews as a methodological triangulation procedure. FGDs revealed information that had not been captured during structured interviews and observations, including household power relations and bargaining. Rich data regarding women empowerment indicators of women input in productive decisions, control over use of income, leisure and workload were generated from FGDs and were not at variance with the information obtained from other techniques such as key informants and structured interviews.

In each selected district one FGD was conducted comprising of 9-12 smallholder farmers on average (See Appendix 2). A total of four FGDs were conducted in this study. The FGDs constituted of both men and women discussing themes relating to household resource ownership, decision making, labour divisions, and time budget as well as how the income is distributed. An experienced agricultural extension officer recruited as an enumerator was responsible for moderating the FGDs as well as recording the themes arising from the discussion. The moderator was a native Swahili speaker, Tanzania's national language. Each discussion was highly interactive and lasted about one and half hours on average.

The FGDs were composed of both men and women to balance the arguments especially concerning the domestic, economic roles of men and women in different households. Discussions involving both men and women enabled a balanced discussion on the status of power dynamics and bargaining power within households. Information gathered from the FGDs provided important pointers and supported the key points that were emanating from the structured interviews especially on key issues on household decision making, resource ownership, time budgets, as well as the roles of women and men within households.

3.4.4 Extended household visits

Repeated household visits were done to ten purposively sampled cassava producing households in Mkuranga district of Tanzania. These visits were an ethnographic way of grounding truth (Rubin 2016) to the cross sectional data that were collected using structured interviews and group discussions. This technique enabled me to have long term presence in the field, taking note of what people in the selected village do during different days, and different times of the day. This technique enabled me to gather data regarding the economic roles, social roles and bargaining power of women and men within each household. Household visits also provided information with regards to time allocation and asset ownership. Information about gender roles cannot be sufficiently documented from what people report about themselves during structured interviews, but rather by observing and documenting what they do at times during different days hence the use of repeated household visits. In addition, it helps to document movements, expressions and utterances as reported by Rubin (2016).

The researcher was based in Dar es Salaam city at IITA East African Hub which is about 60km away from the Coast (Mkuranga). Transport logistics were arranged by IITA support staff and upon arrival in Mkuranga, an agriculture extension officer would accompany us to the respective households in Kipera village. Each household was given prior notification of our visit so that we could meet at least one of the household heads (woman or man) to provide the required information. These households were selected based on their quantities of cassava they produce and also the size of arable land they allocate for cassava. A total of six random visits to the selected households were made between the period January and July 2016. Their farming and household livelihoods activities were documented detailing how they produce, process and market their cassava.

An epistemological study of these households was done giving detailed information of how these households allocate time, make decisions regarding ownership of resources and benefit sharing of proceeds from cassava and other crops at different times. Data gathered from this technique enable the researcher to explain issues of different gender roles that were key in the mapping cassava value chain map. From this technique we were also able to acquire data on time budgets

as well as decision making roles within households that were useful in answering the objective of women empowerment in agriculture.

3.4.5 Validity and Reliability

Reliability was ensured in this study through several methods. Firstly, the questionnaires were piloted to a total of 10 smallholder farmers in each study site. It was also ensured through a statistical test, the Cronbach's alpha where the alpha level was 0.84 which indicated that the instrument was reliable. The Spearman-Brown correlation was also applied to test the reliability of the entire survey. Validity was also ensured through the use of methodological triangulation whereby similar questions from the structured questionnaire were asked during focus group discussions and key informant interviews. Correlations of scores from the questionnaire were computed and correlated with the predicted variables and the correlation was 0.78 indicating that criterion related validity existed in this study.

3.5 Challenges encountered and how they were handled

The unavailability of policymakers due to time constraints led to the researcher to use more of a desk study to obtain information regarding the policy framework on agriculture and gender. Prior appointments with key informants had to be made and sometimes I had to make frequent visits since most of the key informants were experts and had busy schedules and commitments. Undertaking primary data collection in a foreign country often presents the researcher with a number of challenges, of which cultural differences, especially the issue of language, have often been cited as major constraints. These were of little significance to me because soliciting information from household heads was not that difficult since we used the local extension workers who interact with farmers in their day-to-day farming activities.

Another challenge was on choosing a woman to interview as a representative of the household head when the man as a household head was present. To overcome this, the enumerators had to explain to the husband in detail the objectives of the study and the possible implications. This was successful since the enumerators were part of the community, hence could be easily trusted by the farmers. However, detailed and quantitative information were not easy to access, since

most of these farmers would not usually quantify their inputs, cassava yields, cassava sales and even cassava post-harvest losses. The main challenges faced were in terms of measurement especially in trying to quantify yields and other variables, since there were no standard measurements. We had to develop a standard measure for example of bundles of cassava sold as planting material that was specific to each study area and then standardise it so as to be the same across all households as well being the same in other study sites.

During FGDs some men who appeared to be community opinion leaders tried to dominate the discussion, but the moderator was experienced enough to manage the group dynamics, since he was a respected person in the community and also knew the characters and community power status of the various participants. At the early stages of the FGDs, women appeared conservative but as the discussions progressed, they were encouraged to put across their ideas freely, to which they did enabling us to collect rich data. In Kigoma, accessibility of the study area (Kakonko) was very difficult since it was during the rainy season and the gravel roads were slippery which is characteristic of red clay soils when wet. Together with my research assistant and driver, we faced accommodation challenges at Kibondo, Cheyo hotel where our study period coincided with the United Nations High Commission for Refugees (UNHCR) and other humanitarian non-governmental organisations who were domiciled there during their Burundi refugee camps humanitarian assistance.

3.6 Ethical considerations

One major limitation of social research is the entry and acceptance of investigators into the community by respondents. Tanzanian Ministry of Agriculture Fisheries and Livestock extension officers together with a commissioned letter from COSTEC enabled us to get permission from the local authorities to access communities to collect data. The research ethics clause for this study was approved by the University of Pretoria, Faculty of Humanities Ethics Committee and the Tanzanian Commission for Science and Technology (COSTEC) before commencing with data collection. Respondents were debriefed about the objectives of the study and were voluntarily asked to sign consent forms.

The research subjects had the right to withdraw from the study. Information gathered from the respondents was and will be confidentially kept. Farmers who were individually interviewed were given consent forms which guaranteed their anonymity and confidentiality. However with key informants, no anonymity was guaranteed, since it is not feasible and important to uphold that. The identity of respondents is secretly kept using unique identifying numbers in all the analysis and presentation of results so that the participants would not be identified. Farmers volunteered to participate in the study. Pseudo names were used to identify respondents whose anonymity must be upheld in cases where direct quotations would be used in text.

3.7 Data analysis

Since the study adopted a mixed-methods approach that involved both qualitative and quantitative designs, both qualitative and quantitative data were generated. Data generated from the two traditions were then analysed using different techniques. Quantitative data was subjected to descriptive statistics and regression analysis while qualitative data were subjected to thematic content analysis.

3.7.1 Quantitative data

Quantitative data was captured, cleaned and analysed using IBM SPSS Version 20. Descriptive statistical analysis using percentages, tables, bar graphs was generated to show the proportions of empowerment and participation of women and men in the cassava value chain. The factors influencing the farmers' decision to engage in cassava farming as well as farmers' decision to participate in cassava markets as sellers were estimated using the Probit model (selection equation) while the level of participation in cassava production and amount of cassava sold (measured in terms quantity of cassava produced) was estimated using the Ordinary Least Squares approach (Outcome equation). A backward model selection method was used to determine the best estimated model that fits the data based on the goodness of fit pseudo R-squared statistics (Cox and Snell, Nagelkerke and McFadden). The gross margin analysis method was used to analyse profitability and the profit margins were calculated by deducting variable costs from total or gross revenue. The estimation of average variable costs for inputs like fertilizers, seeds/cuttings, labour and transport was based on current prices (February 2016).

3.7.2 Qualitative data

The process of qualitative data analysis involves an inductive approach aimed at reducing the volume of information by systematically organising the data into categories and themes from the specific to the general (Creswell 2014). During the analysis process, the steps are considered interrelated and repeated cyclical until the level of data interpretation is sufficient to answer the research questions posted (Creswell 2009). Thematic content analysis was used for qualitative data generated from key informant interviews and focus group discussions. Thematic content analysis is used for systematically analysing written communication such as information from focus group discussions and key informant interviews.

In this study, content analysis was done manually. The emerging themes and concepts were identified in line with the research questions and objectives. Themes relating to different roles were drawn, participation of women and men in cassava production, processing and marketing were done. The identified themes were also used as building blocks of the conceptual framework. Quotations and narrations extracted from key informant interviews, FGDs and repeated household visits were used to explain information regarding cassava processing, and household power dynamics. The major themes that emerged indicated that men owned most of the productive resources and made important household decisions regarding time budgets and income use.

3.8 Chapter summary

This chapter sought to give a detailed and concise description and explanation of the methodology adopted in this study. Efforts were made to describe and explain the research design, sampling, study site, data collection methods, challenges faced during fieldwork and solutions used, ethical considerations and data analysis methods used. A mixed-methods approach was adopted in this study which entailed the use of qualitative and quantitative data collection methods. The study was divided into two levels, the macro and the micro level. The macro level research involved a review of policy documents and reports on gender and agriculture as well as key informant interviews with policymakers (directors, senior ministerial

government officials), gender specialists, agriculture extension officers, community leaders, agricultural economists, agro dealers and large scale cassava traders. Information solicited from these key informants was useful in identifying actors, description of relevant guiding gender norms, laws, systems, rules and the possible implications on household gender power dynamics.

At the micro level, a methodological triangulation of structured interviews, focus group discussions, direct observations and repeated household visits enabled the collection quantitative and qualitative household data. Structured interviews enabled us to gather quantitative data about household demographics, resource endowments, land size, quantities of cassava produced, marketed as well as number of participants in each cassava value chain node. The quantitative data enabled the determination of empowerment levels of women and men, determination of participation of women and men in cassava production and marketing of cassava using bi-probit and ordinary least squares regression equations. The quantitative data also enabled the determination of percentage of actors involved in each node. All relevant ethical considerations of confidentiality, debriefing, informed consent and the right to withdraw from the study were upheld having been commissioned by University of Pretoria Ethics Review Committee and COSTEC. The thematic content analysis was able to tease out the emerging themes on control of resources, decision making and gender roles generated through FGDs, key informant interviews and repeated household visits.

Chapter 4

Gender, agriculture policy and case study sites characterisation in Tanzania

4.1 Introduction

Since the study is intended to investigate gender and cassava value chains in Tanzania, it is essential to provide an overview of gender, cassava and agriculture policy dynamics at the national level, and some basic information on agro-climatic conditions of the case study areas. The chapter provides background issues that underpin the study using a macro level analysis of gender and cassava value chains in Tanzania where the study was undertaken. The chapter also provides a detailed description of the three study sites (Kigoma, Zanzibar, Mkuranga and Geita) in terms of climatic, edaphic, agriculture activities and dominant livelihood activities are done followed by an overview of cassava and gender issues in Tanzania. An outline of the country's gender and agriculture policy frameworks is provided in an attempt to situate the household gender dynamics and cassava value chain in the broader socio-economic and political context. The chapter draws material from literature sources and key informant interviews. The chapter is organised as follows: It begins with a description of the food security status of Tanzania in order to understand the significance of the agricultural sector to the Tanzanian economy. This is followed by the detailed description of the country's agro-ecological and climatic conditions and the three case study sites

4.2 Climatic and agro-ecological conditions of Tanzania

4.2.1 Climatic conditions

Tanzania is a major cassava producing country in East Africa. She lies within 1- 12⁰ S and longitude 29 - 40⁰ E between Lake Victoria in the north, Tanganyika to the west and Lake Nyasa to the south (Basalirwa *et al.* 1999). The greater part of the country receives less than 1000mm of rainfall, except the highlands and parts of the extreme south and west where 1400 - 2000mm can be expected. On average about 200-600mm of rainfall is received in the central areas Basalirwa *et al.* 1999) Rainfall is generally unimodal in the north while to the south it is bimodal. The seasonal variations are depicted in Table 4.1.

4.2.2 Soil types

Major soil types are volcanic soils with very high agriculture productivity potential and are common in Arusha, Kilimanjaro and the south west highlands, Kitulo plateau. The light sandy soils are commonly found in the coastal areas such as Mkuranga while granite soils occur mainly in the western region in Mwanza and Tabora. The red soils take up most of the central plateau while ironstone soils occupy the far west mostly in Kagera, Kigoma and Shinyanga. These ironstone soils are generally acidic, but can be productive when enough inputs are added. Generally crops grown include maize, cassava, banana, rice, beans, and cotton.

Table4.1: Rainfall seasonal variations in various zones of Tanzania

Month	Season	Zones		
		North	Central	South
Dec to March	Kaskazi	Dry	Dry	Wet
March to May	Masika	Wet	Wet	Wet
June to Sept	Kusi	Dry	Dry	Dry
Oct to Nov	Vuli	Wet	Wet	Wet

4.3 Biophysical case study sites characterisation

4.3.1 Kigoma (Kakonko district)

The Kakonko district is in Kigoma region in the western part of Tanzania bordering Burundi. The region lies between longitude 29.5° and 31.5°E and latitude 3.5° and 6.5°S. It covers about 45066 square kilometres, an area which is close to 4.8 percent of the whole area of Tanzania. About 27.1 percent of the land is suitable for cultivation (United Republic of Tanzania 2007).The

soils in Kigoma are predominantly fertile red soils. Kigoma is characterised by a tropical climate with two pronounced seasons; the dry and rainy season. Rainfall is generally reliable and ranges from 600 mm to 1500mm per annum with much rain in the western highlands and the least in the lowlands to the east. The average daily temperature is 25°C during December and January and 28°C in September. Major livelihood activities include farming of staple and cash crops. According to Shayo (2015) major crops which were widely grown included maize (97.4%), beans (94.0%), cassava (47.4%), bananas (38.1%), and sweet potatoes (31.6%). Other less grown crops were coffee (25.6%) sorghum (16.4%), groundnuts (11.2%), and peas. With the exception of coffee, which was grown as a cash crop in Kalinzi village, all crops were principally cultivated for food. Farmers also grow cotton for commercial purposes and cassava, banana, maize, beans, groundnuts as staple food crops which are also sold in times of surplus.

4.3.2 Zanzibar Island (Unguja)

The United Republic of Tanganyika and Zanzibar was named United Republic of Tanzania in 1964 after their unification. The Government of the Republic of Tanzania has sovereign powers to deal with all union matters and non-union matters in the main land of Tanzania while the Revolutionary Government of Zanzibar deals with union matters in the Zanzibar Islands of Unguja and Pemba, hence Zanzibar is a republic autonomous state in the Indian Ocean. In Zanzibar, the agriculture sector contributed an average of 25 percent of the total GDP within eight years period from 2000 to 2007. Approximately 70 percent of the population depends directly or indirectly on the agriculture sector for their livelihood.

Cassava is the most dominant food crop grown in Zanzibar and a staple for the majority of poor in rural areas. The area under cultivation is estimated at 34000 ha (Unguja 11840ha and Pemba 22160 ha). The average annual cassava yield is estimated at 5 tonnes/ha while potential and expected yields are 25 tonnes/ha when improved varieties are planted. In Zanzibar, major constraints to increased cassava production includes: depleted soil fertility, poor yielding local varieties that are also susceptible to pests and diseases, high-post harvest losses and limited options for utilisation. Rice is the staple food in Zanzibar and is grown mostly during the long rainy season. Only a few households plant the crop during the short rainy season and most of these households are located in areas where few irrigation schemes are operating. In Zanzibar, banana is an essential staple crop ranked third in terms of consumer preference after rice and

cassava and is an important source of trade and income especially among smallholder farmers. It is grown in all agro ecologies of Zanzibar, although it does well in the plantation and “deep soil” areas of both Pemba and Unguja islands. Sweet potato is also one of the most important food crops the general local food basket of Zanzibar. Zanzibar’s tropical climate provides ideal conditions for the production of many types of tropical fruits spices. Cloves and coconuts occupy a prime position in the history and agricultural system of Zanzibar. Cloves have been a major foreign exchange earner in Zanzibar for the last hundred and fifty years.

Women in Zanzibar constitute more than 50 percent of the labour force and they are household head in about 21.3 percent of households. The majority of women in Zanzibar work in the agricultural sector, where they account for 70 percent of the agricultural work force and 70 percent of the agricultural output. However, their conditions of service and remuneration have remained generally poor and not well recognised and rewarded. Women’s efforts to increase productivity are hampered by illiteracy, lack of appropriate technology, inadequate access to information, limited access to extension services and capital, as well as social and cultural factors that have compromised their rights to land and personal development. Despite the responses in addressing gender inequality in Zanzibar, its prioritisation and mainstreaming across sectors are still low.

4.3.3 Mkuranga district

Mkuranga district is located in the coast region between latitude 6⁰ 50' and 7⁰ 33' south of the equator and between longitudes 38⁰ 5' and 39⁰ 28' east. In the north it is bordered by the Dar es Salaam city, in the West by the Rufiji district and in the East by the Indian Ocean. Other districts that make up the Coast region are Bagamoyo, Kibaha, Kisarawe, Mafia and Rufiji. The rainfall pattern is bimodal, with the short rains (*vuli*) stretching from September to December and, the long season (*masika*) stretching from March to June (Lusendamila 2010). Usually the long season rains are more reliable and evenly distributed than the short season rains. Rainfall ranges from 800mm to 1000mm. The average mean annual temperature is 28⁰C. The soil is predominantly sandy and loamy. The vegetation is predominantly forests (mangroves), miombo woodland and swampy vegetation. The district has three distinct agro-ecological zones, which are coastline zones, upland zone, and low-lying basins and valleys which are found in both the

coastline zone and upland area. Based on the census conducted in 2012, the Mkuranga district has a population of 187 428 people of whom 91 714 are males and 95 714 are females. Agriculture forms the backbone of the livelihoods in this district and 97 percent of the total households are engaged in agricultural production. Perennial crops that are grown include cashew nuts, coconut and a variety of citrus fruits, pineapples, mangoes, pawpaws and watermelons. Food crops include cassava, paddy, maize, sweet potatoes and legumes. The average farm size cultivated by small holder farmers ranges from half an acre to two acres. There are no plantations or estates run by commercial farmers. The type and scale of agriculture that is practised in this district is purely subsistence. An estimated 80 percent of the income generated by households in the district is through cashew nut production which is also an export crop.

4.3.4 Geita district

Geita district is located in Geita region of Tanzania bordered to the east by Mwanza region as well as Shinyanga region to the south. Before its establishment Geita region was part of Shinyanga, Mwanza and Kagera regions of Tanzania (Ewald & Narman 2004). The area is approximately 7825km² with 33 wards and 185 villages within it. There is an estimated total population of about 807 619 people as reported in the 2012 Tanzanian Household Population Census. The district has moderate temperatures of between 17°C to 30°C. Geita receive an average annual rainfall of about 1200mm. The rainfall pattern is also bimodal with the short rain season occurring usually between October and January and the long usually reliable rain season occurring between March and May. The soil is predominantly loam, clay, sandy and kaolinite (Mmasa 2014).

Major crops that are grown in Geita comprise of cassava, maize, cotton, sweet potatoes, beans, finger millet, yams, pigeon peas, cow peas, bambara nuts, rice, groundnuts and pineapples. Although cassava may be grown on various types of soil, highest yield and better quality roots will be obtained on soils that are loose especially the sandy and loam soils. Hence, for the case of Geita soil profile, areas with loam and sandy loam solids are best for production of cassava. The major livelihood activities in Geita include crops cultivation, livestock keeping (both small stock and large stock), fishing, and small scale mining. Majority of the population women in particular relies on agriculture as a source of livelihood with men engaging more on fishing and off farm

employment such as small scale mining. However, concerted efforts in increasing productive efficiency in the agricultural sector are constrained by many factors including poor infrastructure, unreliable markets, inadequate market and crop communication from research and extension organisations.

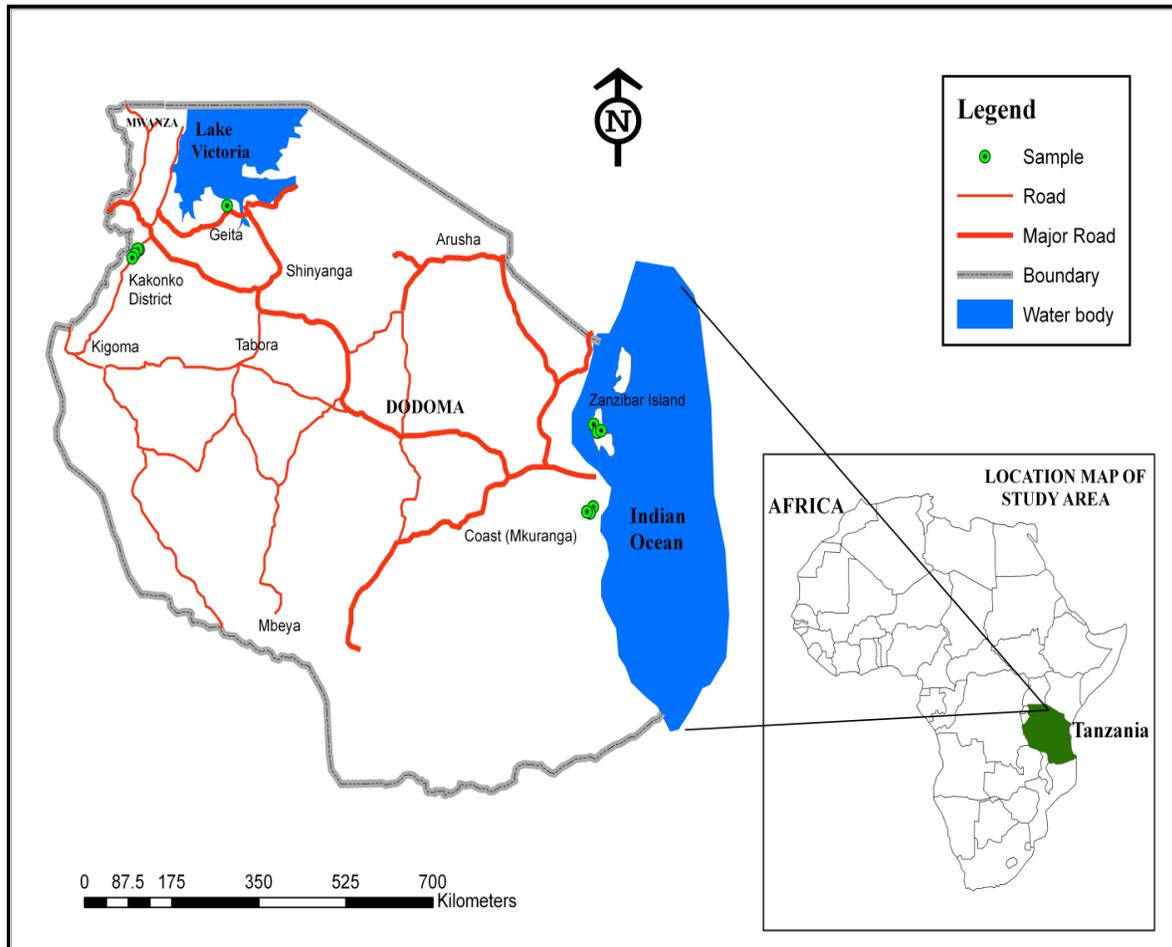


Fig 4. 1:Map showing location of case study sites in Tanzania

4.4The policy framework for gender and agriculture in Tanzania

Since the late 1980s and late 1990s, Tanzania has undergone significant socio-economic reforms representing a move away from the interventionist and socialist policies (Ujamaa) to a more market-led and decentralised system (Shayo & Martin 2009). In the context of these reforms, the Government of Tanzania has made considerable efforts to integrate gender into its policy-making

and institutional activities in all the sectors of the Tanzanian economy. The Government of Tanzania has introduced gender equality policies in the economic, political and social spheres, with policies emphasising non-discrimination and the use affirmative action to promote and integrate women at all levels including policy making (Shayo & Martin 2009). This has been shown by several examples that include the commitment to increasing the number of parliamentary seats reserved for women, the requirement of employers to register and report on equality issues to a labour commissioner, and the provision of rights to maternity leave and breastfeeding in working environments with women.

These policies have been introduced on the basis of the equality principles enshrined in the Tanzanian Constitution, which ban sex discrimination of any kind and promote gender equality at all levels in the society. The general policy objective of the Tanzania Agriculture and Livestock Policy is to commercialise agriculture in order to increase farmers' income, reduce poverty, achieve food security, increase export earnings, support and promote agro-industries and environmental conservation (Shayo & Martin 2009). Several policy documents that have been enacted takes cognisance of the fact that the marginalised position of women is attributable to poor access to land, credit and services and emphasises the importance of engendering extension services by recognising women's multiple roles and time constraints.

As a result the Land Act and Village Land Act of 1999, which repealed customary and traditional practices, were enacted to provide gender equality in the ownership, use and management of land. This is because land has been regarded a major resource especially for rural populace who rely on agriculture as a source of their livelihood. Women are also recognised as being significant contributors to the agricultural sector especially with regards to staple food crops such as cassava, maize, banana and rice which are key ingredients to securing nutrition of households. Women have also been observed to contribute much of the labour force in the agricultural sector though at low value yet critical nodes.

In addition to a series of national gender policies which seek to address gender inequality in productive resources ownership, Tanzania is a signatory to various international policies on equity and non-discrimination, such as the Convention on the Elimination of All Forms of Discrimination against Women (CEDAW) and the Beijing Platform of Action. The East African country is also a signatory to regional and sub-regional policies, such as the Southern African Development Community (SADC) Declaration on Gender and Development and the African Charter of Human and Peoples Rights of 1981 (ACHPR). Tanzania has also ratified all eight core ILO.

Conventions that consider the plight of employment conditions, are drafted specifically to counter discrimination in women's employment (Tanzania Gender Networking Programme, 2006). During the early 1990s, the Tanzanian government formed the Ministry of Community Development, Women and Children (MCDWC) to oversee policy and programmes on community development, women and children's affairs, and family planning, and coordinate gender issues in the country (Shayo & Martin 2009). In 2000 the name was later changed to the Ministry Community Development, Gender and Children (MCDGC), representing a strategic shift towards a Gender in Development approach. The Ministry works in a range of priority areas, such as policymaking, institution-building, legal and human rights, education, employment, decision making and health care. The Ministry also established the position of 'Gender Focal Points' in each ministry and at various levels of government and introduced gender budgeting initiatives in selected sectors (Shayo & Martin 2009).

The Tanzanian Government has developed a comprehensive Poverty Reduction Strategy that aims to encourage the full participation of women in eradicating poverty, and the promotion of equal opportunities for men and women. During this period of the late 1990s, the Government also began to devolve more power in the agricultural sector to the district level. Districts then became responsible for developing District Agricultural Plans (DADPs), designed to address local issues and encourage greater participation in extension services and development. The Agricultural Sector Development Strategy (ASDS) was launched in 2006, and the Agricultural Sector Development Program (ASDP) for agricultural growth and poverty reduction has been implemented since, linked with the National Strategy for Growth and Reduction of Poverty.

However, the majority of the Government's efforts in addressing gender have been criticised due to the lack of human and financial capacity institutions have to implement policies, and lack of capacity at the district level (particularly in expertise and data collection) (African Development Bank 2005).

As far as economic development is concerned, it is pertinent to note that the economy did not perform as well for the year 2007 compared to the previous two years. This is due to various reasons, including among others, the adverse effects of severe food and power shortages as well as drought, deterioration of key sectors and poor infrastructure and means of communication. In order to understand the cassava value chains and women's roles and their position, it is useful to locate them within the broader gender and agricultural context in Tanzania. As alluded to in section 3.2, Kanji and Barrientos (2002) argue that the behaviour of individuals within households must be linked to wider social processes and power structures so as to have a comprehensive gender analysis of food value chains. Key issues emanating from the review of agriculture and gender policy documents as well as national reports are analysed to examine how they contextualize agriculture and gender issues in Tanzania. In order to address the imbalances in ownership of productive resources such as land, the Government drafted a policy and prioritised these issues. In an effort to address gender inequality, the 2013 National Agriculture Policy of Tanzania stated the following policy statements:

- The Government committed itself to facilitate equal access to land to both men and women;
- The development and utilization of appropriate labour saving technologies to relieve men and women from laborious and time consuming tasks shall be promoted especially for women who perform productive reproductive roles;
- The Government also committed itself to improving the participation of men and women in decision-making processes to improve their access to productive resources at macro, meso and micro levels; and
- Awareness creation and sensitisation of communities on negative cultural attitudes and practices shall be promoted in collaboration with the ministry responsible for gender.

The National Agriculture Policy (2013) of Tanzania also acknowledges that increased use of modern inputs such as fertilizers, agrochemicals, seeds, farm machinery is a pre-requisite for achieving sufficient agricultural production and growth to meet economic development, poverty reduction and food security and nutrition goals. Therefore, this policy statement affects the input supply node within the cassava value chain where it has been dominated by local agro dealers.

Agricultural commodity production in Tanzania has traditionally been dominated by few commodities which were mainly for export, namely, coffee, cotton, cashew nuts, tobacco, tea, sisal, sugarcane and pyrethrum. Other emerging crops such as cassava have become equally important in local and regional markets in their ability to generate national income and farmers' earnings as well as in enhancing food security and poverty alleviation. A number of these crops have found market outlets in regional and international markets. Of late, food crops, particularly cereals have become as important as traditional commodities owing to food shortage in regional and international markets and therefore, offer additional opportunities for the Tanzanian economy. The policy further points out that there is a need to focus on the development of agricultural commodities such as cassava that have comparative and competitive advantages locally and regionally as there are many unfolding opportunities, which compel the policymakers to develop strategic measures in order to take advantage of those opportunities. Hence, the development of a strategic food crops such as cassava would create more opportunities for the Tanzanian economy.

The Ministry of Community Development Gender and Children is the line ministry responsible for policy formulation, coordination and monitoring of gender related activities through quarterly reviews in the Republic of Tanzania. The Ministry of Youth Employment Women and Children Development is the National Gender Machinery for Zanzibar and is responsible for policy formulation, coordination and monitoring in Zanzibar. As part of the Tanzanian Government 1977 constitutional amendment in 2000 and 2004, women's participation in the National Parliament and Local Authorities was increased thereby endorsing gender equality and equity and guaranteeing full participation of women and men in social, economic and political life. In addition, the Tanzanian Government also formulated the Women and Gender Development

Policy that was crafted in 2000 to put more emphasis on the Women in Development Policy (WID) that was instituted in 1992 in line with the Beijing platform for action.

The Government of the Republic of Tanzania has also put in place the National Development Vision 2025 that aims at attaining gender equality and the empowerment of women in all socio-economic and political relations, and culture by the year 2025. This also includes the empowerment of women in agriculture, hence the initiatives to develop and upgrade the cassava value chains. In an effort to ensure effective implementation of the Women and Gender Development Policy, the National Strategy for Gender Development (NSGD) to promote gender equality and equity was developed. This strategy covered key areas of gender concerns stipulated in the Women and Gender Development Policy that include among others decision making and power, education, training, economic empowerment, food security and nutrition, division of labour, ownership of resources and community participation for women. These policy issues were raised, because previous policy frameworks aimed at increasing food security and food production, tend to underestimate or totally ignore women's role in both production and the general decision-making process within the household (Mmasa 2013). This comes at the backdrop that the role of women in agriculture cannot be overemphasised as demonstrated by what the then President of the Republic of Tanzania said about women's role in agriculture:

After decades in which agriculture and nutrition didn't always get the attention to the lack of credit, especially for small farmers, most of whom are women. ... and play a rolebecause government cannot and should not do this alone...²

This statement is evidence that policymakers in most developing countries are acknowledging that women are an integral part in as far as poverty alleviation and food security enhancement is

²President Jakaya Kikwete on the African Development Bank Group Opening Statement at the 47th Annual General Assembly, 31st May 2012 – Arusha – Tanzania

concerned in most developing countries such as Tanzania. This empirical evidence provides enough justification for the examination of intra-household gender dynamics and cassava value chain mapping to identify different gender roles and participation at each value chain node. This will be accomplished in Chapter 5 where the mapping of gender roles will allow for identification of appropriate development interventions within the cassava value chains.

4.5 Gender and Agriculture in Tanzania

Information gathered from an interview with a Senior Agricultural Research Officer in the Lake zone gave the following insights with regards to the availability of useful gender disaggregated data:

.....one of the challenges is the unavailability of gender disaggregated data concerning rural women engaged in different economic activities including agriculture and agribusiness especially with particular reference to traditional staple food crops such as cassava. The data bases within the Ministry responsible for gender and agricultural related activities are not disaggregated by gender. This poses a challenge in that the data cannot be analysed to generate information that can be used to inform policy that target marginalized women. In addition there has been very limited gender focused research done to generate updated and reliable data with regards to important issues that have significant implications on how rural households operate such as :

- (i) economic structural adjustment programs that have implications on productivity and marketing among smallholder farmers;
- (ii) proliferation of urbanization especially by men thereby leaving their rural households with limited labour and support; and,
- (iii) the need for increased attention to the importance of women involvement in natural resource management and in national agricultural policy.....³

One of the major challenges that were identified was with regards to access to extension information as reported from a farmer focus group discussion in Kakonko. The challenges facing

³Interview with Dr. P. Mlay, Agricultural Research and Development Institute, Mwanza, 27 January 2016.

smallholder farmers were captured in the following excerpt from an interview with a women farmer:

...we hardly receive visits from local agricultural extension workers at our households to discuss issues regarding cropping. Much of the knowledge and technical expertise we make use of is information we share with local fellow farmers. This has negatively impacted on our yields and marketing strategies...⁴(Mariah, Interview, Kakonko, 22 January 2016).

As reported by Shayo (2015), rural women and men in Tanzania have differential access to and control over productive resources including land. These gender differences persist across many spheres in Tanzania, including in education, health, legal status, cultural perceptions, and in the economic arena. Most of these disparities have implications not only to rural women but to over country's growth potential particularly. Several forms of initiatives have been implemented to assist rural women to overcome most of the problems and challenges mentioned above including policies and legislation. In terms of addressing issues related to access to and control over land, the Tanzania government introduced the Land and Village Land Act of 1999 to allow for equal distribution of land and to eradicate gender inequality in land ownership at the community level.

In addition, some specific strategies to address cultural and traditional obstacles that limit rural women to participation effectively in agricultural activities have been introduced including review of oppressive laws especially those that work against women. In most rural communities in Tanzania, cultural traditions still strongly influence the ability of Tanzanian rural women to realise their potential in agribusiness' activities. More specifically, cultural norms and values tend to influence prevailing rural women's attitudes and beliefs towards their roles in agriculture. These in turn tend to affect rural women's ability to improve yield, profit, and efficiency in agriculture.

The lead power that controls the chains identifies the main drivers of the agriculture commodity value chain that provides additional value to the produce or is able to satisfy the changing consumer preferences. Often, the intermediaries operate in the most profitable parts of a chain

⁴Interview with Mariah, Kakonko district, Kigoma, 22 January 2016.

such as marketing with the highest entry barriers. There are producer-driven and demand-driven chains according to the nature of the lead firms, capital or labour intensity and their position vis-à-vis consumers markets (Gereffi & Korzeniewicz 1994). In connection with changing consumer preferences, an inevitable shift from producer-driven to demand or buyer-driven can be observed particularly in most agriculture food value chains. Buyer-driven value chains are positioned nearer to the final consumer and are gaining market power and the capacity to vertically coordinate the chain. With the rise of agro-food chains, the need for vertical coordination as complement to market power of the lead firms has increased considerably (Hobbs & Young, 2001).

4.6 Chapter summary

This chapter provided a detailed characterisation of case study areas describing the climatic conditions, soil characteristics, vegetation, crops grown and other off farm economic activities were explained. The presentation was followed by the description of the macro level context within which gender and agriculture are situated in Tanzania. Macro level description used secondary information such as policy documents, reports and scientific articles to characterise the policy framework within which gender and agriculture operates. Agriculture policy statements and gender strategies were reviewed and provided insights on the position of the Government of the Republic of Tanzania pertaining to the issues of land, inputs, marketing and control of resources especially among women farmers. In addition, challenges faced by smallholder farmers, women in particular were investigated together with the initiatives that were put in place to address the challenges. This chapter contributes to the successive Chapter 5 by situating the micro level cassava value chain operations within a broader macro-economic contextual policy framework.

Chapter 5

Mapping cassava food value chains in Tanzania's smallholder farming sector

Mapping a value chain eases a clear understanding of the series of activities with main actors and relationships involved hence, value chain analysis (VCA) begins with the process of mapping the value chain.

5

⁵ This chapter was published as follows:

Blessing Masamha; Vusilizwe Thebe & Veronica N.E Uzokwe (2018). Mapping cassava food value chains in Tanzania's smallholder farming sector: Implications of intra-household gender dynamics. *Journal of Rural Studies Vol 58* , pp 82-92. Elsevier B.V.

5.1 Introduction

Mapping a value chain eases a clear understanding of the series of activities with main actors and relationships involved. It provides tools and examples on how to capture the different dimensions of a value chain. This chapter aims to address issues regarding the identification and description of cassava value chain nodes, identifying the main actors, their roles, and how gendered power relations within households affect both women and men, and how in turn these dynamics affect the cassava value chain's functioning. This well-embedded chapter tries to address intra-household gender inequalities within cassava value chains. In line with the Harvard Analytical Framework underpinning this study, which was presented in Chapter 2, this chapter contributes significantly to the guiding framework through the description of women and men's gender roles, mapping of work and resources of men and women and highlighting their main differences. Gender dynamics and implications of who controls the resources and benefits within the household were identified and explained. The guiding framework enabled the bringing together of a gender focus of the cassava value chain at the household level with a pro-poor value chain approach to analyse, in a coordinated manner, a comprehensive range of cassava-related activities and constraints relating to input supplies, production, processing, governance, supporting infrastructure, and marketing. The cassava food value chain map (Fig 5.9) depicts various contextual factors influencing the nodes in which men and women dominate.

The chapter is organised in the following manner: The first section provides a brief background of cassava value chains and gender relations in Tanzania, followed by a detailed description of various cassava value chain nodes. The chapter starts by giving an account of the gender dynamics in the supply of cassava inputs, and then the cassava production node describing control of land use, cassava area planted, and the roles of women and men. The chapter examines the cassava harvesting node looking at people involved in the harvesting, equipment used and the forms of post-harvest losses experienced. The value chain node on cassava processing is examined defining the gender roles and the various products produced after processing. The cassava transportation and marketing nodes are also dealt with extensively examining mode of transport used; potential customers' gender roles, constraints and cassava value chain gender feedback effects. The final section presents a schematic diagram of the cassava value chain map

based on empirical findings from this study. The chapter summary finally gives the overview of the chapter and its contribution to the whole thesis.

As alluded to in Section 1.4, a value chain is defined as a range of activities that are required to bring a product from its conception, through its design, sourcing of raw materials and intermediate inputs, processing, marketing and distribution, to the final consumer (Kumar *et al.* 2011). This definition is adopted in this chapter to aid in the identification of the cassava related nodes and the activities that happen thereof. The application of the value chain approach for examining the development of agriculture commodities has been identified as an important strategy for enhancing efficiency and coordination (see Coles & Mitchell 2011). It also plays a critical role in enabling policymakers, development practitioners, donors, and academics to develop an understanding of cassava production methods, processing and marketing, and the gender and power dynamics between actors at the levels of both the household and the value chain (Kaplinsky & Morris 2001). This, according to Coles and Mitchell (2011) is because the use of a value chain approach enables the identification of gaps and interventions that can benefit marginalised groups such as women and the poor.

5.2 Analysis of cassava value chains and intra-household gender dynamics

Identifying the cassava value chains involves tracing the product from downstream up to upstream, focusing on vertical and horizontal relationships within the chain. Vertical relationships are mainly between the buyers and suppliers and the movement of cassava product from producer to consumer. Horizontal services can refer to the range of goods and services that support or provide inputs to the vertical chain like financial services and technical advisory services like this case where almost 95 percent of the agricultural advisory services are done by the government.

In Tanzania, the key nodes in the cassava value chain that are critical to both accumulation and poverty reduction will include the following:

- input supply;

- production;
- harvesting;
- processing;
- transportation;
- marketing and; and
- consumption.

Similar value chain nodes were reported in other studies on agricultural product value chains in Africa. For example, Ouma *et al.* (2010) report similar value chain nodes in the traditional marketing channels for banana and plantain in Central Africa. Similarly Andersson *et al.* (2016) report similar findings about production, processing, traders and middlemen in the cassava leaves value chain in Mkuranga in Tanzania, while Osuji *et al.* (2017) made similar observations in the cassava value chain mapping gender role analysis in Southeast Nigeria. Of particular interest from the research in Tanzania is the tremendous dominance of large-scale middlemen (60%) in the cassava marketing node.

Smallholder rural households constitute the points of inception for these value chains, extending to towns like Kigoma, Zanzibar, Dar es Salaam, Mkuranga, and Mwanza, as well as to other neighbouring countries such as Burundi, Rwanda, Democratic Republic of Congo, and Uganda. The flow of these products in this chain is generated by small-scale producers and is transmitted through middlemen, retailers, and fresh markets in Mkuranga, Zanzibar, and Dar es Salaam. While cross-border trading of cassava between Kigoma, Burundi and Rwanda is potentially lucrative for farmers, the research revealed that these farmers were often subjected to exorbitant taxes, which discourage farmers to sell their produce to other countries since they would incur more costs, thereby increasing the retail prices of cassava upon selling. This means that farmers will benefit less from the cross-border trading of cassava.

Moreover, the middlemen operating particularly in the rural setting of Kigoma region often buy cassava at very low prices from smallholder farmers. This practice results in smallholder farmers especially women getting less income as expected from their produce. This is usually because

some middlemen buy their produce. Small-scale cassava farmers also faced other constraints, which hampered active participation of the majority of people. Farmers complained that the general environment was not enabling enough for the large majority of people to participate. Factors relating to an enabling environment included ecological conditions like changing climatic conditions, socioeconomic conditions relating to asset ownership, control of resources such as land, as well as gendered power dynamics within households. Politics also constituted a further factor that influences policies on marketing, prices of inputs, and land allocation. These issues will be discussed in this section.

5.2.1 Cassava inputs supply node

Smallholder farming in developing countries is heavily constrained by the availability of adequate farming inputs. The Tanzanian government recognises the problem of input supply particularly for smallholder farmers. Through the Agricultural Extension Officers operating in the field, the government of Tanzania noted that smallholder farmers were experiencing inputs shortage, which was the main cause of low yields and resultantly food shortages especially for women headed households. To address this, the 2013 Tanzanian National Agriculture Policy was crafted and enacted, targeted smallholder farmers to access agriculture inputs. The 2013 Tanzanian National Agriculture Policy framework was meant to support farmers in accessing modern inputs and agro-chemicals together with increased private sector participation, because it had noted low utilisation of modern inputs and agro-chemicals among farmers.

Most of the implements that were commonly used by farmers were traditional and inexpensive ones. Most of them have been made of locally available wooden and metal objects. The implements that were utilised by farmers across all study sites were limited to basic tools (ox-drawn plough, matches, hoes and sprayers) and very limited quantities of agrochemicals. Most farmers (80%) were not applying fertilizers of any kind. The communal exchange system of acquiring cassava cuttings is another peculiarity of cassava value chain in the Tanzania which has a reducing effect on the influence of input suppliers and agro dealers.

In Tanzania, the input suppliers are mainly Agro Dealers, who are mainly men and are responsible for procuring inputs from manufacturers and research institutions and then sell to farmers at the local level. This means that most women purchase their inputs from men who usually put higher gross margins, hence rendering their stock unaffordable to women farmers. In Zanzibar and Mkuranga the inputs suppliers were mainly small retail shops as well as whole sale shops located in Zanzibar Town while in Kigoma individual, agro dealers with retail shops characterised the inputs supply node. The agro dealers in Kigoma reported that they get orders for their stock from input wholesalers in Mwanza and Geita for further retailing in Kakonko whilst in Mkuranga retail orders were sourced from Dar es Salaam. This cassava value chain node is upstream (see Figure 5.5) at the bottom of the value chain. The inputs required for cassava production include fertilizers, seed, herbicides, improved cuttings and implements such as ploughs, hoes and knap sack sprays. These, according to Agriculture Extension Officers, they are the major inputs that determine cassava productivity in all the three sites: Kigoma, Mkuranga and Zanzibar.

Farming inputs such as herbicides, insecticides, fertilizers, and spraying equipment are supplied by small local shops located at business centres. About 95; 75 and 60 percent of the agro dealers in Kigoma, Mkuranga and Zanzibar respectively were men. The dominance of men in agro dealing in Kigoma is probably due to cultural restrictions on women movements to distant urban areas where they collect their input orders. Unlike in Mkuranga and Zanzibar where sources of inputs were close to towns, a considerable percentage of participation in agro dealing by women 25 percent and 40 percent were recorded for Mkuranga and Zanzibar respectively. Women would easily order their agriculture input stock from the nearby Tanzania's main city, Dar es Salaam as well as the city of Zanzibar. In areas like the Kakonko district, farmers mainly sourced their input locally, because of the long distance between smallholder rural households and urbanised areas like Kibondo, Kigoma and Mwanza towns.

This was similarly reported by Shayo and Martin (2009) in the Southern zone of Tanzania where most villages indicated that they obtained cassava planting materials from various sources as fellow farmers and local NGOs. Farmers in Mkuranga sourced their input from local agro dealers

and also from Dar es Salaam city which is about 60 km away. This was the similar case with farmers in Zanzibar who sourced inputs locally and from Zanzibar town. Over 80 percent of the farmers in the sample reported that they sourced their inputs locally in all study sites.

The supply of inputs is dominated by men who are able to travel long distances. Cultural and gender-related constraints limit women's movements, thereby reducing their potential to engage in the supply of input. The case of women in Kigoma and Mkuranga provides evidence of how cultural constraints limit the active participation of women in the provision of agriculture input for farming. This is evidenced by what Karina narrated in Kigoma:

As a woman actively involved in cassava farming, i face difficulties in accessing inputs for planting hence I end up sourcing inputs from Agro Dealers who are predominantly men with whom my bargaining power is very limited. My husband does not allow me to travel long distances alone and in addition my household chores limit time available for me to move around sourcing for planting material and other inputs. To overcome this challenge I usually source planting material from fellow farmers and relatives.....⁶

Across all study areas, approximately one-third of farmers could directly purchase improved cassava cuttings from their fellow village farmers. About 70 percent of the smallholder famers had to travel to neighbouring villages, or to the central district, to access cuttings for planting. Those village level sellers of cuttings are individual farmers and not necessarily agro dealers. The village level sellers usually have surplus planting materials and they take an opportunity to sell their surplus to other fellow farmers at local weekly markets. Sometimes they even sell the plants from their home gardens where they propagate the cuttings during the dry season.

Cassava is cultivated mainly from local cultivars, although a major program to improve cassava varieties has been implemented by the International Institute of Tropical Agriculture (IITA).

⁶Interview with Karina Habai, Kigoma, 20 January 2016.

Local cassava varieties such as Zamani, Kisasa, Manyenzi and Ugonjwa were more common among both women and men in Kigoma and were reported to be producing good yields and traditionally preferred by farmers. This is because most of the farmers particularly women faced difficulties in accessing enough cuttings for planting owing to the limited movements to places where they acquire affordable planting material. This means that they relied heavily on men and fellow neighbouring farmers for provision of planting material.

Whereas about 90 percent local varieties of cassava are primarily grown in Kigoma, improved varieties are mostly planted in Zanzibar where IITA had established cassava trials and demonstration plots in collaboration with the Ministry of Agriculture Fisheries and Livestock, and National Research Institutes such as the Kizimbani Research Institute in Zanzibar. They develop disease resistant and high yielding varieties on station and upscale them at smallholder farms by distributing them for propagation. About 80 percent of these improved varieties were sourced from the Kizimbani Agriculture Research Institute where demonstration plots have been established in collaboration with IITA.

These findings are similar to those of Coulibaly, Arinloye & Abdoulaye (2014) who reported the distribution of improved cassava varieties to smallholder farmers by IITA and other National Research Institutes in West Africa. A local or informal seed system is predominant across all the three study sites, which involves farmers producing; disseminating and accessing seed directly from their own harvest through exchange and barter trading among friends, neighbours and relatives. This is common practice in traditional farming system, and Me-Nsope and Larkins (2016) came up with similar findings in the Malawian pigeon pea value chain where an informal seed system was also predominant. Similar results were reported by Adeoye, Oni, Yusuf and Adenegan (2013) in the plantain value chain mapping in South West Nigeria and in the sweet potato value chain in Tanzania.

An agricultural extension officer for Kigoma explains the access and distribution of cassava cuttings:

Smallholder farmers share cassava cuttings within their neighbourhood and close friends as a way of enhancing their relations. This also happens with other crops such as groundnuts, maize, beans and banana. The cassava varieties exchanged are predominantly local varieties...⁷

The agro dealers were not very much involved in the sourcing and distribution of cassava cuttings (germplasm) in the four study areas. Instead farmers traded local varieties of cassava among themselves during the planting season, with one bundle costing between TZSH2000 (US\$2) and TZSH3000). These prices were almost the same across the three case study sites and varied with season as well as the quantity of the yield. Other organisations such as the International Institute of Tropical Agriculture (IITA) are responsible for propagating the germplasm that is distributed by local agriculture extension workers to farmers for planting. The majority of the women (75%) across all study sites source their cassava cuttings from local fellow farmers whilst about 25 percent receive them from research institutes such as Kizimbani and IITA. The supply of inputs is dominated by men who are able to travel long distances. Cultural and gender-related constraints limit women's movements, thereby reducing their potential to engage in the supply of inputs. The majority have to travel to neighbouring villages, or to the central district, to access the cuttings.

5.2.2 Cassava production value chain node

Smallholder farming generally characterises Tanzanian agriculture. This is probably, because of the land tenure system which is predominantly communal. This is particularly so in the production of cassava where women mostly dominate. Like most traditional crops grown on a small scale, cassava production is labour intensive, entailing a variety of activities such as land clearing, and tillage, planting, weeding, harvesting, and processing. Labour intensity has led to gendered division of labour within a household where women are active in both productive and

⁷Interview with Moshi Salvatory, Kigoma, 19January2016.

reproductive household activities. In Tanzania in general, about 80 percent of land preparation for cultivating cassava is done primarily by the men within a household.

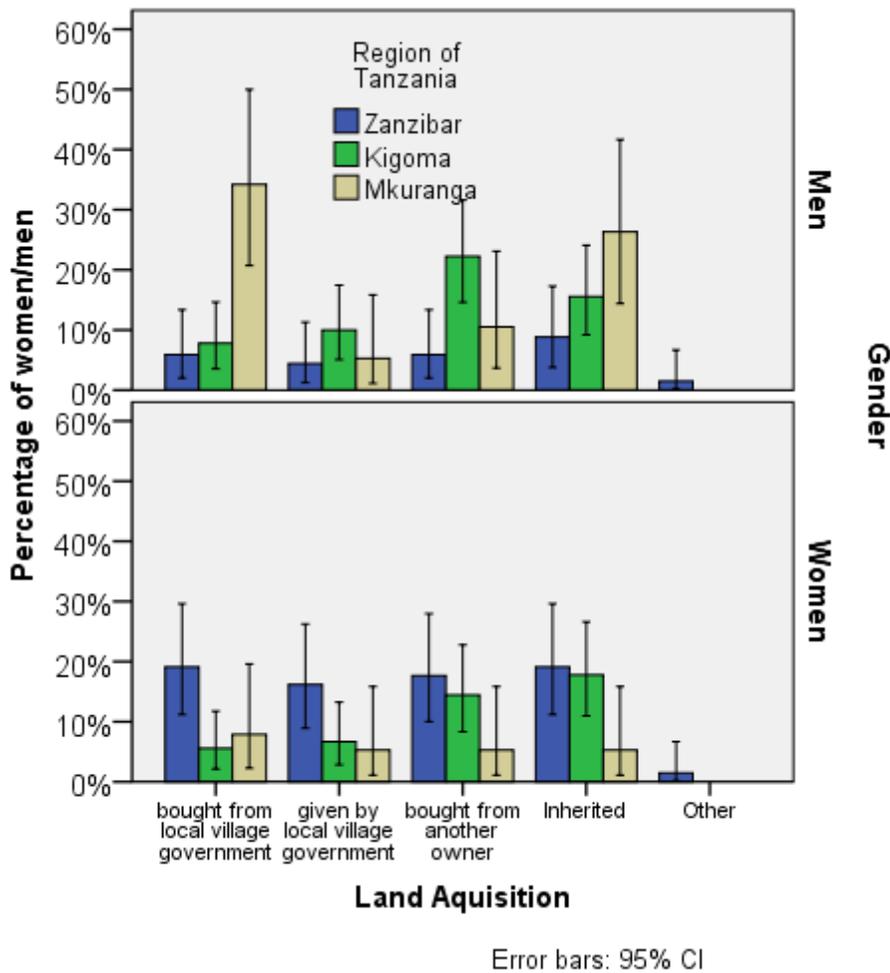


Fig 5.1: % of different ways of land acquisition by women and men in Tanzania

The method of how land was acquired has significant implications on decision making with regards to access and use of land particularly in a patriarchal society such as Tanzania where land is mainly given to men. Figure 5.1 shows that most women in Kigoma acquired land through inheritance (20%) implying that women indirectly get access and user rights to land after the death of men who in some cases could be their husbands or parents. In both Kigoma and

Mkuranga less than 10 percent of the women In Zanzibar, women acquired land predominantly through inheritance (19%), buying from local community governing authorities (19%), buying from other land owners (18%) and about 17 percent of the women were given land by local governing authorities. This result indicates that the distribution of land in Tanzania is biased in favour of men.

Women were able to buy land in Zanzibar, since they actively participated in cassava markets resulting in them handling substantial disposable income. The situation was different in Kigoma where about 19 percent of women inherited land and about 16 percent bought it from other owners. About 20percent of the men in Kigoma bought land from others while about 15 percent inherited land from their families. This result revealed the patriarchal system in Tanzania where land is perceived to be mainly owned by men. In Mkuranga, about 35percent of the men bought land from the local governing authorities and close to 25 percent inherited land from their families. In all the three sites, the results showed that men were active in the acquisition of land and hence influencing its control.

The average size of land cultivated varies from less than 1 hectare to 3 hectares, and differs between men and women considerably. In general, women planted smaller areas compared to men generally, because they are allocated land by men who are decision makers in the household. In Kigoma, about 1.59 hectares of land (see Table 5.1) on average, is allocated for cassava, whilst in Zanzibar, an average of 1.58 (see Table 5.1) hectares of land are planted with cassava. The least area planted with cassava by women was recorded in Mkuranga where 1.55 hectares were used. After clearing of the land, men in the households divide land and allocate plots for different crops which include cassava among other crops. Since cassava is predominantly female grown, women end up receiving marginal plots and sometimes smaller ones for cassava cultivation. In households with *de jure* and *de facto* women headed households, women hire men to clear their land and are paid either in kind or in cash.

De facto women headed households usually pay in form of cash generated from off farm employment by their husbands whilst *de jure* women headed households have very limited income and they pay for hired labour using their farm produce such as cassava and maize. A widowed mother of three in Geitasums up the situation of most *de jure* women headed households:

Land clearing is an activity which is labour intensive and to accomplish this task, we hire men to do it on our behalf. However, because of limited income, we use our agriculture produce to pay for the hired labour.⁸

Relative to the area planted by women, the cassava area planted by men across all the study sites which was significantly higher (see Table 5.2). Whether the production was done by men or women, the planting system was predominantly intercropping. This is usually done in order to maximize the use of available inputs such as fertilizer which may not be applied to all available arable plots. Intercropping has also been traditionally done to maximise arable land available especially in study areas such as Zanzibar and the Coast where arable land is very limited.

For example, in Kigoma 70 percent of cassava production was done through intercropping. In these situations cassava was either intercropped with 60 percent groundnuts or 40 percent of beans, with men intercropping more with cereals such as maize and women producing more groundnuts and beans. Despite the dominance of the intercropping technique, sole cropping was also practised by a minority of households (30%). In Zanzibar, intercropping of cassava involved crops such as cowpeas and coconut trees, although sole cropping was mostly dominant (80%).

⁸ . Interview with Hafsa, Geita, 26 January 2016

Table5.1: Average land area planted with cassava and yield harvested in the three study sites

District	Women		Men	
	<i>Area (Ha)</i>	<i>Quantity (Tons)</i>	<i>Area (Ha)</i>	<i>Quantity(Tons)</i>
Kigoma	1.59	712	2.331	2077
Zanzibar	1.58	2151	1.90	2233
Mkuranga	1.55	1386	1.84	1453

As already alluded to in the introduction section, all land in Tanzania is public land vested in the president as trustee on behalf of all citizens. This therefore, implies that all citizens in smallholder farming communities have user rights but do not own land. The East African country is endowed with about 44 million hectares of arable land out of which 10.8 million hectares, which is equivalent to about 24 percent, is under crop production. According to information discussed in Section 4.4 of the National land policy of 1997b women’s access to land is under customary law where women generally have inferior land rights relative to men and their access to land has been indirect and insecure. Some of the traditional provisions which used to protect women’s land use rights have been reportedly eroded and left women in a vulnerable position. In allocating land village councils have been guided by custom and have continued to discriminate against women by allocating land to heads of households who are usually men.

Within households, ‘land ownership’ reflects a patriarchal system which is skewed towards men. In all sites men hold rights to land ownership including land that is used by women. Land is allocated through the parents of a grown up young man as soon as he gets married. Women can only get access to land ownership rights through their husband when he passes on. In this study ownership of land was solely the responsibility of men about 95 percent across all study sites although decision making with regards to use of land is sometimes jointly made with the man and woman within a household. Despite the land ownership dynamics, household decisions on

land use were sometimes jointly made, with women playing a major part in cassava-related activities.

Women were reportedly found active in preparing cutting (80%), planting (75%), weeding (90%) and the general disease scouting (80%) management as well as general supervision of cassava plots. According to Mmasa (2013), women's access to land had been through usufruct rights through their husband's lineage family group. However, the Government of Tanzania through the National Agriculture Policy of 2013 committed itself to the promotion of equitable land tenure governance and endeavours to eliminate discriminatory or exclusionary laws. The Government of Tanzania also instituted the Land and Village Land Act of 1999 to allow for equal distribution of land and eradicate gender inequality in land ownership at the community level. This also has enabled women-headed households to have access to land and ownership rights as well.

As already highlighted in Table 4.2, women dominate most critical and labour intensive nodes of cassava farming such as planting, weeding, harvesting and processing. However, even if women take the major activities in cassava cultivation, men are responsible for the major cassava cultivation decisions at the household level across all study sites. To illustrate this, Yuvhitha for example is married to Mousiri and they have four children together. The household has about 4 hectares of land and is involved in cropping as well as livestock keeping. They are also involved in cassava production. Yuvitha summarises her situation:

....although I perform most of the cassava cultivation responsibilities, my husband owns the land and he is the one who allocates the size of land for the different crops although he consult me in some circumstances I will only gain control of the land when my husband is late.⁹

⁹. Interview with Yuvhitha, Zanzibar, 12 February 2016.

This is similar to the situation described by Me-Nsope and Larkins (2016) in Malawi where men were responsible for the pigeon pea cultivation decisions at the farm level. In cassava production, labour peaks are experienced during land preparation, planting and weeding. As alluded to earlier, while land preparation is solely the responsibility of men, planting and weeding is done by all members of the households (men, women and children). Key findings from the study indicated that the participation of women (70%) and children (20%) was largely confined to low value nodes.

These results depart from those reported by Shayo (2014) in a study on gender differences in earnings (wage gap) in the cassava value chain in Tanzania. The author reported that women dominate all the cassava value chain nodes. Notable findings by Me-Nsope and Larkins (2016) from the pigeon pea value chain in Malawi postulate that women are more likely to be in charge of seed selection, seed storage, harvesting and processing as discovered from our study of the cassava value chain as well.

These findings are also supported by those of other studies that have shown that within agricultural value chains, women often participate in less visible nodes that receive little attention, performing low skilled and low paid work, while men, by contrast, are often engaged in marketing and other high value activities (e.g. Mayoux & Mackie, 2007; Coles & Mitchell, 2011). The findings of a study on the avocado value chain conducted by Oduol *et al.* (2013) in Uganda revealed that while women dominated the production phase, men tended to own the fields and control revenues, making decisions on the sales of premium quality (Grade 1) fruits.

Major challenges reported by farmers during cassava production phase were diseases such as Cassava Brown Streak virus disease and Cassava Mosaic Disease which were more prevalent on local varieties as compared to improved varieties. In Kigoma and Geita, farmers cited Cassava Brown streak virus due to Cassava white fly as the major challenge they are facing whilst in Zanzibar the major challenge appeared to be the Cassava Mosaic disease (CMD). Over 80

percent of farmers indicated that their harvest was compromised by the former in Kigoma and Geita and 60 percent were victims of the Cassava Mosaic Disease in Zanzibar.

This finding is consistent with literature which report that the production of cassava in Africa is faced with serious biotic constraints, such as diseases (CMD and CBS) and pests, poor logistics for the supply of planting materials, poor agronomic practices, small and unorganised production systems, poor post-harvest handling and processing. The devastating effects of these diseases were summed up by a narration from an experienced agriculture extension officer in Zanzibar who said the following:

Our major challenge in this region is in dealing with cassava diseases and pests. Of particular importance in this area is the Cassava White Fly which transmits viral diseases that is Cassava Mosaic Disease (CMD) and Cassava Brown Streak disease. They destroy the plants and the tubers are rendered inedible after infection. During the past 10 years, whitefly problem has been increasing and crop damages can be 100 per cent.¹⁰

Literature reports that the whitefly is concentrated in East Africa especially in countries such as Tanzania, Uganda, Malawi, Mozambique and Zimbabwe and has been reported since early 1990s. Research institutions such as IITA in collaboration with local National Research Institutes have made efforts to generate cultivars that are resistant to such diseases. The use of improved varieties as a way of controlling the diseases has also been promoted, but issues of access and affordability have posed a challenge particularly for women farmers. These findings agree with those of Oduol *et al.* (2017) who report that small scale producers of avocado fruit lack requisite skills and knowledge to undertake measures against diseases and insect pests attack in Kenya. Similarly, this explains the huge losses cassava farmers are incurring due to the attack by the Cassava White Fly.

¹⁰. Interview with Salima, Zanzibar, 13 February 2016.

5.2.3: Cassava harvesting

The harvesting of cassava in a piece meal manner is the normal practice of cassava small-scale farmers in Tanzania due lack of processing skills and equipment, poor storage facilities as well as unavailability of ready market. Small amount of cassava harvested is manageable for them to process using kitchen knives to peel off the outer layer and cutting it into pieces. This harvesting approach poses a serious work burden for women, because the harvesting activities have to be repeatedly done. This comes as a great challenge in terms of time allocated for other household activities to be accomplished by women.

Nweke *et al* (2002) echoes similar findings from a study in Nigeria where it was highlighted that farmers who produce cassava for subsistence purposes incur high labour costs, because they harvest in a piece meal fashion as similarly reported in this study. In addition, the longer the cassava tubers stay in the field after maturity, the higher the chance for pests and diseases infestation causing high post-harvest losses. The study revealed the percentage of individuals that are involved in the harvesting of cassava in the three case study sites.

Table 5.2: Percentage of people involved in the harvesting of cassava at household level

<i>Region</i>	<i>%Men</i>	<i>% Women</i>	<i>% Children</i>	<i>% Hired men</i>	<i>% Hired Women</i>	<i>Total</i>
<i>Zanzibar</i>	41.1	38.8	13.2	6.2	0.78	100
<i>Kigoma</i>	31.4	32	6.9	22.9	6.9	100
<i>Mkuranga</i>	53.5	30.2	16.3	0	0	100

What emerged from the study is that both men and women in Kigoma and Zanzibar were jointly responsible for harvesting cassava as highlighted in Table 5.2. In Zanzibar 41 percent of the men were involved in the harvesting of cassava compared to 38.8 percent women. This means that both men and women in Zanzibar jointly harvested cassava which was almost the similar case in Kigoma with men and women involvement being 31.4 percent and 32 percent respectively. The notable difference was the relatively high percentage of hired labour of men (22.9%) in Kigoma compared to none in Mkuranga and 6.9 percent in Zanzibar.

The situation was different in Mkuranga, where men were predominantly involved in the harvesting of cassava (see Table 5.2). This is probably, because men in Mkuranga had limited off farm employment unlike in Zanzibar, hence the harvesting and subsequent marketing of cassava on the road side and nearby Mkuranga town and Dar es Salaam city made men to be more involved in harvesting of cassava for immediate disposable income. Root tubers are mostly harvested and are processed within 2 or 3 days of harvesting, because of their high perishability. This finding is consistent with those of Coulibaly *et al.* (2014), who report that cassava root tubers were popularly harvested in Sierra Leone.

An agriculture policy brief reported that women in Tanzania take charge of weeding, harvesting, processing and storing food crops; they also contribute significantly to these tasks for cash crops, though men tend to help more with agricultural tasks for cash crops (Mmasa 2013). This is

consistent with Oduol *et al.*(2017) who report planting, weeding and harvesting as being done predominantly by women in South east Nigeria. After harvesting, farmers incur post-harvest losses of cassava produce due to several factors as highlighted in Table 5.3.

Farmers lose approximately 30 percent of their produce as post-harvest losses due to rotting if there is not enough labour to process the root tubers within the required 2-3 days after harvesting. Information from the review of a policy brief indicated that agro-processing in this country is constrained by limited supply of rural energy; inadequate raw materials; inappropriate machinery and technology; and limited skills. Figure 5.2 depicts the percentages of women and men who experience post-harvest losses in the respective study sites.

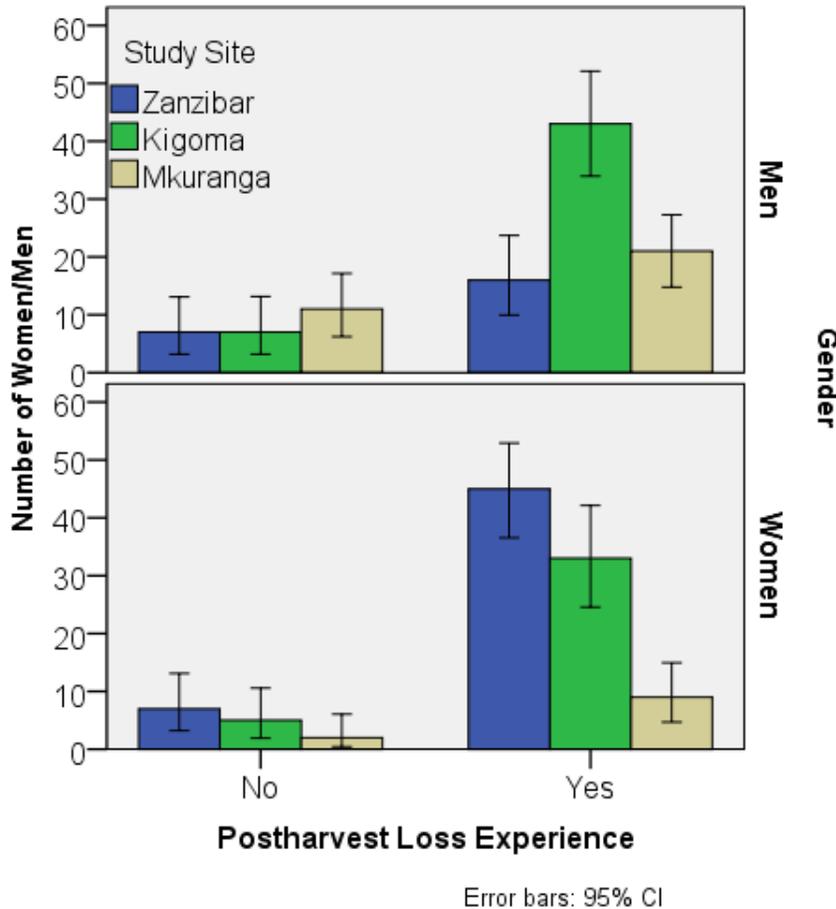


Fig 5.2: Proportion of women and men experiencing cassava post-harvest losses

Based on my analysis in Figure 5.2, overall what emerges is that 81percent of the farmers experience post-harvest cassava losses in the three sites as compared to only 19 percent who reported that they do not experience post-harvest cassava losses. Women in Zanzibar experienced much of the post-harvest losses as compared to men where almost half of them (men) experienced post-harvest losses in the same study area (see Figure 5.2). One of the reasons could be the high percentage of women farmers (71 %) who were sampled relative men (29%) in Zanzibar hence results will be skewed towards women. This is also probably because women in Zanzibar are actively involved in the handling of cassava after harvesting unlike men who were mostly active in off-farm employment (55%) such as fishing (Zanzibar Port) and trading of high value fruits and crops. Also because of proximity to urban areas, most women could sell their products at road sides (72%) and sometimes to the markets in towns.

Among the farmers that experienced post-harvest losses, about 52.1 percent of them were women. Of these women, about 53 percent were from Zanzibar, 35 percent from Kigoma and about 12 percent from Mkuranga. This is because in Zanzibar 71 percent of the sampled household heads were women and also that women were more involved in agriculture activities relative to men who were mostly into off farm employment. Cassava post-harvest losses were also most prominent in Kigoma for both men and women with men experiencing much of the losses as depicted in Figure 5.2. This is because men were predominantly involved in the collection and storage of cassava prior to marketing hence due to long distances and inaccessibility they experienced losses whilst they waited to transport cassava to the market. This was exacerbated by the fact that cassava is highly perishable since it constitutes about 70 percent water.

Similarly, more men as compared to women experienced post-harvest cassava losses in Mkuranga probably, because men were involved more in the marketing hence they would store cassava prior to transportation to Mkuranga town or Dar es Salaam city thereby incurring more losses during the storage period. This is contrary to the situation where women are mostly involved in the handling of cassava in the harvesting, storage and processing stages especially in Zanzibar, hence they face serious challenges of food losses due to various losses as depicted in Table 5.3. Since women are primarily responsible for household food preparation and provision, it therefore, implies that there are more burdens on women to secure resources to prevent post-harvest losses.

The most prevalent form of post-harvest loss is the deterioration of cassava root tubers whilst in the field (see Table 5.3). This is commonly caused by pests and diseases and women are mostly affected, because they are the ones predominantly involved in post-harvest handling and the immediate household food security status. Farmers also identified losses of cassava due to bruises during harvesting. These were common due to the manual character of harvesting task. According to a narration by a woman from a focus group discussion in Mkuranga:

...the manual way of harvesting cassava tubers results in losses since once the tuber is cut or heavily bruised it reduces its shelf life and gets easily rotten and cannot be consumed. Such losses are usually experienced when men are involved in the harvesting of cassava root tubers..¹¹.

From the findings, cassava losses due to bruises during harvesting were higher among men than women. One of my informants attributed this to the manual work habits which are not as gentle as those of women. But also, men were relatively more than women at harvesting consequently the more losses were attributed to men at that stage.

¹¹Interview with Salama, Kipera Village in Mkuranga,

Table 5.3: Types of cassava post-harvest losses experienced in the respective study sites

Post-harvest Loss	Zanzibar		Kigoma		Mkuranga	
	Women	Men	Women	Men	Women	Men
	(%)		(%)		(%)	
1.Deterioration of tubers in the field	48.3	19.1	26.9	28.4	19	33
2.Bruising tubers during harvest	17.2	10.3	33.8	6.4	3	18
3.Harvest of immature tubers	3.4	0	0	0	3	21
4.Deterioration of roots after processing	0	0	22.6	6.4	0	0
5.Deterioration of cassava during drying	1.7	0	33.8	6.4	0	3
6.Deterioration of quality during storage	0	0	11.3	5.1	0	0
7.Losses during peeling	0	0	33.8	5.1	0	0
Total	70.6	29.4	42.2	57.8	25	75

The deterioration of cassava tubers in the field was more prominent across the three study sites with women having recorded the highest experiences (see Table 5.3) The losses attributed to the bruising of tubers during harvesting were also common across the study sites and more prominent among women as well. However losses that were attributed to deterioration of cassava during storage and peeling were reported only in Kigoma with 33.8 percent and 5.1 percent for

women and men respectively for peeling. This is because women are predominantly involved in cassava processing hence much losses could be attributed to them.

5.2.4 Cassava processing

5.2.4.1 Household cassava processing

The processing of cassava root tubers entails a series of procedures that include peeling, washing, and grating, pressing, drying, and finally grinding into flour. Raw cassava is also processed into flour, chips and spaghetti that are used in cooking. Cassava high quality flour is used to prepare *maandazi*, cakes, biscuits, and *chapatti*, while cassava leaves are also harvested and consumed either as relish or, after being dried and pounded, as porridge. Women and children are mostly involved in the processing of cassava and in the culinary preparation of products for sale. The processing of cassava is done at the household level, and in some areas like Geita and Zanzibar, small-scale processing cooperatives have been established.

Table 5.4: Percentages of women, men, children and hired labour as cassava processors

Process	Women	Men	Children	Hired Men	Hired Women
	(%)	(%)	(%)	(%)	(%)
Peeling	57	43.9	20.6	6.6	19.3
Chopping	25.4	15.4	8.3	0	0
Drying	43	33	9.6	0.9	8.3
Grating	5.7	1.8	2.2	0	0
Grinding	8.8	12.3	6.1	0	0
Packaging	26.8	36.8	7.5	18	0

Table 5.4 shows that women dominate the process of peeling with 57 percent, chopping (25.4%) and drying (43%) relative to men. At the processing node men are mostly involved in grinding and grating, since these processes require physical strength and the technical knowledge of operating and repairing grinding mills. Men are also more involved in the packaging of cassava with 36.8 percent compared to 26.8 percent of women in both sites. This is consistent with findings reported by Mayoux and Mackie (2007) who postulated that within agricultural value chains women often participate in less visible, inadequately acknowledged, low-skilled and less highly paid roles, yet these nodes constitute critical links while men often engage in functions of marketing involving access to income and other benefits. For this and other reasons, the gender inequality gap widens, because women's participation in marketing and decision making on benefits is limited.

Similarly, in the cashew nuts value chain, women are restricted from participating in the marketing, but are more prominent in the processing node (Kanji *et al.* 2004). Results from this

study are consistent with those reported by Andersson *et al.* (2016) who argued that cassava leaf processing is dominated by women even at other value chain nodes, since the value chain is at its formative stage. Children are also involved in the processing of cassava, especially in the processes of peeling where 20.3 percent were involved, chopping where 8.3 percent of children were represented and finally, drying with 9.6 percent children involvement in the four study sites as highlighted in Table 5.4. Other than the processing of cassava at the household level, processing of cassava is also done at a slightly larger scale at small-scale cooperatives which consists of women and men occupying different roles during processing.

5.2.4.2 Cassava smallholder cooperative processors

These small-scale cooperatives were mainly composed of both women and men. The allocation of responsibilities within these groups is highly gendered, with women involved primarily in planting and processing. Men are more involved in land clearing, packaging, transportation, and marketing. In Kigoma about 80 percent of land clearing was being done by men either as hired labour and also those from the households where cassava is grown. In Zanzibar and Mkuranga, about 60 percent of the lands clearing activities were being done by men while women were also involved in land clearing occupying about 25 percent, with hired labour and children being involved at a level of about 15 percent. About 90 percent of the packaging activities in the cooperatives were being done by the women. An interview with the chairman of Mkombozi small scale cassava processing cooperative gave insights above the advantages of processing cassava collectively rather than at individual households. The establishment of the cooperatives had led to a number of advantages for women as highlighted by one of the key informants in Geita District:

..processing our cassava cooperatively have enabled us to reduce processing costs since requirements like fuel, labour and equipment are collectively made. It has also enabled us to increase our bargaining power and access to lucrative markets such as retailers in Sengerema and even as far as Mwanza town....¹²

¹²Interview with Jamani, Geita, 24 January 2016.

Similar findings involving cassava leaves processing were reported by Andersson *et al.* (2016) where drying of leaves was done predominantly by women in farmers' cooperative called the District Cassava Farmers Organization (DCFO) in Mkuranga. Sewando, Mdoe & Mutabazi, (2011) identify lack of appropriate processing technologies for adding value to cassava as a major problem. A further challenge they identify relates to the unavailability of drying equipment, especially during seasons when day light is limited. As one of the women in Geita highlighted in the following statement:

.....we experience challenges of poor drying equipment especially during the period when day light is limited. Because of that cassava root tubers rot and we end up incurring losses...¹³

Smallholder cooperative processors also use wooden-made trays like the ones in Figure 5.3 to dry their cassava flour. These are cheap to construct, since they are made from locally available wooden material. However, during the season when the day light is limited, farmers face challenges of drying their cassava flour, hence this is the time they experience huge harvest losses of their produce. These trays are constructed by men and women are involved in the processing and drying of the cassava flour (See Appendix 3). None of the cooperatives visited used mechanised cassava drying equipment.

5.2.5 Transportation of cassava

After processing cassava into various products, it is packaged and transported to retail shops for marketing. Fresh cassava root tubers are also transported for marketing to various places such as urban areas, local markets and neighbouring countries. Figure 5.4 depicts the common modes of transport that were being used in the three study areas by both women and men.

¹³Interview with Marietha, Geita, 26 January 2016

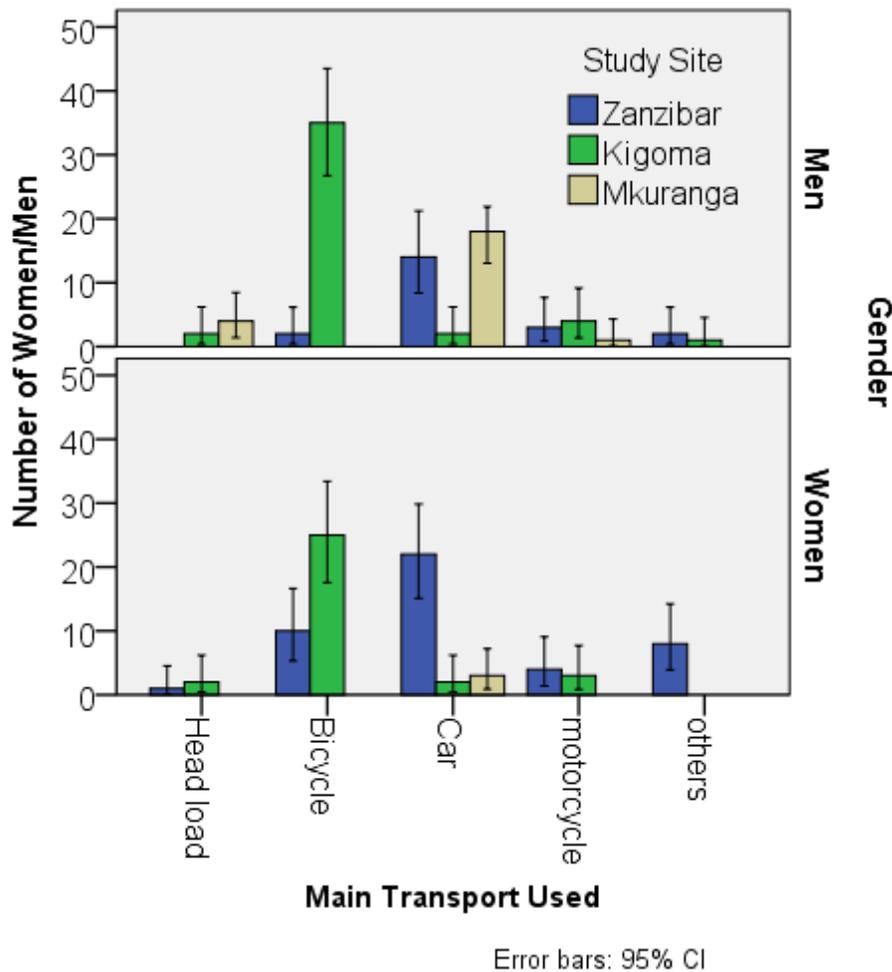


Fig5.3: Mode of transport of cassava to markets by men and women in Tanzania

Bicycles, motorcycles, car and head load were the most common modes of transport reportedly used by smallholder farmers for the transportation of cassava root tubers and processed products. About 80 percent of the men were predominantly involved in the transportation of cassava to distant and lucrative markets. They used bicycles and motorcycles to transport cassava locally and hired vehicles to transport cassava products to distant urban markets. The use of bicycles by both women and men is more pronounced in Kigoma (see Figure 5.4) with men almost doubling the number of women in using bicycles in Kigoma.

In this rural set up, the bicycles were the most commonly owned mode of transport with 81 percent of the respondents owning them. Bicycles were used for transporting produce and inputs such as cassava cuttings. Figure 5.4 also shows that more women than men were using cars to transport cassava in Zanzibar and Mkuranga with very limited use of cars in Kigoma. This is because Zanzibar and Mkuranga are very near to urban areas, with Mkuranga being 60km away from the main city Dar es Salaam and in Zanzibar almost all villages studied were less than 30km from the main city, Zanzibar. This facilitated the availability of transport and accessibility of the places under study hence the prominent use of cars.

Unlike in Kigoma (Kakonko District) where there were poor roads that made the place difficult to access, the use of cars was very limited; instead bicycles and other modes of transport such as ox-drawn carts were being used (see Fig 5.4) to transport cassava to the markets as compared to women in Zanzibar who used cars as mode of transportation for their produce. This is because men have no restrictions to travel to distant markets and are directly responsible for the marketing of produce. However, the other possible reason for high number of use of bicycles and cars by men in Mkuranga and transporting cassava is the fact that most middlemen are men and they can negotiate for the hiring of a vehicle in the event that the quantities of the produce were very high.

Farmers faced challenges in transporting their cassava produce to distant markets. This was reported mostly by women whose mobility was limited as a result of cultural norms and limited time due to the productive and reproductive household roles. This is similarly reported by Jagwe, Machete and Ouma (2010) who maintain that women faced difficulty to sell their produce at distant markets in banana marketing in Eastern and Central Africa. Farmers also face constraints related to modes of transport, with most farmers using bicycles (see Fig 5.4) to transport their produce. This is because across all study sites, 71.5 percent of the farmers owned bicycles and 44.7 percent of them were owned by women, hence the bicycles were the most common mode of transporting their produce. In all the three sites only 8.9 percent of the farmers in this study owned motorcycles, and 40 percent of them were owned by women with men commanding 60 percent ownership of motorcycles.

These motorcycles were reportedly used for transporting their planting material and cassava produce for marketing mostly in Kigoma and Zanzibar as shown in Figure 5.4 where motorcycle ownership were more pronounced in Zanzibar and Kigoma. Similar findings were reported from the pigeon pea value chain in Malawi by Me-Nsope and Larkins (2016) where it was reported that women face mobility restrictions, unequal gender divisions of labour in reproductive and household chores as well as limited access to transportation assets, hence their limited participation in the cassava value chain node (transportation) in Tanzania.

5.2.6 Marketing of cassava

Agricultural product markets especially the cassava urban markets which were identified in Zanzibar are crucial for the development of agricultural commodities and stimulating agricultural production. Furthermore, the whole set of supportive infrastructure from production, transportation, storage and processing is vital in enhancing agricultural marketing. In this study, the marketing of cassava is conducted at the household level, with fellow farmers coming to buy produce from each other's fields even before harvesting. This appeared to be a popular practice among women especially in Kigoma (Kakonko). One of the women in Kigoma had this to say:

Cassava is even sold whilst still in the field before the crop is ready for harvest. The farmer (buyer) will then come and harvest [it] once the crop is mature and ready for harvest...¹⁴

¹⁴Interview with Riraga, Kiziguzigu village, Kigoma, 20 January 2016.

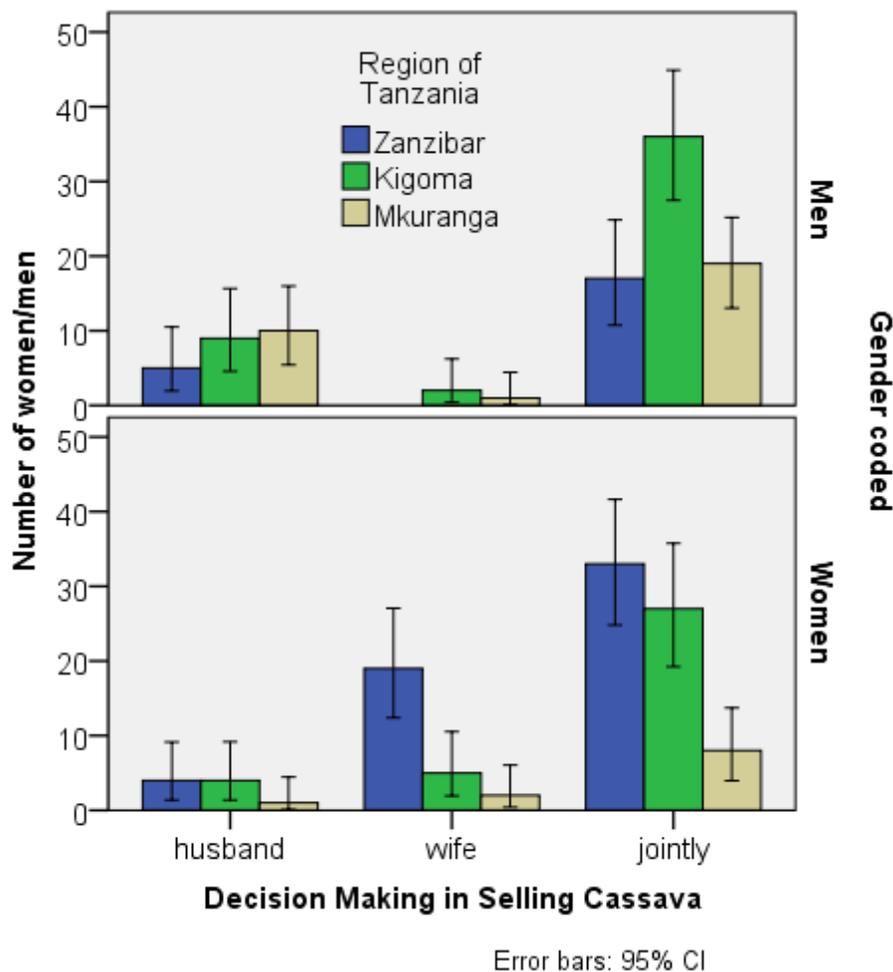


Fig5.4: Decision making in cassava selling within households in Tanzania

Across all study sites, men and women reported that decision making with regards to the selling of cassava products are done jointly (see Figure 5.5). A high proportion of men in Kigoma reported cassava income use was being done jointly probably, because they would want to bring out an impression that women are also given an opportunity to decide in the household. This is supported from the information generated from the focus group discussion held in Kigoma where women and men unanimously agreed that decisions regarding income use were made jointly in most households. In Zanzibar it emerged that women were majority decision makers (see Figure 5.5) probably, because they were more involved in cassava activities unlike men who concentrated more on off farm employment. However, even if the decision to sell cassava is

jointly done, it emerged from the study that men will be responsible for the selling of cassava especially to urban markets which are distant. This practice had an implication on how the income will be used between husband and wife, since the money will be under the control of the men after trading. A great deal of literature has demonstrated how men end up abusing income generated from the selling of agriculture produce with women receiving little benefits in terms of income. This has been frequently reported in the cash trading of crops such as cotton and tobacco even if the decision to sell had been jointly made.

Cassava sales are also conducted at roadsides to passing motorists as well as at weekly local markets and at nearby town markets by women and children in all study areas. In Kakonko, cassava is predominantly marketed at local weekly wet markets with women (80%) and children (20%) doing the marketing, whilst men are involved in operations as middlemen and large scale buyers. Figure 5.6 show that marketing of cassava is predominantly characterised by middlemen in all the three study sites. In Zanzibar the number of women middlemen is almost double that of men. This is probably because women in Zanzibar have easy access to urban markets and also the availability of convenient transport such as cars. It also goes on to show that men in Zanzibar are not very much involved in cassava marketing but they are rather into off farm employment and cash crop marketing such as banana, spice and rice.

In Kigoma and Mkuranga, men are more predominant middlemen in cassava marketing (see Fig 5.6). This is because in these areas, cassava is transported to distant markets that require more manpower and bargaining with transporters and buyers. This should be contrasted with the urban marketing and middleman operations like the one in Zanzibar where women are predominant. The dominance of women in Zanzibar could be attributed to the disproportionate sampling, where (71%) of the sample were women, hence the results are skewed towards them. Most middlemen were involved in collecting large quantities of cassava from farmers, which they then sell in urban areas.

In Kakonko, middlemen also sold cassava to neighbouring Rwanda, (about 30 km from Kakonko), Uganda (about 130km), and Democratic Republic of Congo (DRC). These middlemen buy the cassava from both women and men farmers at very low prices and make supernormal profits when they sell in towns and neighbouring countries. However, the major challenge faced by smallholder farmers in trading their produce in neighbouring countries are the exorbitant taxes charged at border posts of Tanzania. This finding is in agreement with what is reported that smallholder farmers' situation has been exacerbated by the introduction of stringent new rules and market standards following increasing consumer concerns about food safety, as well as social and environmental aspects of the food supply chain.

There was limited access to urban retail markets particularly in Kigoma which resulted in limited income being realised since farmers, especially women could not fetch high prices from local wet markets and from selling at farm gate. In addition the inaccessibility of urban markets also contributed significantly to post harvest losses incurred during storage whilst farmers wait for transport. Sewando *et al.* (2011) similarly found that lack of access to urban markets was mainly attributed to small volumes of produce in cassava marketing in Tanzania. This was exacerbated by a lack of collective marketing among smallholder farmers and the inability of farmers to maintain stable supplies and quality standards for cassava products as a result of the crop's seasonality and the use of inadequate processing methods as an Agricultural Extension Officer in Kakonko District of Kigoma explained:

Large scale middlemen move around households buying cassava with very low prices and they transport their product to either nearby town of Kigoma or across the border to Burundi or even Rwanda. The middlemen try a much as possible to bypass the border control authorities to evade exorbitant export taxes that restrict them from trading with neighbouring countries.¹⁵

¹⁵. Interview with Walika, Kakonko, 21 January 2016.

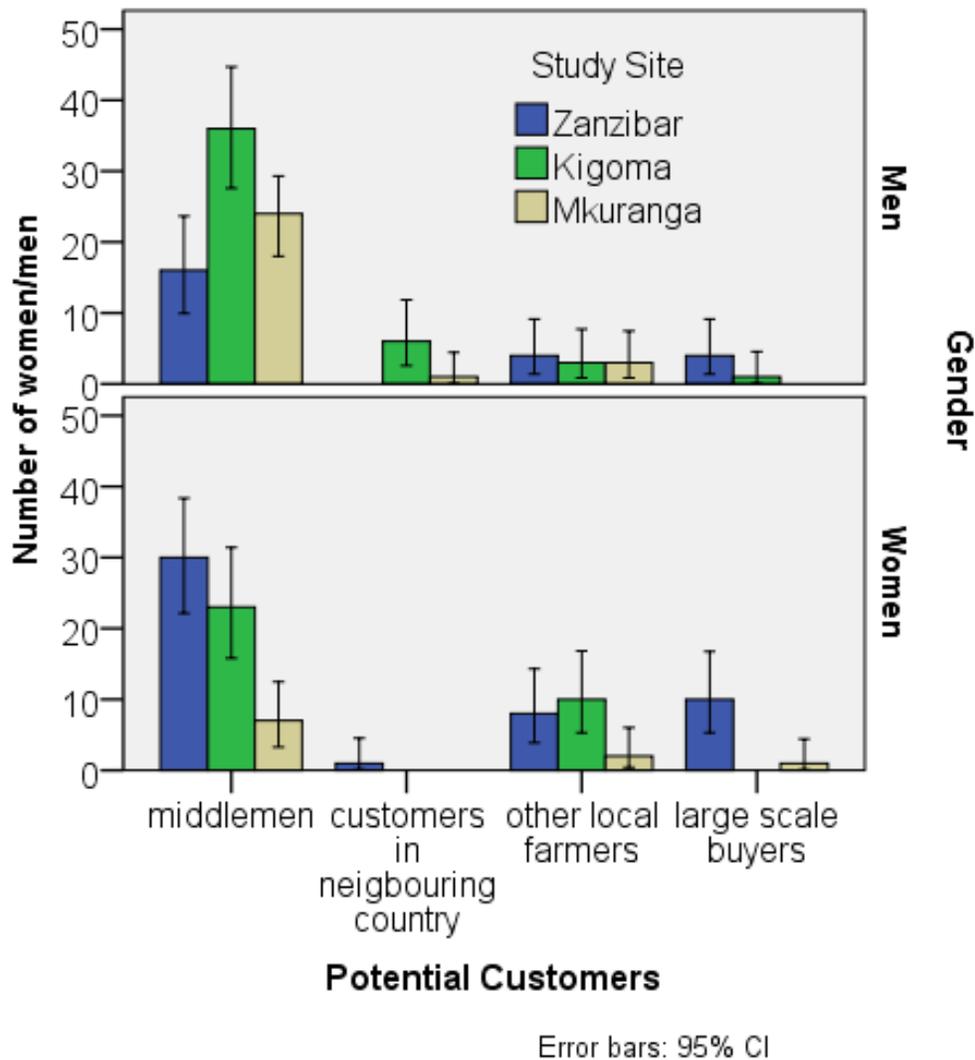


Fig.5.5: Number of potential cassava customers disaggregated by gender in Tanzania

From Figure 5.6 what further emerges is that women also have a substantial market share of local farmers especially in Kigoma and Zanzibar. This is also evident among men, although it is more pronounced among women. This might be because women have restrictions in terms of movements due to a number of factors such as household productive and reproductive

responsibilities as well as cultural restriction within their households. Therefore, they will trade among themselves in the local villages and local weekly markets. A high number of middlemen were recorded in Zanzibar and Kigoma with men being more predominant in the later while women were more predominant in the former (see Figure 5.6).

Large scale cassava buyers were mainly observed and reported in Zanzibar probably, because of proximity to the town markets unlike in remote and inaccessible areas like Kakonko in Kigoma. Smallholder cassava farmers, mostly women, obtain very low returns from raw cassava or from traditionally processed cassava chips sold in local spot markets and at roadsides at low prices. This is evidenced by a 53 year old widow in Zanzibar who usually is involved in cassava trading among local farmers in Kilombero village. She had this to say:

I market my cassava tubers to local and neighbouring fellow farmers and sometimes to middlemen who collect from my household. Because of limited access to urban retail markets, I realize very little income from my produce since my marketing options are very limited...¹⁶

¹⁶Interview with Salma, Zanzibar, February 2016.

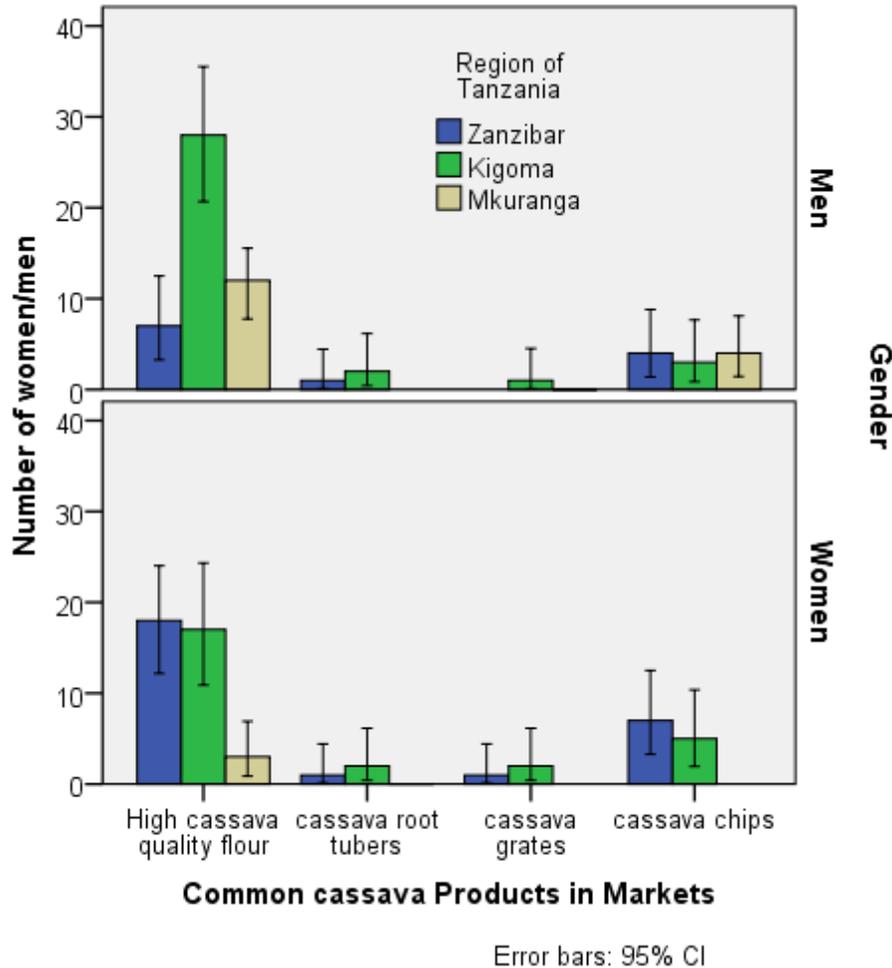


Fig5.6: Common cassava products sold by women and men in markets

High quality cassava flour is predominantly sold by both women and men (see Figure 5.7). In Kigoma men dominate selling of cassava in the form of high cassava quality flour. This is evident, because men occupy high cassava value chain nodes such as marketing. Processed high quality flour fetches higher prices on the market relative to raw cassava root tubers; therefore, men tend to favour the marketing of such products to generate more income. Cassava high quality flour is used to make variety products such *ugali*, biscuits, scones, bread and porridge. Cassava is also mostly sold as fresh root tubers in Kigoma compared to Zanzibar and Mkuranga where cassava sales are mostly sold in the form of processed cassava chips and high quality flour. This is probably because processing plants were common in Zanzibar and Mkuranga and also the urban market requires a variety of processed products for consumption.

Figure 5.8 shows the markets that were being used by women and men to sell their cassava products. In the rural setting of Kigoma, the main market used by women was selling their cassava whilst the crop was still in the field and also to local open markets within their communities. This is mainly because of limited movements imposed on women and also the poor transport system due to poor infrastructure. This is different from places like Zanzibar and Mkuranga where urban marketing was dominant for both women and men (See Figure 5.8). This was probably because of proximity of urban market places such as Zanzibar city and Dar es Salaam city for Zanzibar and Mkuranga study areas respectively.

In Kigoma, men were largely involved as middlemen. Road side marketing of cassava was also a common feature among women in Kigoma since they argued that they receive more income from selling in this mode than selling at farm gates or in fields. Middlemen were a prominent feature in the marketing of cassava, because of poor road network which precluded smallholder farmers to travel to distant markets and also the proximity of neighbouring countries such as Burundi and Rwanda where bulk middlemen would take their produce to. Figure 5.8 depicts that women in Kigoma would sell their cassava tubers whilst still in the field. This was exacerbated by the perishability of the cassava root tubers which have a shelf life of 2 to 3 days post-harvest beyond which the tubers will have gone bad. The unavailability of processing equipment in Kigoma also pushed women to market their produce whilst in the field.

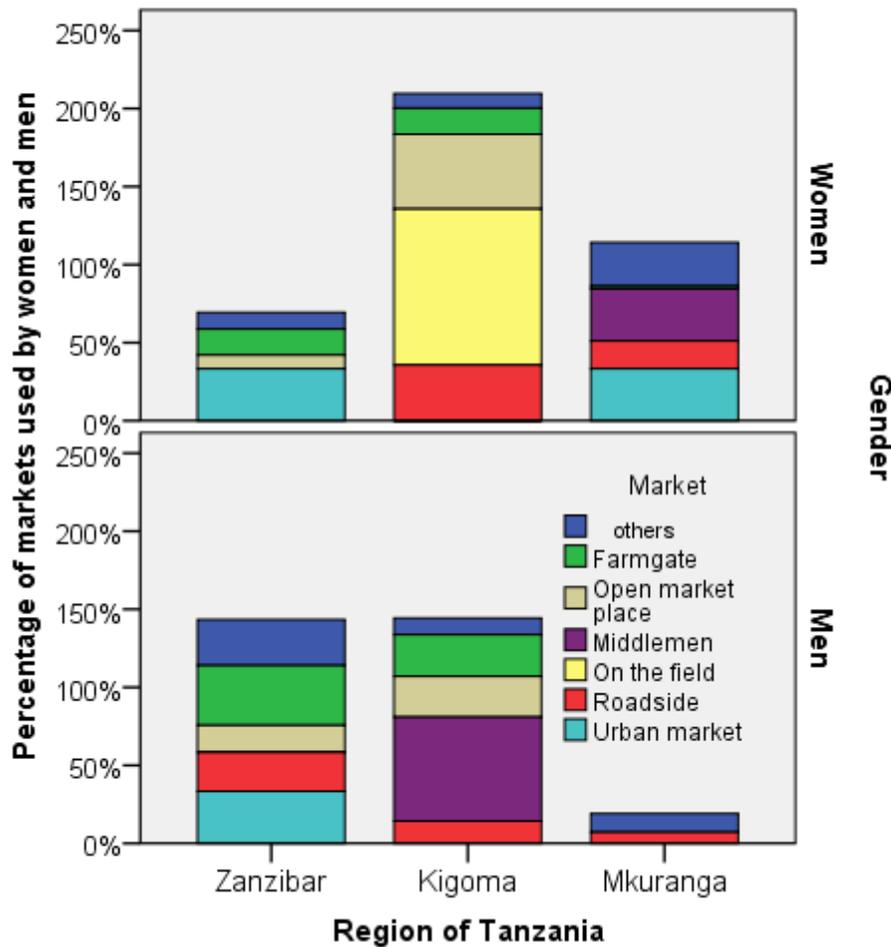


Fig5.7: Cassava marketing outlets for women and men in Tanzania

The cassava marketing channels that were identified in Zanzibar, Kigoma and Mkuranga are presented in Figure 5.9.

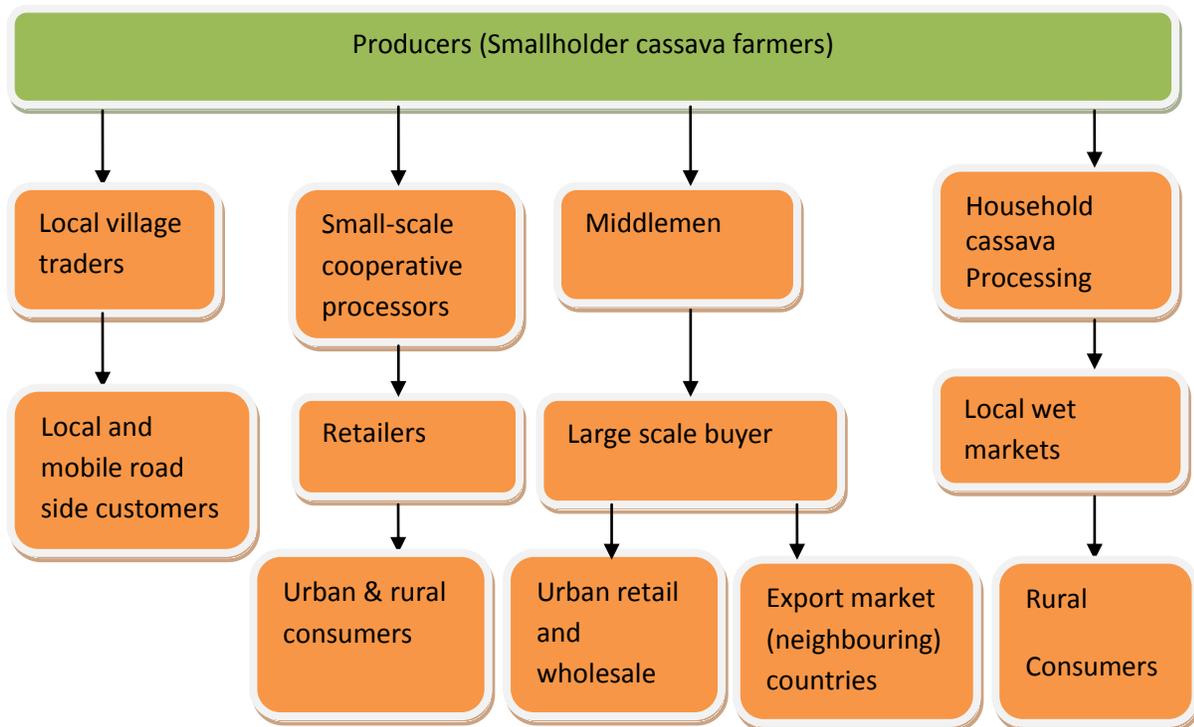


Fig5.8: Cassava value chain marketing channels in Tanzania.

(Source: Author’s own conception based on empirical evidence)

These cassava marketing channels in the three study sites were identified and presented in Figure 5.9. The diagram depicts that the cassava root tubers that are produced by smallholder farmers are marketed through local village traders who sell to fellow villagers. This marketing channel was predominantly found in a rural set-up of Kigoma. Some of the crop is processed through small-scale processing cooperatives and the products such as high quality flour are packaged and sold to local retailers who then sell the products to both urban and rural customers as evidenced in Geita where the Mkombozi small scale cooperative processing unit would market their high quality flour to retail shops in Geita and urban retail markets in Mwanza town. Cassava that is marketed by middlemen is sold to large scale buyers who then market them to retail and wholesale markets in urban areas such as Kigoma town, Dar es Salaam and Zanzibar town. This cassava marketing channel was more pronounced in Kigoma where there a proliferation of middlemen involved in buying cassava root tubers in bulk from smallholder farmers in Kakonko

district and transporting it to neighboring countries such as Burundi, Rwanda and even Democratic Republic of Congo (DRC). Cassava that is processed at the household level is done at a very small scale and much of the products are consumed within the household and also sold at local village markets.

Table 5.5: Ranking of Constraints to the marketing of cassava in the cassava value chains

<i>Constraints</i>	<i>Women</i>	<i>Men</i>
	<i>Rank</i>	<i>Rank</i>
Low cassava price	8	6
No specific market place	6	5
Poor infrastructure	4	5
Poor quality of produce	3	3
Lack of appropriate training	2	2
Proliferation of middlemen	1	0
Lack of capital to invest	1	1

The major constraint to cassava marketing in Tanzania was the low cassava prices for both women and men. Low prices were a major constraint, because of inaccessibility of urban markets especially in Kigoma. Low prices were ranked lower as a limitation to cassava marketing among men, because men were able to transport their cassava products to distant urban markets where they fetch relatively high prices. Low prices were also as a result of poor quality cassava products, since there was limited availability of processing equipment across all study areas particularly in Kigoma and Mkuranga.

The proliferation of middlemen activities was not ranked as limitation among men, because they were the most group involved in middlemen activities compared to women particularly in Kigoma where they transport cassava to neighbouring countries for resale. Poor infrastructure

especially in terms of road network was ranked as major limitation for men since men were mostly involved in middlemen activities and marketing activities on behalf of their households hence they experience most of the transport challenges especially during the rainy season when vehicles cannot easily access areas like Kibondo in Kigoma. Training and lack of capital were ranked lowly by both women and men as a limitation to the marketing of cassava in Tanzania. These limitations were mostly pronounced in Kigoma and Mkuranga unlike in Zanzibar where women cooperative groups existed.

Table 5.6: Proposed strategies to mitigate constraints to the marketing of cassava in Tanzania

<i>Constraints</i>	<i>Women Rank</i>	<i>Men Rank</i>
Establishment of farmer cooperatives	8	6
Regulating middlemen operations	6	3
Establishment of specific market places	5	4
Reduction of government taxes	4	3
Training	3	2

Table 5.6 shows the various strategies that were proposed by women and men as possible mitigation measures to enhance the marketing of cassava in Tanzania. The establishment of cooperatives was ranked highly by both men and women as mitigation against cassava marketing challenges. This is probably because cooperatives result in farmers selling their produce as a group, hence they will be able to bargain for higher prices at the same time they reduce costs of transportation through collective marketing.

The establishment of specific markets for cassava were cited a major remedy for the challenges faced during marketing by both men and women with women citing it as being more important relative to men. Regulation of the activities of middlemen was cited an important measure to

enhance the smooth marketing of cassava by women. This is because middlemen, who are mostly men, buy cassava at very low prices thereby prejudicing women farmers of better income they would otherwise obtain from the selling of their produce at specific established markets. After marketing of cassava products, the income generated was mostly managed by man. This implies that the major decisions regarding income use at household level were being made predominantly by men. The income generated from the marketing of cassava by women and men over a five year period is presented in Table 5.7.

Table 5.7: Income for women and men from cassava sales over a period of 5 years in the study sites

<i>Year</i>	<i>Women (TZSH)</i>	<i>Men(TZSH)</i>	<i>Total (TZSH)</i>
2012	141318.98	1411685.50	1553004.48
2013	183563.26	1930565.34	2114128.61
2014	2088561.95	2 845894.32	4934456.27
2015	2175854.22	3540182.73	5716036.96
2016	2253 518.18	4 012419.19	6265937.38

The income generated from cassava sales in the study areas (Kigoma, Zanzibar and Mkuranga) has been increasing over the five year period as highlighted in Table 5.7. This is probably because cassava has been receiving increasing attention from both women and men as it has become an income generating crop. This triggered the increase in cassava production. As can be seen from the Table (5.7), the average income for women is almost half the income of men. This is because since men control the marketing of agricultural crops cassava included as well as household income, much of the income will be under the control of men as evidenced in Table 5.7.

Information reported from an FGD in Zanzibar showed that income from cassava sales is jointly used. This skewed resource ownership negatively affects women's disposable income within

households. These findings concur with those of Greenberg (2013) who found that women workers in the South African wine sector tended to be concentrated in lower paid, fragmented, and insecure employment focusing mainly on productive activities and informal retail. By contrast, men are predominant within the more lucrative nodes of wholesale, storage, transportation, and milling. Similar findings have been reported for cassava value chains in Mozambique (Donovan *et al.* 2011) and gum Arabic value chains in Burkina Faso (Shackleton *et al.* 2011).

Gross margin analysis in the cassava value chain

Gross margin (GM) is an analytical method that has been widely used in agriculture in estimating economic profitability of farm productivity in different locations. Gross margin is defined as the difference between total revenue and total cost of production. Gross margin is a good measure for comparing the economic and productive efficiency of similar-sized farms such as in this case where farm sizes from Zanzibar, Mkuranga and Kigoma are compared. More importantly, it represents the minimum breakeven price that a farm must generate to stay in business. Even if a farm was to lose money, a positive gross margin would enable it to continue to operate, at least in the short run. But it is not a good measure of a farm's true profitability or a farm's long-term viability. Table 5.8 illustrates the gross margin analysis for cassava producing farmers in Tanzania based on information of production costs and revenue from farm size of one hectare in the 2014 - 2015 farming season. The production costs of tillage, cassava cuttings for planting, weeding and harvesting are quantified as requirements for cultivating a hectare of cassava. The revenue was estimated from the cassava output obtained from a hectare of planted cassava across all study sites. For the cassava crop enterprises, gross margins were calculated based on the formula below:

$$GM_i = TR_i - TVC_i \quad \text{Equation (1)}$$

Where:

- GM_i = Gross margin of crop ysis i Tshs per hectare
- TR_i = Total Revenue from sale of crop i Tshs per hectare
- TVC_i = Total variable cost Tshs per hectare for crop i

Table5.8: Gross margin analysis for cassava farmers in the study sites

Farming Practice	Kigoma	Zanzibar	Mkuranga
Revenue (TZSH)			
Cassava root tuber sales	250 000	500 000	240 000
High Quality Flour cassava sales	120 000	300 000	180 000
Cassava chips and grates	40 000	115 500	60 000
Total Gross Revenue (TZSH)	410 000	915 000	480 000
Production Costs (TZSH)			
Tillage (Annual land preparation) per hectare	60 000	65 000	60 000
Cassava cuttings (price per bundle)	20 000	24 000	20 000
Fertilisers (bags of fertilisers used)	-----	80 000	40 000
Weeding (Hired labour)	20 000	25 000	40 000
Harvesting (hired labour)	25000	30 000	30 000
Processing (fuel, maintenance, labour)	-----	100 000	---
Packaging (cost of packaging material)	10 000	60 000	8 000
Transportation (car hire and fuel costs)	120 000	80 000	50 000
Total Expenses (TZSH)	255 000	464 000	248 000
Profit	155 000	451 000	232 000

Table5.9 compares the gross margins for cassava farming between the three study sites that is Kigoma, Zanzibar and Mkuranga. The results indicate that the profits margins realised from

cassava value chains is high (TZSH 451 000 (US\$451)) in Zanzibar and lowest in Kigoma. The profit was higher in Zanzibar (TZSH 451 000) mainly because the smallholder farmers in Zanzibar received improved cassava varieties which results in more yields, because they are also diseases resistant and drought tolerant. Another important reason for higher profits in Zanzibar was the proximity of urban markets which was also well mediated by availability of reliable and fast transport system in the form of hired cars. This is different from the case in Kigoma where the profit margin (TZSH 155 000) was very low due to unavailability of urban markets with better prices and also the continued use of local cassava varieties which results in relatively low yields thereby reducing possibilities of having surplus cassava for marketing. The inaccessibility of smallholder farmers plots in Kigoma results in high transport costs (TZSH 120 000) contributing to the ballooning of cassava related expenditure thereby reducing the profits. The proliferation of middlemen marketing channels in Kigoma also exacerbates the shrinking of cassava production profits, because these middlemen buy from the farm gate and sometimes they buy the crop when it is still in the field at very lowly bargained prices. This drastically reduces the revenue generated from the sale of cassava. Similar farmers in Mkuranga experience transport problems and also the pricing system and transportation of cassava products. However, they are better off when they market their cassava products in Dar es Salaam urban markets which is only about 60 km away. Farmers from Zanzibar have small scale processing units, hence they have a variety of cassava products on the market with added value accordingly they can fetch more income.

5.2.7 Supporting institutions in cassava value chains

Literature findings argue that farmers' organisations in the form of smallholder farmer associations, cooperatives and groups are important vehicles for farmers to lobby for policy changes that may help to improve their bargaining power in the input and output markets. Farmer groups also provide an avenue for cost reduction of various services such as cost effective delivery of loans, inputs, extension services and market information. However, these institutions identified in Zanzibar particularly, were weak in managerial skills and are not member based. The individuals constituting these cooperatives and associations do not receive enough training in terms of skills to organising and acquiring the necessary experience.

The National Agriculture Policy of 2013 categorically states that the Government of Tanzania shall strengthen Financial Institutions and Financial Intermediaries such as rural or community banks, and SACCOS to make them responsive to agricultural development financial needs. The 2013 policy also reports that the Government in collaboration with other actors shall facilitate accessibility of finance to farmers and other actors in the agricultural sector focusing on the financial needs of women and youths to foster social equity. Limited external support in the form of market information, financial support, research and extension farmer linkages, and access to infrastructural support such as transport as well as communication services provided by institutions and organisations have had negative consequences for women's participation in high value chain nodes, as well as for their generation of income.

Andersson, Lodin and Chiwona-Karltun (2016) reported limited external support, limited horizontal and vertical coordination in the cassava value chain and absence of regulations as well as quality standards. They further report that little attention has been paid to cassava by researchers, development agencies, academics as well as policymakers to increase the knowledge and awareness of its contribution to food security and poverty alleviation in Tanzania. This scenario is not only evident with regards to cassava, but it is also a general problem facing the Tanzanian food system. At the micro level, investigations were done regarding the organisations that offer support to the smallholder farmers in form of banks services, cooperative membership and extension support. Table 5.8 presents the findings in the respective study sites disaggregated by gender.

Table5.9: Farmers who received services from various organizations disaggregated by gender

Study Site	Gender	Zanzibar		Kigoma		Mkuranga	
		Yes (%)	No (%)	Yes (%)	No (%)	Yes (%)	No (%)
Own Bank Account	Women	10	90	0	100	0	100
	Men	29	71	10	90	3	97
Used credit	Women	29	71	0	100	14	86
	Men	29	71	2	98	6	94
Cooperative Membership	Women	44	56	2.3	97.7	0	100
	Men	35	65	2	98	0	100
Extension Support	Women	66	34	32	68	33	67
	Men	55	45	45	55	22	78

Table 5.9 illustrates the percentages of women and men who had access to various services with regards to ownership of bank accounts, access to credit farming, and membership to local farmer cooperative organizations. Overall, about 91.5 percent of the farmers had no bank accounts and

13.5 percent of the farmers reported having accessed money from lending financial institutions for farming purposes. Of the 18 farmers that reported having bank accounts about 67 percent of them were men indicating how women were disadvantaged with regards to monetary issues. Only 10 percent of the women in Zanzibar reported to have bank accounts as compared to none in Mkuranga and Kigoma. This is probably because Kakonko (Kigoma) is a remote place where bank services are not easily accessed. The ownership of bank accounts by women in Zanzibar explains also the relatively high percentage of women having used credit for farming (29%) in the same study site.

Participation in cooperatives as members was more evident among women in Zanzibar (44%) with Mkuranga recording zero percent and Kigoma just 2.3 percent of women (Table 5.8). The results in Table 5.8 also show that generally men were not participating members in community cooperative groups with Zanzibar recording 35 percent, Kigoma 2 percent and none in Mkuranga for men. The high percentage of women participating in cooperative organisations like the one reported for Zanzibar could be attributed to the government's initiative in improving financial intermediaries such as SACCOS for communities as stated in the 2013 National Agriculture Policy. This was displayed by the proliferation of local revolving savings and credit schemes as explained in section 6.3.4. These schemes were only constituted of women and could lend to their members small amounts of money for immediate household use. This development therefore, required that most of the members have bank accounts hence the relatively high percentage of bank account owners for women in Zanzibar.

Table 5.9 depicts that both women and men in Zanzibar received 66 percent and 45 percent agriculture related extension support respectively. This is attributable to the accessibility of their households which were predominantly less than 30km from the main city Zanzibar unlike in Kakonko district which was too remote and inaccessible due to poor road networks. The least extension support was recorded in Mkuranga with 22 percent men and 33 percent women having reported to have accessed extension support. In all the respective study sites, women received more extension support owing to their availability at homesteads when extension officers visit. There are a number of institutions, mostly non-governmental, that support smallholder farmers

through extension as well as the provision of agronomic training, germplasm, and processing equipment.

In Zanzibar, The Zanzibar Agricultural Research Institute, IITA, and Farm Concern International have been involved in programmes to train farmers in the use and repair of processing machinery, as well as the use of solar driers, through the Participatory Agricultural Development Empowerment Program funded by the Alliance for Green Revolution for Africa (AGRA). These organisations have no specific gender integration programmes and they have been dominated by men. A ZARI official explained the situation:

As ZARI we engage in collaborative cassava initiatives with various organizations especially in production of improved cassava varieties. We partner with IITA to set up demonstration plots which we use to develop high yielding varieties that are resistant to diseases. We then upscale the varieties by distributing to local farmers through our extension staff.¹⁷

¹⁷Interview with Hadji Salim, Zanzibar, 11 February 2016

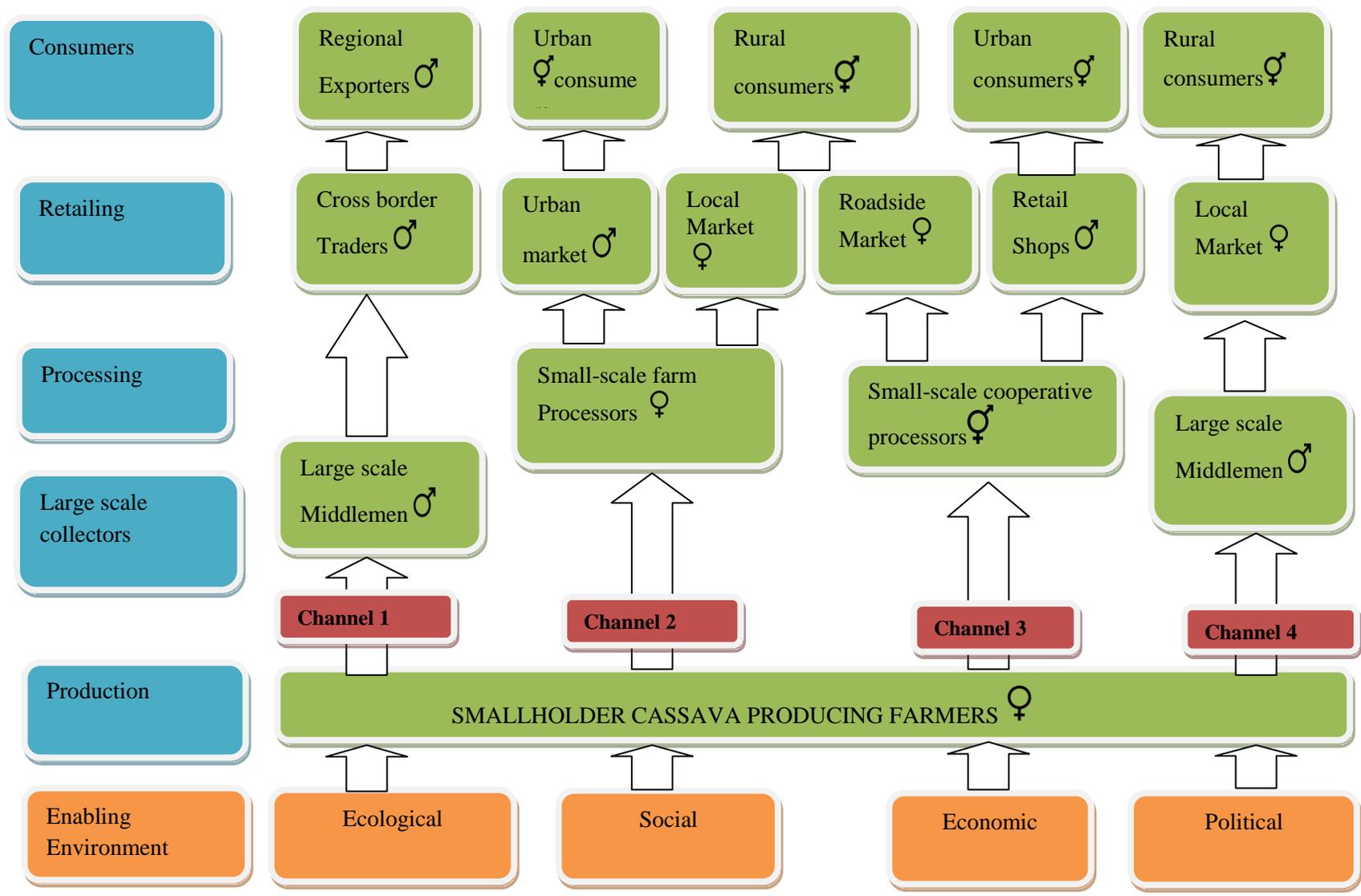


Fig5.9: Cassava value chain map in Tanzania’s smallholder farming sector

(Source: Author 2016).

5.3 The cassava value chain map

Figure 5.5 shows a cassava value chain map which is influenced by a number of external factors namely: ecological, social, economic and political. Ecological aspects include aspects such as climatic conditions defined in terms of rainfall patterns, temperature and soils. The changing climatic conditions in Tanzania have resulted in intermittent droughts, and sometimes floods which have resulted in poor agricultural productivity especially for cropping activities. The socio-economic conditions within households influence the cassava production dynamics through land allocation, provision of inputs, time budgets and the control of income as well as decision making.

The political context affects the cassava smallholder farming activities through the policy and legislative framework especially in land ownership and distribution along gender axis. One of the cassava value chain channels is the selling of cassava to large scale middlemen (channel 1) who then transport it in bulk to cross border traders for trading in neighbouring countries such Burundi and Rwanda. This value channel was mostly prominent in Kigoma where there were no existing large cassava processing plants. There cross border trading of cassava products by large scale middlemen was also enabled by the proximity of neighbouring countries that is Burundi and Rwanda.

The large scale middlemen cassava value chain channel is male-dominated, since it requires much labour and travelling for long distances. In this channel, cassava is predominantly sold in its raw form as tubers packed in sacks. The second channel (Channel 2) involves the processing of root tubers into high quality flour, cassava chips and other products which are then sold at local weekly markets within the community or transported to urban markets where higher prices are obtained. The small scale processing is done at household level which sometimes involves the use of traditional methods of making fermented products.

This channel is dominated by women who make use of primary equipment such as knives for peeling and grating. The marketing of the processed products locally is

also dominated by women whilst men dominate the selling of the processed products in urban markets to urban consumers. This channel was common in all the three study sites. In Zanzibar and Mkuranga, the processed products which involved high quality flour, processed leaves, chips and grates would usually be sold in urban markets (Zanzibar city) and in Dar es Salaam by women from Mkuranga.

The third channel (Channel 3) in the cassava value chain involves cassava being taken from the smallholder farmers to the cassava smallholder processing plant where the processing involves much more mechanised process where cassava is collectively peeled and grated using machines. Drying and milling into high quality flour is done using wooden trays and grinding mills respectively. After milling, the flour is packaged into plastics and then sold to retail shops collectively. The peeling, grating, and packaging within the cooperative are done by women whilst the pressing, grinding and marketing is done by men.

This channel was predominant in Zanzibar and Geita where smallholder cooperative processors existed. The processed products are sold to urban consumers through retailers whilst some of the products are marketed on road sides by women. In Geita, the Mkombozi cassava small scale processing cooperative would take their packaged high quality flour to Mwanza town and Geita business centre. Another cassava value chain channel that was identified was the one involving large scale middlemen who then would sell to local markets within their communities and then the final consumers would be rural consumers.

5.4 Chapter summary

This chapter focused at the micro level and identified and explained cassava value chain nodes, chain actors, defining their roles and the implications of gender roles at each node in Tanzania. At the micro level, a value chain map (see Fig 5.9) was developed mapping the various channels with which cassava moves and value addition is made. The major cassava value chain nodes that were identified include

input supply, cassava production, harvesting and storage, processing, transportation and marketing. The input supply node is predominantly localised with men being involved as agro-dealers. The area planted with cassava was relatively higher for men compared to women and men were predominantly in control of land use.

Harvesting of cassava was jointly (men and women) done with hired labour being engaged where farmers could afford. Cassava producing farmers, in particular women, experienced post-harvest losses during storage and while the crop is still in the field. The processing of cassava was dominated by women especially at household level where traditional method of cassava processing was being done. Processing was also being done at the small scale cooperatives. Transportation of cassava was dominated by men who were mostly operating as middlemen. Marketing of cassava was therefore, a preserve of men except in local wet markets and road side marketing where women children were dominant. Challenges that are faced at each node were also itemised and explained on how they affect the different gender categories.

The chapter also analysed how the value chain supporting organisations, banking services and extension services affected both men and women participating in the value chain. This chapter provides information for other successive chapters in that it provides cassava value chain nodes where gender gaps exist, consequently a need for in-depth analysis of factors affecting the participation of women and men within those nodes (Chapter Seven) and also the need to investigate women empowerment within the cassava value chains in order to address the gender inequality within the chain (Chapter Six). Information presented in this chapter also provides building blocks for a micro level gender-based conceptual framework presented in Chapter 8.

Chapter 6

Gender and empowerment in cassava food value chains

*Empowering women in agriculture value chains results in improved nutrition, health
status and income within households*

(Haddad & Hoddinot 1994)

18

¹⁸ This Chapter was published as follows:

Blessing Masamha; Veronica N.E. Uzokwe & Vusilizwe Thebe (2017). Women's Empowerment in traditional food value chains at the micro level: Evidence from cassava smallholder farming in Tanzania. *Agroecology and Sustainable Food Systems*, Taylor & Francis

6.1: Introduction

This chapter is an attempt to investigate and address the question on women's access and control of productive resources, their influence in household decision making, and control of income as well as time allocation as influenced by household gender power dynamics. This theme is linked to the Harvard Analytical Tool of access and control profile as explained in Section 2.1.2. To adequately address this question, the five domains of empowerment (5DE) sub index of the Women in Agriculture Empowerment Index (WEAI) were employed as propounded by Alkire *et al.* (2013).

This chapter is significant to the study, since it tries to identify gender gaps in women's empowerment relating to resource ownership, decision making as well as control of benefits within the cassava value chain. It also attempts to relate women's empowerment with other household characteristics on significant importance attributes such as food security, education level, marital status and age. Information regarding control and distribution of benefits generated from the cassava value chain is also provided in this chapter giving an indication of the level of control of benefits especially by women within households. This chapter provides information with regards to how women own and control productive resources, share benefits within household and time allocation which has significant implications on how gender inequality operates.

The chapter is organised as follows: the first section explains the 5DE sub index followed by the empirical descriptive statistics of the 5DE domains and indicators. The domains explained in this section include production, resources, leadership and time. The computation of 5DE disempowerment index is done for both women and men independently. The next section focuses on how 5DE empowerment is related to household socio-economic attributes. The household socio-economic characteristics

considered are marital status, level of education, age and food security status of the household. The relationship of these variables are explored in relation to how disempowerment index using the Chi-square tests. Finally, summary is presented to give an overview of what the chapter achieved and its contribution to the thesis.

6.2: The 5DE sub-index of women's empowerment in agriculture (WEAI)

This study used the 5DE sub-index of the WEAI to assess women's empowerment at the micro level. According to the 5DE sub-index, a woman is defined as empowered if she demonstrates adequate achievements in four of the five domains (See Table 6.1), or scores 80 percent or higher through some combination of the weighted indicators that reflect total adequacy (Alkire *et al.* 2013; Malapit *et al.* 2014). A key innovation of the WEAI index is that it is able to show in which domains women are empowered, while simultaneously revealing connections between areas of disempowerment. This enables decision makers to focus on improving the situation of the most disempowered women in agriculture.

The 5DE measurements result in numerical values that range from zero to one, with higher values indicating a greater degree of empowerment. The score has two components. Firstly, it reflects the percentage of women who are empowered (He). Secondly, it reflects the percentage of domains in which those women who are not yet empowered (Hn) yet already demonstrate adequate achievements.

Table6.1: The five domains (5DE) and indicators of empowerment in the WEAI

<i>Domain</i>	<i>Indicator</i>	<i>Definition of indicator</i>	<i>Weight</i>
<i>Production</i>	Inputs in productive decisions.	Sole or joint decision making over food and cash crop farming, livestock and fisheries.	1/10
	Autonomy in production	Autonomy in agricultural production	1/10
<i>Resources</i>	Ownership of assets; purchase, sale, or transfer of assets	Sole ownership of major household assets	1/15
	Purchase, sale, or transfer of assets	Participation in decisions to sell, buy, or transfer assets	1/15
	Access to credit and associated decision making	Access to and participation in decision making concerning credit.	1/15
<i>Income</i>	Control over use of income	Sole or joint control over income and expenditure.	1/5
<i>Leadership</i>	Group membership	Whether respondent is an active member in at least one economic or social group.	1/10
	Speaking in public	Whether the respondent is comfortable speaking in public.	1/10
<i>Time</i>	Workload	Allocation of time to productive and domestic tasks.	1/10
	Leisure	Satisfaction with available time for leisure.	1/10

(Source: Alkire *et al.* 2013).

Table 6.1 shows the 5DE domains and indicators and their weighting used in calculating the 5DE sub-index. Each indicator was given a value of 1 if the respondent's achievement exceeded a given threshold for the indicator and a value of 0 if this fell below the threshold (Malapit *et al.* 2014). The weighted sum of these 10 indicators constituted the empowerment score or 5DE score of the individual. In the 5DE formula shown below, Aa is the percentage of dimensions in which disempowered women had adequate achievements:

$$5DE = He + Hn (Aa), \quad \text{Equation 1}$$

where He = percentage of women who are empowered,

Hn = the percentage of domains in which women, who are not yet empowered, demonstrate adequate achievements,

$He + Hn = 100\%$, and

$0 < Aa < 100\%$.

These equations were used to express the components of the 5DE sub index of the WEAI. The index ranges from 0 to 100%. The components of the 5DE index were used to generate descriptive statistics for the domains and indicators of empowerment using empirical evidence from this study.

6.3 Empirical description of 5DE domains and indicators

The five domains and ten indicators of the WEAI were computed using empirical data gathered from the household survey in Zanzibar, Kigoma and Mkuranga regions. The section starts with descriptive analysis of the domains and indicators of WEAI and then it is followed by the computation of the WEAI index to depict women and men empowerment in Tanzania.

6.3.1 Production and ownership of resources

This domain looked at decisions about agricultural production and refers to sole or joint decision making between women and men within a household involved in cassava farming, and autonomy in agricultural production (Alkire *et al.* 2013).

Figure 6.1 gives empirical evidence of women's and men's decision making and autonomy in production with regards to control of land use. Women had very limited decision making and autonomy in control of land use across all case study sites with a notable number of women in Zanzibar (See Figure 6.1) having autonomy and decision making power in production.

This was evident probably because women in Zanzibar were participating in cooperative groups therefore; these gave them confidence, knowledge and exposure and thus were able to make decisions within their households. These results are consistent with those of Oduol *et al.* (2017) in a study on women participation in avocado value chains in Kenya. They reported that women generally have the least access to and control over productive resources such as land, capital and agricultural services such as training and also that women do not own land and depend on their husbands and families to inherit land, hence very limited land use. In Kigoma, about 90 men were reported to be in control of land use compared to women who were far less than 10 with respect to control of land use in Kigoma. This is because Kigoma is a patriarchal society with men being defined as the sole owners of the means of production as well as being decision makers regarding the use of such resources. The least number of women and men reported to be in control of land use were in Mkuranga with about 40 men being reported to be in control of land use while less than five women were reported to be in control of land use (See Figure 6.1). The limited number of women as well as men in control land use in Mkuranga can also be attributed to the small sample size considered in this study site where only 11 women and 32 men were taken compared to 64 women and 26 men considered in Zanzibar (See Table 3.2).

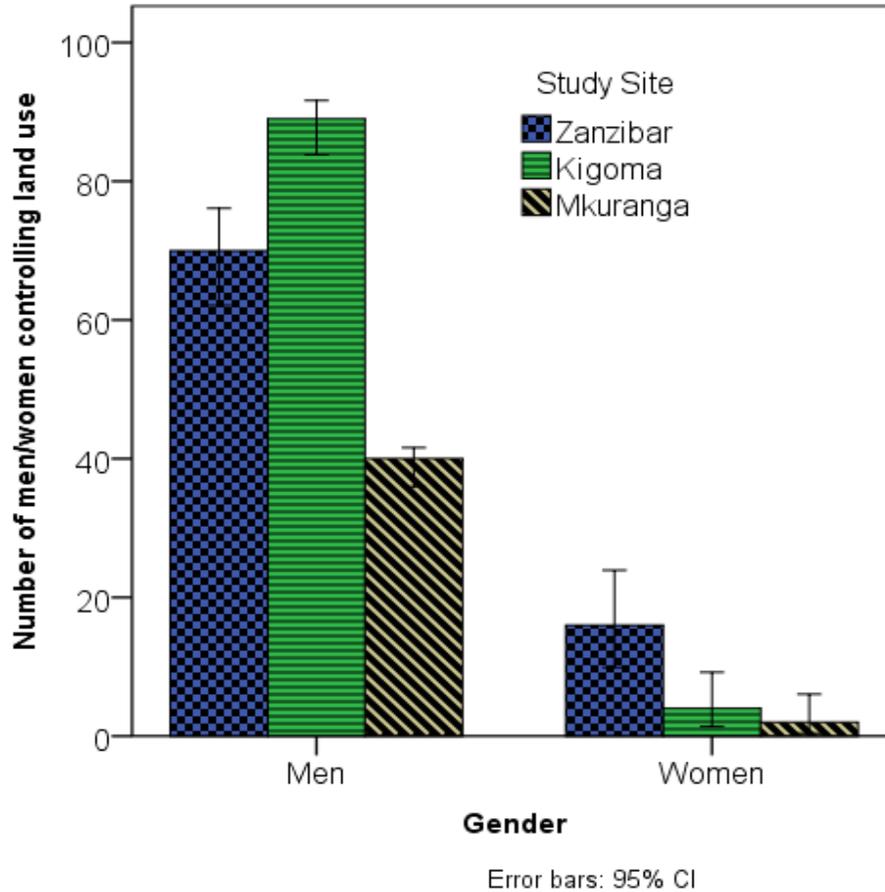


Fig6.1: Control of land use by women and men in Tanzania

6.3.2 Household asset ownership

The resources dimension concerns ownership of, access to, and decision making power about productive resources such as land, livestock, agricultural equipment, consumer durables, and credit. These are reported to be critical in women empowerment. Ownership of household assets that were considered to be important in cassava value chain was considered in the development of the 5DE index. These include ownership of a house; bicycle, motorcycle and a mobile phone (see Figure 6.2).

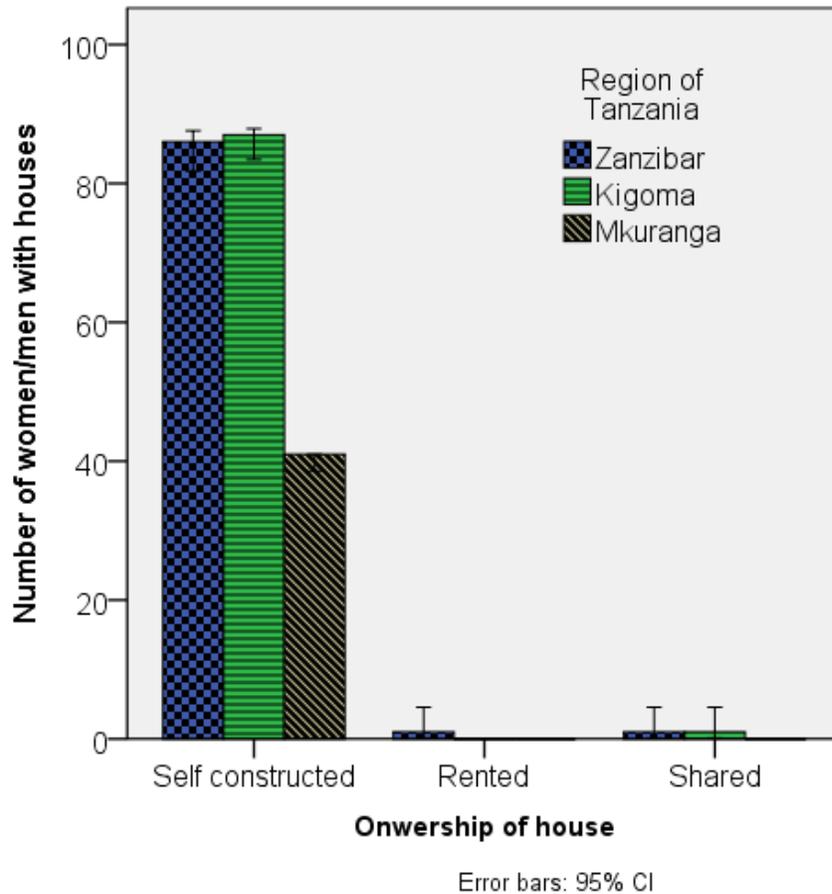


Fig 6.2: Ownership of house in the study sites in Tanzania

Generally the houses owned by the farmers were self-constructed. About 99.1 percent of the houses were self-constructed and only about 0.9 percent were rented and shared. The majority of these households were owned by men across the three study sites. Only 20 households were female headed households with 15 percent of them owned by single women, 20 percent owned by divorced women and 65 percent owned by widowed women. This system sits alongside the traditional patriarchal system, where the men own all productive resources and women access the resources through their relationship to men. The ownership patterns are revealed in the following excerpt from an interview with one of the women farmers in Geita.

Within most male headed households, a husband owns the house and most of the productive household assets. In our household, my husband owns the house and most productive resources such as land, motorcycle, ploughs, livestock and children. As his wife, I only become the owner of these resources when he happens to die and sometimes in the event that there is a grown up adult son, we will have to co-own or share the land with him.....¹⁹.

These empirical findings are well supported by Oduol *et al.* (2017), who demonstrate that in most sub-Saharan African countries, the distribution of physical and human capital is skewed towards men and the intra-household rights and responsibility differences between men and women bring about inefficient resource allocation.

¹⁹Interview with Victoria, Geita, 26 January 2016

Table 6.2: Household assets ownership in the respective study sites

	Zanzibar		Kigoma		Mkuranga	
	Yes	No	Yes	No	Yes	No
Bicycle						
Women	37%	63%	67%	33%	36%	64%
Men	88%	12%	92%	8%	59%	41%
Mobile Phone						
Women	81%	19%	66%	34%	91%	9%
Men	80%	20%	86%	14%	94%	6%
Motorcycle						
Women	5%	95%	7%	93%	18%	82%
Men	16%	84%	14%	86%	3%	97%

Overall, the results show that men dominate ownership of resources such as motorcycles, mobile phones and bicycles. This is highlighted in Table 6.2 where bicycle ownership by women was less than half of the percentage of those that were owned by men in Zanzibar while in Mkuranga women had a higher percentage of bicycle ownership relative to men. This was probably because women in this study

site were mostly involved in the road side marketing of agriculture products such as cassava. They were using bicycles mostly for transporting their produce. Most men were found to be seeking off farm employment in urban areas such as Mkuranga town and the city of Dar es Salaam.

The situation was somewhat different in Zanzibar where women dominated mobile phone ownership with 81percent women owning phones compared to 80 percent of men. This can be attributed to the fact that women in Zanzibar used mobile phones for various purposes including marketing of their products and communicating with their cooperative group members. Women in this study site also showed that they had more disposable income, since they were involved in cash revolving saving groups. Another reason of women dominating ownership of mobile phones in Zanzibar could be because of disproportionate sampling where 64 women were selected compared to only 26 men.

The use of mobile phones for communication however differed with study sites. For example, while the majority of farmers owned phones in Kigoma, these were mostly used for social purposes. This can be contrasted with places like Zanzibar and Mkuranga, where phones were crucial instruments in the marketing of cassava and other income generating activities. This is mainly because most of the households considered were close to the city and much of the business required frequent communication. This scenario contributed more to women's empowerment. Generally, ownership of mobile phones was considerably high across all study sites for both women men as can be seen in Table 6.2.

Bicycles and motorcycles were an important form of transportation for cassava products while mobile phones were reported to be an important gadget for communication purposes. The ownership of motorcycles was considerably low for both women and men across all study sites. However, men in Kigoma and Zanzibar owned motorcycles twice more than women except for women in Mkuranga who had an ownership of 18 percent of the motorcycles. The lower percentages recorded

in the ownership of motorcycles was to the fact that it was relatively expensive with a reported average price of about TZSH 300 000 (US 1 500). Although it was a very useful mode of transport particularly in transporting produce to the market, most farmers could not afford it especially in remote areas like Kigoma (Kakonko District).

6.3.3 Income control

This dimension concerns sole or joint control over the use of income and expenditures within a household. The 5DE domain of income control is determined by the indicators of access to credit by women and men and also the control of use of cassava income within a household. Both women and men were constrained in terms of access to credit facilities for farming across the study sites. Only 13.5 percent of the farmers across all study sites reported having accessed and used credit for farming while the rest 86.5 percent did not access it.

Kigoma region recorded the highest number of men (about 48) who did not access or used credit in cassava farming (See Figure 6.3) while women in Zanzibar used credit in farming more than men in all study areas. Most of the credit facilities that were being accessed by women in Zanzibar were local revolving savings groups and much of the credit was channelled towards immediate household use such as buying household food and paying of school fees for children. Across all study sites, farmers reported that they could not access credit from commercial banks, because they lacked collateral security to be considered for such services. One of the most important reasons behind poor access to credit by smallholder cassava producers was that the crop was not considered a cash crop, hence it is marginalised and therefore, it could not attract funding from commercial banks.

In Zanzibar women also could not access funds from commercial banks solely, because they did not have land tenure titles and they were not eligible to apply. In Kigoma, formal banking services were distant from Kakonko district causing most of the farmers not to have bank accounts (See Table 5.6). The cooperative groups that

women in Zanzibar had were reported during an interview with an Extension Officer working in the Kizimbani Research Institute in Zanzibar:

Most rural women in Zanzibar organize themselves into community cooperative groups in which they pool their resources, share information with regards to inputs supply, marketing, and credit access. One such organization in Zanzibar is the...²⁰

These findings depart from those by Fletschner (2009) who found that credit constraints were more severe among women and that they tended to respond to targeted credit programmes. This difference could have been as a result of proliferation of women groups which were mainly revolving savings and credit schemes in Zanzibar and were reported to offer small amounts of credit mainly useful for meeting immediate household needs such as food and health facilities. This has been similarly reported by Odoul *et al.* (2017) in the avocado value chains in Kenya.

²⁰Interview with Habbai, Zanzibar, 22 February 2016

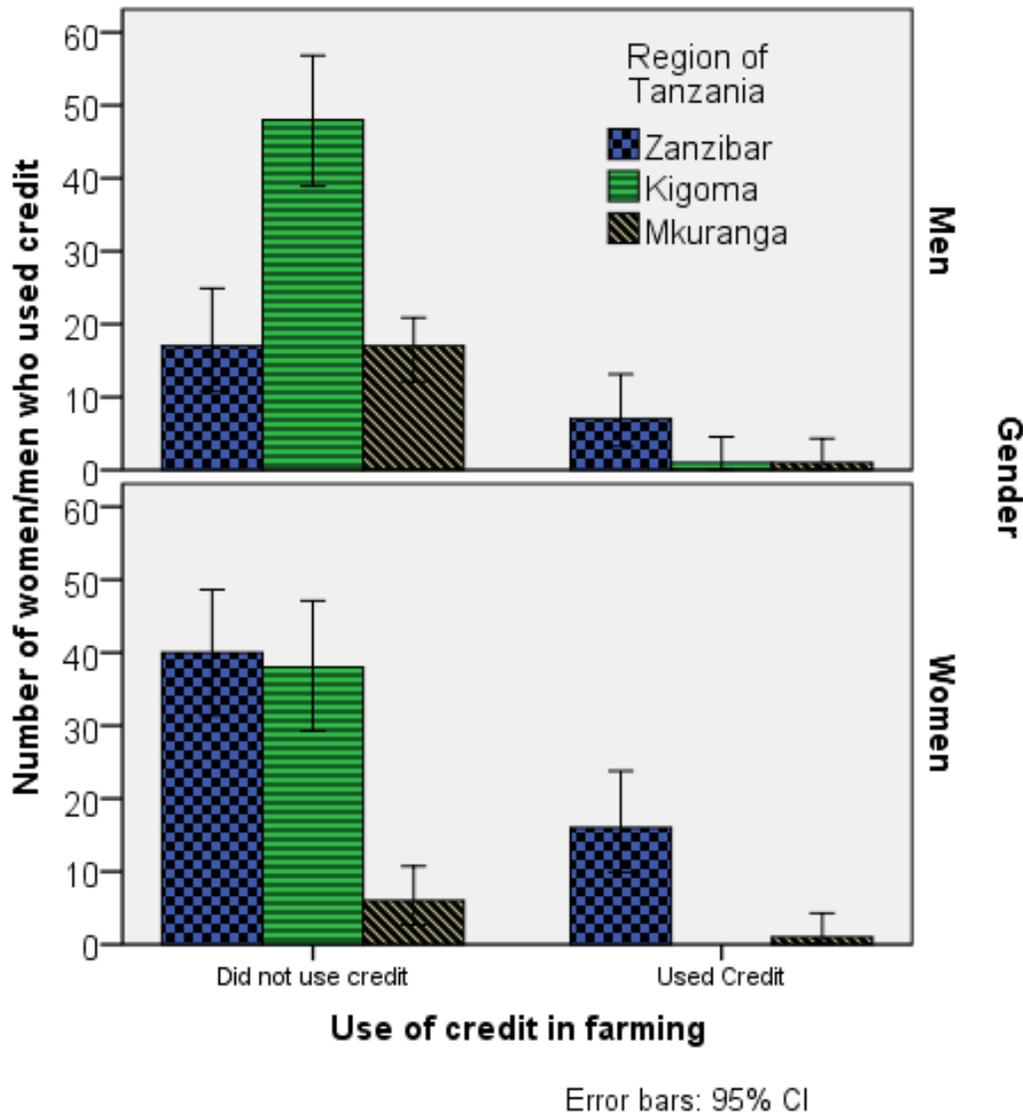


Fig6.3: Use of credit for farming in the case study sites in Tanzania

Ngigi, Mueller and Birner (2017) report findings that are in line with those from this study, where the number of women who accessed credit for farming was almost double (Fig. 6.3) that of men in Zanzibar which is attributed to the existence of functional social and community groups. Ngigi *et al.* (2017) report that when women associate in social groups it offers alternative sources of livelihood diversification and acts as a risk management tool to adapt to climate change in a study on intra-household analysis of gender differences in climate change adaptation strategies and participation in group-based approaches in rural Kenya. These women's groups often assist women to diversify their sources and to manage climate and non-climate risk.

The innovative systems include individual and group-based income generating activities, provision of financial facilities and safety net programmes similar to the ones reported in Zanzibar during this study. Group-based micro-credit facilities also enhance women's ability to build asset portfolios, besides enhancing their welfare through enabling them to pay school tuitions for their kids and gain autonomy over their earnings within their households (Ngigi *et al.* 2017).

Table 6. 3: Control of cassava income use within households in Tanzania

<i>Household Members</i>	<i>Zanzibar</i>	<i>Kigoma</i>	<i>Mkuranga</i>
Husband (Man)	8%	12%	32.5%
Wife (Woman)	20%	7%	2.5%
Joint(Both husband &Wife)	68%	79%	62.5%
Children	4%	2%	2.5%
Total	100%	100%	100%

The Chi-square tests showed that there is a relationship ($p = 0.001$; Pearson Chi-square value = 22.437) between the household members who control use of cassava income and the different study sites. Decisions about income use were predominantly jointly made, that is to say the husband and the wife both agree on how to use the income. This was common across all case study sites with Zanzibar, Kigoma and Mkuranga recording 69 percent, 79 percent and 62.5 percent respectively. These findings therefore, show that the income use decisions were made jointly by the wife and the husband.

The study also revealed that women spent 50 percent of their cassava income on buying household food followed by personal use which account to about 33.9

percent of their budget. The rest of the income, 9.1 percent and 7 percent is used to for paying schools fees for children and buying of farm inputs respectively. This is because women are directly responsible for household food security. This gives rise to the empowerment of women resulting in food secure households. Similar findings were reported in Ethiopia by Dito (2011) where it was reported that income in the hands of women enhances the welfare of household members more than income in the hands of men.

Contrary to women, men spent much of their income on food (31%) and buying of farm inputs as wells as payment of school fees for their children. During the interview with a 46-year-old woman in Kigoma concerning how cassava income is used and shared within the household, the following except was generated:

We all put our heads together as husband and wife to decide on how to make use of all of our proceeds that we get from the selling of cassava and cassava products irrespective of who went to the market our proceeds. As a family we also collectively decide when, how much and where to sell our cassava produce....²¹

The joint use and decision making of income proceeds from cassava within the household has been similarly reported by Oduol *et al.*(2017) in the avocado value chains in Kenya where male-headed households where involved in joint decision to sell and to how to use the proceeds as similarly reported in this study.

6.3.4 Leadership/membership in community groups

This domain concerns leadership in the community, measured in this context in terms of membership in economic or social groups and also comfort speaking in public (Alkire *et al.* 2013). Membership to community groups is crucial for accessing markets and credit for purchasing inputs as well as for technical advice in the cassava value chains.

²¹Interview with Omary, Kigoma, 21 January 2016

Table 6.4: Participation of women and men in community organisations and leadership roles

Gender	Zanzibar		Kigoma		Mkuranga	
	Yes	No	Yes	No	Yes	No
Men	35%	65%	2%	98%	0	100%
Women	44%	56%	2%	98%	0	100%

Results depicted in Table 6.4 show that leadership or community membership in various groups is generally very low for both women and men across all study sites. The absence of community membership was more pronounced in Kigoma and Mkuranga. This was mainly because Kigoma is a rural setting which makes it difficult for households to have formal community groups due to limited and sporadic income generating activities. In Mkuranga there were no community organisations reported (See Table 6.4). However, existence of community groups and leadership roles in the community was reasonably high (44%) among women in Zanzibar and 35 percent among men.

These community groups were mainly composed of women amongst themselves since the inclusion of men would result in women becoming passive participants. Such cooperative groups' included local revolving savings groups of women. This domain was more pronounced in Zanzibar with about 75.7 percent women participation compared to almost none participation of women in Kigoma and Mkuranga. This is also probably because there was reported existence of community groups during the survey in these study sites. This scenario was also explained and

supported by an interview except from an extension officer in Zanzibar who reported that:

Women in Zanzibar are commonly involved in operating in groups such as SACCOS in which they generate income for themselves for use in their immediate household needs...²².

The income from SACCOS was not enough to be used for purposes of farming through procurement of farm inputs such as fertilisers and cassava cuttings. Resultantly both women and men would in the end use income from other sources such as off-farm employment and borrowing from friends and relatives to finance cassava production. One of the important domains of WEAI is time budget which is considered particularly for women whose time budgets are managed by men during allocation of household chores in a typical patriarchal system.

6.3.5 Time

Time dimension concerns the allocation of time to productive and domestic tasks and satisfaction with the time available for leisure activities among women and men within households (Alkire *et al.* 2013). Time is one of the domains of the 5DE sub index which is usually assessed in terms of work-load and leisure particularly for women. Productive and domestic workload is derived from a detailed 24 hour time allocation module based on Lesotho's Time Budget study conducted in Lesotho in 2003). Literature shows that women constitute 70 percent of the labour force in agriculture in Tanzania (Shayo 2015). This means that most of the unskilled and time consuming agriculture activities are done by women. As alluded to in Table 1.1, women constitute 75 percent of labour in food crop production, 74 percent in sowing, 70 percent in weeding and about 71 percent harvesting.

²²Interview with Habbai, Zanzibar, 22 February 2016

These responsibilities, in addition to routine household chores present a time burden for women in particular. This was evidenced in Kigoma where women had limited time to visit their friends and relatives except in circumstances where they go for church services or other gatherings. A detailed engagement with a married 35-year-old woman with three children in Mkuranga District regarding her usual daily household chores during the rainy season and time budget gave the following narration:

I usually wake up around 4:30 am and prepare for my daughter to go to school. Then I will make sure I had done housekeeping chores, prepare a morning meal for my husband and then go to the field to work until around midday when I return to prepare a meal as lunch for myself, husband and the two little boys. In most days I will return to the field until around 5:00 pm to come back and prepare dinner. I will only rest around 20:00 when going to sleep. My leisure time is usually when we go to church or community women groups.²³

From the interview we can deduce that on average this woman worked more than 10 hours a day and rarely had time for leisure to visit relatives or travel to visit friends in the neighbourhood. Such is the time budget of most women in almost all study sites studied. Similarly, from a study on women's bargaining power and intra-household resource allocation in rural Ethiopia, Dito (2011) reports that both women and men claimed that while men's work is carried all year round, it is only intensive during day time while women argued that they often do not rest as their work is often day time consuming and difficult to perform. In Zanzibar, women reported slightly different daily working regimes. About 60 percent of the women in Zanzibar reported that they have time to interact with other women in their community groups as opposed to those in Kigoma where community cooperative groups were almost non-existent denying women of the time to interact and meet friends and colleagues.

²³Interview with Mahamba, Mkuranga, 16 March 2016

6.3.6 Speaking in public

This indicator takes into consideration whether the person feels comfortable speaking out in public or not. The comfort of speaking in public consists of responses to questions about the person's ease in speaking up in public to help decide on decisions regarding infrastructure (like small wells, roads) to be built in the community and contributions to policymaking, to ensure proper payment of wages for public work or other similar programmes, and to protest the misbehavior of authorities or elected officials. Although it does not cover the entire range of possibilities for public engagement, this variable presents some indication of the respondent's empowerment on exerting voice and engaging in collective action.

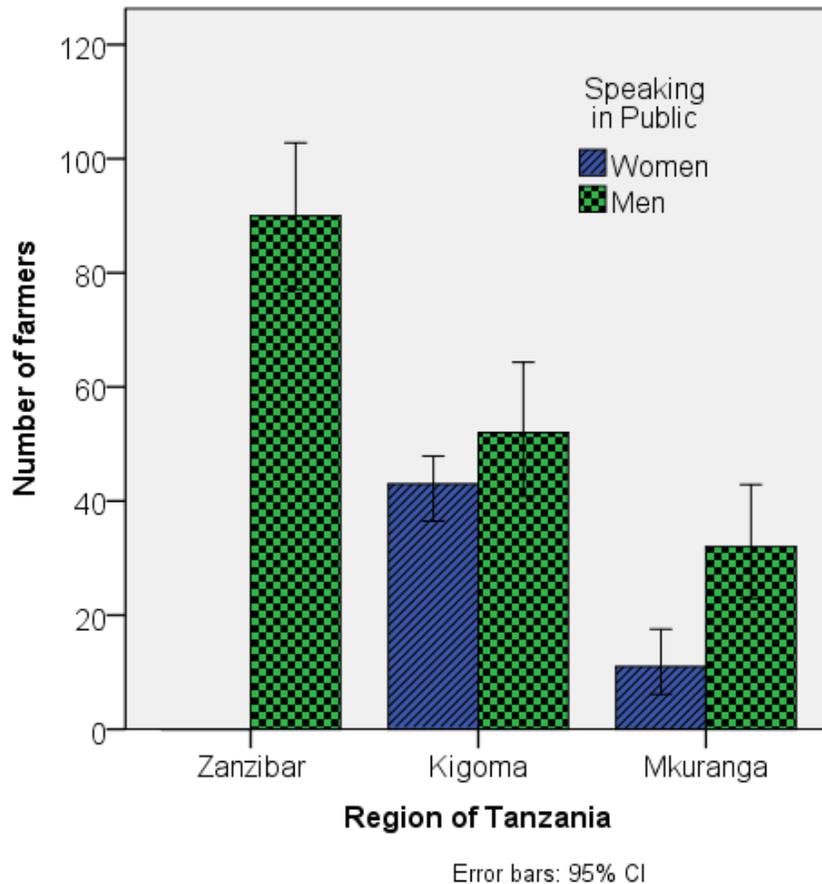


Fig6.4: Number of women and men who reported expressing themselves in public

Figure 6.4 illustrates that generally women were not expressing themselves in public across all study sites. This was more pronounced in Zanzibar (See Figure 6.4) where virtually no women from the study sample reported any involvement in public affairs that included the involvement of men within their community. Women in Zanzibar only had cooperative organisations constituted of women only with no involvement of men thus their public speaking ability was constrained whenever it involved men. This is attributed to the dominant Muslim religion which keeps women in seclusion and confined to household chores with men being the ones making decisions on their behalf. All the sixty-four women considered in the final sample in Zanzibar were Muslim.

This is similarly echoed by Rahman (2008) in a study about women in a predominantly Muslim dominated region in Nigeria. Women in Kigoma (about 45%) reported that they were able to express themselves in public. This is also attributed to differences due to religion where Christians constituted 87 percent of the sample compared to the Moslems who constituted 13 percent in Kigoma. Christianity is characterised by empowering women and enabling them to participate in public enterprises resulting in the high number of women reportedly involved in public speaking in Kigoma. This section is an attempt to provide empirical evidence using descriptive statistics on the domains and indicators of the 5DE sub-index of WEAI. The following section deals intensively with the computation of the 5DE for women and men in Zanzibar, Kigoma and Mkuranga.

6.4 Computation of 5DE Empowerment Index

Based on the empirical findings from this study, the 5DE empowerment index was computed which also showed the disempowerment gaps within the cassava value chain at the household level in Tanzania. Results in Table 6.5 show the 5DE sub-index of the WEAI for both women and men in Kigoma, Zanzibar and Mkuranga

combined. In addition Table 6.6 identifies the domains and indicators that contributed most to the disempowerment of women and men in the cassava value chain in the three study sites of Kigoma, Zanzibar and Mkuranga.

Overall, only 5 percent of women were empowered based on 5DE sub index computed in Table 5.5, with the remaining 95 percent categorised as being disempowered. These include the domain of production, leadership and time budget. Of the women in the latter category, 95 percent reported inadequate achievements in all the domains of the 5DE in the cassava value chains across all the study sites. This high percentage of 5DE disempowerment index for women can be attributed to a number of indicators and domains of 5DE sub index in which women were considerably disadvantaged.

The results for men's empowerment were 86 percent of men who were categorised as being empowered and only about 14 percent of the men who fell on the disempowerment category in the cassava value chains across the three study sites. The high level of 5DE empowerment for men in the three study sites can be attributed to the effect of several indicators and domains where men were more influential. These include the indicators of inputs in productive decisions and autonomy in production where men were reported to be owners of resources such as land and also they were reported to be sole decision makers as far as agriculture production decisions are concerned. These results were comparable to those of the findings of a pilot study (78%) conducted in Uganda by Alkire *et al.* (2013). The domains that contributed most to women's disempowerment in Uganda were time burden (26.3%) and lack of control over resources (23.1%) (Alkire *et al.* 2013)

Table 6.5: 5DE (Domains of empowerment) sub-index of WEAI for women and men in the cassava value chain in Tanzania

Indexes	Women	Men
Disempowerment head count (H)	95%	20.55%
Average inadequacy score (A) ²⁴	100%	68.18%
Disempowerment Index (M ₀)	0.95	0.14
5DE Index (1-M ₀)	0.05	0.86
Number of observations	117	110
% of data used	63.2%	66.4%

(Source: Author, 2017)

Figure 6.1, which depicts empirical evidence from the disaggregation of the disempowerment index according to sex and indicators, reveals that women were more disempowered in relation to most indicators, particularly input to production decisions and group membership across all the three study sites. Similar findings have been reported by Alkire *et al.* (2013) in Bangladesh. The indicators where women felt most empowered were income control, ownership of household assets, and the purchase, sale, and transfer of household assets. FGDs revealed that these activities tended to be conducted jointly with men within the household. Both men and women experienced disempowerment in relation to limited access to credit and

²⁴ The average inadequacy score is the sum of weighted inadequacies experienced by individuals, and the score lies between 0 and 1. Increases in the individual's inadequacies can reach a maximum value of 1, indicating that the individual's achievements are inadequate for all 10 indicators of the 5DE sub-index of WEAI. A score of zero means that an individual has not experienced inadequacy for any of the indicators.

associated decisions. Observations and information obtained from key informants revealed that there were very limited credit facilities in the study areas.

Men were highly empowered in leadership and influence within the community through public speaking (0%) as compared women (13%). This finding is similar to that of a pilot study conducted by Alkire *et al.* (2013) on women's empowerment in the agricultural sector in Bangladesh, indicating that men lacked leadership and influence within the community relative to women.

Women's lack of leadership and influence within the community can also be attributed to different religious beliefs. In Zanzibar and in the coastal regions of Tanzania, communities were predominantly Islam believers, and women have little influence on farm decisions and off-farm decisions, unlike Christian women who freely engage in agricultural and non-agricultural activities as observed in Kigoma. This is endorsed by Rahman's (2008) study in the northern part of the Hausa Muslim-dominated zone of Nigeria where Islamic principles keep women in *purdah* (seclusion), contributing to their weak leadership and public speaking capacities.

Men tended to feel empowered in relation to decision making autonomy on the farm (See Figure 6.1). Similar to our findings, a previous study conducted in Mozambique also reported that men were the decision makers on most cattle- or dairy-related issues, especially regarding the use of inputs, production practices, attendance of meetings, technologies adopted, and enrolment in an association or a cooperative (Quisumbing *et al.* 2014). The study in Mozambique also revealed that domestic assets and/or agricultural productive assets were mostly jointly owned in dairy-related areas, which concurs with our findings (Quisumbing *et al.* 2014).

Table 6.6: Cassava value chain 5DE disempowerment index disaggregated by gender, WEAI indicators, and domains

Domain	Production		Resources		Income	Leadership	Time			
Indicators	Inputs in production decisions	Autonomy in production	Ownership of resources	Purchase/sale /transfer of assets	Access to credit and associated decisions	Control of income use	Group member	Speak in public	Workload	Leisure
Statistics										
Women										
Censored head count ²⁵	0.0896	0.0582	0.0107	0.0040	0.059	0.0	0.0791	0.0463	0.0612	0.0612
Contribution	19.1%	12.4%	2.3%	0.86%	12.6%	0%	16.86%	9.9%	13%	13%
Contribution	0.1815	0.1178	0.0219	0.0082	0.1197	0.0	0.1602	0.0941	0.1235	0.1235
Contribution by										
Domain	31.5%		15.8%		0%	26.8%		26%		
Men										
Censored head count	0.0045	0.0136	0.0487	0.0426	0.0609	0.0	0.0227	0.0	0.0	0.0455
Contribution	1.9%	5.71%	20.38%	17.9%	25.52%	0%	9.52%	0%	0%	19%
Contribution	0.0027	0.0072	0.0285	0.0251	0.0357	0.0	0.0133	0.0	0.0	0.0266
Contribution by										
Domain	7.61%		63.8%		0%	9.52%		19%		

Source: Authors' calculations

Note: 5DE denotes the five domains of empowerment.

²⁵ A censored headcount denotes a ratio that is calculated for each indicator. It is obtained by adding up the number of disempowered people who experience deprivation in relation to a particular indicator and dividing this figure by the total population. The weighted sum of the censored head count ratios generates the disempowerment index (M_0) (Alkire *et al.* 2013).

The disempowerment index for both women and men have been disaggregated according to indicators and domains and presented in Figure 6.5. The table illustrates the percentage each indicator contributed to the disempowerment index for women and men. Notably, the domain of resources was the major contributor to the disempowerment index for both women and men. Both men and women were highly empowered (0%) in the domain of income. Figures 6.5 and 6.6 below shows the diagrammatic disaggregation of the domains and indicators of disempowerment.

Table 6.6 shows that within the production domain, the combined influence of inputs in production decisions and autonomy in production, as indicators, contributed 31.5 percent and 7.07 percent to the disempowerment of women and men, respectively. This indicates that women felt more strongly that they were not in control of productive resources such as land. Moreover, their decision-making power regarding the choice of crops and the purchase of inputs was limited. Consequently, their ability to influence cassava farming was limited. This finding is consistent with those of Quisumbing *et al.* (2014) in the Bogra and Rangpor districts of Bangladesh, where land is almost exclusively owned by husbands, with a very small portion of land jointly owned with wives within a patriarchal structure. Rahman (2008) has also reported that women in Nigeria do not have adequate access to land and that the land commercialisation process has overlooked their cultivation rights. In Nigeria, rates of access to productive resources for women observed for the northern and southern zones were 4.76 percent and 17.74 percent, respectively. Beyene (2008) has also noted that women are seriously disempowered in terms of access to credit, land, and education in agricultural development.

Lack of access to credit and associated decisions, contributed most to men's disempowerment (25.5%) and was almost half of that for women (12.6%). This is may have been because credit decisions were jointly (men and women) made in these smallholder farmers' households and women's credit scores were the aggregate of their sole and joint decisions (Alkire *et al.* 2013) as well as men, resulting in them being less disempowered for that indicator relative to men. In general, there are very limited credit facilities available for both men and women in cassava smallholder farming areas as reported in Figure 6.3. Neither formal nor informal credit institutions were reported in the study areas except for Zanzibar where women had their own revolving saving cooperatives from which they could lend, consequently cassava farming activities among women and men were funded from their off-farm income or savings. This finding endorses that of a previous study by Rahman (2008), who reports inadequate access to credit as a major obstacle limiting agriculture's economic contribution and its productivity in Nigeria. Similarly cassava productivity in the three study sites has also been hampered by poor access to credit facilities particularly for women.

Similar results to those mentioned above were obtained for the following indicators: ownership of resources and purchase, sale, or transfer of assets entailing joint decision making. Information from FGDs strongly indicated that most decisions regarding the use, as well as the purchase or sale of resources were jointly made. This has been alluded to in Table 6.3. Both men and women were empowered in relation to the control of income use indicator (0%) as benefits accrued from joint decisions regarding use and sale. Table 6.6 also reveals that men were empowered for the public speaking indicator (0%) and reduced work burden (0%). For women, the domains of leadership and time contributed almost equally to their disempowerment (26.8 and 26%, respectively).

Women had a heavy work burden (13%) and limited time for leisure activities as observed during repeated household visits and direct observations. Moreover, women had limited time for participating in various social groups (16.86%) relative to men (9.56%) within the community. Women did not speak much within public gatherings, resulting in their disempowerment for the leadership indicator. Rahman (2008) has shown that women spend more hours working than men, regardless of the season, both in relation to farming as well as non-farming activities.

Table 6.7: Relationship between empowerment and individual household characteristics

Statistics	Empowerment					
	Yes	Women			Men	
		No	Missing	Yes	No	Missing
Marital Status						
Single	1	0	2	2	0	2
Married	5	62	30	56	14	34
Divorced	0	2	2	0	0	1
Widowed	1	3	9	0	1	0
Total	7	67	43	58	15	37
Cramer's V	0.252			0.205		
Pearson's chi-squared and p-value	14.871	0.021		9.230	0.161	
Education Level						
Standard 7						
Form 4	2	40	18	36	9	25
Diploma	3	12	9	8	2	3
Adult education	1	1	0	3	0	0
No education	0	0	2	0	0	1
Total	1	14	14	11	4	7
Cramer's V	7	67	43	58	15	36
Pearson's chi-squared and p-value	0.267			0.164		
	16.744	0.033		5.851	0.664	
Age						
< 31	0	12	9	5	1	4
31–40	1	24	14	15	0	7
41–50	3	20	11	19	6	11
> 50	3	11	9	19	8	15
Total	7	67	43	58	15	37
Cramer's V	0.151			0.165		
Pearson's chi-squared and p-value	5.352	0.503		5.996	0.424	
Food Security status						
Food secure	4	47	21	14	2	8
Food insecure	2	10	10	32	10	15
Total	6	57	31	46	12	23
Cramer's V	0.172			0.125		
Pearson's chi-squared value and p-value	2.778	0.249		1.274	0.529	

(Source: Authors' calculations)

Table 6.7 shows how empowerment is related to other important household characteristics such as the level of education, marital status, household food security status, and age. Chi-squared tests provided strong evidence ($p = 0.021$, 95% confidence level [CI]) of an association between marital status and women's empowerment.

The results indicated that 83.7 percent of married women were disempowered, while 76.7 percent of married men were empowered for the three study sites. These findings suggest that women may have been disempowered because their husbands controlled household resources and time allocation. However, we cannot demonstrate here that husbands' empowerment directly contributed to their wives' disempowerment. Other factors may have contributed to married women's disempowerment, including local customs. Furthermore, because only a few of the surveyed women were not married, it is difficult to make any direct conclusions regarding the effects of marital status on women's disempowerment.

There was moderately strong evidence ($p = 0.033$, 95% CI) of an association between the level of education and women's empowerment (Table 6.7). About a quarter of the women who attained a secondary education up to Form 4 were empowered compared with 0.5 percent of empowered women who attained a primary education up to Standard 7. Nearly all the women with no education felt disempowered. This finding indicates that empowerment is related to education and is in agreement with a study conducted by Kabeer (2005) in Tamil Nadu, India. Kabeer's study found that better-educated women scored higher than less educated women on a composite index measuring their access to and control over resources, as well as their role in economic decision making. However, although women's education levels were strongly related to empowerment, other factors, apart from education, also need to be explored to enhance women's empowerment in the cassava traditional food value chain.

There was no evidence of an association between women's empowerment and age and household food security status. This implies that empowerment of women does not depend on their age, because at higher age categories, men tend to control the resources in rural households

in Tanzania. A chi-squared test found no evidence of an association between men's empowerment and their age, marital status, and level of education. The food security status of households was not related significantly to empowerment of either men ($p = 0.529$, 95% CI) or women ($p = 0.249$, 95% CI).

However, the question of food security in our study made many more female household heads feel disempowered (83%) than male household heads (31%). This may be because of the more direct role women play in developing countries in providing food for the household, and potentially because women have less opportunity to earn outside income to purchase food (Maertens & Swinnen 2012). The missing values in Table 4 are because of non-responses and are included for information. All missing cases were eliminated during analysis. The study had sufficient data to make conclusions without these values. The results (See Table 6.7) from this study approve the hypotheses that men control productive resources and income and that they are responsible for decision making in terms of time budgeting in cassava production, processing and marketing.

6.5 Chapter summary

This chapter investigated the gender gaps with regards to women empowerment in the cassava value chains in smallholder farming systems using empirical evidence from Tanzania. The Harvard Analytical conceptual tool of access and control profile for resources and benefits was used as a guiding framework to determine how women and men control resources and the resultant benefits in the cassava value chains.

This was achieved through the use of the five domains of empowerment (5DE) sub index of the Women Empowerment in Agriculture Index (WEAI) which determined the disempowerment of women and men with respects to the domains of production, resources, income, leadership and time (See Table 6.3). The results from this chapter indicate that men were predominantly in control of land use, and also that in terms of ownership of resources, more than 95 percent of them were self-constructed. In terms of household assets ownership, the ownership of a mobile

phone, motorcycle and bicycle were considered to be important among smallholder cassava farmers. It emerged that mobile phones and bicycle ownership was very high across all study sites, with women having higher percentage with regards to mobile phones. However, women commanded less ownership of bicycles and motorcycles across all study sites.

The results indicate that income control was jointly done with the man and the woman in the household agreeing on how to use the cassava income. Leadership and membership to community groups were poor across the three study sites; however, in Zanzibar women were active in local groups which were notable for providing revolving funds only for immediate household use. Women were highly time constrained because of productive and reproductive household chores. The 5DE disempowerment index was also disaggregated according to indicators within each domain (See Figure 6.1).

Resultantly, the chapter highlights that men were in control of productive resources and enjoyed autonomy in productive decision making. Both men and women were empowered in ownership of household assets and control of income use. The relationship between the household and individual characteristics such age, marital status, education and food security status were explored in relation to women and men's empowerment. This chapter contributes to the thesis through the investigation of access and control of resources and benefits profile where inputs in productive decisions and control of income within the cassava value chain were explored. In the process gender gaps of disempowerment were identified particularly for women.

Chapter 7

Factors Influencing Smallholder Farmers' Participation in the Cassava Value Chains in Tanzania

Participation in agriculture commodity value chains does not guarantee benefits, neither does accessing value chain benefits implies that an individual has participated in the value chain

[Coles & Mitchell 2011]

²⁶ This Chapter was published as follows:

Blessing Masamha; Vusilizwe Thebe & Veronica N.E. Uzokwe (2018). Unlocking the household Black Box: A Gendered analysis of smallholder farmers participation in cassava value chains in Tanzania. *Journal of International Development* , 30, pp (20-41), Wiley Online.

7.1 Introduction

Dunaway (2014:64) observes a “glaring absence of women from commodity chains.” In general, women in sub-Saharan Africa, Southern Asia, and South-East Asia are entitled, in theory, to dispose of the products and income derived from their economic activities as they choose. However, in practice, they are often constrained by traditional patriarchal social norms to cover certain kinds of expenditures. Furthermore, cultural stereotypes about men’s and women’s work often determine what roles women can play in cultivating crops and marketing their products. This chapter attempts to address the research question on how gender inequalities affect the differences in participation of women and men in the cassava value. Much emphasis was placed on women, because women and men are involved at different stages of the chain, with women being marginalised and less visible despite being critical links in the chain’s development (Lowitt *et al.* 2015). The ultimate goal is to identify external challenges and opportunities useful in developing appropriate interventions to make the value chain beneficial to the marginalised women. This chapter is underpinned by the guiding Harvard Analytical conceptual framework profile of determining factors affecting participation of different gender groups as alluded to in Chapter Two. Bivariate probit models and Ordinary Least Squares (OLS) regression models were used to determine the factors determining decisions to engage as well as the level of participation at the major cassava value chain nodes identified in Chapter Five.

The chapter is therefore organised as follows: The first section gives an explanation of how the empirical analysis for the quantitative data was done based on previous literature. The theoretical equations are presented and explained together with all the hypothesized variables and their expected effect on the dependent variables (See Table 7.1). Some of the variables were log transformed and others were squared for linearity purposes. Descriptive statistics for each hypothesised variable were presented in Table 7.2. The descriptive statistics depicted were the means for each variable and the differences between the women and men means for a particular variable. The section that follows shares a detailed presentation of probit and OLS results at each at the production and marketing cassava value chain nodes. Qualitative findings were used to support the dominant quantitative findings as guided convergent research design adopted in

section 3.2. Finally the chapter summary gives what the chapter achieved in a nutshell and the contribution that it makes to the whole thesis.

7.2 Empirical analysis and description of variables used

Coles and Mitchell (2011) assert that the levels of participation and gains in agricultural commodity value chains are shaped at the household scale by gendered divisions of labour, time allocation, and decision making with respect to household productive resources. To analyse the quantitative data so as to determine the factors determining decisions to engage in the cassava value chain nodes, I used the Heckman (1992)'s model, entailing a two-stage sample selection procedure. This procedure was used to identify the factors affecting smallholder farmers' decisions relating to participation in cassava production, market participation and subsequently to evaluate the factors affecting the level of participation in cassava production as well as market participation. This model was selected, because it enabled us to examine decisions related to participation in the cassava value chain as a two-step process.

The first step entailed a woman's decision on whether or not to engage in the cassava farming. The second entailed the level of women's participation in the cassava value chain (Zamasiya *et al.* 2014). I estimated the factors influencing farmers' decisions on whether to engage in cassava production and market participation using a probit model (Equation 1), also known as the selection equation. The hypothesised variables for explaining female farmers' participation in cassava production and marketing were derived from previous empirical studies on market participation as affected by transaction costs (Goetz 1992; Jagwe, Machete, & Ouma 2010; Siziba & Bulte 2012). The dependent variables in the probit models were dichotomous variables, namely "engaging in cassava production or otherwise" and "participating in cassava market as a seller or as a buyer." Willingness to engage in cassava production was a dummy variable, with the value of 1 assigned to a farmer who was willing to participate; otherwise 0. A discrete decision over cassava market participation as either a seller or buyer was considered as a dummy variable with a value of 1 assigned to participation as a seller and 0 otherwise. Following Jagwe *et al.*'s (2010) method, a threshold level of 200kg of cassava sold was used to define household participation in the cassava market as a seller when the quantity was above the threshold and a buyer when quantity was below the threshold level (Equation 2). I selected the probit model over

the logit model, because of the former model's ability to resolve the problem of heteroscedasticity (Asante, Afari-Sefa & Sarpong 2011).

The probit is a maximum likelihood estimation procedure that is premised on the assumption of normality of the residual error. It estimates for each individual the value Y^* (Equation 1) which is determined by a set of independent factors. Hence it can be assumed to be normally distributed. The theoretical probit model is as follows:

$$Y^* = X^T\beta + \mu = \beta_0 + \beta_1X + \beta_2X + \dots \dots \beta_kX + \mu, \quad \text{Equation (1)}$$

$$q^{s*} > q^s_- = \text{Prob} (Y=1) = X_i\beta + \mu \quad \text{Equation (2)}$$

where

q^{s*} is the latent supply of cassava if a household is a seller observed when it is higher than q^s , q^s is the threshold supply of cassava for market participation, and β_i are the coefficients of independent variables

$$Y^*: Y_i = 1 \text{ if } Y^* > 0 \quad \text{Equation (3)}$$

$$Y_i^* = 0 \text{ if } Y^* \leq 0 \quad \text{Equation (4)}$$

$$P\left(Y = \frac{1}{X}\right) = F(XB) = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{XB} e^{-\frac{(XB)^2}{2}} dx, \quad \text{Equation (5)}$$

where

$$X = (1, x_{1i}, x_{2i}, \dots \dots \dots x_{ki})$$

$$\beta = (\beta_0, \beta_1, \dots \dots \dots \beta_k)$$

Levels of participation were measured in terms of quantity of cassava produced in the cassava value chains which were modelled using the OLS method. For this estimation, the dependent variable was the amount of cassava produced or harvested. For our study, we hypothesised that the age of the household head, household size, farming experience, ownership of household assets, and distance to the market would affect the degree of women's participation in cassava production. The OLS theoretical model is presented in Equation (6).

$$Y = f(X_1, X_2, X_3, X_4, \dots, X_k),$$

Equation (6)

where:

Y denotes the quantity of cassava produced by women, and

X denotes explanatory variables (Table 7.1).

Table 7.1: Description of variables used in the probit and OLS Models of women's cassava production and market participation

Variable	Description	Measurement	Expected sign
Dependent	Dichotomous variable: who makes the decision to engage in cassava farming in the household	1 = woman 0 = man	
Dependent	Quantity of cassava produced	Kilograms	
Dependent	Dichotomous variable: Decision to participate in markets as buyer or seller	1=seller 0=buyer	
Dependent	Intensity of market participation measured in terms of quantity of cassava sold	Log (Kilograms)	
AGE	Number of years of household head	Years	Positive/Negative
STAT	Married; Single; Divorced Widowed	1 = married; 0 = widowed	Indifferent
REL	Membership of a religious group	0 = Christian 1 = Muslim	Indifferent
HHLDD	Adult equivalence scale	value of 1 to the first household member, 0.7 to each additional adult and 0.5 to each	Positive

		child	
lnHHL D	Natural log transformation of number of people in a household	Number of people in a household	Positive
lnHHL D²	Natural log transformation of squared HHL D size	Number of people	Positive
ln(AGE)	Natural log transformation of age of household head	Age in years	Positive
lnAGE²	Natural log transformation of squared age of household head	Age in years	Positive
EXTN	Access to extension services	1 = Yes 0 = No	Positive
REG_	Administrative Regions of Tanzania	1 = Zanzibar 0 = Kigoma	Indifferent
MOB	Owning a cell phone	1 = Yes 0 = No	Positive
LAN	Size of land owned	Acres	Positive
lnLAN	Natural log transformation of size of land owned	Acres	Positive
lnLAN²	Natural log transformation of squared size of land owned	Acres	Positive
LAN²	Size of land owned squared		
GEN	Gender of household head interviewed	Acres 1=Women; 0=Men	Positive Indifferent
RAD	Own radio or not	1=Own radio 0=do not own radio	Positive
BICY	Own a Bicycle	1=Own bicycle 0=do not own a bicycle	Positive
DEP	Number of people below 18 and above 65 in a household	Number of people	Positive
Ln EDU	Natural log transformation of	Log number of years	Indifferent

	number of years spent in education system		
LnEDU^{^2}	Natural log transformation of number of years spent in education squared	Log number of years squared	Indifferent
EDU	Number of years spent in education system	Number of years	Indifferent
CAVA	Quantity of cassava produced	Kilograms of cassava	Positive
CAVA^{^2}	Quantity of cassava produced squared	Kilograms of cassava	Positive
DIST	Distance travelled to the nearest market place	Km	Negative
DIST^{^2}	Distance travelled to the nearest all weather road squared	Km	Negative

Collinearity diagnostics indicated very weak relationships among the explanatory variables included in the analysis. Table 2 presents the descriptive statistics of the variables considered the analysis.

7.3 Description of explanatory variables

Table 7.1 provides empirical definitions of the independent variables of the bivariate probit model and the expected signs of the coefficients of each independent variable. In the analysis of the data, the choice of women to participate in the cassava value chain was defined by the main cassava producer variable. The main cassava producer in a household was as a result of the choice of either the husband or the wife, which was defined by the outcome of cassava being planted in that particular household. Several factors are considered inclusive of age which may influence participation in the cassava value chains through various avenues such as experience, access to resources, and risk preferences. Hence the expected direction of the effect of age is ambiguous (Zamasiya *et al.* 2014). Household size is an indicator of the amount of available

labour for production activities as well as of household food consumption levels. The expected influence for household size is, therefore, positive as it is expected that a larger household is likely to produce more cassava for their consumption if they are efficient. Distance to the market negatively influences both a household's decision to participate in the cassava value chain and the amount of cassava produced (level of participation). The greater the distance to the market, the higher the transport costs and the lower the profit margins and benefits (Omiti *et al.* 2009).

Religion also affects women's decisions to participate in the cassava value chains, as different beliefs instil varying gender roles within households and in the community at large. The effect can, therefore, be either positive or negative. According to Martey *et al.* (2014), marital status affects an individual's access to information resources. We would expect married household members to be more willing to participate in the cassava value chain, as they are strongly concerned about their households' welfare and food security, which consequently influences their positive decision to participate and increases their level of production (Martey *et al.* 2014). We hypothesised that education would have a positive effect on the decision to participate, as it enables individuals to make independent decisions and act based on that decision, while increasing their ability and tendency to cooperate with others and actively participate in group activities.

Access to information positively influences farmers' decisions to participate in the cassava value chain. Knowledge of input prices, extension advice, and ready markets enable farmers to make informed decisions in the cassava value chain. Ownership of assets such as mobile phones and radios has a positive effect on participation in the cassava value chain as information is easily accessed using such devices. Land availability has an indirect positive effect on farmers' willingness to engage in cassava production, as household heads with more land can produce more for household consumption as well as for marketing. Most studies have found that a positive relationship exists between farm size and the decision to participate in agricultural activities. Literature has also reported that membership of the household head in an association or group increases the household's ability to access information that is critical for decision making relating to production and marketing. This is because most farmer groups are engaged in group marketing and bulk purchasing of farming inputs such as seeds, fertilizers, and chemicals. Some of the quantitative variables were log transformed to make them linear and also some were

squared to explore the quadratic effect on the dependent variables for the variables assumed to have a non-linear relationship with the dependent variable.

Table 7. 2: Descriptive statistics for variables considered in the study

Variable	lnAGE	lnAGE^2	lnHHLD	lnHHLD^2	lnLAN	lnLAN^2	EXTN	MOB	REG	STAT	REL	LAN	DIST	DIST^2
Women														
Mean	3.77	7.53	1.804	3.6075	0.29	0.58	0.833	0.766	0.736	0.8	0.797	1.735	2.403	11.3834
S.E.	0.0307	0.061	0.053	0.106	0.103	0.205	0.069	0.534	0.061	0.052	0.051	0.136	0.2228	1.82623
N	63	63	64	64	62	62	30	64	53	60	64	115	114	114
Men														
Mean	3.7642	7.53	1.8928	3.786	0.650	1.301	0.848	0.829	0.4	0.986	0.584	2.598	2.446	11.5688
S.E.	0.2363	0.047	0.0373	0.075	0.054	0.108	0.041	0.031	0.044	0.001	0.04	0.158	0.2264	1.98818
N	154	154	153	153	153	153	79	152	125	147	154	108	110	110
Diff means	.0012	.0024	-.0888*	-.1785*	-.360*	-.721*	.0041	-.063*	.336	-.186*	.2125	-0.863*	-0.043*	-0.1854*

Note: A negative difference (*) between means (diff means) indicated lower means for women-headed household.

N- Represents the number of respondents.

S.E – represents standard error of the mean.

Variable	GEN	RAD	BICY	LnEDU	LnEDU²	DEP	LnCAVA	LnCAVA²	LAN²
Women									
Mean	1	0.6325	0.6207	1.556	3.2733	3.273	2.7697	8.383	5.069
S.E	0.00	0.0448	0.0453	0.857	0.1960	0.177	0.07934	0.33408	1.341
N	117	117	116	117	117	114	114	114	115
Men									
Mean	0	0.6972	0.8165	1.6317	3.3691	3.95	6.0685	8.1247	9.433
S.E	0.00	0.0044	0.0373	0.0809	0.1809	0.215	0.24398	0.41423	1.224
N	110	109	109	109	109	109	106	106	108
Diff means	1	-0.0647*	-0.1958*	-0.0757*	-0.0958*	-0.677*	-3.2988*	0.2583	-4.364*

Note: A negative difference (*) between means (diff means) indicated lower means for women-headed household.

N- Represents the number of respondents.

S.E – represents standard error of the mean.

7.4 Factors Affecting Men and Women Participation in Cassava Production Node

A number of empirical studies focusing on the welfare effects of modern agriculture value chains (AVCs) participation have faced methodological difficulties in establishing the causal impacts of AVCs. One of the challenges have also been that of attribution, that is in determining whether observed increases in welfare of smallholder farmers can really be ascribed to participation in AVCs), so the degree to which participating smallholders benefit remains somewhat uncertain. This particularly evident particularly in the context of neglected low value chains such as for cassava crop among women farmers. The situation is also true in cases where institutional arrangements have left smallholder farmers especially women exposed to risks of shocks, unequal distribution of productive resources, decision making and predatory middlemen such as those reported in Chapter 5. This Chapter is therefore an attempt to assess several factors affecting the decision of women and men to engage in cassava farming and also the analysis of factors influencing the quantity of cassava produced. The factors affecting the decision to participate in cassava markets as sellers or buyers and the factors influencing the quantity of cassava traded are also analyzed in detail.

7.4.1 Determinants of the Decision of Women to Engage in Cassava Farming

This section analyses in detail the decision of smallholder farmers (women and men) to engage in cassava production using a biprobit model. Table 7.3 shows the results of the bivariate probit analysis for the decision of women to engage in cassava farming. The pseudo McFadden R^2 was used as an indication of the goodness of fit of the model as highlighted in Table 7.3. The dependent variable was the main cassava grower, describing the individual within a household who makes the decision to grow cassava. In this case, the decision maker was either a woman or a man, resulting in a dichotomous variable.

Table 7. 3: Probit estimates for women’s decision within the household to engage in cassava farming (see Table 7.1 for a description of the variables)

Variables	Decision to participate		
	Coefficient	S.E.	P-value
AGE	0.297	0.229	0.194
AGE ²	0.003	0.003	0.260
HHL D	0.551	0.597	0.356
HHL D ²	-0.054	0.038	0.156
LAN	2.014	1.190	0.090
LAN ²	-0.605**	0.298	0.043
STAT	0.414	0.492	0.401
EDU	0.302	0.216	0.161
EDU ²	-0.014	0.015	0.334
REL	5.961**	2.395	0.013
RAD	-0.111	0.489	0.820
BICY	-7.769**	0.789	0.027
EXTN	-0.717	0.621	0.248
REG	-4.491**	2.246	0.046
GEN	0.936	0.581	0.203
DEP	0.463**	0.298	0.013

Notes: Number of observations = 84

-2Log-likelihood function = 55.679

Pseudo R² McFadden = 0.466.; Cox and Snell Pseudo R² =0.429 & Nagelkerke Pseudo R² =0.613

*p < 0.10, ** p < 0.05 and ***p < 0.01.

A range of variables that included land ownership log transformed and squared ($\ln \text{LAN}^2$), Religion (REL), ownership of bicycle (BICY) and region (REG) and number of dependents in a household (DEP) had a significant effect ($p < 0.05$) on a household's decision to grow cassava (Table 7.3).

Contrary to my expectations, variable land size squared (LAN squared) showed an increasing negative significant ($p = 0.043$) effect on women's participation in cassava production, although the land ownership (LAN) variable was positively linked to the decision to engage in cassava farming with a coefficient of 2.014 (See Table 7.3). The decision to engage in cassava production was positively influenced by land ownership by women indicating that if women were to own land most of them would consider producing cassava food crop. My analytical position on this issue of importance of land ownership influence on cassava production is buttressed by one Agriculture Extension Officer's argument in Kakonko, Kigoma. He stresses that:

Arable land is one of the most important determining factors in cassava production. With increasing arable land, cassava production by women may decrease due to various reasons. One of the major reasons is that cassava is treated as a marginal crop hence preference is given to high value cash crops such as cotton, rice and banana. Hence when more arable land becomes available much of the plots are allocated to high value cash crops for purposes of income generation and meeting household needs. Cassava is then allocated plots that are often left fallow and infertile²⁷

The negative relationship may indicate that when land area increases, women's engagement in the cassava production decreases, probably because the relationship is non-linear. This means that as land size increases, women continue to engage in cassava farming up to a certain point at which the relationship starts to be negative. With increasing land size, women are presented with alternative options to use the land to earn more income. For example, in Kigoma alternative cash crops such as cotton, banana and staple food crop maize were planted. In Zanzibar alternatives crops were banana, rice, sweet potato and fruits as alluded to in Chapter 1. This indicates a

²⁷Interview with Moshi Salvatory, Kakonko, Kigoma, 22 January 2016.

diminishing marginal effect on participation in the cassava value chain with an increase in land area, probably because cassava is grown on marginal land that is often left fallow.

Further, because men rather than women control land allocation in all the three case study sites, cash crops and other farming activities prioritised by men are selected at the expense of cassava production. This finding is in line with that of Boughton *et al.* (2007), who used an asset-based approach in their study of the participation of rural household heads in maize and cotton markets in Mozambique. The negative effect of land area squared on crop production appears consistent with the findings of most studies on farm size productivity effects, such as that by Heltberg (1998) on rural market participation and farm size productivity and between-farm size and profitability in developing countries.

Similarly, Pendera *et al.* (2004) found that land size had a negative effect on crop production in Uganda. The land ownership (LAN) variable is positively linked to the decision to engage in cassava farming indicating that as women control more arable land, their propensity to engage in cassava farming also increases. This finding is supported by Key *et al.* (2000). Land was positively and highly significantly associated with market participation in cotton and tobacco markets (Boughton *et al.* 2007). The variable region (REG) was negative for Zanzibar and the coastal area (Mkuranga) relative to Kigoma probably, because the former case study areas had limited arable land as observed during fieldwork. Because Zanzibar is an island, arable land is limited compared with that in Kigoma. Furthermore, agricultural activities are limited on the island, because profitable off-farm economic activities, such as fishing, take most up of the residents' time.

At the 95 percent confidence level the number of dependents in a household (DEP) showed a positive and significant ($p = 0.013$) relationship with women's decision to engage in cassava production. This may be due to the fact that women are usually responsible for taking care of dependent family members and therefore, an increase in the number of dependents triggers women to engage in cassava production so that they generate some income as well as enough household food. Ownership of a bicycle (BICY) resulted in a coefficient estimate that was

negative and significant ($p = 0.027$) at the 95 per cent confidence level although 81 per cent, 51 per cent and 54 per cent (see Table 6.2) of the farmers in Kigoma, Zanzibar and Mkuranga owned bicycles respectively. This implies that the ownership of a bicycle for women did not directly influence engagement in cassava farming. Most farmers concur with this result stressing that ownership of a bicycle (BICY) did not have a direct positive effect on decision of women to engage in cassava production as argued by a 42-year-old woman:

Most women including myself market our cassava in local weekly wet markets. We are therefore, not constrained in terms of the need to have mode of transport such as bicycles and motorcycles to transport inputs and produce. We usually carry the produce to the market with the help of our children

This finding is contrary to the expectation that owning a bicycle is positively linked to women engaging in cassava farming, since it will be a means of transport during marketing purposes. In this case, household power dynamics may be more influential in influencing cassava farming such that ownership of means of transport alone may not influence the decision to engage in cassava farming. In addition, it is also difficult for women to sell their produce at distant markets, because of the limited mobility imposed on them by men; hence women tend to sell at the farm gate. As such ownership of a bicycle for transporting cassava may be irrelevant. This is also supported by Jagwe *et al.* (2010) in their study on banana marketing in Eastern and Central Africa where bicycles were not a significant asset in influencing marketing of banana.

Muslim religion (REL) had a significant ($p = 0.013$) positive effect on women's engagement in cassava farming relative to Christian religion. Christian women were less likely to participate in the cassava value chain compared with Muslim women. This was contrary to our expectations as well as to the findings reported in the literature. Usually Muslim women are confined to households with very limited movement and do not have control over household assets or production as reported by Rahman (2008) in a study in Nigeria. The reason for the difference in our results may have been that 70.9 percent of the women in this study were Muslim and only 29.1 percent were Christians. Thus, this disproportionate sample population might have influenced our outcome.

Several demographic variables had positive, but not significant effects on women's decisions to engage in cassava farming. These included gender (GEN), which may be related to the fact that cassava is a traditional staple crop favoured by women, as they are concerned with the food security and nutrition status of their households; AGE (linear) and AGE squared (quadratic). The latter variables were possibly related to increasing responsibility for family dependents and greater experience in farming among older women (Fischer & Qaim, 2012), and greater interest in off-farm employment among younger women. The variable HHLD squared had a negative insignificant ($p = 0.156$) effect on women's participation in cassava farming.

This may be attributable to the allocation in a large household of more household labour and resources for cultivation of cash crops and other high-value staple crops, such as maize and banana, than to cassava. Bekele and Drake (2003) found that in larger families in the eastern highlands of Ethiopia there were competing demands on labour allocation for food-generating off-farm activities such as daily wage work and investments in soil and water conservation. Household size determines the number of people who need to be fed and also indicates the size of the labour force available for production. Consequently, as household size increases, so does the amount of cassava produced.

There was no benefit from ownership of a radio (RAD) on women's engagement in the cassava value chain. This was probably because agronomic, harvesting, processing, and marketing information for various crops, including cassava, are not conveyed through media such as radios. This finding is supported by Ouma *et al.* (2010), who found that the effect of owning radios was statistically insignificant in influencing market participation of both banana sellers and buyers in Burundi and Rwanda. In addition ownership of a radio may be endogenous, implying that the result may be due to reverse causality. The purchase of the radio might be as a result of the proceeds from the engagement in cassava value chain. Self-reported access to extension information (EXTN) from an extension agent was negatively related to the decision of women to engage in cassava farming. Even some of the experienced agriculture extension agents argued that extension information particularly in Kigoma showed that extension information is mostly

targeted towards cash crops such as cotton; beans, rice and maize with little attention being given to cassava farming as one of the male Agriculture Extension Officers in Kigoma said:

...Traditionally, extension support has been biased towards cash crops and high value crops such as cotton, banana, rice and beans. Extension support has been targeting crops such as cotton especially when cotton companies have contract farmers. Cassava has been highly marginalized except when there are specific initiatives such as by IITA and other non-governmental organizations. However, of late cassava is receiving much technical and extension owing to its importance as a strategic food security crop as well as for income generation....

These results showed that there is need to enhance agriculture extension support for smallholder cassava farmers so that the quantity of cassava produced would increase. It is therefore of paramount importance that the determinants of the quantity of cassava produced needs to be examined for purposes of identifying appropriate intervention strategies.

7.4.2 Determinants of the quantity of cassava produced

Quantitative variables, such as the age of the household head, area of arable land, and household size, were log transformed and then squared. The dependent variable of cassava harvested was also log transformed. We used the backward selection method entailing removal of unimportant variables from the OLS model at each successive stage. The best model was chosen on the basis of the R^2 which indicated the goodness of fit of the model. Model 1 was computed to determine factors affecting the quantity of cassava produced by women. The R^2 value for Model 1 was 0.447, indicating that it was a relatively good model, since 44.7 per cent of the variation in quantities of cassava produced by women was explained by factors incorporated within the model. Model 2 is a regression of the quantity of cassava produced by men against the explanatory variables. An R^2 value of 0.26 was obtained, indicating that the model only explained 26 percent of the total variation in cassava produced by men. Model 2 was not very good in terms of the variation explained.

Table 7.4: Ordinary Least Squares (OLS) estimates for the quantity of cassava produced by women and men in Tanzania

Variable	Model 1: Women (N = 64)			Model 2: Men (N = 154)		
	Coefficient	S.E.	P-value	Coefficient	S.E.	P-value
Constant	13.042**	5.743	0.029	7.180	4.662	0.129
RAD	-0.251	0.531	0.639	0.402	0.896	0.655
STAT	-1.319**	0.538	0.019	---	---	---
LnEDU	0.049	0.075	0.521	---	---	---
LnEDU^{^2}	0.461	0.545	0.402	0.151	0.220	0.497
REG	2.030**	0.664	0.004	1.948**	0.896	0.034
LnLAN	1.105**	0.503	0.034	-0.408	0.906	0.654
LnLAN^{^2}	0.346	0.510	0.510	0.347	0.325	0.290
MOB	-1.299	0.706	0.074	-1.297	1.009	0.204
LnAge^{^2}	0.348	0.196	0.085	-0.489**	0.202	0.019
LnHHLD	-8.616	5.946	0.156	---	---	---
LnHHLD^{^2}	1.953	1.591	0.228	0.229	0.218	0.300

Notes: Coefficient of Determination (R^2): Model 1 (Women) = 0.447; Model 2 (Men) = 0.26

Significance level: * $p < 0.10$, ** $p < 0.05$ and *** $p < 0.01$.

Marital status (STAT) was a significant ($p = 0.019$) negative predictor at 95 per cent confidence level in influencing the quantity of cassava produced by women. This reflects the limited

decision-making input from married women with regards to allocation of land, time and other resources for crop production. The husband as the head of the household usually determines the arable land for each crop to be grown giving little preference for cassava since it is traditionally regarded as a “women’s crop”. This issue of decision making is viewed by many as a responsibility of a man in each household especially among smallholder farmers in rural areas such Kigoma, Mkuranga and some rural parts of Zanzibar. This argument regarding input of women in productive decision making is stressed by Mabola, a 35 year old married woman in Kigoma pertaining to input in productive decision making and production. She argued that:

In most male headed households such as mine, decision making regarding allocation of arable plots for cultivation of various crops is done by the husband. This has production effect on previously marginalized crops such as cassava which were labelled as “female crop” and hence were allocated infertile and small pieces of land. Even the inputs and time to work on those plots will be very limited. However when it comes to the marketing of yield from these plots and household use of income, my husband becomes the decision maker.²⁸

The variable region (REG) had a positive significant influence ($p = 0.004$ for women and $p = 0.034$ for men) on quantities of cassava produced. This showed that quantities of cassava produced in Kigoma region were higher relative to the cassava produced in Zanzibar. This is because in Kigoma, there was more arable land and the soils are predominantly red fertile soils which support a wide range of crops. In addition, the major livelihood activity in Kigoma is agriculture that includes staple crops such as cassava and maize as well as cash crops like cotton, banana and rice.

The area of land (LnLAN) had a significant positive effect on the quantity of cassava grown by women, with more land available for cassava production. Vanslebrouck *et al.* (2002) maintain that larger farm size, agricultural education, and participation of younger farmers had a significant positive effect on the probability of household participation in agricultural markets. In

²⁸. Interview with Mabola, Kigoma, 24 January 2016.

addition, there was a positive and significant effect of variable region (REG), suggesting that women ($p = 0.004$) and men ($p = 0.004$) in Kigoma relative to Zanzibar produced higher quantities of cassava probably because of favourable climatic and edaphic conditions as well as market access.

Several variables had positive but not significant effects on the quantity of cassava planted. The two education variables (LnEDU and LnEDU squared) were positive indicating that with higher education levels women acquire better knowledge and information sources on cassava production, processing, and marketing. This result is supported by findings from a study conducted by Fafchamps and Quisumbing (2003) in Pakistan. Their results indicate that education raised off-farm productivity and induced rural Pakistani households to shift their labour resources from farm to off-farm activities. One additional year of schooling for all adult men raised household incomes by 8.9 per cent. Accessing extension information (EXTN) on cassava production and management practices also had a positive effect on women's participation, enabling them to acquire agronomic, processing, and marketing knowledge about cassava.

Information from desk review shows that extension is an important component in reducing gender gap in agriculture commodity value chains. Shayo (2015) proposes the following:

In order to promote gender equity, the extension services need to be reorganized, with increased emphasis given to issues of concern to rural women and men in agricultural production. Field staff needs to be trained in gender analysis and gender-needs assessment. The extension service network which extends to village level should be the main focus for training in gender-role assessment and documentation. To promote gender equity there is need for the reorganization of the extension system, placing emphasis on researching issues of concern to rural women and institutionalizing gender analysis training programmes for field extension staff, statisticians and policy formulators and implementers. It is also important for extension workers to be able to document gender roles at the village level by keeping records of different farming systems. Although the curriculum in training institutes now includes training on gender, extension workers need in-service training.

The variable HHLDD had a negative effect on the quantity of cassava produced by women (Model 1), probably because with an increase in household size, there was a higher labour demand for cultivating other staples such as maize and banana, as well as a greater focus on high-value market crops such as rice. This consequently has a negative effect on the production of cassava. Ownership of a mobile phone (MOB) negatively affected cassava production in both Models 1 and 2. It is possible that mobile phones are not used to convey information for agronomic purposes; rather they are used for conveying marketing information that relates to high-value crops and for social communication. It is plausible that communication assets are less useful in accessing market information and facilitating transactions in eastern Africa, which includes Tanzania.

However this contrasts with the findings of Siziba and Bulte (2012) regarding participation in cereal markets in southern Africa where mobile phones were very pivotal in the marketing of produce. The difference could be because in southern Africa, much of the income and livelihood of smallholder farmers is supported by selling of cereals such as maize to middlemen and government designated government marketing boards, hence they use mobile phones for communication. This is different in the case of cassava which has been marginalised and labelled “female crop” hence limited activity in terms of communication relative to cereals.

Table 7.4 shows that variable region (REG), which denotes farmers location, is a significant determinant of the quantity of cassava produced, $p = 0.004$ and $p = 0.034$ for Model 1 and Model 2 (Table 7.4) respectively indicating that there was a significant difference in quantity of cassava produced between the three sites (Kigoma, Zanzibar and Mkuranga). Much of the cassava was being produced from Kigoma as compared to Zanzibar (Table 5.1) because of the fertile red ironstone soils common in Kigoma. Kigoma also had more arable land than the Indian Ocean Island of Zanzibar. Mkuranga had the least quantity of cassava produced owing to poor soils and limited arable land.

The variable LnAge^2 (AGE squared) had a negative effect in Model 2. This implies that younger male farmers are more likely to produce greater quantities of cassava than older male farmers. This could be probably, because of the ability to provide enough labour from the energetic young male farmers who have enough time and are able bodied. These findings are consistent with those of Ayamga (2006) who reported a decrease in farmers' ability to participate in microcredit programs in northern Ghana with increasing age.

7.5 Factors affecting market participation of farmers in the cassava value chain

Participation in agriculture commodity markets by smallholder farmers in developing countries is mediated by a host of factors of which the major one among them are personal attributes of farmers such as education, age, farming experience and gender of household head. Other factors include infrastructure such as all-weather roads and communication gadgets like mobile phones. Cultural norms and values also affect how gender roles are defined within households and the community thereby having an influence on market participation by women and men. In addition institutional policy frameworks also have important influence on market participation by women and men in the cassava value chains. In this section, regression models were generated for each gender category (men and women).

7.5.1 Determinants of decision of women and men to participate in cassava markets

The analysis of factors determining participation of women and men in markets as sellers was done using a biprobit model and the empirical findings are presented in Table 7.5. The findings in Table 7.5 show that distance to an all-weather road had a moderately significant weak evidence ($p = 0.06$) on the decision of men to participate in the cassava value chain market as sellers. As for women distance to an all-weather road had no significant effect ($p > 0.05$) on their choice to participate as sellers. Distance to the nearest all weather road was used as a proxy variable to distance to the nearest market (DIST) that translated into transport costs to terminal markets (Boughton *et al.* 2007). DIST was negative for both women and men in their decision participate in markets as sellers.

This indicates that as distance increases the decision to participate as a seller is compromised for both men and women but with a more nuanced effect on men who were mainly responsible in transporting cassava to more lucrative markets in towns and cities, compared with women who

tend to sell locally. These findings are in line with Njuki *et al.* (2011) who reported that women control income from food crops sold in local markets such as groundnuts and beans. Jagwe *et al.* (2010) also found that proximity to the market place and geographical location of households had a direct effect on fixed transaction costs and hence on the decision to participate in banana markets.

Table 7.5: Probit estimates of women and men market participation as cassava sellers

Variable	Women			Men		
	Coefficient	S.E	P-value	Coefficient	S.E	P-value
Constant	13.262	11.664	0.256	1.167**	5.033	0.054
EDU	-0.521	0.407	0.201	-0.010	0.173	0.955
AGE	0.151	0.487	0.757	-0.866	1.375	0.529
AGE²	-0.001	0.006	0.883	0.000	0.001	0.733
HHL D	1.840	1.318	0.163	0.394	1.283	0.759
HHL D²	-0.132	0.096	0.171	-0.014	0.027	0.610
DIST	-1.180	0.980	0.228	-2.508**	1.336	0.060
DIST²	0.110	0.107	0.303	0.049	0.033	0.137
CAVA	-0.001	0.002	0.730	5.851**	2.313	0.011
CAVA²	1.727**	0.914	0.05	-0.489**	0.236	0.039
MOB	-0.370	1.216	0.761	-2.137	1.299	0.10
BICY	0.835	1.247	0.503	-0.316	1.308	0.809
RAD	-4.554**	2.408	0.05	2.484	1.487	0.095
EXTN	-2.194	2.069	0.289	-1.265	1.384	0.361

For Women: Cox and Snell $R^2 = 0.603$; Nagelkerke $R^2 = 0.848$ & McFadden $R^2 = 0.743$. -2LogLikelihood=16.295

For Men: Cox and Snell $R^2 = 0.581$; Nagelkerke $R^2 = 0.783$ & Mc Fadden $R^2 = 0.643$. -2LogLikelihood = 24.704.

The variable CAVA represented a linear form of the quantity of cassava produced while CAVA squared represents a non-linear quadratic relationship of the quantity of cassava produced. The variable CAVA squared was negative and significant with strong evidence ($p = 0.039$) for men's

participation in markets as sellers in the cassava value chain. However, CAVA squared was positive with moderately weak evidence ($p=0.05$) for women. Market participation for women is predominantly local and characterized by the selling of cassava at the farm gate as observed in Zanzibar and in Mkuranga.

The influence of quantity of cassava harvested (CAVA) on participation of women as sellers was negative and insignificant ($p=0.730$). The implication of this finding is that with increasing quantity of cassava produced, less of the women were now involved in the marketing of cassava. Moreover, it shows the gendered nature of the marketing value chain node, where men are predominantly active in the marketing of cassava. This is because variable CAVA was positive with very strong evidence ($p = 0.011$) of a significant effect for men's participation as sellers in the cassava value chain indicating the evidence that men become more involved in the marketing of cassava as the quantity of produce increases. Similarly these findings were echoed and shared even among men and women cassava smallholder farmers as it is categorically explained by a 41 year old man in Kakonko district who had this to say:

I employ middlemen who move around households in various villages such as Kasanda, Itumbiko, Kasaga, Gwarama and Rugenge and purchase cassava root tubers in the form of cash. On average the middlemen buy at a price of TZSH 1500 (USD1.50) per kilogram of fresh root tubers. However, the prices fluctuate depending on the season and can go as low as TZSH1200 in times where yields are high or soon after harvesting. The middlemen are predominantly men and they come from as far as Kahama, Mwanza, and Shinyanga. Others also travel from neighbouring countries such as Burundi (30 km) and Uganda (130 km).²⁹

These findings are consistent with those of Shackleton *et al.* (2011) where women were extremely restricted in participation involving collection, transportation and marketing of gum Arabic in Burkina Faso. Similar results were reported by Quisumbing *et al.* (2014) in which women had limited participation in distant markets in the dairy value chain in Mozambique. Donovan *et al.* (2011) reported similar findings, where fresh cassava tuber transportation and marketing was dominated by men in Mozambique, Zambia and Malawi due to the heavy labour

²⁹ . Interview, Jali, Kigoma, 23 January 2016.

involved including carrying, and trade of large volumes of tubers. However, contrary to my results, PIND (2011) argues that in the Niger delta, women were reportedly responsible for production, processing as well as marketing of cassava despite the fact that it has been extensively commercialised.

Age and household size (HHL) were positive but insignificant for both men and women. Age is positively related with experience in marketing and establishment of networks during trading hence increasing propensity to market cassava. These findings are consistent with findings by (Fischer & Qaim, 2012), where age had a positive influence on farmer participation in a farmer group for marketing of agricultural produce. However, AGE squared has a diminishing marginal effect on women participation as sellers, since with increasing age, women get married and their movements are limited. Much of their time will be channelled towards taking care of the family for both productive and reproductive functions. Alene *et al.* (2008) and Omiti *et al.* (2009) argue that household size affects labour supply for production purposes and therefore, assumes that more is produced than is consumed with increasing HHL. This is because household labour endowment is critical in determining the ability to produce a marketable surplus (Jagwe *et al.* 2010).

Education has a negative effect on the market participation by women and men as sellers probably, because as an individual acquires more education, they tend to depend more on off-farm income generating activities rather than selling cassava. This is also supported by evidence from direct observations and repeated household visits, during which we learned that most residents who had successfully completed secondary and tertiary education were employed in urban areas generating greater off-farm income for their households. Assets like MOB, RAD and BICY had mixed effects on both men and women's decisions to participate in markets as sellers. Mobile phones are predominantly used for social purposes and networking with relatives but not for marketing of agricultural produce, since they are not much involved in marketing of cassava. Evidence from direct observations indicated that women do not necessarily need a bicycle to market their cassava locally, although the effect was positive. Information from FGDs showed that market participation is dominated by men, Zanzibar (100% men); Coast (100% men) and Kigoma (70% men; 30% women).

7.5.2: Determinants of the level of farmers participation as sellers in cassava value chain markets

The level of women and men participation in the cassava value chain markets was defined by the amount of cassava sold on the market. The Ordinary Least Squares (OLS) regression models show that variable STAT has a negative influence on the intensity of women participation as sellers in the market (see Table 7.6). This is because married women have limited decision making regarding marketing of agriculture produce since almost all decisions are made by man. This supports the hypothesis that cassava value chain markets are dominated by men indicating that income in households is controlled by men. This is consistent with studies by Shackleton *et al.* (2011) in which women were restricted in collection, transportation and marketing of gum Arabic in Burkinafaso; and Quisumbing *et al.* (2014) who reported women disempowerment in decision making within households.

Table 7. 6: Determinants of the level of market participation of farmers as sellers in the cassava value chain

Variable	Women			Men		
	Coefficient	S.E	P-value	Coefficient	S.E	P-value
Constant	8.039**	1.947	0.01	9.562	2.937	0.002
STAT	-0.415	0.634	0.521	-----	-----	-----
CAVA	0.001**	0.000	0.023	0.001**	0.000	0.000
CAVA ²	-8.651	0.000	0.202	-1.100**	0.000	0.000
DIST	-0.450	0.049	0.325	-0.005	0.006	0.341
DIST ²	0.050	0.049	0.325	-0.001	0.013	0.929
HHL ²	0.005	0.008	0.886	-0.001	0.019	0.612
AGE ²	0.000	0.001	0.463	0.002	0.001	0.230
EDU	-0.180	0.117	0.141	0.113	0.095	0.235
MOB	-1.797**	0.850	0.049	-0.2224	0.885	0.801
RAD	-0.932	0.871	0.299	-0.910	0.628	0.151
BICY	1.777**	0.777	0.034	-----	-----	-----
EXTN	0.188	0.789	0.814	-----	-----	-----
COOP	0.961	0.750	0.216	-----	-----	-----

R-squared =0.722 (Women) R-squared =0.341 (Men)

The quantity of cassava produced within a household (CAVA) has a positive and significant ($p=0.000$) effect on quantity of cassava sold by both men and women. CAVA is consumed within the household and the surplus is sold. The quadratic variable CAVA squared had negative coefficients for both women and men with strong evidence ($p = 0.000$) of significance for men indicating a diminishing marginal effect on cassava market participation as sellers due to

increases in quantity of cassava harvested.

Variables EXTN and COOP had a positive but insignificant effect on the intensity of market participation as sellers for both men and women. Extension information improved farmer knowledge regarding market prices and the best marketing channels. According to Zamasiya *et al.* (2014), agricultural extension workers act as a bridge between research programmes and farmers. They provide information on good agronomic practices, production technologies, and improved cassava varieties, helping to enhance women's engagement in cassava markets and networking.

Cooperatives (COOP) are groups that provide platforms for farmers to exchange information on issues to do with prices, transport arrangements, marketing places (Jagwe *et al.* 2010) and for better linkages of smallholder farmers to emerging value chains (Fischer & Qaim, 2012). Membership in community farmer cooperatives enabled farmers to share their diverse knowledge on marketing outlets and it also enhanced their bargaining power if their cassava and cassava products are sold collectively. Similar findings were reported by Boughton *et al.* (2007) in Mozambique on market participation of tobacco and cotton farmers.

Variables MOB and RAD had a negative effect on quantity of cassava sold by women. These variables represent access to marketing information like prices and transport arrangements. The effect of ownership of these assets may be endogenous resulting in reverse causality. This implies that the selling of cassava itself may result in acquiring income that is then used to buy a mobile phone as well as radio rather than the need of market participation triggering the acquiring of a mobile phone as reported by Jagwe *et al.* (2010). However, ownership of a bicycle was positive and significant ($p = 0.034$) for women's participation as sellers on the market. Bicycle ownership was linked to market participation as a means of transporting cassava produce to the market as reported by Boughton *et al.* (2007) in Mozambique.

7.6 Participation of women and men as processors in the cassava value chain

Cassava root processing involves peeling, chopping, drying, grating, grinding and finally packaging before marketing. Table 7.6 shows that women dominate the processes of peeling (57%), chopping (25.4%) and drying (43%). At the processing node men are more involved in grinding and grating since these processes require physical strength and the technical knowledge of operating and repairing grinding mills. Men are more involved in the packaging of cassava with 36.8 percent compared to 26.8 percent of women. This is consistent with findings reported by Mayoux and Mackie (2008) who postulates that within agricultural value chains women often participate in less visible, inadequately acknowledged, low-skilled and less highly paid roles, yet these nodes constitute critical links while men often engage in functions of marketing.

Similarly, in the cashew nuts value chain, women are restricted from participating in the marketing but are more prominent in the processing node (Kanji *et al.* 2004). Results from this study are consistent with those reported by Andersson *et al.* (2016) who argue that cassava leaf processing is dominated by women even at other value chain nodes since the value chain is at its formative stage. Children are also involved in processing of cassava especially in the processes of peeling (20.3%), chopping (8.3%) and drying (9.6%) (See Table 7.6). One of the prominent and active cassava processors was a woman in Geita district (S02.82663⁰) (E031.93743⁰) whose husband was an agriculture extension officer. She had this to say:

I am actively involved in the production and processing of cassava products such flour. We use cassava flour to make Chapati, Maandazi, Ugali, Cakes and Biscuits. However, when it comes to marketing my husband helps me since he is well informed in agriculture issues since it is his profession. In Mbogwe district I trained a group of farmers comprising of 20 women and 30 men in cassava processing. I incurred a cost of TZSH300000 (USD150) to purchase processing machine and other costs include fuel and packaging sacks. I hire women for peeling, grating and men for pressing. My main challenges are drying facilities, cassava diseases and the cost of hiring transport to ferry my products to the market.³⁰

³⁰. Interview with Fatuma, Geita, 26 January 2016).

Another cassava processing plant visited was the Mkombozi cooperative (S02.82663⁰) (E031.93743⁰) in Geita. This cooperative comprised 26 women and 29 men. According to a FGD, in this cooperative, women are largely involved in peeling, chopping and drying of cassava. According to our observations, the cooperative had a grating and pressing machine, drying trays and a grinding mill. These machines were operated predominantly by men. Cassava flour was packaged into 5 kg bags designed with the unique logo of the Mkombozi cassava cooperative.

In Zanzibar, there was a small-scale cassava processors cooperative called the Mtakawani cooperative comprising seven women and eight men. Information from one of the key members (the chairman) indicated that farmers bring their own cassava and that women are largely involved in peeling, chopping and drying of cassava whilst men permanently employed at the processing plant are involved in pressing and grinding. According to a FGD held in Kanyenzi village in Kigoma, farmers indicated that traditional processing of cassava roots occurs in individual households:

Cassava tubers are sundried for a day; grass is used to cover the tubers for about two days and then fermented. Tubers are then scraped and washed of black fungal substance then they are ground to get flour that will be used for preparing porridge and ugali with a sour taste....³¹

Major cassava processing challenges reported from FGDs and key informant interviews were a lack of funding for purchasing processing equipment (machines), drying equipment, fuel for grating machines and powering of sealing machines. Another challenge facing women was acquiring accreditation from the Tanzanian Bureau of Standards, which requires processed agricultural products to be tested and certified for them to be marketed in outlets such as supermarkets or for export purposes.

³¹Focus group discussion, Kakonko district, Kigoma, 24 January 2016

7.7 Chapter summary

This chapter gave an in depth investigation of factors determining the engagement and level of women and men participation in cassava production, marketing and processing. Several socio-economic factors such as ownership of assets and personal attributes of farmers such as education level, gender, age and marital status were considered as important determinants of participation of both women and men in the cassava value chains in Tanzania. Probit model estimates (see Tables 7.3 and 7.5) and Ordinary Least Squares estimates (see Tables 7.4 and 7.6) were generated and important factors such as land, religion, region, distance to the market, quantity of cassava produced, ownership of household assets and other social attributes such as marital status emerged as significant explanatory factors for both women and men. The results also show that the cassava marketing value chain node was highly gendered with men dominating marketing cassava and cassava products across all study sites. Women and children were predominantly involved in the processing of cassava especially in the remote places such as Kigoma where traditional processing methods were common since unavailability of processing equipment characterised most of these places. The qualitative results were useful in complementing the quantitative results and were primarily useful in the explanation of women and men in the cassava processing node. In essence, this chapter accomplished the targeted objectives by determining the significant factors that affect women and men's participation in cassava value chains. These factors provide avenues for intervention to reduce gender inequalities within households and enable women to benefit especially when they participate in high value nodes such as marketing. This chapter contributes also significantly to the succeeding chapter with literature that is conducive to the development of a micro based conceptual framework for marginalised women within traditional food value chains. The determining factors identified in this chapter functioned as building blocks in the framework in Chapter 8.

Chapter 8

Situating neglected cassava value chains and marginalised women in a household gender-based conceptual framework

A conceptual framework categorizes and describes concepts relevant to the study and map relationships among them by incorporating both relevant theory and empirical research that help to organize [it] to see where the overlaps, contradictions, refinements, or qualifications are.

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³² This Chapter was presented at the International Conference on Breaking the Nexus Between Gender and Poverty at the Elephant Hills Hotel, Vitoria Falls, Zimbabwe, 15-16 May 2017.

8.1 Introduction

This chapter attempts to develop a conceptual framework that can be used to conduct a gendered analysis of neglected traditional food value chains such as cassava at micro level. This framework takes into account socio-economic and political context, cultural and religious elements as well as the climate and environment context into one frame and tries to explain how households responds to various shocks and interactions of these elements in the cassava value chain. The perceived framework is linked to the Harvard Analytical Framework underpinning this study through the identification of women's productive and reproductive roles, ownership and control of resources as well as the factors affecting participation of both women and men.

Survey based empirical evidence from structured interviews, focus group discussions, key informant interviews and repeated household visits in Tanzania is used to serve as building blocks of the conceptual framework. This Chapter is organised as follows: It starts with the partial literature review on existing gender based frameworks which involved the critical review of the gender dimensions framework, integrating gender into agricultural values chains analytical framework, Harvard analytical framework, Moser gender planning framework, gender analysis matrix, Women empowerment framework and the social relations framework. This is followed by the presentation of the Colfer's and Minarchek's (2013) conceptual framework upon which the conceptual framework to be developed is based. The next section provides empirical evidence for the sub-questions of the guiding Colfer and Minarchek (2013) conceptual framework. This is then followed by the description of the elements within the developed framework as well as the schematic presentation of the framework itself. Finally a Chapter summary is documented to provide the details of the chapter in a nutshell.

8.2 Existing gender analysis conceptual frameworks

A number of scholarly frameworks have been propounded to try and integrate and analyse gender component in agriculture commodity value chain studies. These include among others the Gender Dimensions Framework (GDF) which contemplates four dimensions: (i) access to and

control over key productive resources (tangible and intangible) (ii) beliefs and perceptions (iii) Practices and perceptions and (iv) the legal frameworks.

8.2.1 Integrating gender into agricultural value chains

The second framework by Rubin *et al* (2009) is the Integrating Gender into Agricultural Value Chains (INGIA-VC) analytical framework. This framework has five major dimensions namely: (i) mapping men's and women's participation and beliefs along the chain (ii) identifying factors that shape gender patterns in value chain operations (iii) identification of gender based constraints (iv) assessment of gender based constraints and (v) measuring of success of gender development project. The INGIA-VC framework concentrates on the value chain level, although it is involved in the mapping of women's and men's participation as well as the identification of gender based constraints outlined in the INGIA-VC dimensions.

8.2.2 Harvard analytical framework

The Harvard Analytical Framework is also one of the earliest frameworks to systematically consider both women and men and their different positions in the societal set up. The framework is premised on the principle that allocating resources to women as well as men in development efforts makes economic sense and will make development itself more efficient. One of the fundamental keys to Harvard Analytical framework is the adequate data collection at the individual and household levels that is collected in three components that's is activity profile, access control of resources and benefits and the determining factors (Rubin *et al.* 2009). This study is premised upon the Harvard Analytical Framework as the guiding conceptual framework, since it looks at household power dynamics in the context of cassava value chain at the micro level. In this study, data were therefore gathered at individual and household levels focusing on resources access and ownership, engagement and participation in cassava production, gender roles and cassava activity profiles.

8.2.3 Moser Gender Planning Framework

Another framework is the Moser Gender Planning Framework which was developed by Caroline Moser to link women's roles to the broader development planning process. In trying to make

these links both between women and the community and between gender planning and development planning more broadly, the framework encompasses both technical and political aspects of gender integration into development. The approach introduces the idea of women's "three roles" in production, reproduction and community management and the implication these have on women's participation in the development process. The Moser framework is composed of several components namely: (i) The identification of triple roles of women through mapping the activities of household members over 24 hours period. Reproductive roles involve child bearing and upbringing, domestic tasks that guarantee the maintenance and reproduction of future work force. Productive roles involve work done for remuneration in cash or kind that is wage labour, farming and crafts.

Community management roles are works that support collective consumption and maintenance of community resources for example local government, irrigation systems management and education. The second component of the Moser's framework assesses gender needs distinguishing them between practical needs and strategic needs (for power and control to achieve gender equality). Another component of the Moser Gender Planning Framework disaggregates information about access and control over resources within the household by gender on who makes decisions about use of different assets. The last component is about identification of how women manage their various roles and seeks to clarify how planned interventions will affect each one.

8.2.4 The Gender Analysis Matrix (GAM)

The Gender Analysis Matrix was developed by Rani Parker for purposes of identifying how a particular development intervention will affect women and men by making use of a community based technique to investigate and analyse gender differences and to challenge community's assumptions about gender. Therefore, the matrix was explicitly developed for use by the community for self-identification of problems and solutions. This matrix is not applicable directly in my study since my study is focusing at micro level that is the household and individual levels in the cassava value chain. The Gender Analysis Matrix is grounded on various principles that include: (i) It stipulates that all requisite knowledge for gender analysis exists among the people whose lives is the subject of the analysis.

This principle to some extent also applies to my study where data collection primarily relies on individual and household activities and profiles. (ii) It also postulates that gender analysis does not require the technical expertise of those outside the community being analysed, except as facilitators (iii) lastly the Gender Analysis Matrix stipulates that gender analysis cannot be transformative unless if the analysis is done by the people being analysed. Under this matrix the project objective is analysed at four levels of society that is women; men; household and community. The analysis is carried out in terms of how it impacts on women's and men's labour practices, time, resources and other socio-cultural factors, such as changes in social roles and status. Similarly, part of this study also looks into the analysis of implications of time budgets, household assets ownership and control on women in particular as well as on men. This was accomplished in Chapter 6.

8.2.5 Women's Empowerment Framework

The Women's Empowerment Framework was developed by Sara Hlupekile Longwe. The model is explicitly political arguing that women's poverty is as a result of oppression and exploitation rather than lack of productivity, therefore to reduce poverty, women have to be empowered. The framework postulates five progressively greater levels of equality that can be achieved: (i) The first level is equal control in decision making over productive resources. (ii) The second level is equal participation in decision making processes related to policymaking, planning and administration. (iii) The third level deals with attaining equal understanding of gender roles and gender division of labour that is fair and agreeable. (iv) The fourth level is about equal access to the factors of production by removing discriminatory provisions in the laws. (v) The final level is about welfare involving equal access to material welfare that is food, income and health care. Contrary to my study, this framework looks at macro level and considers well to do levels of women unlike my study which focuses on rural marginalised women investigating how household gender dynamics influence their empowerment and participation...

8.2.6 The Social Relations Framework

The Social Relations Framework is broad and locates the family and household within the network of social relations' connecting them to the community, market and state. It shows how gender and other inequalities are created and reproduced within structural and institutional factors and then design policies that can enable women to work to change those factors that constrain them. Social relations framework determines people's roles, rights, responsibilities and claim over others. The state, community and family institutions maintain gender inequalities. While all these frameworks are useful in various contexts, most of them, except the Harvard Analytical Framework, do not look at how household gender roles and relations' affect and are in turn transformed by the functioning of cassava value chains.

These frameworks, however, do not consider how the commodity value chain affects the gender roles and social behaviour of household members and also how the value chain is influenced by smallholder farmers in turn. The GDF framework looks to be more applicable at the macro level contrary to the focus of this our framework which is mostly centred on the household level while INGIA-VC does not consider the interaction and linkages of various contextual factors such as policy, climate, environment, culture, religion and socio-economic attributes on how they affect the household members in the cassava value chain. The frameworks do not also consider how household gender roles and relations are transformed by functioning of cassava value chains. The Moser Gender Planning Framework focused much on women's roles and impact at macro level.

8.3 Developing the Household Gender Based Conceptual Framework

Figure 8.1 depicts a conceptual framework that has been developed to be used for the design and analysis of gender implications in the cassava food value chain at micro level. Table 8.1 gives an outline of the framework upon which my framework is grounded. Questions or issues pertaining to human behaviours within households that can affect cassava value chain and people's well being, women in particular, are outlined. Colfer and Minarcheck (2013) used this framework analysing gender roles in forest management. They further argue that this framework although it emerged from an examination of people living in forested areas, can be applied to other related contexts such as cassava food value chains as applied in this context. Similarly it is used in this

Chapter to capture the gender dynamics that happens within a household in the cassava value chain.

Table 8.1: Guiding Framework for analysing gender implications in cassava food value chains

A. How do men's and women's day to day economic roles differ in the context of cassava value chain at the household level? land clearing, planting, harvesting, processing, marketing

B. What gendered demographic issues affect cropping of cassava and people locally (e.g., migration, population changes.)?

C. What essential/valued domestic roles do men and women play, respectively (e.g., cooking, hygiene, child and elder care, health) that affect their respective involvement in cassava value chain?

D. What patterns are identifiable in intra-household power dynamics? In what ways do men's and women's interests conflict and converge? What are the bargaining strategies used by women and men in the household with particular reference to the cassava value chain?

E. What are the features (e.g., collective action, access to technology, distribution of benefits, time constraints/conflicts) of locally available, alternative economic strategies designed to enhance people's livelihoods and cassava value chain? How do these differentially affect men and women within the household?

(Source: Colfer & Minarchek 2013).

8.4 Empirical Description of the guiding framework questions

8.4.1 Women and men's day-to-day economic roles in the cassava value chain

The roles of women and men in the cassava value chains differ significantly as summarized in Table 8.2. These roles were thoroughly explained in Chapter 5 at each cassava value chain node. In addition, it was noted that women were also both into productive and reproductive gender roles in the cassava value chains. Women roles appeared to be labour intensive (Table 8.2) which had a significant effect on time budgets and remuneration. Women's activities were poorly remunerated unlike men who occupied rewarding nodes such as transportation and marketing. The differences in the gender roles affected participation of women negatively, since their benefits are not properly realized.

Table 8.2: Summary of different gender roles at various cassava value chain nodes in Tanzania

Value Chain Node	Women	Men
Production	<ul style="list-style-type: none">• Planting• Weeding• Harvesting	<ul style="list-style-type: none">• Land clearing• Input procurement• Ploughing
Processing	<ul style="list-style-type: none">• Peeling• Chopping• Grating• Drying	<ul style="list-style-type: none">• Pressing• Packaging
Marketing	<ul style="list-style-type: none">• Local wet markets• Sale from fields	<ul style="list-style-type: none">• Large-scale middlemen• Cross boarder trading• urban markets

8.4.2 Gendered Demographic Issues in Cassava Value Chains

Of particular importance regarding the changes in household demographics, is the age of people within the household that provide labour at each value chain node. In areas such as Mkuranga, the majority of the men migrate to nearby main city, Dar es Salaam for off farm employment. This is the similar situation in Zanzibar and was summarised by a 67-year-old woman from Mkuranga:

We experience labour shortage especially for cassava related activities that need intensive manual labour. Most of our grown up young men and fathers migrate to the city (Dar es Salaam) to look for employment...³³

This situation exposes women to intensive labour provision in agriculture irrespective of their age and other household responsibilities. This negatively affects the production of cassava, since little time is available due to the competing claims of other crops such as banana and rice. Limited labour available at household level results in smaller plots of cassava being cultivated, thus reduced cassava yield resulting in limited or no surplus cassava for marketing. The households therefore, become food insecure and little income is generated. Similarly, in Zanzibar women were dominant in the participation of cassava value chain nodes, with notable dominance in marketing unlike men who were mostly into off farm employment.

8.4.3 Essential domestic roles of women and men in the cassava value chain

The accomplishment of essential domestic roles is vital for societies. The roles include mostly family care, child care and training, cooking, cleaning and taking care of the elderly. The domestic role of women in the cassava value chains entails productive and reproductive roles. Women from all the case study sites reported have heavy work burden especially with regards to domestic roles and reproductive roles. Empirical evidence from focus group discussions in Mkuranga gave the following narration of how women perform their domestic roles within their households:

³³Interview with Mamina, Mkuranga, 9 March 2016.

Men and women in the discussion group unanimously agreed that women were heavily burdened with domestic duties of cooking, enculturation of children, looking after dependents that include the elderly as well as the sick, and also bearing of children and performing conjugal rights to the pleasure of their husbands....³⁴

The domestic roles of women of mainly cooking involved preparation of daily household meals for the husband, children and dependents. It is the immediate responsibility of women to plan for daily meals consequently the availability of cassava as one of the top staple food crops after maize in Tanzania affected intra-household roles and power dynamics. Women's cooking roles link them to the cassava value chain by means of the need for cassava tubers for calorific value in the diet. According to Oey-Gardiner (2002) cooking is central to women's roles and Haddad and Hoddinot (1995) also argue that women are central to the provision of household meals. Therefore, women would advocate for allocation of more productive resources for cassava production, since the crop is central to household food nutrition. Information from the FGDs in Zanzibar also reported that cooking was done both by young girls and mature old women. This is similarly reported by Jassal (2017) in northern India where young girls and women were relegated to household chores of cooking and taking care of the children and the aged.

Women's knowledge is also critical during child care and training. The proper enculturation of children in relation to the cassava value chains depends on the knowledge the woman possess. The knowledge of women have noted the importance of the training of children to source and prepare cassava cuttings, cultivate, weed, harvest and process cassava into various forms. This was notably raised from a FGD in Kigoma were of the sample were women. The following argument emerged from the discussion regarding women's' knowledge on cassava:

³⁴Focus group discussion, Mkuranga, 10 March 2016.

Children are taught by their mothers from a tender age on how to prepare cassava cuttings for planting, cultivating cassava, weeding, harvesting and more importantly how to process the cassava using our traditional methods. Mothers train especially the young girls how to process cassava using the traditional methods of fermenting which is more popular and preferred method among the elderly...³⁵

This role by women is linked to cassava in that children are able to acquire skills they will use to contribute to production of cassava as they grow. In addition the processing methods taught provide alternatives for livelihoods for children so that they can add value to their cassava and sell at weekly markets and nearby road sides for income generation. The ability of elderly women to train children in preparing cassava cuttings has been similarly reported by Sajise (2014) in Andhra Pradesh India where older women's knowledge was central in the saving of seed as well as the selection of planting material. In this cassava value chain context women are viewed as natural guardians' and gatekeepers of valuable traditional cassava processing methods for the society. These domestic roles carried out by women include child care, food gathering and preparation as well as healthcare.

8.4.4 Identifiable intra-household power dynamics in the cassava value chains

Intra-household power dynamics play an important role in the determination of the degree to which women have options to become involved in the cassava value chain and the responsibilities that they must accomplish. The intra-household dynamics are also critical in women's involvement in decisions about the division of benefits from the labour that they may have provided. In this context, I focused my attention on three major issues viz: the different interests' women and men may have; women's vulnerability to force as well as intra-household bargaining between women and men. Women's vulnerability to force especially by men within households results in inequitable gendered interests.

³⁵Focus group discussion, Itumbiko village, 21 January 2016.

This has manifested itself through gender-based violence and much emphasis has been placed on ensuring that women have rights over productive resources such as land through enactment of Acts such as the The Land and Village Land Act of 1999 explained in Section 4.4 in Tanzania. As alluded to in Chapter 6 and Chapter 7, women have limited access and control over productive resources, land in particular. Goebel (2003:122) reported the use of herbs to ‘control harsh husband behaviour’ in about 80 percent of Zimbabwean resettlement community. When women have land rights, cassava yields are expected to be high and also vulnerability is reduced.

Intra-household bargaining power that is moderated and exacerbated by cultural norms tilts the playing field in favour of men within the cassava food value chains. However, when women grow older, they become more empowered to make decisions within their households. Women’s decision making within households also increase among widows and *defacto* women-headed households. An excerpt from a FGD discussion regarding household decision making in households:

..Generally men are the major decision makers when it comes to issues of productive resources. However as women grow older they become decision makers as well. In cases of women being widows, divorcees and *de facto* household heads, they are the immediate and sole decision makers in those households...³⁶

In the three study sites women-headed households were only 20 percent and in their households they reported that they were the sole decision makers. This is similarly reported by Nemarundwe (2005) where elderly and single women in Chivi, Zimbabwe had the most likelihood to express their views publicly and make their own decisions. This is crucial in the cassava value chains regarding the allocation of plots, time and the limited inputs to cassava production which have been traditionally regarded as a ‘female crop’.

Empowered women also have access to benefits derived from the cassava value chains especially in terms of income sharing. Evidence from the Kigoma, Zanzibar and Mkuranga showed that

³⁶Focus Group Discussion, Zanzibar, 13 February 2016

control of income use among men and women was jointly done. Chapter 6 showed that women were empowered (0%) in the indicator of control of income use (see Table 6.6) based on the 5DE empowerment index. Women are likely to have more bargaining power in circumstances where external involvements enhance their skills and confidence. This was particularly evident in Zanzibar where women dominated the cassava marketing node probably, because they had more external influence from the available cooperative savings groups and SACCOS.

The existence and participation in these community groups were reported only for women (44%) in Zanzibar. In addition, the existence of a relatively high percentage of women who used credit (Table 5.6) during farming is a clear indication of women who had better bargaining power within households in Zanzibar. However, an increase in women's income in Zanzibar did not necessary translate into increases in household bargaining and decision making power within households. This was mainly attributable to the dominant Muslim religion where women are highly submissive to their husbands External influence imparted on women was also through agriculture extension support which was 66 percent , 32 percent and 33 percent for Zanzibar, Kigoma and Mkranga respectively. This extension support affects the cassava value chain through increased yields, enhanced marketing and skills development for women farmers. With this information they are able to bargain for better cassava prices on the market.

8.5 Components of the conceptual framework

The landscape within which the framework operates is influenced by a wide range of contextual factors viz: policy framework and government legislation, climate and environment, political and socio-economic context as well as culture and gender equity. Even if individuals are living in the same household, men and women typically experience these contextual factors differently based on their roles and responsibilities and other political, social, economic and cultural factors as discussed in Section 8.4. It is imperative to investigate the gender influences, since cultural norms and values can define the roles of men and women differently and this has diverse effects on the functioning of the cassava value chains especially in developing countries. The legal and policy framework can affect the different gender groups differently as well especially with regards to resource ownership, processing and marketing of cassava.

This is particularly so with regards to resources such as land. The policy and government element shows the institutional set up and regulations that are put in place to govern agriculture activities inclusive of land laws, marketing and processing requirements. This is because the governance of land is a contested issue. In the context of cassava smallholder farming, such regulations include the taxes that are imposed on farmers when they try to market their cassava produce across borders such as Burundi, Rwanda and Uganda. After processing of cassava, farmers are expected to meet the ³⁷Tanzanian Bureau of Standards (TBS) and are required to pay exorbitant fees so that they can be accredited to sell in formal markets such as supermarkets. Such punitive measures have negatively impacted on livelihood of farmers through reduced market access and income generation. Decentralised government structures, agricultural extensions support, active and gender inclusive farmer associations will allow smallholder farmers, women in particular, to have a voice in decision making in the cassava value chain (Birner *et al.* 2009).

The climatic and environmental conditions affect households in various forms. The changing climatic conditions bring in some shocks such as drought resulting in acute food shortages. The effect of these shocks on households may vary according to gender and power dynamics within households. Household resource ownership influence how men and women respond to shocks like drought. Assets owned by men are usually disposed of in circumstances such as dowry while women dispose assets in times of illnesses, food shortages hence ownership of resources is key to households in the cassava value chain. Such phenomena affect women and men differently since women are involved mainly in preparation of meals hence they are largely affected. This is supported by Haggblade *et al* (2008) who ascertain that women domestic roles are mostly confined to cooking, child care and other household chores as already alluded to in section 8.4.

³⁷ Tanzania Bureau of Standards is a national requirement for every consumable product to be tested and be approved by this institution. Farmers are therefore required to pay exorbitant fees of about TZS200,000 (USD100).

Culture and gender equity shapes the domestic roles, and power dynamics within households from which decisions about production, processing and marketing are made. This component also explains how productive resources are owned within households based on cultural values and gender differences. The traditional customs and norms invariably determine the ownership of resources, domestic roles, economic roles and power dynamics in households thereby influencing the cassava value chain. Therefore, it is imperative to take a deeper investigation to fully understand the differences brought about by cultural norms as supported by Meinzen-Dick (2011) and Akem (2016). The political and socio-economic environment affects operations of the cassava value chain at household and community levels. It shapes the distribution of resources at community level such as land ownership. Women need to be actively involved in political activities at all levels to influence distribution of resources as well as ownership of the resources. The cassava value chain is also affected by asset endowment by smallholder farmers that include inputs, tillage equipment, processing equipment and the mode of transport.

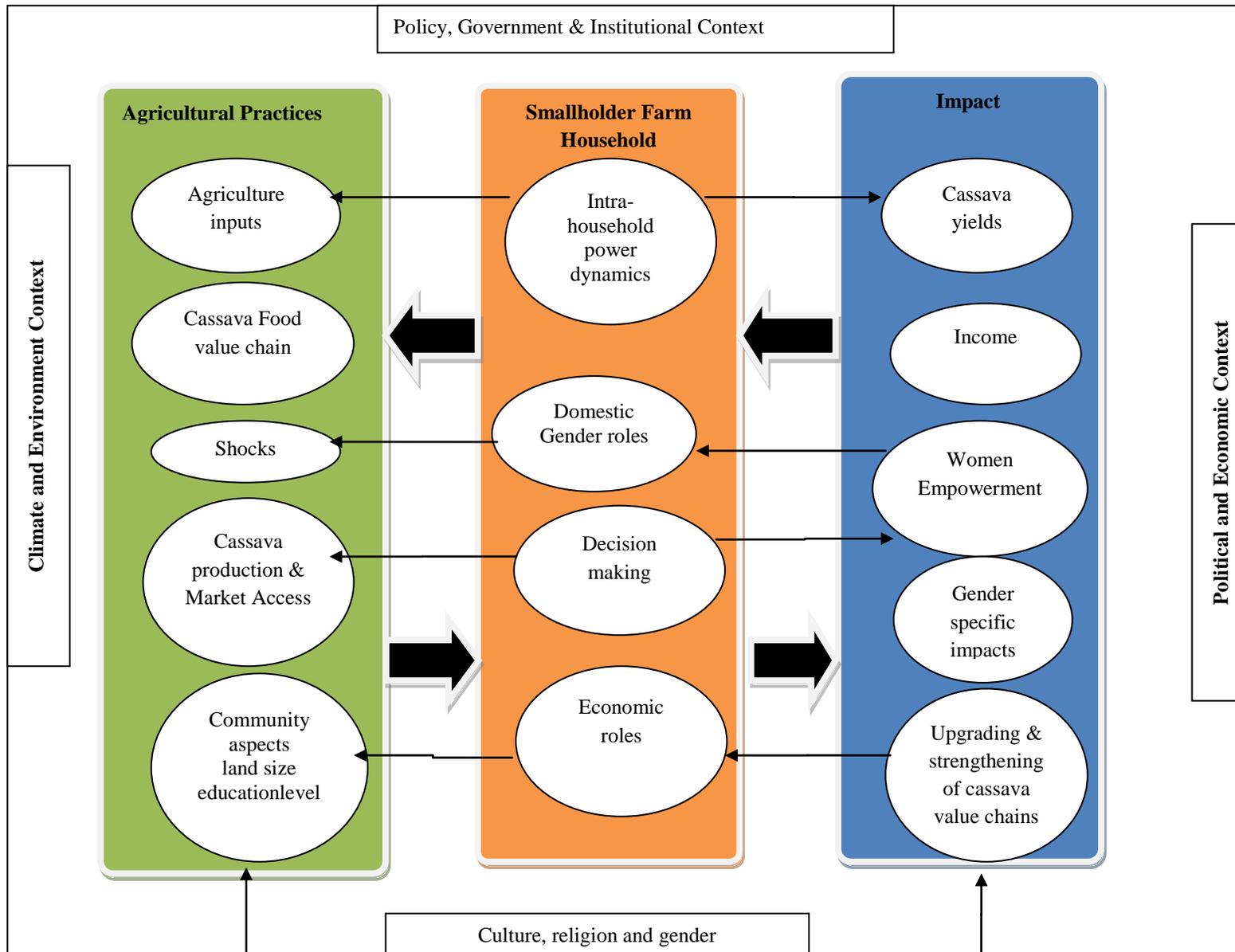


Fig8.1: Schematic presentation of the household gender based cassava value chain framework

Source: Author 2016

The first element of the conceptual framework is the context, which may include a broad range of ecological, social, economic, and political factors. Agricultural practices component in the framework comprise of community aspects such as land size, level of education and also the available household and community infrastructure. The size of land determines the land allocated for cassava production and usually this is marginal land. Allocation of land is influenced by the power dynamics within households and decision making process as well. This is supported by Currie and Vernoooy (2010) who argue that women continue to deal with obstacles of limited access to and control over land, labour, financial support and other services such as extension, training and education. In most developing countries land titles and tenure rights continue to be controlled by men through formal or customary laws.

Shocks such as drought affect different households in various ways. When a household is faced with harsh climatic conditions, women and men are affected differently in that their coping strategies are influenced by cultural values and rules and regulations imposed by men in a typical African set-up. Men would consider other options such as off-farm employment which may not be the case with women who have very limited mobility as highlighted by Rahman (2008) in Northern part of Hausa Moslem-dominated zone of Nigeria where Islamic principles keep women in *purdah* (seclusion) contributing to women's limited mobility and participation in marketing of cassava or looking for other alternative livelihood options. In similar circumstances, while the biophysical (climatic and environment) context applies to the entire household, its impacts, depending on other contextual factors and resources, may be different for men or women. For instance, low rainfall may be less of a constraint to men if their fields have irrigation and women's do not (or conversely), or if women have primary responsibility for collecting water for the household and must devote more time to this activity (Colfer & Minarchek 2013).

Some of the shocks include drastic market price reductions that result in poor prices of the product (tubers in particular). This will be more detrimental to women who cannot travel to long distant markets unlike men who would travel to more lucrative markets such as urban and nearby foreign markets. Findings by Meinzen-Dick *et al* (2011) in Malawi and Uganda also reported

that women were more likely to participate in local markets for legumes and livestock products such as milk. In Bangladesh's dairy value chain, women were also restricted from going to markets (CARE-Bangladesh 2010). Women's domestic roles are confined to the immediate family needs such as productive (cooking, taking care of the sick and elderly) and reproductive roles. Their economic role is also confined within a family and immediate community engagement projects with very limited time.

The impact of improved agricultural practices and the smallholder household activities manifest in increased yields within households. When inputs, land and climatic environment are conducive, the yield of cassava increases. This was observed in Kigoma where fertile red soil was predominant and found to be an important media in which several crops including cassava were being cultivated. This also results in increased income from cassava product sales which in turn have a positive feedback influence on production since more inputs can be purchased using the disposable income. Intra-household power dynamics play a critical role in determining the degree to which women have options to become involved in cassava value chain, the responsibilities men and women undertake, and their involvement in decisions about the division of benefits from labour they may have provided (Colfer & Minarchek 2013). Hence, the key issues to be addressed in this framework are the different interests of men and women, women's vulnerability to enforcement by male counterparts, and the intra-household bargaining power. If women have good bargaining power with limited enforcement, it implies that they are empowered and there is increased yield, income as well as the strengthening of the cassava value chain. The value chain is also strengthened, since women occupy most of the critical value chain nodes that is production and processing.

Empowerment of women and men will have positive feedback influence on decision making, production and market access. Empowerment will enable the disadvantaged women to also own productive resources such as land participate in policy and governance issues and influence the political and socio-cultural landscape to their advantage in the context of cassava value chain. Improving women's share of cash income through strengthening their participation high value node such marketing in the cassava chain increases the share of household budget allocated to

household consumption and other important social amenities (Duflo & Udry 2004; Hoddinott & Haddad 1995).

Religion is another element emanating from the context of culture, and gender. It has great influence on the domestic roles, economic roles, and household power dynamics. Power dynamics within households are also shaped by religious beliefs which in turn affect women and men's role differently eventually having far-reaching implications on bargaining power, benefit sharing and performance of the cassava value chain.

8.6 Chapter summary

This Chapter developed a conceptual framework for gendered value-chain analysis that seeks to combine a detailed and nuanced understanding of household social relations, changing gender roles, resource ownership as well as benefit sharing linked with broader political, economic and climatic contexts within which they are situated. The Colfer and Minarcheck (2013) conceptual framework on gender and forest resources management was used as the guiding framework for the household gender-based conceptual framework. Empirical findings were used to explain the issues of economic and domestic roles of women and men within the cassava value chain. Questions on gendered demographic issues within households and also the intra-household power dynamics were also dealt with extensively.

Finally the components of the developed conceptual framework were explained in terms of how women and women are affected and also how each element affects the cassava value chain. One of the key contributions of this chapter is the conceptual framework that is based at household level which considers feedback effects of gender roles within the cassava value chains. This framework will also be applicable to other staple food crops that have been previously marginalised and can be useful to policymakers, development agencies and academics.

Chapter 9

Discussions, conclusions and policy implications

.Now a whole is that which has a beginning, middle and end

(Aristotle)

9.1 Introduction

This Chapter gives a detailed presentation of the summary of findings, brief discussion, conclusions and implications for policymaking as deduced from the empirical findings. The thesis examines gender inequalities focusing mainly on intra-household gender dynamics in the different cassava value chain nodes in Tanzania. This thesis used information from desk review, key informant interviews, structured household survey and ethnographic based repeated household visits to collect data in Kigoma, Zanzibar, Geita and Mkuranga regions of Tanzania. Unlike other gender agriculture value chain studies, this study was unique in that it used both quantitative and qualitative methods with an extended engagement with cassava smallholder farming communities. This approach managed to generate rich in-depth data regarding intra-household gender inequalities within cassava value chains. This chapter aims at teasing out major themes that emerged from the study in an effort to address the research questions posed in section 1.4 of Chapter 1. These themes will be used to conclude the thesis and out of the conclusions, implications for policy will be extensively identified and discussed. The study managed to map the cassava value chains through identifying the value chain nodes, gender roles and main actors in Zanzibar, Mkuranga, Kigoma and Geita. The study also investigated the empowerment of women and men using the 5DE sub index of the women empowerment in agriculture index (WEAI). Empowerment was examined focusing on the domains and indicators of the index. In addition the factors determining the participation of women and men in the cassava value chains in the smallholder farming sectors in Tanzania were extensively examined resulting in the identification of possible cassava value chain upgrading avenues. Finally a household-based conceptual framework for gendered analysis of smallholder farmers involved in the cassava value chains was developed and is presented in this chapter. It is in this chapter that emerging issues of land ownership, cassava input access, post-harvest losses, and marketing difficulties by women are first of all discussed. The limited ownership of productive resources by women, time budget constraints, and inability to express their views in public contributed much to their disempowerment. A household level based conceptual framework for gendered analysis of cassava value chains in smallholder farming sector was developed. The study findings refute the assumption of household unitary preferences along gender axis. The policy implications of the findings from this study are also presented in this study as well as the scope for further study. Policy implications on productive resources ownership and control, infrastructure development

and legal framework will be presented. Finally, possible future study areas are presented. This chapter is therefore, organised as follows: It starts with the discussion of the findings from the study, followed by the conclusive remarks from the whole study. After this, the recommendations for implementation are outlined with implications for policy following and finally the suggestions for further research are documented.

9.2 Discussion

9.2.1 Cassava value chain mapping and implications of intra-household gender dynamics

Firstly, the gender-focused mapping of the cassava value chain, which has its inception point in the villages, has shown that intra-household gender power dynamics influence the structure and functioning of the value chain. This theme was underpinned by the Harvard analytical conceptual framework of identification of gender roles of women and men within the cassava value chains. The results showed that the major actors within this cassava value chains are input suppliers, smallholder farmers, large scale middlemen, traders, small-scale processors, and retailers. The study revealed that women participated more in the cassava production and processing value chain nodes, with high value nodes such as packaging, marketing, and transportation being dominated by men as alluded to in Chapter 5. The results showed that women had the least size of area planted with cassava in all the three sites (See Table 5.1). This is an indication that women had little control of land for farming purposes, particularly for those crops considered to be ‘female crops’ as in the case of cassava. The supply of inputs was predominantly localised with men dominating as agro dealers in the community. A local informal seed system was the main practice in all the three study sites although it was limited in Zanzibar where the smallholder farmers received cassava cuttings of improved varieties from Kizimbani Research Institute and other organisations such as IITA. This result means that local varieties were mostly commonly grown in Kigoma and Mkuranga, while Zanzibar farmers used both improved and local varieties.

At the harvesting cassava value chain node, men were mostly involved both as household members and as hired labour and women from the respective households also being significantly involved in harvesting of cassava (See Table 5.2). Women reported to be experiencing much of

the post-harvest losses compared to men, largely owing to the fact that women are mostly involved in crop storage management after harvesting and also in food preparation; hence they are concerned about the quality of the producer after harvesting. About 81 percent of the farmers experienced post-harvest losses and they lose up to 30 percent of their produce. The major forms of post-harvest losses reported by women were deterioration of tubers whilst in the field, deterioration of cassava during drying, and deterioration of cassava root tubers due to bruising whilst harvesting (See Table 5.3)

The processing of cassava was reported to be predominantly traditional with women and children dominating the processing roles of peeling, chopping, grating, and drying while men tend to dominate the grinding and packaging roles in this cassava value chain node (See Table 5.4). Processing was also reported to be done at a larger scale at small-scale cooperative processing plants which is somewhat mechanised unlike the processing at household level where it is not mechanised. The processing of cassava at the small-scale cooperatives is also hampered by unavailability of drying, grating and grinding equipment.

Transportation and marketing of cassava products are dominated by men mainly, because of the patriarchal societal culture observed in Kigoma, Zanzibar and Mkuranga which have restrictions for women to travel long distances alone. The common modes of transport used for transporting cassava root tubers and cassava products were bicycles, car and motorcycles in that order (See Figure 5.4). The head load method of transportation was common for both women and men in cases where the produce was being taken for marketing at local weekly markets. The most common potential customers for cassava tubers in all the three sites were middlemen who were predominantly men particularly in Kigoma where farmers would even sell their cassava root tubers whilst still in the field. This was because of poor access to lucrative markets largely because of transport and affordability problems. Another marketing channel was that of other local farmers and other large scale buyers. Women were also mostly engaged in marketing cassava and cassava products at local and roadside markets than men, who had access to high income urban markets. This was predominantly observed in Mkuranga and Zanzibar, since these sites were close to urban areas where motorists and other customers would frequently pass by unlike in the remote study site of Kakonko in Kigoma region where there were no all-weather

roads and women farmers relied mostly on local weekly markets for trading. These findings suggest that there is need to strengthen women's participation in high value nodes of the cassava value chain. The study's findings also show that there is a need to provide farmers with cassava processing equipment to reduce post-harvest losses.

The results also depict that the smallholder farmers had limited access to services such as banking, credit, community group membership and agricultural extension support (See Table 5.8). Overall about 91.5 percent of the smallholder cassava farmers across all the three study sites had no bank accounts. In Kigoma and Mkuranga, none of the 53 sampled women reported having a bank account whilst in Zanzibar 10 percent of the 64 women reported having bank accounts. The situation was slightly better for the men where 29 percent, 10 percent and 3 percent in Zanzibar, Kigoma and Mkuranga respectively were reported to have bank accounts. The use of credit for cassava farming was very poor for both men and women particularly in Kigoma and Mkuranga sites. In Zanzibar, both women and men recorded 29 percent use of credit in cassava farming whilst the 14 percent credit use recorded for women in Mkuranga could be attributed to the lending among relatives and friends, since they did not have bank accounts. Community cooperative membership was relatively poor especially in Kigoma and Mkuranga while in Zanzibar it was 44 percent and 35 percent for women and men respectively. However, most of the cooperative membership groups for women in Zanzibar were largely informal being used as local revolving funds for immediate household use. Generally farmers reported adequate agriculture extension support particularly for women owing to their usual availability at homesteads in the times when extension personnel make visits to farming households. In a nutshell, the study revealed that farmers need to be provided with improved cassava varieties and other and women need to have more involved in agro dealing involving cassava inputs.

9.2.2 Women empowerment in cassava value chains

Women's empowerment within agriculture can be a major driver of agricultural development and household food security in rural households, contributing to the development of sustainable food systems. This study investigated women's empowerment within the cassava value chain among smallholder farmers in Tanzania using the 5DE sub-index of the WEAI. The empirical findings were used to describe the indicators and domains of the 5DE sub-index of WEAI. With

regards to the 5DE domains of ownership and control of, men were reported to be solely in control of land use (See Fig 6.1), as well as being decision makers as far as productive decisions are concerned. Women had very limited decision making and autonomy in control of land use with a notable number of women being able to make decisions and control land use in Zanzibar. In terms of the ability of ownership of assets, purchase and sale of resources, house, bicycle, motorcycle and mobile were considered. The results showed that over 90 percent of the houses were self-owned and self-constructed across all study sites with a few (less than 5%) households in Zanzibar and Mkuranga being rented and shared. This indicates that in terms of household ownership, both women and men were empowered. Bicycle and mobile phone ownership was very high (See Table 6.2) for both women and men, however with regards to motorcycle ownership, it was very low particularly for women as well as men. This was mainly, because a motorcycle was expensive to purchase although it is more useful during transportation of cassava for marketing. The control of cassava income use within households in all the three sites was predominantly jointly (husband and wife) done (See Table 6.3) with the highest percentage being recorded in Kigoma. This means that both the wife and the husband would consult with each other and agree on how to use their income. In terms of the 5DE domain of leadership, both men and women poor membership in community groups particularly in Kigoma and Mkuranga with the exception of Zanzibar where women were more active better than men. The 5DE domain of time, as alluded to in section 6.3.6, revealed that women had more workload (productive and reproductive) resulting in them working very long hours per day with limited time for leisure. Almost 90 percent of the women across all study sites reported being highly disempowered with regards to the domain of time. This is largely attributed to the idea that men control resources and allocate household time budgets hence resulting in women being overburdened with household chores.

Overall, the computation of 5DE disempowerment index results show that women in the cassava value chain felt highly disempowered (0.95) compared to men who reported that they were highly empowered with a 5DE disempowerment index of in(0.14). Areas of disempowerment for women included inputs in productive decisions (See Table 6.1), limited membership of groups with social functions, very limited access to credit and associated decision-making power, limited autonomy in production, and a heavy workload with very limited leisure time as

highlighted in the earlier domains and indicators explained. These empowerment gaps need to be addressed in an effort to close the gender gap within cassava value chains. However, the results also showed that women were empowered in relation to the indicator of control of income use and assets owned, because of joint decision making and ownership (See Table 6.3). The joined control and decisions on use of income from cassava sales was 79 percent, 68 percent and 62.5 percent for Kigoma, Zanzibar and Mkuranga respectively. Women also had very high time burdens and limited use of credit facilities (See Figure 6.3) during farming season. Women empowerment was significantly ($p = 0.003$) related to the level of education where about 25 percent of the women who reached secondary education were empowered. It therefore, implied that education is a key driver of women empowerment in cassava value chains. Empowering women in the aspects in which they are disempowered will also enhance food productivity within households resulting in a sustainable cassava value chain which can be upgraded.

9.2.3 Factors affecting women's and men's participation in cassava value chains

This study also investigated the participation of women in the production, processing and marketing nodes of the cassava value chain in Kigoma, Zanzibar and Mkuranga. The analysis used the Probit and OLS regression models to investigate the effects of household and farm characteristics, asset ownership, public goods, education and location characteristics on decisions to engage in the cassava value node of production and on quantities of cassava produced in the three study sites of Kigoma, Zanzibar and Mkuranga. The probit model results indicate that the most significant ($p < 0.05$) determinants of the decision to engage in cassava production are religion (REL) and number of dependents in a family (DEP) which were positive, location or region (REG), ownership of bicycle (BICY) and land area squared (LAN^2) (See Table 7.3). The variable DEP had a significant effect on the decision to engage in cassava production, because the more the number of number of people who need to food in a household, the better the chances of women engaging in cassava farming are so as to provide household food. Likewise, for variable LAN^2 its significant effect on the decision of women to engage in cassava production implies that when arable land increases, more land is allocated to cassava production until a certain level when land allocated to cassava production decreases probably, because of allocation to other cash crops. The variable REG also had a significant effect on women engagement in cassava farming because the Muslim dominated Zanzibar region had facilities and conditions such as improved varieties and markets unlike in Kigoma region hence women in

Zanzibar would consider producing cassava relative to those in other study sites. Likewise the Muslim dominated Zanzibar region had a positive influence on women intending to engage in cassava production relative to Christianity religion which dominated the Kigoma region. Ownership of a bicycle (BICY) positively influenced the decision of women to engage in cassava production as alluded to in section 7. This is because the bicycle is useful as a means of transporting cassava inputs as well as transporting cassava products for marketing. These findings from the study suggest that there is a need to ensure that productive resources are allocated to women to promote cassava production. Findings from the desk review also emphasise the allocation of productive resources to women. The National Development Vision 2025 and National Strategy for Gender Development (NSGD) were crafted to effectively implement policies to achieve gender equality and equity in areas such as control of productive resources, decision making and power, education, training as well as economic empowerment. From the OLS model, results indicated that arable land area (InLAN) and marital status (STAT) (Table 7.4) were significant and important determinants of quantity of cassava produced by women. These results show that land area available for planting is an important determinant of the quantity of cassava produced. As already similarly explained in section 7.2, the results show that married household heads tend to produce more quantities of cassava than households with single and widowed men and women. This could be because of the need to provide the required calorific needs of the family as well as additional income after selling cassava to sustain their families.

Interventions to promote cassava should adopt a gendered approach, given that gender was found to be one of the most important determinants of participation in cassava production. The empirical evidence also indicates that market participation in the cassava value chain is highly gendered with men dominating marketing as individual sellers and as large-scale buyers. Gender sensitive policies aimed at improving the position of women in market participation as sellers need to be developed and implemented. The government is addressing this through the 2013 National Agriculture Policy in Tanzania where facilitation of women in accessing technology, inputs, extension, access to productive resources and sensitisation of retrogressive cultural practices within communities was being promoted. Distance to the nearest all weather road which was a proxy variable to distance to the nearest market was negatively related to intensity

of market participation for both men and women. Interventions targeting development of infrastructure such as roads and new markets would enable greater participation of women in particular. One of the issues militating against marketing of cassava products into formal markets such as supermarkets is the requirement of accreditation with the Tanzania Bureau of Standards (TBS) which was reported to be costing US\$400 (TZSH 800,000). Women dominate the cassava processing node as evidenced by their activities of peeling, chopping and drying in all of the small-scale cooperatives that were visited and investigated. Major challenges during cassava processing include unavailability of drying equipment, fuel requirements and unavailability of funds to purchase processing machines which was reported to cost about US\$150 (TZSH 300,000).

9.2.4 Household gender based conceptual framework

A conceptual framework was developed for gendered value-chain analysis that seeks to combine a detailed and nuanced understanding of household social relations, changing gender roles, resource ownership as well as benefit sharing linked with broader political, economic and climatic contexts within which they are situated. Contrary to the assumption of unitary household preferences, this framework argues that more effective policy instruments and development interventions will emerge from analysing the context in which households balance their diverse gender based interests within the cassava value chain. By putting much emphasis on intra-household gender dynamics, the framework helps in overcoming the problem of gender inequality in resource ownership, participation, benefit sharing and power relations within the cassava value chain.

9.3 Conclusion

Overall, deducing from the empirical findings, it can be concluded that the empowerment and participation of women and men in the cassava value chains in smallholder farming sectors of Tanzania are highly gendered. This is because the intra-household gender dynamics shape the roles of women and men in the different cassava value chain nodes. The mapping of the cassava value chains in Tanzania revealed that women occupy low level cassava value chain nodes that require unskilled labour such as planting, preparation of planting material, planting, harvesting and processing. In the process they tend to work long hours yet poorly remunerated, because of the nodes they occupy which are not directly linked to the benefits accruing from cassava sales.

Contrary to women, men occupy cassava high value chain nodes where they are directly in control of the benefits particularly income proceeds from cassava sales. Women were not actively involved in agro dealing involving cassava inputs although the cassava input system was predominantly local. In terms of control of productive resources, women were not owners of land and had very limited decision making in access and use of land particularly for a marginalised crop such as cassava. Resultantly, the plots allocated by men for cassava production within the households were smaller and infertile compared to size of the plots allocated to other crops considered important for household income and food security by men. The harvesting of cassava was mostly done in collaboration with other households engaging hired labour where necessary. At this node, post-harvest losses were experienced mainly, because of the piece meal approach in the harvesting resulting in more infield cassava losses due to diseases and pests. This was more detrimental to women who were predominantly involved in the storage and preparation of food, hence their importance in cassava post-harvest management.

As guided by the Harvard analytical conceptual framework profile of control of resources, women were reported not to be active control of productive resources, control of income generated from cassava sales. Drawing from the results of the 5DE sub index of WEAI, it can be deduced that women had a disempowerment index of 0.95. This disempowerment index is mainly attributable to the poor ownership of resources, limited influence by women in the purchase, sale and transfer of assets within their households. Both women and men had limited access to credit and associated decisions with their households thereby contributing to their disempowerment. Within their households as well as in the community women have pronounced limitation in leadership and limited expression in public. Because of the reported dominance of men in decision making within households, women are loaded with productive and reproductive household roles. This resulted in heavy time burden for women depriving them of leisure time to visit friends and relatives.

The examination of factors affecting the participation of women and men in the cassava value chains was done as underpinned by the Harvard analytical conceptual framework of determining different gender roles along the cassava value chains. The size of land, number of dependents, bicycle ownership, religion and the location (region) were important determining factors for

women engagement in cassava production. Marital status, location (region) and land size were important significant determinants of the quantity of cassava produced within households in Tanzania. Women participation in the cassava value chain marketing node was significantly mediated by the quantity of cassava produced (CAVA) and the ownership of a radio. This implies that the more women produce cassava, the more they sell on local markets. The influence of ownership of a radio on the quantity of cassava sold by women may be as a result of reverse causality. The participation of men in the cassava marketing value chain node is also mediated the distance and quantity of cassava produced. This is because distance to the markets, particularly long distant urban markets affects transportation of cassava hence being an important factor for men unlike from women whose cassava markets are limited to local wet markets. The quantity of cassava marketed by women significantly explained the quantity of cassava produced, ownership of mobile phone as well as ownership of a bicycle. With regards to men quantity of cassava produced only was a significant influencing on the quantity of cassava sold on the market. This finding buttresses the hypothesis that the cassava marketing value chain node is highly gendered with men being the dominant participants, hence they control the cassava income proceeds.

From the household based conceptual framework developed, where several contextual factors were simultaneously considered, it emerged that household preferences are not unitary and there is need to take into consideration intra-household power dynamics into consideration to improve the position of women in the cassava value chains. Because of differences in preferences brought about by intra-household gender power dynamics, high levels of inequality particularly for women in terms of resource ownership, decision making, time allocation, and participation in various high value cassava value chain nodes were observed.

9.4 Implications for policy

The results of this study have substantial policy implications. As revealed by the empirical findings from the study, policies and strategies should be developed that enable women to participate fully in social and economic activities, and especially in making productive decisions with respect to key resources such as land, time, and credit facilities. Currently there is a general

scarcity of well-thought-out and developed policies regarding the empowerment of rural women in the low value chains such as cassava in most developing countries, Tanzania included. Specifically in the case Tanzania, the results show the need for formulating policies that focus on women's access, ownership and use of agricultural land. This should be done through the amendment of land ownership laws and community engagement with local leaders to consider women during land allocation. This initiative has a positive effect on cassava production, since the results from the study show that when land area increases women tend to engage more in cassava production. There are however, encouraging efforts that the Republic of Tanzania instituted regarding land ownership. These among others include the Land and Village Land Act of 1999 that was instituted to allow for equal distribution of land and eradicate gender inequality in land ownership at the community level. The purchase and inheritance laws with regards to land need to be streamlined along gender axis to accommodate the plight of women.

The government of Tanzania as well need to consider some policy shifts regarding the marketing regulations and laws of low value marginalised crops such as cassava, since the current cassava marketing system is dominated by middlemen who buy cassava produce from farmers at very low prices since farmers; particularly women have very limited marketing options for their cassava root tubers and processed cassava products.

There is need for the Republic of Tanzania to craft financial inclusion policy framework that tries to make sure that smallholder farmers particularly women has access to financial credit to finance their cassava farming activities. There is need to tailor-make the credit facilities so that smallholder farmers can access them even through promotion of micro-finance schemes targeting smallholder farmers particularly women. This is because in the three study sites considered, formal and micro-finance credit schemes for cassava farmers were not recorded except for the local informal revolving schemes reported in Zanzibar operationalised predominantly by women. However, most of such initiatives could only meet immediate household needs with nearly nothing left to be used for farming. Some efforts although not very effective have been made by the government of the Republic of Tanzania to improve the position of women. Previous studies conducted in Bangladesh, India, Sri Lanka, and Nepal, have shown that the lack of an appropriate policy response to rural women's needs is of pressing concern

(Quisumbing *et al* (2014); Alkire *et al.* (2013). Consequently, affirmative action on the part of policymakers within development agencies, government agencies, and non-governmental organisations is required to improve the situation of women within the cassava traditional food value chain. Policy options need to be explored to empower women in relation to their ownership of productive resources and decision making, as well as their participation in the transportation and marketing of cassava.

Policies aimed at promoting reforms in legal land tenure rights through women's land entitlement and registration of land in their names, especially for married women, may improve their control of land use and enable them to participate in cassava production. This is evidenced by limited control of land use and decision making by women as alluded to earlier in Chapter 5. Interviews confirmed that land entitlement and decision making within male-headed households lie within the jurisdiction of men only. Since cassava is considered marginal women's crop that is usually only cultivated in fallow and infertile land, this scenario, therefore results in limited cassava production.

Policymakers also need to consider the taxation framework to enable farmers to engage in cross border cassava trading with buyers in neighbouring countries. This is because traders, particularly those from Kigoma region complained of exorbitant taxes when they cross with their cassava tubers to Burundi and other countries such Uganda and Rwanda. There is need policy framework regarding the establishment of reliable infrastructure especially all-weather road network in areas like Kigoma where both women and men attributed most of their cassava post-harvest losses to be due to long distances to the marketing places.

One of the key challenges in terms of institutional support to the cassava value chains was the accessibility of banking services to most of the farmers, women in particular (See Table 5.6). There is need for policymakers to tailor make financial inclusion policies that accommodate the poor resourced farmers and marginalised women to access credit and other financial-related services. Agriculture extension support emerged as one of the limitations for farmers although it was relatively good for women in Zanzibar and Mkuranga owing to accessibility and proximity to Zanzibar and Dar es Salaam cities where most services were accessed. There is need for Ministry of Agriculture Livestock and Fisheries to have strategies for supporting women farmers

in cassava farming through research and extension. Women need technical information regarding production, processing, transportation and marketing of cassava. Research and extension with regards to cassava disease resistant varieties as well as high yielding varieties would help women to increase their yields and enhance food security within households at the same time eradicating poverty through increased income.

9.5 Scope for further study

There are several avenues within which further studies could focus on the effects of various categories such as *de facto* and *de jure* women headed households, in relation to women, and differences in land tenure entitlements and wealth classes among these categories, on decisions to participate in cassava farming and on quantities of cassava produced. This could adequately close the gender gap after considering the dynamics of various women categories within smallholder farming systems. Similar studies could also be conducted at the value chain level to investigate the level of participation of different categories of women. Moreover, future studies can focus on analysing local socio-economic and biophysical trends and identify the differing preferences of men and women in the cassava value chain. Other areas for future studies include areas on women's empowerment at the level of traditional food value chains for cassava and other agricultural commodities. Scholars can also apply the gender parity sub-index of WEAI in their investigations of traditional food value chains to investigate the gender gap.

Potential future studies could conduct cassava value stream mapping to explore the potential use of cassava in industrial processing, for example, in the production of ethanol. Researchers could also incorporate the gender component into investigations of cassava post-harvest treatment methods since it merged that post-harvest losses were being experienced particularly by women. Most of the existing scholarly evidence has not adequately addressed the issue of post-harvest losses in low value chains; much attention has been paid to cash and high value food crops hence taking gender perspective into consideration may lead to development of appropriate post-harvest interventions.

APPENDICES

Appendix 1: Household questionnaire

Identification information

Date of interview: _____

Location:

	Region	District	Village	GPS Coordinates
Name				
Code				

Particulars of respondent and enumerator

	Name	Questionnaire Number	Contact
Respondent			
Enumerator			
Data enterer			

Introductory remarks

Hello! My name is _____. I work for The International Institute of Tropical Agriculture (IITA), a research organization based in Dar-es-Salaam. IITA in collaboration with University of Pretoria is conducting research on the cassava value chain and market linkage in selected cassava regions in Tanzania. This region is known for its high but unexploited potential in cassava production. The findings of this research will help in the design of intervention strategies for a vibrant cassava subsector in the area. The success of the cassava subsector in this part of the country as a result of this study will be critical in up-scaling and replication of the intervention in other parts of Tanzania with high potential for cassava production. IITA and University of Pretoria will not cite an individual's opinions, but your views will be included in the report, along with the views of many

other stakeholders in the development process of this area.

If you have any question we are ready to clarify, otherwise we would like to start the interview, Thank you.

1. Household characteristics

Gender of respondent	Religion	Age (yrs)	Marital status	Total number of people in your household	Number of dependants (household members under 18 yrs and those incapacitated for any reason)	Highest level of education of household head	Literacy	Main occupation of household
0=Male 1=Female	1=Christianity 2= Moslem 3=African Traditional		1=Single 2=Married 3=Divorced 4=widow/er 5=other			1=Standard 7 2=Form IV 3=Form VI 4=Diploma 5=University 6=Adult education 7=No formal education	1= Can read and write 2= Can't read and write	1=Crop production 2=Livestock keeping 3=Formal employment 4=Business

2. Household wealth status

	Items	Options		
	House	Ownership	1. Self-constructed	2. Rented
Wall material		1. Brick wall	2. mud wall	3.Others (specify)
Roof material		1.Iron-sheet	2.Grass	3.Others (specify)
Nature of the floor		1 Soil	2 Cement	3.Others (specify)
Door and window material		1 wood	2 Aluminium	3.Others (specify)
Use electricity		1. Use	2. Not use	

Household assets		Yes=1 No=2	Number	Total value
	Sofa-Couches			
	Radio			
	Bicycle			
	Mobile phone			
	TV			
	Refrigerator			
	Motorcycle			
	Car/Vehicle			
	Tractor/Power tiller			
	Others (Specify):			

3. General farming Information

1. Farm size and ownership

Total farm size (acre)	Kind of land ownership 1= Own property 2= Rented 3=Communal 4=Government	If you own land, how did you acquire it? 1= bought from village government 2= given by village government 3= bought from another owner 4= Inherited 5= Other	Who controls land use in your household? 1=husband 2=Wife 3=Jointly
Plot 1 _____	_____		
Plot 2 _____	_____		
Plot 3 _____	_____		
Plot 4 _____	_____		

4. Farm access

Distance to the largest plot from your homestead _____ (Km)	Time to the largest plot from your homestead _____ (minutes)	Means of transport to the largest plot from your homestead 1=Foot 2=B/cycle 3=M/cycle 4=Car 5=other		Distance to an all-weather road from your largest farm plot _____ (Km)	Time to an all-weather road from your largest farm plot _____ (minutes)	Usual mean of transport to an all-weather road from your largest farm plot 1=Foot 2=B/cycle 3=M/cycle 4=Car 5=other	
How much of your total land was cultivated during the last season (acre)				Suppose you wanted to expand agricultural production, would you experience land scarcity? 1= Yes 2= No			

5. Major crops in your farm apart from cassava for 2012/14

Crop (rank by importance)	Area (acre)	Production (Kg or specified unit)	Home consumption (Kg or specified)	Sold (Kg or specified unit)	Price TSh /specified unit

Who mainly grows between men and women?

0=Men; 1=Women

Are there any cassava variety preferences between men and women? 1=Yes , 0=No

If yes, which varieties are preferred by men and by women and why?

Are there any decisions mainly made by men only, women only or jointly in the production of the identified crop variety?

If yes which ones?

Decision	Decision made by Men 1=Yes; 2=Women	Decision made by Women 1=Yes; 2=Women	Decision made jointly 1=Yes; 2=No

Was your household food self-sufficient in the 2014/15 season? 1=Yes; 2=No

6. Cassava production and market participation issues

Production/Output during 2014/15

How big is your cassava field?	How much did you harvest?	How much was consumed at home?	How much did you sell	Mode of selling 1= at home 2= roadside 3=market place 4=at processor	In how many lots did you sell cassava	
					Fresh	Makopa
Acres _____	Tons _____	Tons _____	Tons _____		_____ lots	_____ lots

7. Gender influenced decision making and benefit sharing

Who is responsible for decision making to sell cassava in the household 1=Husband 2=Wife 3=Joint	Does a wife consult their husband when selling cassava? 1=Yes 2=No	Does a husband consult their wife when selling cassava? 1=Yes 2=No	Who decides on the use of income from cassava sales? 1=Husband 2=Wife 3=Children 4=Jointly	What proportion of income is managed by women from the sale of cassava? 1= None 2=25% 3=50% 4=75% 5=100%
What proportion of income is managed by men from cassava sales? 1= None 2=25%	How is the proportion of income from cassava sales used by women? 1=Buy food 2=Pay school fees 3=Buy farm inputs	How is the proportion of income from cassava used by men? 1=Buy food 2=Pay school fees 3=Buy farm inputs		

3=50%	4=Personal use	4=Personal use		
4=75%				
5=100%				

What constraints do smallholder farmers face in marketing their cassava?

Gender	Constraints	Copying strategies	Are the strategies efficient 1=Yes 2=No 3=To some extend	If no, what else needs to be done to deal efficiently with the constraints
Men				
Women				

Modes of marketing used for cassava

Mode of Marketing	Reason	Men 1=Yes; 2=No	Women 1=Yes; 2=No

What are the most common markets accessed by women and men?

Market	Gender	Reason for using the market	Distance	Mode of transport

What are the main constraints faced by women in accessing inputs and other services?

Gender	Constraints	Copying strategies	Are the strategies efficient 1=Yes 2=No 3=To some extend	If no, what else needs to be done to deal efficiently with the constraints
Men				
Women				

What are the most common sources of credit and financial services for women and men?

Source of credit/financial services	Distance from community	For men 1=Yes 2=No	For women 1=Yes 2=No

9. Organisation and type of trainings received by women and men

Have there been organizations providing training on cassava production in this community? 1=Yes; 2=No

Training Organisation	Aspect trained on cassava	Women 1=Yes; 2=No	Men 1=Yes; 2=No

10. Sources of information for women and men

Source of information	Aspects of Information Conveyed	Women 1=Yes; 2=No	Men 1=Yes; 2=No

11. Constraints to accessing training and information by women and men

Gender	Constraints	Copying strategies	Are the strategies efficient 1=Yes 2=No 3=To some extend	If no, what else needs to be done to deal efficiently with the constraints
Men				
Women				

12. Fixed costs in cassava production during 2014/15

Equipment	Year most of the items bought/constructed	Buying/construction cost for the of items	Expected life span of most of the items	Proportion of usage in cassava (%)
Hand hoes				
Sacks				
Baskets				
Drying structure				
Bicycle				
Motorcycle				

13. Variable costs in cassava production during 2014/15

Agronomic operations	Labour inputs									
	Family labour						Hired labour			
	Men		Women		Children under 15 years		Men		Women	
	No	Days	No	Days	No	Days	No	Days	No	Days
Land preparation										
Seed										
Planting										
Weeding 2										
Pesticide application										
Harvesting										
Other										

14. Processing operations at farm level during 2014/15

Operation	Labour inputs									
	Family labour						Hired labour			
	Men		Women		Children under 15 years		Men		Women	
	No	Days	No	Days	No	Days	No	Days	No	Days
Peeling										
Chopping										
Drying										
Grating										
Grinding										

15. Marketing operations during 2014/15

Operation	Labour inputs									
	Family labour						Hired labour			
	Men		Women		Children under 15 years		Men		Women	
	No	Days	No	Days	No	Days	No	Days	No	Days
Packaging										
Storage										
Transport										

16. Cassava pricing during 2014/15

Cassava product type	Quantity (Kg)	Price (TSh/Kg)	Type of buyer	Why do you sell cassava in the form you sell it? 1=buyers want it in that form 2= lack of technology 3= it's a tradition
			1= Neighbour	
			2= Processor	
			3=	

			Assembler 4= Other (specify)	4=Other (specify)
Raw				
Makopa				
Flour				
Grated				

17. Market access information during 2014/15

Did you know price before selling your cassava ? 1=Yes 2=No	What motivated you to sell crops? 1=Price 2=Cash problems 3=Space for the next harvest	Do you know where traders sold most of the crops they bought from this village in the 1999/2000 season? 1=Yes 2=No	If yes, do you know the market price where traders sold crops? 1=Yes 2=No	If yes, what was the source of information 1=Traders 2=Friends 3=radio 4= Motorcycle 5Others (Specify)_____	What was the main transport mode used in transporting crops to the market? 1=Head-load 2=Bicycle 3=Car 4=Motorcycle 5=Others (Specify)_____	How many traders (on average) came to you before you decided to sell your consignment?
Who are your potential customers? 1= Middlemen 2= Customers in neighboring country 3=Other farmers 4=large scale buyers	If customers from neighbouring country please specify 1= Rwanda 2= Burundi 3= DRC-Congo 4= Any other (specify)	Are you able to sell all of the tubers that you take to the market each time? 1= Yes 2= No	If you do not sell all tubers, what do you do with the unsold tubers ? 1= Return home 2= Leave at the market till sold 3=Sell on loan 4= Any other	Are standard measures used during the exchange process 1=Yes 2=No		
Do you think what you sell to the market	Who informs you on the quality? 1= Buyers in the	Does the market want other cassava products that you	Which are those cassava products	What do you think should be done in order to be able to satisfy the market with the product(s) you have just		

is the quality the customer wants? 1= Yes 2= No	market 2= Mobile phone messages 3 =Fellow farmers4 4= Others specify	cannot supply?1= Yes 2= No	1=Cassava high quality flour 2=Cassava starch 3=Cassava grates 4=Cassava chips	mentioned?

18. Postharvest loss issues

Have you ever experienced losses in your cassava produce? 1=Yes 2=No	If yes, what was the loss like in most cases? 1= Deterioration of the roots in the field 2= Bruising the roots during harvest 3= Harvesting very thin roots that do not get market 4= Deterioration of the cassava after processing 5= Deterioration of the cassava during drying 6= Deterioration of quality during storage 7= During peeling where some parts of the root goes with the peel 8= Other specify	Are tubers usually damaged during harvestin g? 1= Yes 2= No	What percentage of each harvest is normally damaged? (%)	In what form is the loss like? 1= Bruised/cut tubers 2= Tubers left in the ground un-harvested 3= very tiny tubers that do not fetch market 4=rotten tubers
What do you do with the damaged tubers? 1=Throw away in the field/home	Are there losses of the tuber flesh that occur during peeling? 1= Yes 2= No	What percentage of the tuber flesh (edible stuff) that goes with	In what form is the loss like? 1= tuber flesh that cling to the peel 2= Tuber flesh cut in both	Are there losses of the tuber flesh that occur during washing? 1= Yes 2= No 3= Not Applicable

2=Use as animal feed 3= Others (please specify)		the peel? (%)	root tips when start peeling 3= Other (specify)	
--	--	---------------	--	--

What percentage loss do you think occur during washing? (%)	In what form is the loss like? 1=Washing water turns white 2= Small pieces of tubers left in the washing water 3= Other (specify)	Are there losses of the tuber flesh that occur during drying? 1=Yes 2=No	What percentage of the tuber flesh that occur during drying? (%)	In what form is the loss like? 1= Pieces of tubers flesh left on the drying mat 2= Small pieces of tubers fall on ground when transferring to sacks/polypropylene bags 3= Other (specify)
How many days does it take to dry cassava tubers (days)	What is the colour of the tuber after drying 1= Black 2= Dark Blue 3= Brown 4=Other (specify)	Are there losses of the tuber flesh that occur during storage? 1=Yes 2= No	What percentage of the tuber that occur during storage? (%)	In what form is the loss like? 1= Rodent damage 2= Theft 3=Tuber rot due to humid weather 4= Tubers spread on the floor due to low quality of sacks/polypropylene bags 5= Other (specify)
Are there losses of the	What containers do you use to transport the tubers from	What percentage of the tuber flesh	In what form is the loss like?	Do you know of any quality loss in cassava?

tuber flesh that occur during transportation from field to home? 1= Yes 2=No	the farm to the market, house or processing centre? 1= Baskets 2= Jute bags 3= Polypropylene bags 4= Others, please specify	that is lost during transportation? (%)	1= Dry tuber pieces dropping from containers 2= very small tuber particles that sieve out from the sacks/polypropylene bags 3= Other (specify)	1= Change in colour of the tubers 2= Processing without washing 3= Washing with dirty water 4= Drying of the tubers exposed to dust 5=Drying the tubers on the ground 6= Other specify

19. Miscellaneous questions

Do you own a bank account 1=Yes 2=No		Did you use credit (in cash or in kind) in farming activities in the 2009/10 farming season? 1=Yes 2=No	
If you used credit, what was the main source? 1=Bank 2= Relative/Friend 3= Money lender 4= Farmers' group 5=Other (specify)		Did you consult an extension officer regarding farming activities in the 2009/10 farming season? 1=Yes 2=No	
Are you a member of the following farm related groups? 1=Yes 2=No Cooperative _____ Farmers' Association _____ SACCOS _____ Other (Specify) _____		If you received extension services on cassava farming, in what operation 1= land preparation 2= planting 3= weeding 4 = harvesting Where do you get cassava stem cuttings for planting? 1= From your own farm, 2= Researchers and extension agents 3= Purchase from other farmers, 4= Other sources(specify)- _____	

If purchased, how many bundles did you buy for your farm during 2013/14?		How much are they sold per bundle	TSh.
What type of farming system do you practice in your farming? 1= Mono cropping 2= Mixed cropping		If mixed cropping, what crops do you intercrop with cassava? 1= Maize 2= Beans 3= Banana 4=Groundnuts 5=Other (specify)	

Appendix 2: Focus Group Discussion Interview Guide

THE UNIVERSITY OF PRETORIA IS CONDUCTING A STUDY ON HOW GENDER ISSUES ARE INTEGRATED IN THE CASSAVA VALUE CHAIN.

INTERVIEW GUIDE FOR FOCUS GROUP DISCUSSION

Region:.....District.....

Moderator..... Timetaken:from.....to.....

1. At household level, who owns land for crop production and other household assets?

.....
.....

2. How are decisions made at household level regarding land allocation for various crops?

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

3. Is cassava crop a female or male crop?

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

4. Who makes the decisions about land allocation and cassava planting?

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

5. In order of preference, which crops receive more allocation in terms of land?

Crop	Size of Land

--	--

6. Is cassava grown on fertile or marginal land?

.....

7. Who are the group of people involved in the following activities mostly (women; children; men; joined (men&women))?

Activity	Responsible group	% Contribution	Remarks
Land preparation			
Planting and weeding			
Harvesting & processing			
Transportation & Marketing			

8. Who are the major actors involved in the cassava food value chain?

Input suppliers	Transporters	Processors	Retailers	Consumers	Other service providers

9. Which are the key markets that are used for selling cassava and cassava products?

.....

10. Do you get the desired prices for your cassava products?

.....
.....

Appendix 3: *A female respondent (right) being interviewed by the enumerator in Mkuranga.*



Appendix 4: Focus group discussion in the Coast (Mkuranga) at Kiimbwaindi Village.



Appendix 5: Mkombozi Smallholder cooperative processors in Geita sun drying cassava



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