

**STATUS, DETERMINANTS AND EFFECT OF AGRICULTURE
COMMERCIALIZATION AMONG SMALLHOLDER FARMERS IN TANZANIA**

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**A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE
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ABSTRACT

Commercialization of agriculture refers to shift from subsistence oriented production to an increasing complex production and consumption system based on market; apart from marketing agricultural output it also includes product choice, input use and decisions making based on profit maximization. It has been documented that agriculture commercialization in Tanzania remains to be marginal and less than one third of farmers' produce might possibly reach commercial market; very few farmers' uses inorganic fertilizer and improved seed. The overall objective of this study was to examine the status, determinant and extent as well as effects of agricultural commercialization. Specifically the study identified socio-economic characteristics of farmers, status in market participation as well as identifying factors influencing output market participation and its contributions to farmers' welfare. Data generated by Living Standards Measurement Study in collaboration with Tanzania National Panel Survey for two waves of 2010/11 and 2012/13 was used; descriptive statistics was used to analyze status in market participation, Craig's double hurdle model was used to analyze determinants and extent of commercialization. Results revealed proportions of poor households was decreasing for the two survey periods while proportions in output market participation was observed to increase for paddy, beans, groundnuts and maize; maize recorded lower commercialization index among the four commodities. Age of household head, sex, household size, land area allocated for production, use of inorganic fertilizer, use of improved seed and accessibility to agricultural inputs on credit were found to significantly influence decision for farmers to participate in agricultural commercialization of the four commodities. It is recommended for policy measures that increase accessibility of land to farmers, accessibility to agricultural input and encourage on using inorganic fertilizer to smallholders farmers so as to increase marketable surplus.

DECLARATION

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

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The above declaration is confirmed by:

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DEDICATION

I dedicate this work to my beloved brother Benito John Mbegallo who put all his effort for me to fulfill this dream.

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LIST OF ABBREVIATIONS, SYMBOLS AND ACRONYMS

AERC	African Economic Research Consortium
BOFC	British Overseas Food Corporation
CBN	Cost of Basic Need
CIAT	International Centre for Tropical Agriculture
EAC	East Africa Community
ESRF	Economic and Social Research Foundation
GDP	Gross Domestic Product
GVP	Gross Value of Production
GVS	Gross Value of Sales
Ha	Hectare
HBS	House Budget Survey
HCI	Household Commercialization Index
IFPRI	International Food Policy Research Institute
LSMS	Living Standard Measure Survey
MAFSC	Ministry of Agriculture and Food Security and Cooperatives
MDG's	Millennium Development Goals
MPCHE	Minimum per Capita Household Expenditure
MT	Metric Tone
NAIVS	National Agricultural Inputs Voucher Scheme
NBRP	National Bean Research Programme
NPS	National Panel Survey
PCE	Per Capita Expenditure
SADC	Southern African Development Community

SPSS	Statistical Package for Social Science
URT	United Republic of Tanzania
USAID	United States Agency for International Development
USD	United State Dollar
WGOP	World Geography of Peanut

CHAPTER ONE

1.0 INTRODUCTION

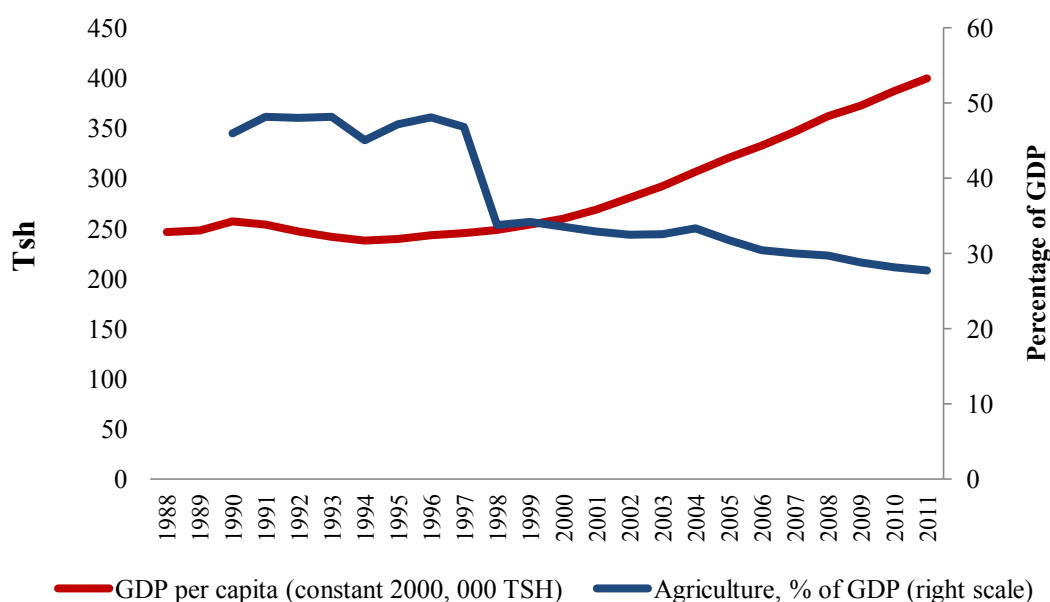
1.1 Background Information

In Tanzania, agricultural commercialization remains to be marginal as it has been observed that 26% of farmers' did not sell any of their crop produced and so they were not connected to market, with only 25% of farmers selling more than half of their total production (World Bank, 2011). Furthermore; Amani, (2005) documented that less than one third of grain produced by households in the country might possibly reach commercial market, hence from all these observations it is plausible to urge that the output side of agricultural commercialization are very low for smallholder farmers to experience the associated benefits.

On the input side of agricultural commercialization, the overall fertilizer usage in Tanzania is approximately 9 kg nutrients / hectares which is very low compared to many sub Saharan countries like Malawi(16 kg nutrients/hectare),while the average usage of fertilizer in most significant food crops has fallen from 70% in 1990 to 32% by 2005 (MAFSC, 2006). Despite low productivity, the producer cost of many smallholders farmers in Tanzania are among the lowest in the world, primarily because of low labour costs and minimal usage of purchased inputs, however, this cost advantage is lost in market place as very few farmers are linked to output markets (Amani, 2005).

United Republic of Tanzania is basically an agricultural-based economy, where by agriculture accounts for more than a quarter of Gross Domestic Product (GDP), and remains an important contributor to economic growth (Fig. 1). More than 73% of the population is in rural areas and about two-thirds of the employed population works in the

agricultural sector; proving that most of the poor derive their livelihood from agricultural sector. Smallholder agriculture in Tanzania remains to be major engine of rural growth and livelihood improvement pathway that can lift large members of the rural poor out of poverty. Increasing rural incomes will require some form of transformation out of semi- subsistence, low –input, low productivity farming system that currently characterize much of rural small holders farmers in the country Mandivamba(2012).



Source: WDI (2012)

Figure 1: Share of Agriculture in GDP and GDP per capita in Tanzania

Agricultural commercialization refers to the shift from subsistence oriented production to an increasingly complex production and consumption system based on the market (Goletti, 2005); Apart from marketing of agricultural output, it includes product choice, input use and decision making based on the principle of profit maximization (Pingali and Rosegrant, 1995).

Commercialization strengthens linkages between input and output sides of the market through demand for modern technologies, promotion of the input side of production and facilitation of the development and advancement of technological innovations. The use of modern technologies can result in higher productivity and production, influencing farmers to enter into the market, and the output market growth can often drive input market linkages as the cash generated from sales can be used as investment funds (Pingali and Rosegrant, 1995).

Accelerated growth in agriculture was seen by many scholars as critical upon meeting the Millennium Development Goals (MDG's) in Africa, and as for now it can still play a big role upon realizing the new Sustainable Development Goals (SDG's). Intensification and commercialization of smallholder agriculture can play a central role in achieving economic growth as well as poverty reduction; According to this thinking, smallholder agriculture is uniquely positioned to deliver broad based growth in rural areas where by vast of majority of poor people are living (Leavy and Poulton, 2007). Mathenge and Olwande (2012) reported that there is an important need of linking the agricultural marketing sector with the overall economy such as labour market and other multiplier effects such as induced investment in inputs use and technological change, which may make high value crops such as horticulture a promising growth strategy despite their current small base.

Number of factors has been identified to influence agricultural commercialization that can be grouped into long term and short term and thus can either facilitate or hamper commercialization. Some examples of the long term factors are such as population growth and rural infrastructure; population growth can increase the quantity of marketable surplus by increasing its demand, while rural infrastructure affects agricultural

commercialization through its impact on prices and diffusion of technology thus affects combination of inputs and outputs (Kirui and Njiraini, 2013).

Example of short term factors that influence agricultural commercialization are such as consumption effects and income effects; with households whose food production hardly meet their consumption requirements are expected to be less commercialized, while income earned from marketing of produce may significantly facilitate input acquisition and hence increased productivity and in turn improves commercialization (Valdes *et al.*, 1988, cited by Kirui and Njiraini, 2013). Transaction costs faced by farmers as they participate in market also has been documented to have an effect on short term factors that influences commercialization; with low proportions of products exchange in the markets reflects existence of high transaction costs thus market participation declines as results of inhibitive transaction costs (Okello *et al.*, 2010 cited by Kirui and Njiraini, 2013).

Domestic staple food market have potential to involve a much larger number of smallholder farmers than other commodity markets in both domestic and export markets for most countries in sub Saharan African, as there is ample evidence to suggest that the sheer magnitude of domestic staple food markets is far greater than those for exported commodities or higher value crop (Hazell, 2005; Dia *et al.*, 2007). Jayne *et al.* (2005), reported that currently smallholder farmers do not frequently participate much in staple food markets and their overall market share is very low, as they found out that top two per cent of commercial farmers sold about 50% of produced maize in Kenya, Mozambique and Zambia, their observations were not far from that reported by Ellis (2005) that farmers in semi-arid areas of Africa have very low proportions of output marketed, the situation is

not different from Tanzania scenario as less than one third of farmers grain produce might possibly reach commercial market (Amani,2005).

The low level participation in the market by the smallholders have been contributed by different reasons such as low prices received for staple foods commodity and farmers desires to increase their return, thus there appears to be divergent trends on the demand and supply side. Despites several benefit of agricultural commercialization, also it has been documented to have adverse consequences on household welfare, as commercialization combined with failure institution policies, or marketing can be damaging (Pingali and Rosegrant, 1995).

Mathenge and Olwande (2012) documented that while there is general agreement that improving market access and commercialization of smallholders will help induce greater investment, productivity, and income, there remains several challenges regarding it making progress. Some of challenges that they document included identification of output markets and types of commodities that can enable large numbers of smallholders to improve incomes; identification of those commodities can provide significant opportunities for the both poor and non-poor farmers; identification of these constraints and interventions are important for improving access to markets by the famers.

1.2 Problem Statement and Justification for the Study

Scholars define agricultural commercialization in variousperspectives but in its great aspects, commercialization of agriculture involves moving farmers from subsistence oriented agriculture to market oriented agriculture and on the process include increased integrations of farmers into exchange economy; motivating farmers to enter into competitive market that is profit oriented, increase recognition of farming as business

venture, production for markets, participation in input and output market, profit oriented and uptake of efficient technology as well as strong formal linkage with other value chain actors (VonBraun and Kennedy, 1994; Pingali and Rose Grant, 1995).

Agricultural commercialization in Tanzania is still marginal presenting a blockage for smallholder farmers to experience the benefit out of agricultural practices. In 2012/13 the demand for improved seed in Tanzania were 60 000 metric tons but the available stock were only 30 443 metric tons creating a supply deficit of 49%; on other hand the demand for inorganic fertilizer were 452 202 metric tons but the available supply quantity were 240 350 metric tons thus creating supply deficit of 47% (MAFSC, 2013).

Domestic market in the country is not yet saturated as evidenced by super markets that are full of imported fresh and manufactured product such as spinach and tomatoes from abroad that can be produced locally (MAFSC, 2013). The situation can be attributed due to lack of four elements of marketing comprising of time, place, quantity and form that have to be adhered for sustainable marketing especially for agricultural commodities as explained by Kohl and Uhl (1990).

Kirui and Njiraini (2013), reported that the lower level of commercialization is explained by many factors such as remoteness of many villages, low productivity, low farm gate prices, high marketing margins, lack of information and lack of market accessibility as many farmers walk on approximately 18 kilometers to the closest market away from the village center and more often there is no public services to reach the market. All these factors hinder smallholder farmers from exploiting the benefits of agricultural commercialization. A shift towards more intensive, sustainable form of agriculture can make a substantial positive contribution to economic growth, income as well as food

security not only through its ability to sustainable intensification of production but also through an emphasis on improving people's ability to acquire food (Pretty *et al.*, 1996 as cited by Maxwell, 2001).

The argument in favour of agricultural commercialization is that it allows farmers to exploit its comparative advantage and there by maximize income, generate an investible surplus which helps to maximize growth for both farmers and nations, generating linkages both upstream by supplying of inputs and downstream through the use of products thus generate growth and livelihood (Maxwell, 2001). Despite the importance of agricultural commercialization for economic growth and income generation, there are very limited coverage on studies explaining individual determinants, status and extent of commercialization as well as its effects in Tanzania context as many research works have concentrated on external factors and constrains to commercialization. (e.g. Jaleta *et al.*, 2009; Von Braun and Kennedy, 1994) and thus the present study aim at finding out what are the determinants and status of agricultural commercialization and to what extent these determinants influence farmers to participate in agricultural commercialization.

1.3 Overall Objective

The aim of this study was to assess status, determinants and outcomes of agricultural commercialization to smallholder farmers in Tanzania.

1.3.1 Specific objectives

Specifically the study sought to:-

- i. Examine the socio economic characteristics of smallholder farmers
- ii. Assess status/changes in market participation among smallholder farmers

- iii. Examine factors influencing smallholders participation in agricultural commercialization
- iv. Investigate the welfare situation of farmers operating at different levels of agricultural commercialization.

1.3.2 Research hypothesis

- i. Socio-economic and institutional factors do not influence the likelihood of farmers to participate in agricultural commercialization
- ii. The welfare situation of smallholders farmers do not improve with the participation in agricultural commercialization

1.5 Research Question

What is the status/change in output market participation among smallholder farmer?

1.6 Rationale of the Study

To win the war against poverty in Tanzania, strategies of eliminating poverty can be made reality through enhancing return from agricultural production and through improved access to market. The government of Tanzania has put forward a number of policies to improve rural household and moving farmers from subsistence agriculture to commercial agriculture. Key findings from this study can add to the existing stock of knowledge and literature whose focal point has been agricultural commercialization; it can be used as reference for policy makers, academicians and researchers

1.7 Scope of the Study

The study focused on status, determinants and effects of agriculture commercialization among small holder farmers in Tanzania, the targeted population is smallholder farmers

that grow food crops especially maize, rice, beans and groundnuts. There were number of factors prompted selection of these foodcrops, some of these factors are:

Large number of smallholder farmers in the country grows these crops but the percentage of output sales for these crops (especially cereals maize and rice) are still low as Amani(2005) reported that less than quarter of these crops may reach the market. On the other hand the household that focusing on production and marketing of these food crops are either subsistence oriented or net buyers and thus these group of producers are found to be poor in many aspect than net seller.

According to Economic and Social Research Foundation (ESRF) (2014), the agricultural sector in Tanzania experience uneven growth of market for national food cropsas large part of market covers on traditional export crops (cotton, coffee, sisal) thusincreasing the subsistence and rural poverty to smallholder farmers engaging in production of these food crops. Despites the fact that the country has passed though the period of liberalization of agricultural sector, there is experience of little transformation of grains and marketing chains for main crops such as maize and rice.ESRF(2014) furthermore reported that the export of cereal crops in Tanzania is a sensitive issue due to food security maintenance; during the season normally the government will discourage farmers from selling their produce as future season is unpredictable, the situation poses disincentive to local producers and denial of lucrative market opportunitiesavailable in neighborhood countries

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Review of Theoretical Framework

Agricultural commercialization (market participations) has been explained from different perspectives, including asset-based approach and agricultural development theory approach. Omiti *et al.* (2009) summarized the asset-based theory by arguing that as market share of agricultural output increases; input utilization decision and output combination are progressively guided by profit maximization objectives, this process in turns lead to systematic substitution of non-traded inputs with purchased inputs, the gradual decline of intergraded farming system and emergence of specialized high value enterprise. Tirkaso (2013), when examining the role of agricultural commercialization on smallholder productivity and food security, summarized theory of production and concept of economic efficiency on to which argued that, an economic process of transforming various inputs into final goods and services involves choice of inputs and technology that maximizes output with least cost and thus the principal motive of smallholder farmer as economic agent is to maximize profit either by minimizing cost or maximize output.

Kirimi *et al.* (2013), upon analyzing the extent and determinants of agricultural commercialization on household food security in Kenya, used agricultural household model where he identified a household as producer and consumer, and thus as consumer the principal motive is to maximize his/her utility from consumption of goods and as producer household aims at maximizing the profit given the production decision contribute to income through farm profit as factors influencing production and household consumption. The current study will also adopt the agricultural household model.

2.2 Empirical Studies on Agricultural Commercialization

Jaleta and Gebremedhin (2010) when analyzing the determinant of marketing orientation and market participation in Ethiopia used Tobit model to conclude that market orientation strongly translated into market participation. Policies, technological, institutional and organizational intervention aimed at promoting commercial transformation of subsistence agriculture were recommended for improving market orientation. Onoja *et al.* (2012) adopted the Craig's double hurdle model to argue that household size, distant to the nearest marketing channel, pricing of commodity and sex of fish farmer/marketer as the factors that increase the probability of household to participate in fish market. Infrastructure development, provision of marketing incentives to women and development of institutionalized marketing information are to be considered for increasing farmers' participation in the market. Craig's double hurdle models are corner solution outcomes (sometimes referred as censored regression model). These models define initial discrete probability of participation; ($Y > 0$), a second decision is made on the intensity of participation. Initially those models were estimated using the Tobit model that account clustering of zero due to non-participation however its major limitation it assumes the same set of parameters and variables determine both probability of market participation and level of transaction. Crag's double hurdle model relaxes these assumptions by allowing different mechanism to determine discrete probability of participation and level of participation.

2.3 Agricultural Commercialization

Scholars define agricultural commercialization in different perspective but many agree on the common terms as the degree of participation in the (output) market focusing on cash income, other dimensions of commercialization can also include input market participation, increase reliance on hired labor, profit motive within the farm business as

well as a move away from diversification towards specialization for long term (World bank, 2008, Pingali, 1995). Commercialization of agriculture can be understood as proportional of agricultural production that is marketed and it can include both cash crop and/or food surplus (Jayne *et al.*, 2005). It involves graduating from subsistence-oriented patterns to increasingly market-oriented patterns, with assumption that markets allow households to increase their incomes by producing those commodities that generate the highest returns and then use the cash to buy household consumption items (Timmer, 1997).

Agriculture commercialization does not only incorporate marketing of agricultural produce it also includes product choice and inputs use decision that are based on the principle of profit maximization; commercialized farmers does not only means the farmers who exports only but also farmers participating in market whenever there opportunities arose and will respond to available market opportunities. Through income generation commercialization can be viewed as ultimate purpose for poverty reduction but in most southern African countries most smallholders' farmers have remain to be subsistence oriented and their contribution to economic growth is not extensively felt.

Table 1: Characteristics of food producer's with increasing commercialization

Level of Market orientation	Farmers objectives	Source of inputs	Product mix	Household income source
Subsistence system	Food-self sufficiency	Household generated (Non-trade)	Wide range	Predominantly agricultural
Semi-commercial system	Surplus generation	Mix of trade and non-traded inputs	Moderately specialized	Agricultural and non-agricultural
Commercial system	Profit maximization	Predominantly traded inputs	Highly specialized	Predominantly non agricultural

Source: Pingali and Rose grant, (1995)

Because of opportunities in the changing environment of the world such as demand growth derived by population growth, urbanization and income growth as well as changing consumer tastes and lifestyles then the future of agricultural commercialization is still bright, providing a vital changes for growing income and alleviate poverty (Zhou *et al.*, 2013). The concept of agricultural commercialization can be complex, and has contributed to varying definitions and weights given in the literature. According to Pingali (1997), agricultural commercialization is more than marketing of agricultural outputs; he urged that agricultural commercialization is attained when household products choices and input use decisions are made based on the principles of profit maximization. Von Braun and Kennedy (1994) urged that commercialization implies increased market transactions to capture the benefits from specialization. Increased market transactions are more easily attained when there are favorable policies and institutional arrangements that promote open domestic as well as international trade environment, development of market infrastructure and support services that facilitate access to existing markets, and the opening up of new market opportunities under a secured legal system.

2.4 Drivers of Agricultural Commercialization and Opportunities

There are different drivers of agricultural commercialization that have been documented and for the case of simplicity the study adopted the five drives as documented by Zhou *et al.* (2013). Those five drivers are:

2.4.1 Factors promoting demand growth

The population of Tanzania is estimated to be about 45 million and it is expected to keep on increasing and this growth in population will increase demand for both food and non-food agricultural product (World Bank, 2008), and for the crops the demand is multifaceted as increased demand for livestock also causes increased demand for crops

used to produce stock feeds. By 2020 the developing countries in Africa will experience demand growth of 1.4 % per annum for human consumption, 2.6% feed stock cereals and 2.9% for livestock products (Zhouet *al.*, 2013).

2.4.2 Environmental changes pushing for renewed approach

Demand for agricultural products in Sub Saharan Africa has rapidly grown but the production pattern in agriculture sector is not impressive; agricultural contribution to GDP has continue to decline where by cereals production have grown lower than the demand of population, urbanization and income growth, thus forcing these countries to heavily depend on imported food. This provide an opportunity for domestic market especially market for agricultural product to excel as there is high demand and the supply is not yet enough to sustain the market.

2.4.3 Factors making the operations more efficient

Any factors that will improve the farming efficient and reduce the transaction costs will have a significant impact on commercialization of agriculture. Example access to appropriate technology and value chain integrations can significant improve efficiency of farming activities and reduce transaction costs, promoting more commercialization by farmers.

2.4.4 Factors making the operating environment more conducive for productivity

Countries found in Southern Saharan region including Tanzania are endowed with ecological conditions and natural resources (arable land, water and vegetation) suitable for productions of particular crops and livestock for trade with non-producing region (World Bank, 2008). In previously years especially early 1990's there were different pro-smallholders policies which drive up the productivity in maize, cotton, tea, and sugar. Sub

Saharan African countries can still adopt them for increased productivity of agricultural sector. The presence of regional blocks such as that of East Africa Community (EAC) and Southern African Development Countries (SADC) also pave the way more for agricultural crops trade by reducing the barriers to trade between member's countries thus farmers can exploit this potential and use it for their own advantages.

2.4.5 Individuals factors motivating farmers towards commercialization of agriculture

Entrepreneurial culture also proves to be the key driver for agricultural commercialization, although not many researchers have been able to document the content regarding the entrepreneurial capacity and its ability to transform the mind set of farmers towards more commercialized farming activities (Zhouet *al.*, 2013).

2.5 Marketing of Agricultural Products in Tanzania

Tanzania still relies on traditional export for 45% to 50% of export revenue, while the share of the total export revenue has declined from 70% in the mid of 1980's; coffee, sisal, tea, tobacco and pyrethrum still played an important role in the economy through the exports earnings, however the prices that these crops realize in the world market has been fluctuating for the past decades (Zhouet *al.*, 2013). The prospects of traditional export commodities is not good but the shift to new market especially for high value produce such as vegetable, fruits or flowers is neither easy nor quickly especially for sub Saharan African countries where infrastructure is poor, communication is difficult and financial markets are thin (URT, 2009).

2.5.1 Regional markets

Tanzania has been blessed with the presence of sea on its territories and thus many countries in East and central Africa access to the sea is via Tanzania and some of these countries on differently occasion suffer from shortage of food. Malawi, Rwanda and Burundi for instance have exhausted their high potential land and with rapidly population increase they are chronically food deficit countries. Tanzania could make better use of food production in its southern-western region by servicing the market of the countries on its western borders. Example from the southern highland regions, Tanzania could produce and supply cereals such as maize and other products to Malawi or Burundi considerably cheaply than import through Dar es Salaam or Tanga and this will help to maintain market for cereals producers that are far from Dar es Salaam.

2.5.2 Domestic market

Domestic market in Tanzania absorbs more of agricultural output as about two third of total food consumption is produced on the family farm, the ratio of 42 % for rural families and 18% for urban families Zhou *et al.* (2013). Demand for livestock product which is weak is expected to increase more rapidly than the demand for cereals and staple food as its income inelastic is higher, the domestic economy has also absorbs agricultural raw materials as about 5000 tons of produced tobacco is absorbed annually by local market (URT 2009). Marketing of agricultural crops especially food crops has been progressively liberalized since 1984, as in 1987 weight limits and permit requirements for grain trade between regions were lifted, minor crop export were liberalized and domestic marketing of inputs were opened to private sector, the removal of restrictions on maize marketing coupled with good weather and improved road network has led for reduction in the real market price of maize (URT,2009).The government of Tanzania in the mid of 1980's and early 1990's as a part of structural adjustment program put forward some

series of major reforms including decontrolling of marketing of crops as the way to for cooperative and private traders to participate in marketing aspects of all agricultural crops in a competitive marketing environment.

2.6 Market Concentration

Market concentration measures the proportion of the total market share accounted for by the top largest firms in an industry. It is a function of the number of firms and their respective shares of the total production or sales. Alternative terms for market concentration are industrial concentration and seller concentration. However, a minor difference is that industrial concentration concerns the distribution of production within an industry, while seller concentration looks at a market (Margetts, 2006). Market concentration is the key element in market structure and an important determinant of conduct and performance and hence the type of competition, it reflects the degree of competition in the market. Studying market concentration helps to provide useful guidelines for competition policy, taking into account dynamic aspects of competition. Mangisoni and Kayenga (2006) pointed out that as market concentration increases, competition and efficiency decrease and chances of collusion and monopoly increase. Therefore, a higher concentration measure represents a higher level of lack of competition i.e. few participants dominate the market.

Market structure is the manner in which markets or industries are organized and it is largely dependent on the number of participants or firms in the market or industry and the extent of market control of each participant. The two extremes are perfect competition and monopoly or monopsony. Perfect competition represents the theoretical benchmark structure of efficiency that contains a large number of participants on both sides of the

market, and no market control by any firm. Perfect competition is an idealized market structure that is not observed in its purest form in the real world.

The three market structure models with varying degrees of market control on the supply side are monopoly, monopolistic competition and oligopoly. While on the demand side there are monopsony, monopsonistic competition and oligopsony (Margetts, 2006). The theory of 'imperfect competition' explains the nature and implications of markets dominated by one or few sellers or one or few buyers. In each case of imperfect competition resources are underutilized and total production decreases than would be characterized by the preferred perfect competition (Todaro and Smith, 2003).

2.7 Trends in Cereal Production and Productivity in Tanzania

2.7.1 Maize and paddy

Maize is considered as the most important food crop in Tanzania covering 45% of total arable land and generating close to 50% of rural cash income, an average of 100 dollar(USD) per maize producing household in 2008 (USAID, 2010). Ministry of Agriculture, Food Security and Cooperatives (MAFSC) reports more than 20 regions in Tanzania are producing maize annually, mainly of white type, the southern regions of Iringa, Rukwa, Ruvuma and Mbeya account for more than 35% of the total annual maize production, they produce surplus maize compared to consumption levels, while there are deficits in the northern highlands, Dar es Salaam, and central regions providing an opportunity of good market for the commodity.

Since the introduction of maize to Tanzania, its acceptance as a food crop has been increasing and it now the most food preferred by large population; it has shown abundant potential as a cash crop for farm household, so most of household allocate about half of

their farming land (hectares) to its production. While the amount of land allocated to maize production has been increasing, its productivity per unit land has been declining since liberalization of the maize market in 1984, partly due to liberalization of agricultural sector especially the input sector (Urassa, 2010).

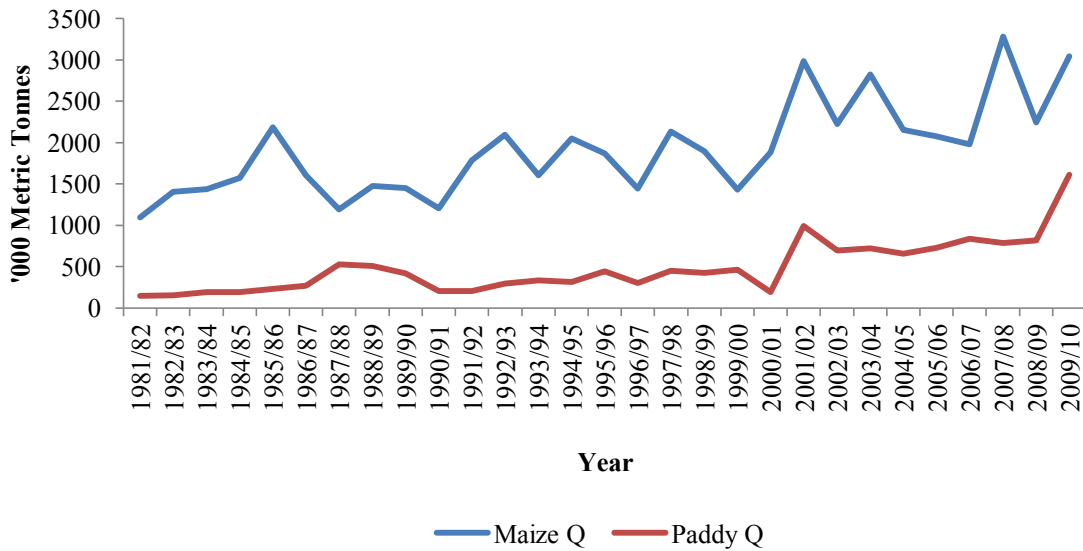
The removal of pan-territorial prices on both inputs and maize crop has damaged the sector, causing a decline in productivity, shift maize production between regions within the country depending on its profitability (Urassa, 2010). Increase access to new technologies and improvement in the marketing situation may increase income and profit and thus lead to reduction in poverty. Skarnstein (2005) cited by Urassa (2010), reported that a key to deregulation of prices and adoption of free marketing for both inputs and output (crops) is having correct input prices as well as correct higher producers' prices; these then motivate the producers to increase their production efficiency through more investment and higher land and labor productivity.

The overall trends in maize production and productivity for the past three decades from 1981/82 to 2009/10 are shown in Figures 3 and 4 respectively; production of maize has been increasing over time despite the fact that its productivity over the period shows an fluctuating trend, increased in 1981 to 1996 before declining again in 2009/10. Maize recorded a production of 1.1 million metric tons in 1981/82 and 2.2 million metric tons in 1995/96, where else a total of 3 million metric tons were produced in 2009/10. On the other hand, maize productivity was 1.1 tons per ha in 1981/82 and 1.8 metric tons per ha in 1995/96, while in 2009/10 productivity declined to 1.5 metric tons per ha as per National Agricultural Input Voucher Scheme (NAIVS), report (2013).

Rice (*Oryza sativa*) is the third most important food and cash crop; and it's among the major sources of employment, and income for many farming households. According to the Agricultural census of 2004, 17% of all agricultural households in the country grow rice and its production in Tanzania covers approximately 681 000 ha, representing 18% of cultivated land and almost all rice (99%) is grown by smallholder farmers using traditional seed varieties (URT, 2010). Nearly half of the country's rice production is concentrated in the regions of Morogoro, Shinyanga, Tabora, Mwanza and Mbeya. The first four rice producing regions are located in the east and northern part of the country and the fifth is located in the south. Figure 3 and 4 shows the production and productivity trend in rice sector.

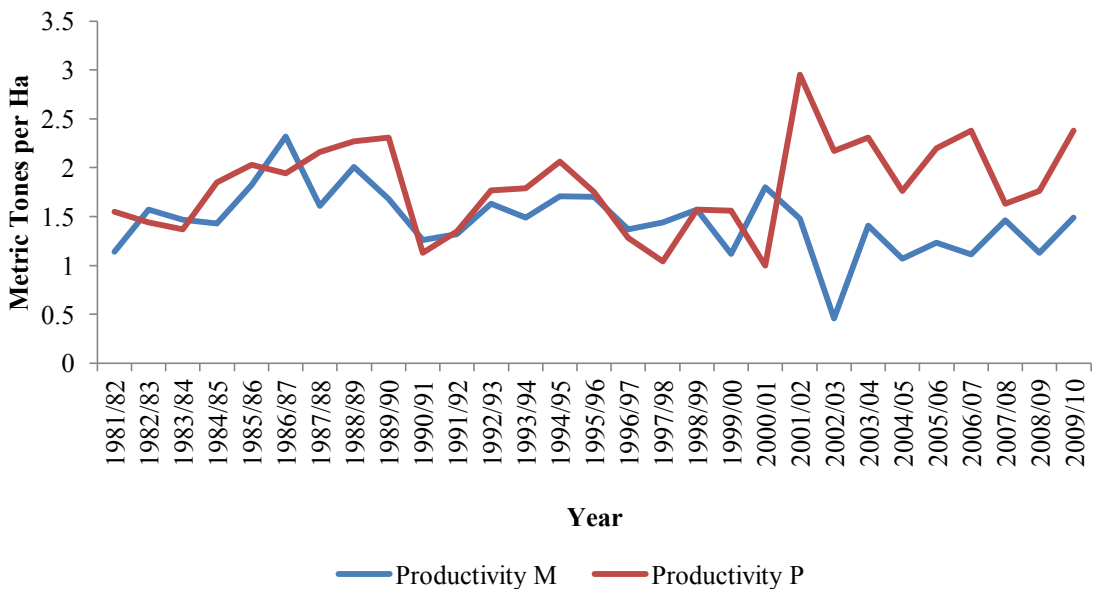
For paddy, both production and productivity over the period (1982/2010) have been increasing; In 1981/82, 145200 metric tons were produced, with productivity at 1.6 metric tons per ha; In 2009/10 production of paddy was 1.6 million metric tons, with productivity at 2.4 metric tons per ha. Both production and productivity of paddy were observed to rise between 1981 and 2010, but despite the gradual rise there is existence of some notable ups and down both in crop production and productivity.

Upon comparison between the two commodities in terms of quantity produced maize has been far better compared to paddy, while in terms of productivity paddy performs slightly better in comparison to maize. This trend in production and particularly productivity of maize and paddy can be explained by the fact that over time paddy becomes a more attractive crop to farmers due to its higher prices in the market compared to maize (although increase in the price is almost at the same rate). In addition, the government has developed a number of projects to promote paddy production through irrigation in the country which also leads to the good performance of paddy compared to maize which depends mainly on rainfall.



Source: NAIVs – Agricultural Input Section

Figure 2: Trends in Crop Production between maize and paddy



Source: Constructed using data from MAFC – Agricultural Input Section

Figure 3: Trends in Productivity between Maize and Paddy

2.7.2 Beans and Groundnuts Production

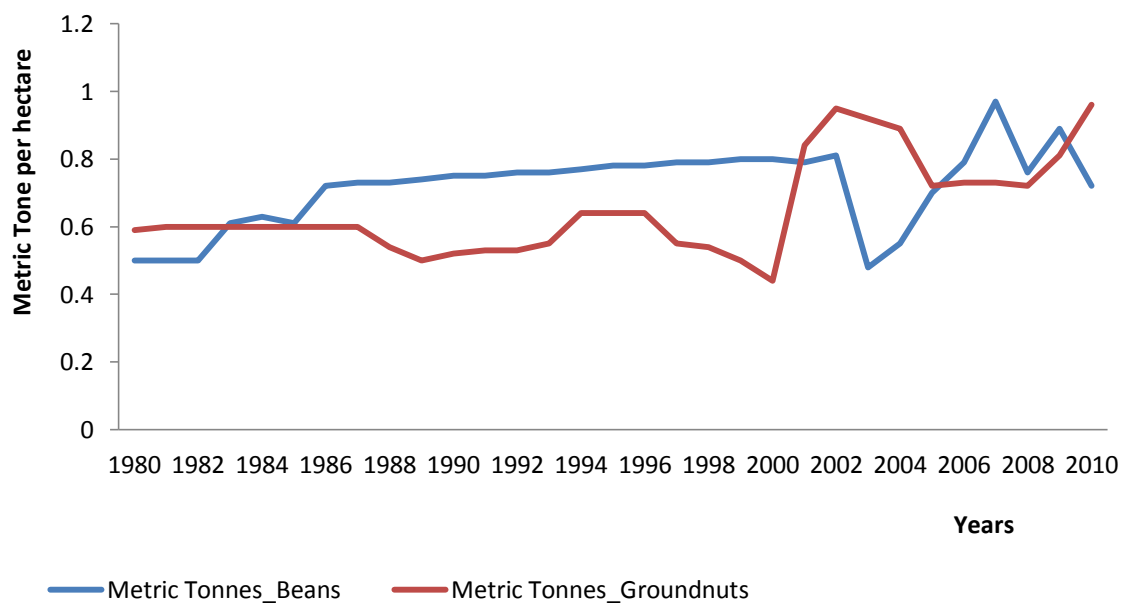
Common beans (*Phaseolus vulgaris*) play an important role for most Tanzanians; together with maize and rice; beans are the major food crops for smallholders farmers in the country, about 75% of rural household depend on beans for daily subsistence (CIAT, 2008); further more they more point out that beans are an important source of protein for low income households in rural and urban areas, providing about 38% of utilizable protein and 16% of daily calorific requirement.

Due to the importance of beans to the Tanzanian population, national bean research programme (NBRP) was initiated in the early 1980's with the objective of identifying high yielding varieties that are also resistant to diseases and insects pests (Urassa, 2010). Figure 5 shows that Tanzania bean yield (MT/Ha) has been observed to gradually increasing from 1981 to 2003, before sharply declining in 2004/2005 then rise again in the following years, trend in beans productivity in the country has an implication on smallholders farmers orientation towards the market, as the increase in yield will prompt many farmers to engage in the market; however, because of various constraints such as poor agronomic practices, inaccessibility of the market present a significant impediments to the farmers especially smallholder farmers upon participating in these market.

Groundnuts (*Arachis hypogaea*) was introduced in Tanzania by the British Overseas Food Corporation (BOFC) through the famous groundnuts schemes which covered Dodoma, Tabora and Mtwara regions, However the scheme failed and was abandoned in the early 1950's. Generally groundnuts are grown by smallholders farmers and are one of the raw materials for edible vegetables oil in the country, according to World Geography of Peanut (WGoP) (2013), constraints on the production of groundnuts in Tanzania include adverse weather conditions, particularly unreliable rainfall which has been recognized to

be partly responsible for low yield. Others causes of low yield are lack of improved seeds, poor agronomic practices, pest and diseases, all of these factors also have implication on market participation by smallholders farmers as small quantity produced also have implication on the market orientation.

Trends in groundnuts productivity in terms of yield per acre (MT/Ha) are shown in the Figure 5; the productivity were observed to decrease from 1986, then it gradually rise before falling backward again in 1997, from 1998/2000 productivity sharply increases, and the trend was observed to rise and fall periodically. Urassa, (2010) observed that groundnuts yield in Tanzania seems to have changed from its downward trend between 1966/1985 and started to rise during the 1986/2006, perhaps in response to the need of oil industry following liberalization of the economy and greater availability of buyers, particularly in the vegetable oil industries.



Source: FAOSTAT (July, 2015)

Figure 4: Tanzania bean and groundnut productivity trend 1980-2010

2.8 Contribution of Agricultural sector in the Economy and Food Security

Tanzania Development Vision (2025), visualize that by 2025 the economy will have been transformed from low productivity agricultural economy to semi-industrial economy led by modern and highly productive agricultural activities which are effectively integrated and cushioned by supportive industrial and services activities in urban and rural areas (URT, 2009). In summary the sector has played the following significant roles in the economy and food security by contributing to; Gross domestic product, national food security, employment (formal and informal), production of raw materials and poverty reduction.

Agriculture sector has forward and backward linkages with other sectors. And in terms of labour force in the country its shown to be growing up to 18.7 million with more than 70% of people are involved in agricultural activities whereby women forms 54% of labour force and the remaining 46% are from men; because of that improvements of agricultural operation, capacity building to enhance skills of farmers and other stakeholders is unavoidable and will have large impact to the majority particularly through increase of income as the move will have the multiplier effects on both agriculture and non-agriculture sector through increased demand for goods originating from agricultural activities (URT, 2009).

In order to ensure greater contribution of agriculture to the national economy and food security, the government of Tanzania has come out with different policies for the development of the sector; one of it is the agricultural and livestock policy of 1997 with the ultimate goal of improving the wellbeing of the peoples whose principal of occupation and a way of life has based on the agriculture with the most of people targeted were smallholder farmers and livestock keepers who do not produce surplus for market, thus

the policy aimed at commercializing agriculture so as to increase income. National food security was also put into perspectives by improving national standards of nutritional through increasing the outputs, food quality and availability. Other goals of the policy were on increasing foreign exchange, produce and supply raw materials and expand the role of the sector as market for local industrial outputs, promote access to credit, development of human resource (URT, 2009).

2.9 Agricultural Commercialization and Food Security

Von Braun (1995) urges that the effects of commercialization on income, consumption, food security and nutrition is very complex and mainly depend on household preference and intra household allocation. It has both positive and negative outcome, on the positive side; commercialization can produce considerable real income gains, thus enhancing a household's capacity to acquire food. And on the negative side: problem of resources allocation between cash crop and food crop as well as on the decisions upon spending of income depending on who controls the income as it can cause less food available for household consumption with little amount of income spent on food items.

Peters and Hererra (1994) in their research done in Malawi pointed out that income from market participation was positively correlated to nutritional adequacy, with per capita income and per capita expenditures being the most important determinants of child nutrition, however the rise in farmers income were not correlated with the health of children as the study shows the health status of children with farmers participating in the market were not significantly different from those of the farmers that do not participate in the market, thus agricultural initiative that guarantee income to the rural poor should be encouraged.

Mandivamba(2002) summarized the characteristics of hunger that sub Saharan countries do encounter in the following aspects:

- ✓ Poverty is the main causes of hunger and income poverty is at the core
- ✓ Lack of political voice on the part of poor rural famers
- ✓ Few options for coping strategies and social security
- ✓ Most hunger is chronic, but civil war and natural disasters escalates acute or transitory food insecurity
- ✓ Women and children under the age of 5 years are most vulnerable

Form all the aspects it can be understood that the chronic inability of smallholders' farmers and rural entrepreneurs to have their economic interest articulated in the political process is the cause of serious concern for Tanzania future.

2.10 Performance of Agriculture and Rural Development

In Tanzania about 75% of population is employed in agriculture sector where the level of productivity is among the lowest in sub Saharan Africa, and it is much attributed by the overreliance on unpredictable natural precipitation, very low usage of improved seed as only 12000 tons of improved seed are used in the whole country instead of 120 000 recommended per year as well as low application of fertilizers, 9kg per hectares compared with an average mean of 16kg per hectares for SADC countries, small farm sizes and low productivity of indigenous animal breed (URT, 2013).

To a large extent the agricultural sector registered low growth rate than industrial and services sectors for the past decades where by agricultural grows only by 4.4% while the industrial and services sector grow by an average of 8.3% to 7% respectively. The lower growth in agriculture sector explain why although the country has experience increase in

economic growth but it has not been translated to poverty reduction especially in the rural areas where agriculture has been growing more slowly than the other major sectors. Thus the growth of agriculture sector does not substantially influence the GDP growth as it did in 1970's and 1980's when it contributed to about 50% of the total GDP (URT, 2013).

Through its forward and backward linkages the agro-processing, consumption, export and its provision of raw materials to the industries and market for manufactured goods, agriculture still remains to be the major provider of formal and informal employment to most rural dwellers in the country. The major setback to rural development and agricultural growth is low productivity of land and labor, and the factors contributing to low productivity are low expenditure on agricultural research and development, inadequate agricultural financing, poor production techniques, underdeveloped market infrastructure and farm level value addition.

2.11 Challenges Facing the Food and Agriculture Sectors

2.11.1 Food production-population imbalance

Rapid population growth is increasing pressure on the food supplies as well as the natural resources base, in many sub Saharan African state, growth in income and population will demand that food supplies to grow by 4.5% annually (Mandivamba,2012), but because of low productivity in agriculture and thus many farmers are producing for subsistence then it is very unlikely to meet the targeted demand and thus attributes much to the problem of food insecurity.

2.11.2 Low level of employment in rural areas

On average 7 out of 10 people in Tanzania are living in rural areas and it is projected that majority of people will be still living in rural areas by the 2020 where by their main occupation remains to be in agriculture in to which majority of labor force has been employed there with more than 70% of rural population, the industrial and services sector have not been able to generate much employment for rural population hence the incidences of poverty is still very high (URT, 2013). Theories of development urged that in order for rural population to realize economic growth and hence development there is need to diversifies the labour force from agriculture sector to industrial and services sector, it is the duty of the government to initiates programs and policies that can fulfill the triples roles of providing jobs, increasing the purchasing power to acquire food and developing rural infrastructure. Presence of inter linkages between industrial and agricultural planners for developing of policies and programs that deepen on increasing the rate of agricultural growth and spreading employment opportunities through rural economy will provides a way out through the poverty cases in rural areas (Mandivamba, 2012).

2.12 Effects of Agricultural Commercialization

The effects of agricultural commercialization can be documented on both positive side as well as negative side:

2.12.1 Positive effects

Studies done by IFPRI, Von Braun and Kennedy (1995) and World Bank in (2008), in Africa credited agricultural commercialization for increased productivity, and increased household income through market participation; at the society level it also have an impact

on contributing towards food security, and poverty alleviation, through improving economic growth.

2.12.2 Negative effects

Agricultural commercialization have been also negatively criticized upon negatively influencing on nutritional, welfare and environmental sustainability, Pingali and Rosegrant (1995) pointed out that commercialization of agriculture is criticized more for failing to improve household nutrition and livelihood of the poorest, replacing subsistence risks with more market risks; failing to guarantee household food security as well as widening regional inequalities and land degradation through extensively usage of inputs. However Von Braun and Kennedy (1995) underscore the fact that failure in commercialization are due to failure in policies, strategies, institutions, attitude as well as distribution of benefits and cost within household and community.

2.13 Poverty Issue in Tanzania

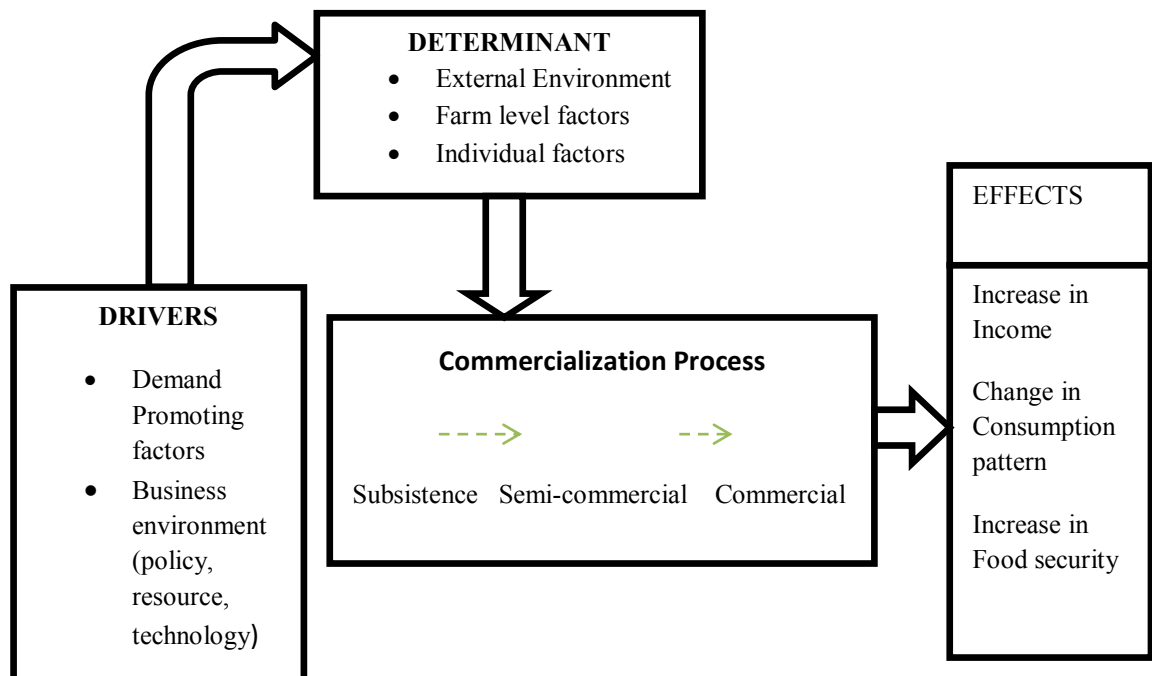
The government of Tanzania when measuring poverty incident it define two poverty lines the food poverty line and Cost of Basic of Needs (C-B-N) poverty line. The CBN poverty line includes not only the minimum food expenditure but also non-food expenditure for subsistence. It is noted that the national food poverty line is not appropriate to measure poverty at a regional level since the food basket used to obtain the national poverty line is derived from the median of the Household Budget Survey (HBS) data, which cannot be reflected in the regional characteristics of food consumption. It is also noted that the poverty lines, which are adjusted by price indexes in order to compare the level of expenditure between different surveys, would include small differences over and under estimation.

The last estimates of poverty incidents in the country were conducted in 2011/12 and it was found out that the BasicNeeds Poverty Line (C-B-N) was TZS 36 482 per adult equivalent per month and food poverty Line were TZS 26 085 per adult equivalent per month. The daily costs of the food poverty line were TZS 858 per adult equivalent (NBS, 2012). The distribution of poor were found to be much concentrated in rural area compared to urban areas whereby Dar es Salaam were found to be substantially well off than other urban and rural areas in the country as it was found out 84.1% of poor lives in rural areas, 14.4% in other urban area and only 1.5% of poor lived in Dar es Salaam. Households with higher number of children under age of 6 years were found to have higher incident of poverty compared to other household as 40.8% of poor household were found to have 3 or more children under age of 6 years of age (NBS,2012).

Poverty Gap is an average shortfall of per capita consumption in the population relative to the poverty line, it identifies the depth of poverty; people living in rural areas were having a poverty gap index of 7.9 compared to that of Dar es Salaam 0.8 and thus people living in rural areas were in deep poverty than that of urban. Income inequality measures extent in which income is distributed in unevenly manner between people in the population, it is measured by using Gini coefficients and it was found out that more inequality is in other urban areas (0.37) compared to Dar es Salaam and rural areas that were having a Gini coefficient of 0.35 and 0.29 respectively (NBS, 2012). Other non-indicators of poverty are such as education, health, employment, household composition, ownership of houses, modern roofing materials, modern wall materials, coverage of electricity national grid, source of energy for lighting, energy for cooking, ownership of motorcycle, and ownership of phones.

2.14 Conceptual Framework

The conceptual framework (Fig. 2) illustrates the relationship between drivers and determinant of agricultural commercialization that resulted to its effects in the farmers' population. It shows a way how agricultural commercialization process resulted into positive effects to the smallholders farmers.



Source: Modified from Zhou *et al.* (2013)

Figure 5: A Conceptual framework model of smallholder agricultural Commercialization

Smallholder agricultural commercialization can be described by key interrelated component of concepts such as drivers, determinant, processes, and effects (outcomes) as presented in Figure 2. Multiple drivers trigger the process of commercialization by increasing the demand, making business environment more enabling through policies and making the operations more efficient through technology change. Policy environment

includes institutions and regulations while the resource environment comprise of infrastructure and other means of communication; as smallholder farmer progress from subsistence towards commercial orientation.

The success or failure can be determined by many factors ranging from environmental factors (socio-economic factors), farm level factors (farm resource such as farm size, use of inputs, extensions services etc.) and individual skills. External environment such as improved roads can influence smallholder farmer to engage in agricultural commercialization by enabling them to transport their agricultural produce to market as well as transport the inputs to the farms. Transactions costs, access to market information, availability of market (both input market and output market) are some of factors whose reforms will determine the decision of smallholder's to participate in commercial activities. Individual factors such as age of household head, household size, education level, and ownership of assets, and access to credit are also essential factors in determining farmer's participation and its extent to commercial agriculture. All these are determinants of agricultural commercialization whose effects are also influenced by the drivers of commercialization, and when these factors are favorable they facilitate commercialization making it successful but when they are unfavorable they will hinder the process causing a failure.

2.15 Theoretical Framework

The extent and determinants of agricultural commercialization can be modeled in terms of demand functions within the framework of agricultural household model, where by a household is considered as both a producer and a consumer.

The household utility function can be shown as follows:

$$U = u(X_i, X_m, \ell, D_h) \dots \dots \dots 1$$

Whereby U is the utility function (assumed to be twice differentiable, increasing and strictly quasi-concave). X_i and X_m are vectors of home produced and market produced goods respectively that are consumed by household i, ℓ , is the leisure and D_h presents a set of demographic characteristics that influence the preference of household members and the level of utility derived from consumption of goods and leisure. Utility of the household is maximized from consumption of goods subject to farm production, income and time constraints as described here under:

$$Q(Q_i, L, A, K) = 0 \dots \dots \dots 2$$

$$P_i(Q_i - X_i) - P_m X_m - \omega(L - L_f) + N = 0 \dots \dots \dots 3$$

$$T = L_f + \ell \dots \dots \dots 4$$

Where by $Q(\cdot)$ is an implicit production function well behaved (twice differentiable, increasing in the output, decrease in inputs and strictly convex), Q_i is the vector of quantities of good produced by household on the farm, L is the total farm labor inputs, A and K are household fixed quantities of land and stock of capital, P_i is the price of good i, P_m is the price of marketed purchased goods; $(Q_i - X_i)$ marketed of surplus good i, ω is the wage rate; L_f is the household labor supply used by the farm, N is the non-farm income, T is the total time available for household that is located between farm work and leisure.

The income and time constraints can be combined into one equation as:

$$P_i(Q_i - X_i) - P_m X_m - \omega(L - T - \ell) + N = 0 \dots \dots \dots 5$$

When re arranged will give out

$$P_i X_i + P_m X_m + \omega \ell = P_i Q_i + \omega T + \omega L + N \dots \dots \dots 6$$

The left hand side of the equation represents household expenditure on home produced and marketed purchased goods and its own leisure time and the right hand side is the full income equation, representing the value of total agricultural production, the value of household entitlement on time, the value of labor used on farm including hired labor and non-farm income.

Assuming that all relevant inputs and outputs market function well, production and consumption decision are separable. The household behave as though its production decision is made first, and general full income is allocated between agricultural production and leisure. Therefore, participation decision depends on production decision and variables but not vice versa (Kirimi *et al.*, 2013). The first order condition can be solved for input demand (L^*) and output supply (Q^*) in terms of prices, wage rate, land and capital

$$L^* = L^* (P_i, P_m, \omega, A, K) \dots \dots \dots 7$$

$$Q^* = Q^* (P_i, P_m, \omega, A, K) \dots \dots \dots 8$$

Given the optimum input (L^*) and output level (Q^*), the full income obtained when profit are maximized is given by substituting L^* and Q^* into equation

$$Y^* = P_i Q_i^* + \omega T - \omega L^* + N \dots \dots \dots 9$$

$$Y^* = \omega T + \mu^* (P_i, P_m, \omega, A, K) + N \dots \dots \dots 10$$

Where Y^* is the full income that is achieved under the assumption of maximized profit, μ^* on the consumption side, first order equation can be solved for consumption demand as:

$$X_i^* = X_i(P_i, P_m, \omega, Y^*) \dots \dots \dots 11$$

$$X_m^* = X_m(P_i, P_m, \omega, Y^*) \dots \dots \dots 12$$

The equation above shows the demand for home-produced, and market produced goods respectively, one of which is food. The four equations (7, 8, 11, and 12) can be combined through the profit effects, given that production decision contribute to income through farm profit as the factors influencing production affects income and hence market participation decision.

Based on this and incorporating households demographic characteristics (D), determinants of agricultural commercialization can be represented as:

$$X_{i,m}^* = X_{i,m} \{P_i, P_m, \omega, Y^*(P_m, \omega, A, K, N), D\} \dots \dots \dots 13$$

2.15 Research gap

Many literatures have concentrated on the effects of agricultural commercialization leaving the gap on the determinant as well as outcomes of agricultural commercialization to small holder farmers. On large part this study has been on exploring what as the determinant, extent and outcomes of agricultural commercialization to smallholder farmers that are growing food crops especially maize, beans, rice and groundnuts.

The study couldn't cover all aspects of agricultural commercialization and leave areas for further research, those areas are on investigating why there is limited involvement of private sector on smallholder agricultural commercialization as well as entrepreneurship and investment in smallholder farmers.

CHAPTER THREE

3.0 METHODOLOGY

3.1 Description of the Study Area

United Republic of Tanzania covers a land area of 885 800 square kilometers and extends from the Indian Ocean coastline to more than 1000km inland. The topography ranges from sea level to over 1600m altitude in the west. The highest point in the country is Kilimanjaro Mountain that is at 5895m altitude. Much of the country lies above 1000m altitude with many areas above 1500m in the center and north. The coastal areas and southern areas are generally lower altitude. The northern borders lie almost on the equator while the southern border is at around 12°S.

Tanzania has got a tropical climate but has regional variations due to topography; in the highlands, temperatures range between 10 and 20 °C (50 and 68 °F) during cold and hot seasons respectively. The rest of the country has temperatures rarely falling lower than 20 °C (68 °F). The hottest period extends between November and February (25–31 °C or 77.0–87.8 °F) while the coldest period occurs between May and August (15–20 °C or 59–68 °F).

The country is characterized by seasonal rainfall; Seasonal rainfall is driven mainly by the migration of the Inter-tropical Convergence zone. It moves southwards in October to December, reaching the south of the country in January and February, and returning northwards in March, April, and May. This causes the north and east of Tanzania to experience two distinct wet periods – the short rains (or "Vuli") in October to December and the long rains (or "Masika") from March to May – while the southern, western, and

central parts of the country experience one wet season that continues October through to April or May.

The 2012 Population and Housing Census results show that, Tanzania has a population of 44 928 923 people of which 43 625 354 is on Tanzania Mainland and 1 303 569 is in Tanzania Zanzibar. The economy of Tanzania mainly depends on both, industrial and agriculture sector, however agricultural sector is dominant one as more than 70% of the population is engaged on agricultural activities, and the country is famous for producing both food and cash crops. The main food crops produced in the country include maize, paddy, beans and sorghum, Irish potatoes and sweet potatoes. The main cash crop includes coffee, cotton, pyrethrum and tea. Livestock keeping is also one of the important economic activities in the country.

The study used the data from the National Panel Survey (NPS); NPS recognizes explicitly four analytical strata as its study population; the strata are Dar es Salaam, other urban in mainland, rural areas in mainland and Zanzibar, but due to time constraints in case of this study the chosen study area were only three strata of Dar es Salaam, other urban in mainland and rural areas in mainland. Within each stratum, clusters were randomly selected as the primary sampling units; in urban areas clusters match enumeration areas while in rural areas clusters match the village.

3.2 Research Design

The study was carried out in Tanzania mainland and used longitudinal research design; it used the two round agricultural season of 2010/11 and 2012/13 data generated by the Tanzania National Panel Survey (NPS) conducted as part of the World Bank; Living Standards Measurement Survey (LSMS) in collaboration with the Tanzania National

Bureau of Statistics (NBS). Data were collected on the characteristics of the households, social economic living standard and farm specific variables as well as income and expenditure variables.

3.3 Study Population and Sampling Procedure

NPS in collaboration with LSM-ISA project used multi stage sampling technique to select representative farming household on nationwide range to be involved in the data collection on various topics including agricultural production, non-farm income, consumption expenditure, wealth and other social economic characteristics. The study sample were 3846 farming household grouped in four domain of inference, namely Dar es Salaam, other urban areas on mainland, rural mainland and Zanzibar, multi stage sampling were used because it took in cognizance the demarcation of the study area into districts, wards and villages scattered in wide geographical area. Multi stage for the data collected involved different stages. First stage involves simple random selection of district, after selection of districts then second stage involves simple random selection of wards and villages to be involved in the survey. After the multi stage sampling technique, simple random selection of the household was subsequently employed to be involved in the study so as to avoid biasness on the selection of respondents. The household was sampling unit for the data collection. After data cleaning for this survey the number of respondents used for analysis were 2424 that incorporates households involved in production of food crops especially maize, paddy, beans and groundnuts.

3.4 Data Processing and Analysis

3.4.1 Data processing

Data collected by structured questionnaires were coded, summarized and entered in the Statistical Package for Social Science (SPSS) and STATA computer programs.

Descriptive statistics was used to characterize farmers according to different socio-economic characteristics; also involved calculation of poverty line as well as profiling farmers according to their poverty status. The government of Tanzania upon estimating the poverty incidents in the country, they mainly use two poverty lines, the food poverty line and Cost of Basic Needs (C-B-N) poverty line, the C-B-N poverty line includes not only minimum food expenditure but also non-food expenditure for subsistence. The C-B-N calculated in the study were adjusted for the prices in order to compare minimum expenditure between time, it involves calculation of Per capita expenditure per adult equivalent per month (PCE) and mean per capita household expenditure per month (MPCHE).

$$\text{Per Capita Expenditure (PCE)} = \frac{\text{Total household Expenditure}}{\text{Adult Equivalent}} \dots\dots\dots \text{i}$$

$$\text{Mean per Capita Expenditure (MPCHE)} = \frac{\text{Total Household PCE}}{\text{Total Number of respondents household}} \dots\dots\dots \text{ii}$$

A relative approach was used in which household was defined as poor relative to other in the same society or economy. Categorization of Poverty line was given as, Poor household were those spending less than two third of MPCHE and Non Poor household were those spending greater than two third of MPCHE (Omonona *et al.*, 2008).

Commercialization of agriculture was calculated as the ratio of total value of crop m sold by the households i to the total value of crop m produced by the same households i expressed as percentage. The entire crop subsector commercialization will be determined by using commercializationIndex (Mdoe *et al.*, 2013).

$$CI = \frac{\sum_{j=1}^m GVS_{ij}}{\sum_{j=1}^m GVP_{ij}} * 100$$

Where:

CI= Commercialization Index

GVS_{ij} = Gross Value of sales of i^{th} household for j^{th} crop

GVP_{ij} = Gross Value of Production of i^{th} household for j^{th} crop

The index measures the extent to which crop production oriented towards the market. A value of zero would signify a total subsistence and closer to the index is 100, the higher the level of commercialization. The present study adopted the Commercialization Index (CI) to determine the level of crop commercialization; the Index captures variation in terms of intensity of commercialization across different crops, thus the degree of commercialization were grouped into three categories of low commercialized ($\leq 25\%$ volume of output sold), Medium commercialized (26%-50% volume of output sold) and High commercialized ($> 50\%$ volume of output sold)(Martey, 2013).

3.4.2 Craig's double hurdle

Objective number (iii) was address by using the Craig's double hurdle model. Craig's double hurdle method was employed to assess the determinants and extent of agricultural commercialization by small holders' farmers in the study area. Crag's double –Hurdle models as adopted by Mathenge and Olwande (2012) was considered for estimating the factors that influence farmers as economic agents to participate in agricultural commercialization. The double-hurdle model is the type of corner solution outcomes, as they define an initial discrete probability of participation model, first it involve conditional on participation ($Y > 0$), a second decision is made on the intensity of participation.

Tobit models were used originally on estimating these models that accounted for clustering zeros due to non-participation; however, its major limitation is that it assumes the same set of parameters and variables determined both probability on market participation and the level of participation (Wooldridge, 2002). A two step-step model however relaxes these assumptions by allowing different mechanism to determine the discrete probability and level of participation. These models allow for separation between the initial decision to participate ($Y>0$ vs $Y=0$) and decision on how much to sell given that ($y>0$). In this case it is assumed that some right hand side variable may affect differently the decision to participate at all and the decision on the level of participation. The first step in two-tier model involves probit estimation while the second stage can take different functional form distribution. The simplest two step model for a corner solution outcome assumes that conditional on $Y>0$, $Y \mid X$ follows a lognormal distribution (second stage)

$$P(y = 0|x) = 1 - \mu(x \alpha)$$

$$\log(y) \mid (x, y > 0) \sim \text{Normal}(x\beta, \delta)$$

Double-hurdle model of Craig (1971) is commonly used two tier model, as in this model second stage is defined by a truncated normal distribution instead of log normal distribution described here. The main advantage of the truncated normal distribution over lognormal is that it nests the usual Tobit model thus allowing testing restriction implied by Tobit hypothesis against two step model (Wooldridge, 2002).

Double hurdle can be noted by:

$$P(y = 0|x) = 1 - \mu(x\alpha)$$

$$\log(y|x,0) = 1(y=0) \ln \left[\mu, \left(\frac{\chi\beta}{\delta} \right) \right] + 1(y>0) \ln \left| \frac{\mu(\chi\beta)}{\mu\left(\frac{\chi\beta}{\delta}\right)} \right| + \ln \left[\frac{1}{\delta\sqrt{2\pi}} \exp\left(-\frac{1}{2\delta^2}(y - \chi\delta^2)\right) \right]$$

The main issue between a sample selection model and a corner solution model is data observability, for corner solution problems, all data is observed and non-participation implies that some economic agents have made the optimal choice of a corner solution i.e. $y=0$ such as expenditure on research and totally home consumption. This study will also adopt the two step method advanced by Craig (1971), usually referred as double-hurdle model to model market participation decisions, and thus we assume non-participation as purely economic decision by household not to participate in the market. The double hurdle model contains two equations:

$$d_i^* = Z_i\alpha + u_i \begin{pmatrix} \varepsilon \\ u_i \end{pmatrix} \sim N \left[\begin{pmatrix} 0 \\ 0 \end{pmatrix}, \begin{pmatrix} 1 & 0 \\ 0 & \sigma^2 \end{pmatrix} \right]$$

$$y^* = X_i'\beta + v_i$$

From the diagonality of the of the covariance matrix, the two error terms are assumed to be independently distributed. The first hurdle is then presented by:

$$d_1 = 1 \text{ if } d^* > 0$$

$$d_1 = 0 \text{ if } d^* \leq 0$$

The estimated double hurdle model for market supply thus takes the following specification:

$$P(y_1 = 1) = P(Q_* > 0) = x_i\alpha + \varepsilon \dots \dots \dots a \text{ Market Participation model}$$

The dependent variable y_1 is then market participation in terms of gross sales of output, based on the equation a above; estimated empirical model will include various explanatory variables hypothesized to affect agricultural commercialization and thus the regression equation can be expressed as:

$$Y_{it} = \alpha_0 + \chi_1\alpha_1 - \chi_2\alpha_2 + \chi_3\alpha_3 + \chi_4\alpha_4 - \chi_5\alpha_5 + \chi_6\alpha_6 - \chi_7\alpha_7 + \chi_8\alpha_8 + \chi_9\alpha_9 + \chi_{10}\alpha_{10} + \varepsilon \dots \dots \dots b$$

Where by

Y_{it} =Market participation for maize, rice, beans and groundnuts(Y_{it} =1 if participated in the market, 0 otherwise)

α =parameters to be estimated

χ_1 =sex of household (dummy variable, 1=male, 0 otherwise)

χ_2 =Household head age (years)

χ_3 =literacy of household head (dummy variable 1= attend school (literate), 0 otherwise)

χ_4 =Land size allocated for production (acres)

χ_5 = household size

χ_6 =value of assets ownership (Tanzania shillings)

χ_7 =Distance to the nearest market (kilometers)

χ_8 =Use of inorganic fertilizer (Dummy variable 1=Yes, 0 otherwise)

χ_9 = Inputs on credit (Dummy variable, 1=yes, 0 otherwise)

χ_{10} = Use of improved seed (Dummy Variable, 1=Yes, 0 otherwise)

ε = error term

Equation *a* and *b* define the market participation model where y_1 takes the values of 1 if household made any positive sales to the market and value of zero if no sales were made.

$Q_* = Z_i\beta + u$*c* Intensity Model

Equation *c* is the second part of the hurdle; this is truncated normal regression equation that shows the intensity of the gross sales of output. Q_* Is the proportion of quantity sold (or alternatively might represent valued sold), x_i and Z_i define factors affect the discrete probability of participation and intensity of participation respectively.

The equation for quantity of gross output sold can be expressed as follows:

$$Q_* = \beta_0 + Z_1\beta_1 - Z_2\beta_2 + Z_3\beta_3 + Z_4\beta_4 - Z_5\beta_5 + Z_6\beta_6 - Z_7\beta_7 + Z_8\beta_8 + Z_9\beta_9 + Z_{10}\beta_{10} + \mu$$

.....d

Where by

Q_* = Output quantity sold for maize, rice, beans and groundnuts

β = parameters to be estimated

Z_1 = Sex of household head (1=male, 0 otherwise)

Z_2 = household head age (years)

Z_3 = Literacy of household Head (1=literate, 0 otherwise)

Z_4 = Land size allocated for production

Z_5 = household size

Z_6 = Value of assets ownership

Z_7 = Distance to the nearest market

Z_8 = quantity of inorganic fertilizer used (Kg)

Z_9 = Inputs on credit

Z_{10} = Quantity of Improved Seed (Kg)

μ = Error term

3.4.3 Description of variables used in the model

Different factors are assumed to influence smallholders' farmers to participate in the market for their produce, but for this study we group different factors into demographic characteristics and human capital; ownership of assets, distance to nearest market and tarmac road, accessibility of inputs on credit and use of inorganic fertilizers.

Demographic characteristics and human capital: included in this study are; sex of household head, age of household head, education (literacy) of household head and household size. Sex of household head is expected to capture differences in market participation between males and females, with male expected to have a higher propensity to market (more commercial oriented) than females. Age of household head is an indicator of dependency (Risk aversion). It is expected that higher age and therefore more risk averse with commercial orientation as older household head tends to be more dependents and hence more subsistence production activities (Mathenge and Olwande, 2012).

Human capital is represented by attendance in the school by the household head (whether he/she ever attending school or not), as education enhance skills and ability to utilize market information, which may reduce marketing costs and make it profitable to participate in the market.

Household size is expected to negatively affect market participation as it is expected higher household size will results into higher consumption of household produce and thus reduce amount of produce that will be oriented towards the market.

Land size: Land may have indirect positive impacts on the market participation by enabling farmers to generate production surpluses, overcome credit constraints, where land can be used as collateral for credit, and allow them to adopt improved technologies that increase productivity.

Distance to nearest market: Distance to nearest market is included in order to capture the role of travel time and costs, which are expected to impact negatively on market

participation. These are sometimes termed as location specific constraints that tend to hinder extent of market participation.

Access to input on credit: Accessibility of input on credit by farmers will tend to increase market participation by smallholders farmers through reducing the credit constraints that are facing them and thus they can increase their produce and quantity that is oriented towards the market.

Use of Inorganic fertilizer: inorganic fertilizer increase the productivity especially to depreciated land and thus it expected that if the farmer will be using inorganic fertilizer will increase the output and thus increase the produce that is oriented towards the market.

CHAPTER FOUR

4.0 RESULTS AND DISCUSSION

4.1 Descriptive Analysis Results for Socio Economic Characteristics of Households

This subsection presents a discussion on socio-economic characteristics of both poor households and non-poor households for comparison purpose, involving two rounds survey of 2010/11 and 2012/13. Under this study poverty were measured by using the level of consumption and expenditure at the households level, thus poverty line were defined on the costs of basic needs including additional allowances for non-food essentials where by a households were defined poor relative to the other if they spend less than $\frac{2}{3}$ of mean per capita expenditure and non-poor households were those spending equal or greater than $\frac{2}{3}$ of mean per capita expenditure and this standard is according to World Bank Standard. Results show that 41.7% and 30.7% of the study population were poor households for 2010/11 and 2012/13 surveys respectively; 58.3% and 69.3% were non-poor households for 2010/11 and 2012/13 respectively.

4.2 Demographic Characteristics

Demographic characteristics considered here are age group, marital status, sex, family/household size and education level for the households' heads. Demographic characteristics of the households' heads have important implications on the poverty level of the households as well as market participation practices and decision. They provide an important signal on the behavior of households especially in the decision making process.

Table 2: Distribution of respondents' demographic characteristics

Variable	2011	% Poor 2013	%Non-poor 2011	2013	χ	df	Sign
Age group					9.09	3	0.028*
18-35	19.6	21.3	24.5	26.6			
36-50	38.3	33.2	34.3	33.4			
51-60	16.0	18.6	19.3	19.9			
Above 60	26.1	26.9	21.9	20.1			
Marital status					10.38	6	0.110
Married	76.4	77.1	77.7	75.6			
Single	1.1	1.2	1.5	2.6			
Separated	5.3	5.6	6.0	6.0			
Divorced	2.8	3.4	2.6	3.5			
Widowed	14.4	12.7	12.2	12.3			
Sex					0.18	1	0.677
Male	74.0	75.3	78.7	78.7			
Female	26.0	24.7	21.3	21.3			
Education					18.42	1	0.000*
Never attend School	35.1	39.2	29.1	16.9			
Primary Education	60.4	59.7	56.5	66.4			
O level + some course	4.5	1.1	12.4	13.6			
A level +some course	N/A	N/A	0.5	0.8			
Diploma + University	N/A	N/A	1.5	2.3			
Mean size of household		6.36.4	5.1	4.9			

* Significant at 5%

4.2.1 Age of respondents

Results show that the mean age of respondents in the study population were 50 years of age for the poor households' heads and 48 years of age for non-poor households. More than 50% of the respondents were in productive age group between 18 years to 50 years for both poor and non-poor households in both round, but in the population of households' heads within the age group of 51-60 more than 15% of respondents fall in the poor households' category in both rounds. Over 26 % of poor household heads falls to the group of respondents above 60 years of age and this has implication on the productivity ability, dependency and hence the poverty level in the households compared to that of

non-poor households whereby only 21% of households' heads were found to be in the age group above 60 years in both 2011 and 2013.

The results of chi-square suggest that there is evidence of relationship between the age group and the status of poverty in the households for the survey round 2012/13; (chi-square=9.085, df 3, $p \leq 0.05$) with large proportions (69.5%) of poor households in the age category above 60 years, while only 38.3% of non-poor households were in the age category above 60 years for the year 2013. This can be attributed to the fact that with the increase in the age above a certain level (60 years and above), the ability of households' heads to be actively involved in production activities decreases and thus decreases the availability of income to provide basic needs for households members.

4.2.2 Education of the households heads

Although relatively small, there was a decrease in the percentage of both poor and non-poor households whose heads had never attended school in the periods 2010/11 to 2012/13 from 36.1% to 35.5% and 24.1% to 18.8% respectively. Percentage of households' heads that finished primary education were higher in poor households (60.4%) compared to non-poor households (56.5%) for the year 2010/11 while 59.7% and 66.4% of the households' heads were primary education leaver who spent not more than seven years for both poor and non-poor household respectively for the year 2012/13. The results generally concurred with the findings of agricultural marketing information study which reported that large number of peoples in the country that are involved in agricultural marketing are primary education leavers (URT, 2009).

Percentages of households' heads that finished ordinary level education increased for non-poor households in the two survey rounds while it decreased for poor households. None of the poor households in the two surveys recorded to either finish diploma or

university education while 1.5% and 2.3% of the non-poor households' heads recorded to finish either diploma or university level education in 2011 and 2013 surveys respectively. This information's have got an implication on market participation between these two groups as the increase in the level of education has implication on reducing cost of transactions due to increased awareness, access to information as well as bargaining power of an individual.

Under the chi square test there is evidence of relationship between whether a households' heads attended school or not and the poverty status of households' for the survey year 2012/13 (chi square 108.55, df 1, $p \leq 0.000$) whereby household heads that never attended school were more likely to be poor (71.9%) compared to their counterpart households that attended school (28.1%percentage).

4.2.3 Sex of household head

The results in Table 2 show a decrease in the percentages of female headed households that are poor from 2011 (26%) to 2013 (23.8%)while for poor male headed household, increased from 74 % in 2011 to 76.2% in 2013. In the same time span, the percentages of non-poor female headed households increased from 21.3% in 2011 to 23% in 2013,as the non –poor male headed households decreased from 78.7% in 2011 to 77% in 2013.

The fact that percentage of male headed household is higher than female headed household can have an implication on decision and rate of market participation for agricultural output as Ruhangawebare (2010) observedthat men are the one involved in daily management of farming activities and thus they have more power upon making the decision on agricultural output to be sold and the kind of inputs to be purchased.

4.2.4 Marital status

The Results in Table 2 show increase in the percentage of married households' heads that are poor from 76.4% to 79.1% in 2011 and 2013 respectively, on the same time span percentages of non-poor married households heads also increases from 74.4% to 77.7%. Concurrently in the same time span, the proportions of poor widowed households' heads decreases from 14.4% to 11.8%; while there were an increase in the percentage of non-poor households' heads that are widowed from 12.2 % to 12.9%. There were no evidence of relationship between level of poverty in the households and marital status of the households' heads (Chi square =10.38, df 6, $p \leq 0.110$).

4.3 Economic Characteristics

4.3.1 Household land size

The average land size in acres increased from 6.4 to 7.5 for non-poor households and 5.5 to 6.2 for poor households in 2010/11 and 2012/13 respectively (Fig.6) thus with small land size the only hope for the for poor households to make any meaningful gains from agriculture lies on improving productivity of their land and having assurance market for their produce. One of the major inputs for smallholder farmers who deliver their means of livelihood through agriculture is land, land ownership and size can be one of the important factors in determining changes in agricultural production and market participation.

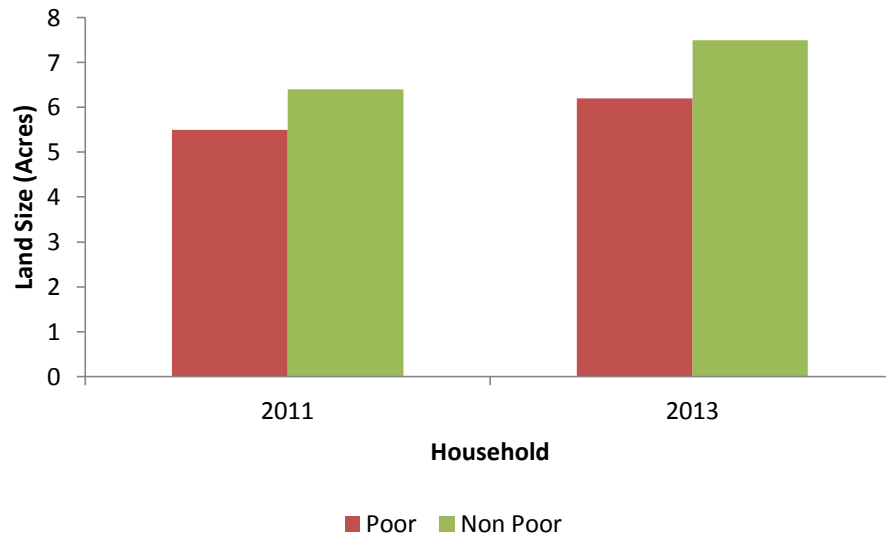


Figure 6: Mean household Land size in acres

4.3.2 Value of households assets

Under this section the study considered various household assets and their current value, the assets in consideration were; radio, telephone (both landline and mobile), television, chairs, sewing machine, computers, cooking utensils, complete music system, motor vehicle, motor cycle, cars, bicycles, animal drawn carts, livestock, poultry, field land, combine harvester, and water pumps. The mean value of households assets are presented in Figure 7, it shows the increase in the value of households assets for the two agricultural seasons with non-poor households recording larger mean value of assets (Tsh 148.31 and 703.22 in 2011 and 2013 respectively) compared to poor households (Tsh 113.11 and 148.31 in the same time span). Increase in the value of assets between two agricultural seasons it shows that households allocates some of their income in accumulating assets, given the fact that households income is expected to increase over time.

With increase in income of household due to increase in the value of accumulated assets, in one hand farmers can indirectly increase agricultural production through purchasing productivity enhancing technologies such as fertilizer and improved seeds rendering to increase on the frequency of market participation, on other hand increase in value of household assets may prompt the household to invest more on non-agricultural activities.

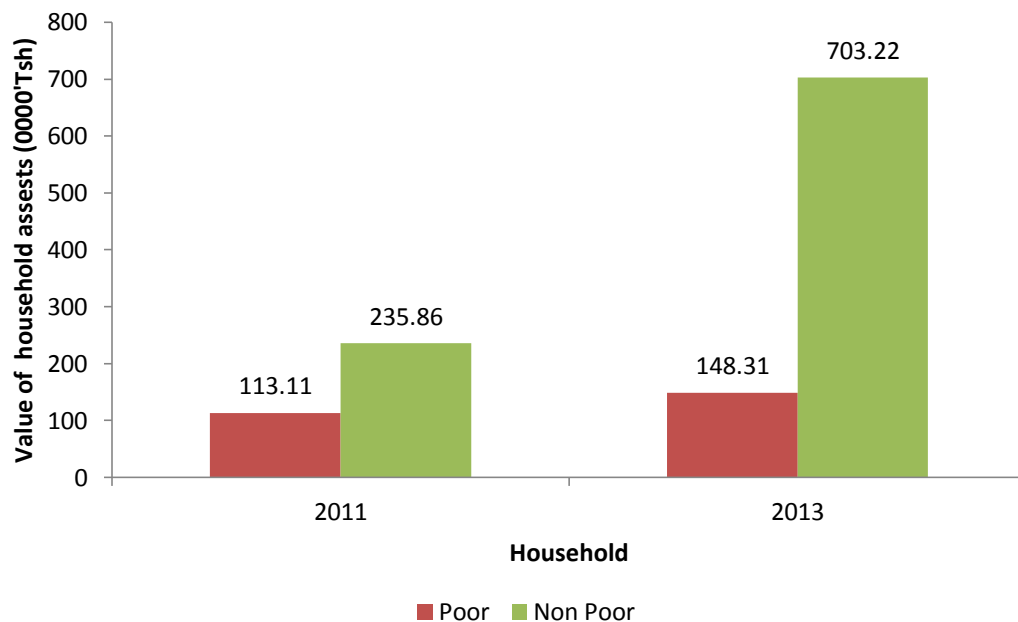


Figure 7: Mean value of households' assets in Tsh

4.3.3 Accessibility of inputs on credit and possession of bank account

Availability of reliable and affordable agricultural credit to farmers is of critical importance in strategies aimed at improving their production and marketing capacity; whereas having a bank account can be used as proxy for saving ability of a households, if a household will be able to save some of his or her revenue then it will give a greater ability and advantage as they will be able to use their saving as collateral and thus it can be easy to venture into market by covering their capital constraints.

The proportions of households that obtained inputs on credit and those having a bank account with commercial bank are presented in the Figure 8. Results suggest that in 2011 percentage of households that receives inputs on credits were higher for non-poor households (55.6%), compared to poor households (46.4%); while in 2013 percentages of households that receives inputs on credit were also higher for non-poor households (77.3%) compared to poor household (22.7%), thus it is plausible to urge that non-poor households benefited more than poor households upon receiving agricultural inputs on credit. However over the total surveyed population lower proportions of households were shown to obtain input on credit and these can be attributed by the fact that very few credit providers are willing to supply credit services to peoples that are engaged in agricultural activities and thus the supply of credit services is skewed towards those that are in non-agricultural activities. Mathenge and Olwande (2012) reported that credit providers in Kenya tend to extend agricultural credit towards the high potential agricultural regions served by mainly commodity based credit providers and cooperatives.

In agricultural season 2011 proportion of households that own a bank account with commercial bank where higher for non-poor households (87.7%) compared to poor households (12.3%) and the situation is not different for the season of 2013 in which 92.6% of households that own a bank account with commercial bank were non-poor households while 7.4% were poor households; These results suggest that the saving abilities of poor households in the formal sector is very low and thus very few will be able to access loans in the commercial banks.

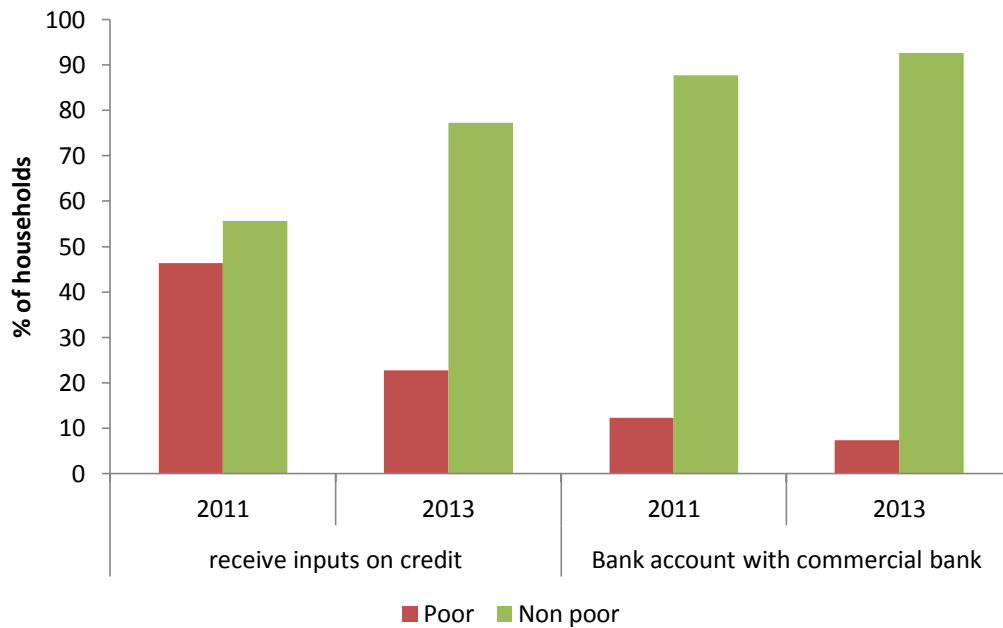


Figure 8: Proportions (%) of households using credit and having a bank account

4.4 Status of Market Participation

4.4.1 Output market

The geographical conditions of Tanzania are varied and thus dictate the kind of agricultural crops in which farmers produce as well as performance of these crops. Maize, beans, paddy and groundnuts are observed to be grown in large parts of the country and by most of the rural population. The proportions of selected households engaged in production of these crops, and volumes of production are presented in Table 3. Overall maize production is shown to increase for the two agricultural seasons, with over 78% of households producing maize in 2010/11 while more than 80% produces maize in 2012/13, indicating the importance of the crop to the majority of Tanzanian smallholders' population. Percentage of households engaging in production of maize, beans and groundnuts were observed to increase for the two agricultural seasons but it decreases for paddy.

The fact that in Tanzania maize is considered as the major food security crop than other crops such as paddy, has contributed for large percent of household to grow maize. When there is an occurrence of food deficit at any place in the country the major food to be distributed is maize thus improving its market accessibility than the other crops, but if the notion could change and other crops such as paddy be regarded as one of food security crop then the situation on its production and marketing could have change due to incentive of easily market accessibility for the crop

Table 3: Percentage of Households producing various crops, and mean volume of Production

Commodity	Year	% of household producing			Mean Volumes (kg) of production		
		Poor	Non-poor	Overall sample	Poor	Non-poor	Overall sample
Maize	2013	23.9	55.5	81.7	696.7	754.1	729.38
	2011	34.0	44.8	78.8	661.1	770.1	724.78
Paddy	2013	7.83	18.8	26.7	585.8	964.2	851.03
	2011	10.0	17.4	27.5	598.5	827.3	751.10
Beans	2013	8.5	18.6	27.5	156.9	293.1	211.55
	2011	11.1	15.1	26.2	122.9	219.9	142.19
Groundnuts	2013	5.7	11.4	17.2	228.6	220.1	222.32
	2011	6.2	8.3	14.5	158.1	210.4	187.54

There is a difference in the mean volumes produced between the four crops, and the status is observed to increase for the two agricultural seasons with non-poor households showing higher mean volumes produced compared to poor households. In 2013, paddy were recorded to have higher mean volumes of production (851 kg) among the four crops followed by maize (729 kg), this is attributed to the fact that large population in Tanzanian are smallholders farmers that grow paddy and maize for food security purpose as these are major food crops.

Small proportion of households (14.5% and 17.2% in 2011 and 2013 respectively) are engaged in groundnuts production and this is due to the fact that groundnut is regarded as cash crop rather than food crops thus it is produced much for the market and it has not given much weight as its effects in terms of consumption and food security contribution for the households is low. The differences in volumes produced between the four crops may also be influenced by differences in resources endowment, land size and use of productivity enhancing inputs such fertilizer and improved varieties allocated in the production of those crops.

4.4.2 Market participations among the four Crops

The proportion of households that participated in the market of various crops, mean volumes of and extent of sales (commercialization index measured by gross value of crop sales) are presented in the Table 4. Overall it is shown that smallholder farmers are still oriented towards subsistence production as the level of market participation is not higher enough among the four crops for the two surveys round as none of the crop has recorded commercialization index above 60%.

Proportions of households that are involved in the marketing of various crops were shown to increase from 2011 to 2013; paddy (from 27.3% to 27.9%), beans (from 22.6% to 37.1%) and groundnuts (from 16.6% to 18.2%), where else in the same time span it decreases for maize marketing (from 59.8% to 55.7%), however in both rounds of survey the increase is observed to be higher in the non-poor households compared to poor households and this can be attributed due to differences in the resources endowments between the two population. Percentage of households participating in the market of various crops and the volumes marketed disguises important information about the extent of marketing participation by the households.

The extent of market participation (commercialization index) in this study was captured by looking at the gross value of crop produced that ended up in the market for each crop. Maize recorded medium commercialization Index (38.1% and 27.4% in 2013 and 2011 respectively) and this portrays the fact that volume of maize produced that is oriented to the market is lower among the four crops, many smallholders farmers in Tanzania produce maize for home consumption and food security purpose, only the surpluses are the ones oriented towards the market. In 2011 groundnuts and beans recorded higher commercialization index of 54.5% and 54.3% compared to paddy and maize which scored a medium commercialization index of 49.2% and 27.4% respectively and this can be urged that smallholder farmers in Tanzania produce beans and groundnuts for market purpose where else paddy and maize (major cereals) are produced for food security purpose. In 2013 paddy were the most commercialized crop with an index of 51.8% which was higher than the index of other three crops providing signal that crop is potential for market orientation and if favorable environment were to be established many smallholder farmers may benefit.

The percentage of households marketing maize is higher (more than 50%) among the four crops for both rounds of survey and this is due to the facts that more than 70% of farmers in Tanzania they are growing maize however the volume of maize produced that is translated to the market is still very low evidenced by commercialization index of Lower than 50% suggesting that the volume of cereals marketed in the country it has not hit the higher note. Many factors can be said to contribute to the situation but one of it is low and fluctuating prices that cereals are fetching in the market (Kirimi *et al.*, 2013).

Table 4: Proportions (%) of households marketing various crops, sales volume and commercialization Index

Commodity	% selling			Mean Volumes (kg) of sales			Commercialization Index
	Poor	Non poor	Overall sample	Poor	Non poor	Overall sample	
Maize 2013	14.7	39.9	55.7	756.1	759.3	758.46	38.1
	24.8	34.2	59.8	661.1	789.3	661.60	27.4
Paddy 2013	8.1	19.9	27.9	555.3	931.1	821.66	51.8
	10.48	16.19	27.3	583.7	865.9	765.10	49.2
Beans 2013	8.4	14.2	37.1	163.4	203.5	186.75	46.3
	9.64	12.6	22.6	113.8	194.8	150.90	54.3
Groundnuts 2013	6.3	11.1	18.2	237.3	178.8	199.24	43.3
	8.1	7.9	16.6	122.4	243.2	180.10	54.5

4.4.3 Market concentration

Market concentration measures the relative size and thus market power of an industry largest firm, it is the function of the number of firms and total production or sales respectively. Under this study market concentration was defined as the distribution of total volumes marketed across the surveyed households, it is represented in Table 5. Generally it is shown that between 62% and 72% of all marketed volumes for various crops were sold by the top twenty per cent of commercialized farmers' for both two years; the bottom twenty per cent of commercialized farmers' sold less than 3% of the marketed volumes.

For the maize, over 70% of the marketed volumes was sold by the top twenty per cent of the commercialized farmers while the bottom twenty per cent sold less than 5%; for beans and groundnuts over 67% and 71% respectively of the marketed volumes was sold by the top twenty per cent of commercialized farmers while the bottom twenty per cent of commercialized farmers sold less than 3% of both beans and groundnuts. The paddy

market is the least concentrated among the four enterprises, with the top twenty per cent of commercialized farmers account for about 63.5% of marketed volumes and bottom twenty per cent account for about 2% of the marketed volumes. These findings indicate that market participation in the study population is dominated by minority of the farmers; majority of smallholders farmers in the study area are locked into subsistence production thus any policy formulated by the government should strive to give special attention to these smallholder farmers that are in subsistence agriculture, these results concurred with the ones reported by Mathenge and Olwande(2012) when analyzing market participation among poor rural households in Kenya and reported that market for many agricultural products are concentrated and thus many smallholder farmers are still subsistence.

Table 5: Distribution of marketed volumes of various commodities across the sample

Commodity	Lowest 20 (%)	20 (%)	20 (%)	20 (%)	Highest 20 (%)	Total
Maize						
2013	1.50	3.96	8.13	15.32	71.09	100
2011	1.90	4.20	7.89	15.21	70.78	
Paddy						
2013	2.18	5.10	10.08	19.14	63.50	100
2011	2.18	5.42	9.08	20.98	70.78	
Beans						
2013	1.85	5.76	10.31	15.46	66.63	100
2011	2.84	5.73	9.37	18.19	63.87	
Groundnuts						
2013	1.31	3.23	7.77	16.71	70.97	100
2011	2.24	5.12	9.58	18.87	64.19	

4.5 Input Market Participation

Agricultural commercialization can be analyzed on both output and input side; on the input side the study considered the participation of farmers on the inorganic fertilizer market. Fertilizer is essential for increasing the productivity especially for the soils that

have been losing its fertility so inorganic fertilizer is essential for better and proper crop performance. Due to diminishing land holdings, many farmers continue to cultivate the same piece of land over period of many years and on some other places they keep on growing the same kind of crops which has effects of reducing the soil fertility of their farms, thus for these farmers to experience the increase in their productivity they need to add supplementary inputs on their soils and one of the major supplementary is use of inorganic fertilizer.

Other inputs that can guarantee increase of productivity to the farmers especially maize producers is the use of improved seeds, mix it with inorganic fertilizer can guarantee farmers to increase their productivity and thus affects production as well as market participation. Federet *al.*(1985) as cited by Mathenge and Olwande(2012) identified lack of credit, limited access to information, and aversion of risk, inadequate farm size, insufficient human capital, tenure arrangement and absence of adequate farm equipment as key constraints for smallholders' farmers in developing nations to adopt productivity enhancing technologies such as fertilizer and improved seeds.

The results from this study(Table 6) indicated that, the rate of farmers adopting the use of inorganic fertilizer increased between the two periods of 2011 and 2013, the increase is higher in non-poor household compared to poor households. Overall usages of fertilizers for the farmers were very low with only 14.4 % and 19.4% of the total respondents using inorganic fertilizer in 2011 and 2013 respectively. The situation is worse for poor households (compared to non-poor households) whereby proportions of poor households that uses inorganic fertilizer were 4.8 % and 12.9% for the period 2011 and 2013 respectively, while 9.6% and 22.2% of the non-poor households used inorganic fertilizer for 2011 and 2013 respectively.

Intensity of using inorganic fertilizer¹ increased for the two waves from 9.45 kg per acre in 2011 to 15.94 kg per acre in 2013, whereas the intensity of use is higher in the non-poor population compared to poor population. In 2013 the use rate of inorganic fertilizer were 10.52 kg per acre and 18.64 kg per acre for both poor and non-poor households respectively and in 2011 the use rate were 6.21 kg per acre and 11.98 kg per acre for both poor and non-poor households respectively (Table 6).

Table 6: Proportions and intensity of households using fertilizer

Fertilizer		Poor	Non-poor	Overall sample
Adoption (% of hhs)	2013	12.9	22.2	19.4
	2011	4.8	9.6	14.4
Use rate (Kg/acres)	2013	10.52	18.64	15.94
	2011	6.21	11.98	9.45

4.6 Welfare Effects of Agricultural Commercialization: Descriptive Statistics and

One Way ANOVA

According to Samuel and Sharp (2007); the ultimate goal of agricultural commercialization is attainment of better welfare by those households that are participating in agricultural commercialization. The concept of welfare is broad as it comprises various factors in different context, however in this study welfare is represented by households poverty status that is estimated from the consumption of different commodity such as non-grain consumable like sugar and salt, kerosene consumption, alcohol consumption, expenditure on households necessities like clothes, shelter and shoes as well as education, health and durable goods like Television.

¹Fertilizer use intensity is defined as kg of fertilizer applied per acre of cultivated land by households that used fertilizer

To determine the contribution of agricultural commercialization to the households' welfare, households' poverty status was compared between those who participated in the market for different crops and those did not participate. It was shown that, there is higher incident of poverty to the households that did not participate in the market compared to those that participated in the maize and beans market (Table 7) as the one way analysis of variance (ANOVA) shows there is relation between poverty incidence and market participation in either maize or beans market however there were no relation between poverty incidence and participation in either paddy or groundnuts market. Thus it is plausible to urge that the severity of poverty can also be tackled in one hand with farmers participating in different market and thus increasing the income from market that can be used to purchase various consumable commodities.

Table 7: Welfare outcomes for household with poverty status (poor and non-poor)

Poverty Status	Market Participation			
Beans	Mean	Standard Deviation	Frequency	Prob>F
Beans				
Poor	0.4293	0.4961	205	0.0123*
Non-poor	0.3296	0.4701	451	
Maize				
Poor	0.2643	0.4413	579	0.0471*
Non-Poor	0.3093	0.4623	1345	
Paddy				
Poor	0.4421	0.4979	190	0.7832
Non-Poor	0.4539	0.4984	456	
Groundnuts				
Poor	0.4783	0.5013	138	0.6042
Non-Poor	0.4513	0.4955	277	

*, significant at 5%

4.7 Econometrics Results

This section will present the discussion on econometric estimation results of the output market participation for smallholders' farmers. Odd ratios of market participation and extent of participation are discussed here for maize, paddy, beans and groundnuts, the discussion focuses only on the variables of interest (sex of households' heads, age of households, education of households' heads, land size, value of asset, distances to the market, use of inorganic fertilizer, access to credit and use of improved seed) and thus they will be used to generate the conclusion for the study. The robust option in Stata 12 was selected to correct the problem of heteroscedasticity. The probit results on the decision to participate in the market and truncated regression analysis results on the extent of market participation are presented in Tables 8 and Table 9.

Sex of households significantly influences the decision to participate in maize market, and it was shown to positively influence participation if the head of households' is male. Age of households head negatively and significantly influences the decision of households' heads to participate in the market for all four commodities, and in the beans market after it affects the decision to participate in the market it also affected negatively the quantity of produce that were oriented towards the market (Table 9).

Households' size negatively and significantly associated with a likelihood of famers to participate in the market of maize, paddy, and groundnuts, though not significant household size also affected negatively on the decision to participate in the market for beans crop. After the decision to participate in the market has been made, the size of households does have significant influence on the quantity of produce sold except for beans. These results underscore the fact that as number of individuals in the households increase it also increases the consumption of both food and non-food in the

households' and thus cause a diversification of resources from farm activities to cover other daily basics need in the households as the nature of most household involved in the farming activities are poor and resource constraints.

Land size allocated to the production positively and significantly associated with likelihood of participating in the maize, paddy, and beans market, it also affected positively the decision to participate in the market for groundnuts though its effect was not significant; furthermore land size allocated for the production also positively and significantly influenced the marketed volumes of the produce (Table 9). Though it was insignificant, value of households' assets show unexpected sign of negatively influencing the decision of farmers to participate in the market and the quantity of produce that is oriented toward the market for all four commodities, the possible explanation for this is that many smallholder farmers they don't possess large value of assets and those who possess assets with large value they don't participate in the market for agricultural produce, they invest their money in non-agricultural activities (Table 9).

Distance to the nearest market, which is an indicator of travel time and transactions cost to the market, shows mixed results in both models for decision to participate in the markets and extent of participation as it was expected to affect negatively on the market participation. Results portray significantly and positively association between the distance to the nearest market and decision to participate in beans market as well as quantity of produce that sold (Table 8 and Table 9), this can be attributed by the fact that most of these crops including beans are non-perishable commodity and thus if there is presence of well-functioning market farmers will be influenced to participate irrespectively of the distance, also smallholders farmers in the village experience low prices for agricultural

product and thus tend to travel toward the town centers where they can fetch higher prices for their product.

Use of inorganic fertilizer were observed to be positively and significantly influences the decision to participate in market for maize and paddy market, as well as on the quantity of produce that are oriented towards the market, this can be attributed by the fact that use of inorganic fertilizer can increase the productivity and thus quantity of produce that are oriented towards the market, these results also places non-poor households on the advantage side as compared to poor households because the rate of usage of inorganic fertilizer is higher in non-poor households compared to poor households. It also affected positively on the decision to participate in beans and groundnuts market though its effects were not significantly.

Use of improved seed have positively and significantly influence on the likelihood of market participation by maize smallholders farmers, as well as on the quantity of produce that is oriented towards the market, this can be due to the fact that improved seed may boosts up the productivity of maize farmers and thus help them to generate more produce that can be oriented towards the market. Though insignificantly, also affected positively on the decision to participate in the market for the remain three crops but it positively and significantly influenced the quantity of the produce that are oriented towards the market for rice and beans, thus showing the importance of improved seed on increase the quantity of produce towards the market. If smallholder farmers may have an access to this input their life could change from poor situation to better situation.

Table 8: Probit estimation for decision to participate in maize, paddy, beans and groundnuts market

Variable	Coefficients of decision to participate			
	<i>Maize</i>	<i>Paddy</i>	<i>Beans</i>	<i>Groundnuts</i>
Sex of household head (1=male)	0.179*	-0.092	0.129	-0.102
	(2.74)	(0.44)	(0.81)	(0.60)
Household head age (years)	-0.012*	-0.013*	-0.015	-0.011*
	(4.15)	(3.10)	(3.79)*	(2.28)
Literacy of household head(1=literate)	0.002	0.131	0.172	-0.079
	(1.33)	(0.85)	(0.13)	(0.49)
Land size allocated for production	0.094*	0.460*	0.147*	0.009
	(9.41)	(7.64)	(3.60)	(0.42)
Household size	-0.035*	-0.063*	-0.001	-0.057*
	(3.84)	(3.60)	(0.04)	(2.92)
Value of assets ownership	-3.65e-08	-3.52e-08	-2.62e-08	1.09e-08
	(1.07)	(1.11)	(1.61)	(0.37)
Distance to the nearest market	0.002	0.005	0.019*	0.007
	(0.24)	(1.29)	(3.76)	(1.41)
Use of inorganic fertilizer	0.481*	0.466*	0.339	0.056
	(5.41)	(2.54)	(1.36)	(0.28)
Inputs on credit	0.049	1.342	0.082	1.206*
	(0.18)	(1.85)	(0.19)	(2.21)
Improved seed	0.101*	0.193	0.165	-0.122
	(1.92)	(0.58)	(2.92)	(0.20)

* Significant at 5%, the values in parentheses are z values

Table 9: Truncated regression, reporting on extent of maize, paddy, beans and groundnuts market

Variable	Coefficients of decision to participate			
	Maize	Paddy	Beans	Groundnuts
Sex of household head (1=male)	0.058*	-0.022	0.036	0.038
	(2.35)	(0.40)	(0.67)	(0.59)
Household head age (years)	-0.004*	-0.004*	-0.005*	-0.004*
	(5.54)	(3.08)	(3.98)	(2.28)
Literacy of household head(1=literate)	-0.001	0.049	-0.005	-0.032
	(0.04)	(0.98)	(0.12)	(0.49)
Land size allocated for production	0.032*	0.066*	0.039*	0.039
	(10.38)	(7.07)	(3.46)	(0.44)
Household size	-0.011*	-0.014*	0.001	-0.020
	(3.52)	(2.27)	(0.07)	(2.95)
Value of assets ownership	-8.24e-9	-8.42e-9	-7.72e-9	4.34e-09
	(3.93)	(1.14)	(1.61)	(0.40)
Distance to the nearest market	0.001	0.002*	0.007*	0.002
	(0.40)	(1.67)	(4.01)	(1.39)
Use of inorganic fertilizer	0.166*	0.198*	0.054	0.022
	(6.38)	(3.44)	(1.14)	(0.29)
Inputs on credit	0.015	0.467*	0.018	0.359*
	(0.22)	(1.79)	(0.25)	(2.21)
Improved seed	0.034*	0.093*	0.135**	0.044
	(2.09)	(1.97)	(1.74)	(0.50)

*, ** significant at 5% and 10% respectively, the values in parentheses are z values

The magnitude of Maximum Likelihood estimates in the double hurdle model cannot be interpreted in a sensible manner so marginal effects need to be estimated. Table 10, provides the marginal effects value of the probit model, it shows the change in the probability of market participation for each additional unit increase in the independent variables; the marginal effects presented here are for those variables that are statically significant.

The probability of households heads to participate in beans, groundnuts, paddy and maize market decreases by 0.57%, 0.42%, 0.53% and 0.38% respectively for every additional year of age of households' heads. The results are conforming to the prior expectation as age of households heads was expected to negatively influence market participation due to

risk aversion factor as the age of households heads increases they tend to be more risk averse and thus orient to produce most to cover home need and food security issues also the labor productivity decreases with the increase in the age of households heads.

Land size allocated for production has positively and significantly influence on the decision of households' heads to participate in beans, paddy and maize market as the probability of participation increase by 5.57%, 18.65%, and 3.17% for every acre of land allocated for beans, paddy and maize production respectively. The results reveals the strong influence of land asset upon the decision and extent of market participation for smallholder famers and thus pose the constraints for poor households to participate in the market as majority of them were observed to possess small land size than their counterpart non-poor households.

Distance to the nearest market has produced a mixed results as it was having a positives correlation with the decision of farmer to participate in the bean market, it was shown that the probability of farmer to participate in bean market increase by 0.74% for every kilometer travel, and this can be explained by the fact that beans are non-perishable commodity and thus if there is presence of well-functioning market farmers will be influenced to participate, also smallholders farmers in the village experience low prices for agricultural product and thus tend to travel toward the town centers where they can fetch higher prices for their produce. It was expected that the probability of farmers to participate in a certain market will decrease with the increase in the households size due to allocation issues as with larger number of individuals in the households will increase the amount of produces allocated for home consumption and reduce the amount that are oriented toward the market, and results reveal that the probabilities of participation in

groundnuts, paddy and maize market decreases by 2.27%, 2.17%, and 1.19% respectively for every individual increase of the household member.

Farmers who use inorganic fertilizer had 19.27% and 17.29% probabilities of participating in paddy and maize market respectively than farmers who did not use inorganic fertilizer, while farmers who uses improved maize seed has probability of 3.38% in participating in maize market compared to those that did not use improved seeds. Thus showing the importance of these inputs upon enhancing the production of paddy and maize as well as its market, in order for the agricultural policy that are developed in the country to have an impact they should address the availability and accessibility of these inputs to smallholder farmers so they can increase their production as well as the quantity of produce oriented towards the market.

Accessibility of credit on inputs also showed positively and significantly likelihood for farmers to participate in the market for groundnuts and paddy as well as the quantity of produce that is oriented toward the market. It was observed that famers who receive credit on input has 47% and 57% probabilities of participating in groundnuts and paddy market respectively than those who did not receive input on credit demonstrating the importance of farmers to access input on credit especially for those famers who cannot afford to buy the inputs on cash as it will have an impact on boosting up their production. Household that are headed by male have 5.8% probability of participating in the maize market than household that are headed by female this can be contributed by the fact that daily to daily decision of participating in the selling of agricultural produce for major crops in the household are made by men. Ruhangwebare (2010) noted similar results in Uganda where by daily to daily management of livestock including sales are the sole responsibility of men and if head of household who is man dies the older boy will be responsible for

daily management. With all the insignificant variables the literacy of household shows negatively correlation with the decision to participate in beans and groundnuts market and this can be partially explained by the fact that many household that are literate are young ones and with limitation in the accessibility of land for producing various crops they opt to produce more on maize and paddy rather than beans and groundnuts due to land constraints. On the other hand though it is insignificant there is negatively relation on the decision to participate in groundnuts market and male headed household, showing that the decision to participate in groundnuts market are made by female in households this can be attributed by the small amount of groundnuts that are produced by these household's thus it become the responsibility of female partner to participate in the market of groundnuts and the quantity to be sell for this crop is always small.

Table 10: Probit estimation, reporting on marginal effects for maize, paddy, beans and groundnuts market

Variable	Marginal probability effects of decision to participate in market			
	Maize	Paddy	Beans	Groundnuts
Sex of household head (1=male)	0.058* (2.21)	-0.045 (0.73)	0.040 (0.67)	-0.041 (0.59)
Household head age (years)	-0.004* (5.33)	-0.005* (3.09)	-0.006* (3.96)	-0.004* (2.28)
Literacy of household head (1=literate)	0.001 (0.03)	0.031 (0.510)	-0.001 (0.01)	-0.032 (0.49)
Land size allocated for production	0.032* (9.51)	0.187* (7.29)	0.056* (3.73)	0.004 (0.44)
Household size	-0.012* (3.35)	-0.022* (3.08)	-0.001 (0.13)	-0.023* (2.95)
Value of assets ownership	-1.23e-8* (4.35)	-1.47e-8 (1.16)	-1.09e-8 (1.76)	4.72e-9 (0.40)
Distance to the nearest market	0.001 (1.05)	0.002 (1.30)	0.007* (3.92)	0.003 (1.39)
Use of inorganic fertilizer	0.173* (6.11)	0.193* (2.910)	0.063 (1.20)	0.022 (0.29)
Inputs on credit	0.016 (0.24)	0.568* (1.99)	0.031 (0.24)	0.479* (2.21)
Improved seed	0.034* (1.96)	0.078 (1.26)	0.129 (1.56)	-0.048 (0.50)

* Significant at 5%, the values in parentheses are z value

CHAPTER FIVE

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

Mathenge and Olwande(2012) urged that market participation can results into welfare gains through comparative advantage, economies of scale, regular interaction and exchange of ideas, however there are some of groups who in particular would not benefit from this kind of welfare boot and they may be hampered by different constraints that hinder their successful participation in the market. Present study assessed the status, effects, determinant and extent of market participation among smallholders' farmers in Tanzania.

The study discloses differences in market participation across selected commodity groups between poor and non-poor households. Poor households generally recorded lower market participation for selected commodities compared to their counterpart non-poor households. There are different factors that could explain the lower market participation, some of these factors include:

- Small land size that are recorded for these smallholder farmers and thus lend them not to produce marketable surplus and thus they lack commodity to supply to the market
- Assets ownership and its total value has an implication on market participation as they tend to compromise agricultural productive capacity, generally poor households recorded lower asset value and thus their ability to exploit available market opportunities is limited compared to their counterpart non-poor households.
- Generally very few proportions of smallholders' farmers were shown to participate in input market as use of inorganic fertilizer and the intensity of using this fertilizer

is very low and this is translated into lower market participation as they fail to produce surplus that can be oriented towards the market.

- Accessibility of inputs on credit for smallholders farmers has an implications on improving farmers production by ensuring easily availability of inputs such as fertilizer and possession of bank account has contributions on saving ability of famers to cover future needs and protection against risk and uncertainty that characterizes agricultural marketing, in the study generally it was plausible to urge that few farmers have accessibility of inputs on credit as well as few of them possess bank account with commercial bank. The situation is worse to poor households compared to non-poor households and thus it limits their participation in the market.

Participation in the output market by smallholders farmers is still not higher enough as the commercialization index for different crops is in medium level and thus indicates more of the agricultural produce is still for subsistence usage rather than market orientation and hence the benefits of the market especially the food crops market are not well utilized by these smallholders farmers.

In the study smallholders famers were still on subsistence oriented agriculture, as it was shown that the market for the four crops were highly concentrated; In the study top 20% of selling households accounted for more than 63% of the marketed volumes for paddy, beans and groundnuts and more than 70% of the marketed volumes for maize.

Upon analyzing factors that influence famers to participate in market for food crops; Land size allocated to the production of beans, paddy and maize crops were found to

positively and significantly influence the decision of market participation. Results also show that use of inorganic fertilizers positively and significantly influence the decision for smallholder farmers to participate in maize and paddy market and among the four crop maize were recorded to have lower commercialization index, Use of improved seed also has been observed to have significant influence on the decision to participate in the maize market and it can be attributed by the fact that the productivity of these farmers can increase with the availability of input technology and thus can influence them to participate in these market with surplus produced.

The age of households heads influenced negatively on the decision to participate as well on the extent crops that is oriented towards market as the age of households heads increased it also decreases the volume of crops that were oriented towards the market. Sex of households heads influenced positively on the decision to participate in the maize market if the heads of the households were male.

Distance to the nearest market influenced positively on the decision to participate in beans market as well as on the extent of market participation for the same crop. Size of households also influenced negatively on the decision to participate in maize, paddy, and groundnuts and then influenced negatively on the quantity of the product that were oriented towards the markets for maize and paddy. This was attributed by the fact that as the number of households' members increasing it causes many produce from the farm to be consumed in the household.

5.2 Recommendations

- i. Policies that encouraging on increasing the production and productivity of smallholders farmers should be implemented along the measures that reduces the transactions costs that hinders market participation by these smallholders' farmers.
- ii. More innovation is required to increase the productivity of the land as well as the policies that encourage availability and accessibility of land to the smallholders' farmers also should be adopted.
- iii. Availability of improved inputs technology especially inorganic fertilizer and improved seed should be made possible for maize and paddy farmers to increase their production and thus increase their participation in the market.
- iv. Conducive environment for agricultural production and marketing should be made possible for the youth so as to attract most of them to be involved in agricultural activities, decision to participate in the market is negatively affected with the age, if there are right environment for doing agribusinessit could attract more youth

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