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DETERMINANTS OF SMALLHOLDER FARMERS PRODUCTION AND COMMERCIALIZATION OF MALT BARLEY IN DIGALU TIJO WOREDA, ARSI ZONE, OROMIA REGION, ETHIOPIA

By
MESERET SHIFERAW UMETA

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ADDIS ABABA

A THESIS SUBMITTED TO THE SCHOOL OF GRADUATE STUDIES, ST. MARY'S UNIVERSTY, INSTITUTE OF AGRICULTURE AND DEVELOPMENT STUDIES, FOR PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE MASTERS OF SCIENCE DEGREE IN AGRICULTURAL ECONOMICS

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Declaration

I declare that this Msc. thesis is my original work, has never been presented for a degree in this or any other university and all source of materials used for the thesis have been duly acknowledged.

Student Name: **MESERET SHIFERAW UMETA**

Signature:_____

Name of the institution: **Institute Of Agriculture And Development Studies**

Date of Submission: _____

ENDORSEMENT

This thesis has been submitted to St. Mary's University, school of Graduate Studies for examination with my approval as a University advisor.

_____ _____

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As members of the Board of Examining of the final MSc thesis open defense, we certify that we have read and evaluated the thesis prepared by Meseret Shiferaw under the title "DETERMINANTS OF SMALLHOLDER FARMERS PRODUCTION AND COMMERCIALIZATION OF MALT BARLEY IN DIGALU TIJO WOREDA, ARSI ZONE, OROMIA REGION, ETHIOPIA" We recommend that the thesis be accepted as fulfilling the thesis requirement for the Degree Of Master Of Science in Agricultural Economics

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Table of Contents

Abbreviations

AMF – Asella Malt Factory

ARC – Agricultural Research Centre

ATA - Agricultural Transformation Agency

BoA – Bureau of Agriculture

CSA – Central Statistical Agency

ETB – Ethiopian Birr

FAO - Food and Agriculture Organization

GTP - Growth and Transformation Plan

Ha - hectare

HCI - Household Commercialization Index

IFAD – International Fund for Agricultural Development

MDG – Millennium Development Goals

MoA – Ministry of Agriculture

MoFED – Ministry of Finance and Economic Development

MT – Metric Ton

NGO – Non Governmental Organizations

PASDEP - Plan for Accelerated and Sustainable Development to End Poverty

USDA – United States Department of Agriculture

USD – Unites States Dollar

List of Tables

Table Page

ABSTRACT

Shifting the smallholder subsistence farmers into a market-oriented production system as a way to increase the smallholder farmer's income and reduce rural poverty has been in the policy spotlight of many developing countries, including Ethiopia. This study has identified household level determinants of the output side commercialization decision and level of commercialization in malt barley in Digalu Tijo woreda, Arsi zone, Oromia National Regional State of Ethiopia. Cross-sectional data obtained from a sample of 95 smallholder malt barley producers randomly from five kebeles in the woreda. A double hurdle model was applied to analyze the determinants of the production and market participation decision and level of commercialization or volume supplied and marketed. In first hurdle, the result of Probit Regression Model revealed that, price trend, type of seed used, access to market information and production cost played a significant role in smallholder production participation decision. In the second hurdle, the result of Truncated Regression Model shown that, age of the household, household level of education, total land holding size, prevailing price trend, and transaction cost during marketing of malt barley were the key determinants of the volume of supply to the market or the level of commercialization by the households. From the synthesis of double hurdle model, the price trend for malt barley was determinants of both smallholder malt barley production participation decision and volume of supply in the market. The study recommends the importance of focusing on the improving the service and availability of technologies to the smallholder farmers in collaboration with private companies and development partners with the leadership of public institutions.

Key words: Commercialization, Double Hurdle Model and Malt Barley

CHAPTER ONE: INTRODUCTION

1.1 Background

Modernization and commercialization of the smallholder agricultural sector provides the stimulus and motivation to reducing food insecurity in developing countries. This has been a subject of considerable focus among policy-makers and development specialists not only at the level of farming households but also at the level of national and international policies (Omamo, 1998b).

Basically, agricultural commercialization can occur on the output side of production with increased marketed surplus, or on the input side with increased use of purchased inputs. On the output side, commercialization is measured as a ratio of the value of agricultural sales to the value of agricultural production while it is measured as a ratio of the value of inputs acquired from market to the value of agricultural production on the input side. Technically, agricultural commercialization requires a shift from subsistence production to a more complex market-based production and consumption system that leads to the strengthening of the linkages between input and output sides of a market (Guleti, 2007; Moti, 2009). Moreover, commercialization has a linking power between input and output sides of a market. Demand for modern technologies promotes the input side of production and facilitates the development and advancement of technological innovations. In turn, the use of modern technologies can result in higher productivity and production entering markets (Moti et. al., 2009).

The poverty-reduction strategy adopted by Ethiopia (MoFED, 2005) also seeks to achieve growth through the commercialization of smallholder agriculture. The Plan for Accelerated and Sustainable Development to End Poverty (PASDEP), Ethiopia's strategic framework for 2005/06 – 2009/10, relies on a massive push to accelerate growth. This is to be achieved by efforts in two directions: commercialization of agriculture, based on supporting the intensification of marketable farm products (both for domestic and export markets, and by both small and large farmers); and promoting much more rapid non-farm private sector growth.

Based on the success and lesson learnt from the past five years plan, the government of Ethiopia has also developed the Growth and Transformation Plan (GTP) which aims to achieve the vision of the country to be middle income by 2025 and, in due course, eradicate poverty and so improve the livelihood of citizens, it is imperative to sustain the higher economic growth of the last five years and beyond. For this reason, investment in growth enhancing sectors such as infrastructure and social sectors will continue at a larger scale.

Economic growth is central in creating growing employment opportunities and Ethiopia's transformation into a middle income country. As stated in the five year Growth and Transformation Plan (GTP), the Agricultural sector will continue to be the major driver of economic growth of the country. Industrial growth is given particular focus. Rapid growth of an industrial sector that increases the competitiveness of Ethiopia's exports and results in import substitution encouraged. This approach is expected to result in the rapid and broad based economic growth that will provide a foundation for structural transformation. The government's efforts to eradicate poverty and create employment will be pursued by sustaining rapid and broad based economic growth in a more coordinated and structured manner (MoFED, 2010).

Today, commercialization of agriculture is an inevitable reality throughout the whole world. There are a number of factors affecting the commercialization process in agriculture. Some of them could be named as rapid growth of economies in both developing and developed countries, introducing of new technologies, market expansion, market liberalization, urbanization, rapid increase of demand for food, decreasing of farming population, liberalized and open economic policies, bilateral and multilateral economic agreements, developed infrastructure facilities in farming areas and government agricultural policies. However, commercialization in agriculture is not a new phenomenon and it is not a surprise to the farming community. Since the nineteen fifties, farmers in most of the countries have moved towards commercial agriculture. Their major objective was surplus production aiming market prospects. Agricultural extension plays a major role in agricultural production (Mahaliyanaarachchi et al, 2006).

According to Gebreab (2006), at the farm household level commercialization is measured simply by the value of sales as a proportion of the total value of agricultural output. At the lower end, there would always be some amount of output that even a basically subsistence farmer would sale in the market so as to buy basic essential goods and services. Commercializing smallholder agriculture is an indispensable pathway towards economic growth and development for most developing countries relying on the agricultural sector (von Braun 1995). In the long-run, subsistence agriculture may not be a viable activity to ensure sustainable household food security and welfare. The welfare gains from market-oriented production arise from specialization that builds on and creates comparative advantages, potential for large-scale production, and from dynamic technological, organizational and institutional change effects that arise through the flow of ideas due to exchange based interactions (Paul, 1993).

Based on the work of Moti et al (2009), there is largely a consensus that commercialization has differential impacts on different socioeconomic groups (wealthy and poor, land owners and landless farm households, women, and children) under different socio-economic, institutional and policy environments, although the net impacts are not necessarily or universally positive. However, there are only a few, if any, who contend the need for commercialization to promote social development and economic growth.

Promoting commercialization of agricultural production is a cornerstone of the rural development and poverty reduction strategies of Ethiopia, as well as numerous other developing countries. Policymakers in Ethiopia and elsewhere view agricultural commercialization as an essential part of the process of agricultural modernization, specialization, and structural transformation of the economy toward more rapid and sustainable growth. Past practical research on smallholder commercialization in developing countries generally supports this view, although the impacts of commercialization are dependent on the local context and policy environment (von Braun and Kennedy 1994).

The main focuses of this study are to identify the factors affecting the smallholder's market participation and limiting the level of their commercialization in the Malt Barley business. Ethiopia has the potential to produce huge surplus amount of the crop to meet the domestic demand, creating more employment opportunities and also to earn foreign exchange through export to other countries both in Africa and the rest of the world. The government of Ethiopia has a very attractive investment incentives for companies investing in agro-processing, the cheaper manpower in the country and also the ever increasing domestic demand for beer is attracting multinational companies and encouraging the domestic companies to expand their plant to raise their production. Moreover, there are a number of companies coming in from different parts of the world to invest and establish breweries in Ethiopia.

These companies are importing significant amount of Malt and malt barley from abroad for their breweries and the country is losing significant amount of foreign exchange every year while having production potential to satisfy the current demand. To avoid this cost and use the domestic resource, the companies are trying to work with the smallholders and their organizations to get the raw malt barley in the right quantity and quality required being used as a raw material. To achieve this, different stakeholders are coming together from the public institutions, private sectors and development partners to enhance the domestic supply of the malt barley with the objective of availing the raw materials for the companies with lower cost in one hand and also increasing the income of the smallholder's involved in the production and marketing of the crop.

Malt barley production in Ethiopia is increasing at 11%, while food barley production is rapidly declining at 8% annually; yield and acreage are the two key factors. Both food and malt barley have increased in productivity, 3% and 6% respectively, while food barley cultivated land has decreased significantly by 11%. Malt barley increase in yield and acreage has contributed to its 11% production increase, while food barley production has decreased as a result of acreage (Agricultural Sample Survey, 2011). Though the production trend is increasing, still getting the quantity and quality required is a challenge and companies are importing from other countries while the agro-ecology is suitable for the malt barley production. It is difficult to see strong linkage between farmers and firms in the sector and

there is visible gap in smallholders production of marketable surplus of malt barley that need to be filled through proper identification of the problem and providing recommendations that will be utilized by the stakeholders, either farmers, companies, policy makers or the government.

1.2 Statement of the problem

Currently, Ethiopia only has one malting factory working at full capacity and new started recently. To meet brewers' demand, 60% of their malt is imported (EIAR, 2012). Paradoxically, while Ethiopia is agro-ecologically perfectly suit for malt barley production, it still imports most of its malt barley demand impacting the country's already skewed trade balance.

The interesting aspect of malt barley production in Ethiopia is that the crop has double purpose. It is used for food (bread, and several traditional dishes) and also for malting. As a result, there are different competing alternatives channels for the crop making it a sustainable source of income for smallholder farmers in Arsi highlands. Apart from this, there is a very big gap between the amount of malt produced by Asella Malt Factory domestically and the malt demanded by the domestic Breweries (Getachew et. al, 2011).

Research on barley improvement in Ethiopia started in 1955. Since then, research system has produced substantial amount of technologies, information and knowledge. Due to the weak linkage between research and extension, however, these technologies delayed to reach the growers to bring the required impact. Coordination and cooperation among the different stakeholders in agricultural development is at its low level (Bayeh et.al, 2011).

Malt barley, at the present time, is considered as one of the cash crops and its demand by malt factory has increased due to its increases capacity of malt barley processing and the expansion of breweries and the increase in beer consumption levels in the country (AMF, 2012).

According to Wolday (1994), in Ethiopia the performance of agricultural marketing system is constrained by many factors such as: poor quality of agricultural produce, lack of market facilities, weak extension services which ignored marketing development, poor linkage of research and extension, absence of marketing information and intelligent services, excessive price and supply fluctuations, limited access to credit, inefficient handling including, storage, packaging and transportation problems.

As reported by Mohammed and Getachew(2003), malt barley is among crops demanded in good quantity that lacks supply which its impact directly connected with national economy, as the breweries are importing from abroad with high currency.

With imports a real administrative burden in Ethiopia and already more expensive than local supply with global prices only geared to go up, brewers have a keen interest in seeing the local supply chain improve. With stronger unions marketing capacity, increased malting capacity of malt factories and more involvement of upstream value chain actors, bottled up demand for smallholder barley supply is just waiting to be opened.

As the crop is used both for food and malting purpose, there are a number of competing channels for the commodity. The low productivity of the crops on one hand and competition for the crop for food and mating makes the availability of the malt barley grain in the market scarcer and resulted in shortage of supply from domestic sources.

Today, Ethiopia's barley sector operates below its full potential with a number constraining bottlenecks seen across the value chain identified in Barley Strategy developed by Ethiopian Agricultural Transformation Agency (ATA) and Ethiopian Institute of Agricultural research in collaboration with Federal and Regional bureaus of Agriculture. Ethiopia can better take advantage of existing opportunities in the barley sector by implementing strategic and critical interventions with key actors along the value chain, specially the private sectors and grass root public institutions (ATA, 2012).

According to Tadesse(2011), improved seeds related with the varieties in production which have lost their agronomic characteristics, such as yield, resistance to disease, grain size, etc.,

and consequently their brewing quality. They are also mixed with other varieties. But there are also other factors determining the production decision of famers apart from the seeds in Arsi zone ingeneral.

Malt barley has been the only crop with a sustainable market for farmers in Arsi, which includes Tijo-Digalu, Lemu and Bilbilo, parts of the Assassa, Kofele, Shashemane and Genale Woredas (Tadesse, 2011).

Therefore, this study is trying to identify the household level determinants of the smallholder farmers production decision and volume of supply of the malt barley and related challenges in Oromia region, **Digalu Tijo** woreda of Arsi zone. The research reached to smallholder producers, research centers, breweries, seed enterprises and government institutions to identify the existing situation and came up with actionable recommendations to be implemented and used by the relevant shareholders.

1.3 Research Questions

1. What are the factors determining smallholder farmer's decision to engage in malt barley production?
2. What are the major factors determining the level of smallholder's commercialization or volume of market supply in malt barley business**?**

1.4 Objectives of the Study

General Objective

The research aims to analyze the determinants of commercialization of smallholder producers of malt barley and exploring the challenges and opportunities in the malt barley business of Oromia National Regional State.

Specific Objectives

1. To identify the factors determining smallholders decision to produce malt barley

2. To identify the factors affecting the smallholder famers volume of malt barley market supply

1.5 Definition of Terms

Smallholder Farmers: the definition of smallholders differs between countries and agro-ecological zones. In favorable areas with high population densities they often cultivate less than one ha of land, whereas they may cultivate 10(ten) ha or more in semi-arid areas, or manage 10(ten) head of livestock. Smallholders represent a large number of holdings in many developing countries and their numbers have increased in the last two decades. Evidence from the World Census of Agriculture for a small number of selected countries in Africa shows that between 1980 and 1990, the percentage of agricultural holdings of less than one hectare had increased from 50 percent to about 78 percent (FAO 1997). In this case, smallholder farmers refers to farmers who own and cultivate arable land up to 5(five) hectare per farming household.

Commercialization: The cornerstone of most definitions of agricultural commercialization is the degree of participation in the market. Other dimensions of commercialization include: input markets participation, increased reliance on hired labor, profit motive within the farm business, a move from diversification to specialization, over the long term. Therefore, commercialization is used as a reference for the volume of supply of malt barley in the market.

Malt Barley: Barley malt is a natural sweetener that is derived from barley. It can be used in the home as bread, kolo, beso, or as a substitute for processed sugar, and many commercial foods make use of it as a way of providing sweetening in frozen or packaged foods. The malt is created by toasting sprouted barley and grinding the sprouts into a powder. The powder can then be processed for use as a dry product or made into barley malt syrup, which has a relatively high concentration of maltose. While not as sweet as granulated or powdered sugar, the final product is often sweet enough to produce tasty foods.

1.6 Significance of the Study

This study has identified and analyzed the determinants that affect the smallholder's commercialization of malt barley producing smallholders, particularly Digalu Tijo woreda. It has clearly identified between different categories of factors that inhibit the active participation of the smallholders in malt barley business while there are firms demanding for the kind of the product these smallholders are producing.

The results of this study can be used and implemented by a number of stakeholders in the malt barley business including: farmers themselves in helping them produce based on the market demand at the required standard, domestic and international firms can also use the research output to develop their marketing strategies for the raw materials they need for their processing plants to engage with smallholder producers and policy makers can be informed on the existing situation in the sector and help them to make informed decision while dealing with investment and marketing issues in the business. It will also paves the way for further research for interested individuals and companies who have interest in the smallholders commercialization and malt barley business in Ethiopia.

1.7 Scope of the Study

As this study focused on specific part of the country and focus only on one major malt barley producer woreda in Oromia region, the result might not be generalized for all malt barley producing woredas of the country or other crops. The study area is where there are a number of interested firms started working with smallholders and also possible to gain insights from the firms which might not be the case in other malt barley producing areas.

1.8 Limitation of the Study

This study only conducted only on one woreda and used only the production data for one cropping season i. e 2014. The situation might be different in using data from multiple seasons and from different woredas across the Arsi Zone. Therefore, these might be among the limitations of this study that can be foreseen.

CHAPTER TWO: LITERATURE REVIEW

2.1 Theoretical Literatures

2.1.1 Definitions and Concepts

2.1.1.1 Definitions

Based on the work of Jennifer Leavy and Colin Poulton (2007), commercialization highlights a number of aspects of what it means to be commercialized. However, the cornerstone of most, if not all, definitions of agricultural commercialization is the degree of participation in the (output) market, with the focus very much on cash incomes. One dictionary definition gives a spatial dimension, describing commercial agriculture as "the growing of crops for sale outside the community" (Encyclopedia, Colombia University Press).Other dimensions of commercialization can include: input markets participation, increased reliance on hired labor, profit motive within the farm business, a move from diversification to specialization, over the long term.

According to Gebreselassie et al. 2008, Ethiopia has four categories representing four potentially complementary "pathways" for commercialization policy. Smallholder family farms; Type A are farmers in remote, drought-prone or low-potential areas, generally regarded as "subsistence-oriented" but in fact interacting with markets both as buyers and as sellers. The policy challenge posed by these farmers is to improve their terms of engagement with markets, as well as raising productivity and diversifying livelihoods. Type B are small farmers who are already market-oriented, producing crops partly or wholly for sale alongside crops for their own consumption. Such farmers tend to be in locations with favorable growing and marketing conditions, and tend to focus on specific high-value commodities.

Small investor-farmers are individuals or small groups of partners, often educated and urban-based; sometimes agricultural professionals with a background in government or development agencies or former state farms; often investing in farming as a secondary activity. These farmers are referred to in World Bank terminology as "emerging commercial

farmers", suggesting an expected linear trajectory towards larger-scale agri-business. However, we suggest that they are in fact a separate category. In Ethiopia they have started to re-emerge only in the last few years, when access to land for such investments has been made possible.

Large-scale "agri-business" are generally capital-intensive enterprises (though they also generate employment), and may be either private or state-owned. Examples are the large export-oriented horticulture and floriculture ventures that have multiplied in Ethiopia in recent years. Policy dialogues around agricultural commercialization tend to separate producers into different types of farm (small farms, large farms) growing different types of crops (food crops, cash crops) with simple distinctions made between subsistence and commercial or export agriculture. Lack of clarity about what commercialization actually means may give rise to misconceptions, evoking certain fears that can obstruct the passage of policy into practice. Work by the Future Agricultures Consortium in Ethiopia has identified fears that commercialization means, among other things: a focus on non-food crops, squeezing out the smallholder farmer, expropriation of land, displacement, dispossession of peasants, increased food insecurity, capitalism, mechanization, modernization, capital intensity, rather than labor intensity Moreover, there is a fear that commercialization essentially means promoting change that is essentially promoting the interest of larger, more powerful players to the loss of the smallholder farmers (Leavy et al, 2007).

2.1.1.2 Concepts of Agricultural Commercialization

The concept of agricultural commercialization can be complex, and has contributed to varying definitions and emphases given in the literature. According to Pingali (1997), agricultural commercialization is more than marketing agricultural outputs. He argued that agricultural commercialization is attained when household product choice and input use decisions are made based on the principles of profit maximization. In addition, von Braun et al. (1994) described commercialization as 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 and international trade environment and the 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 (Moti et.al, 2009).

Agricultural commercialization involves the transition from subsistence farming to increased market-oriented production. It is commonly measured as the ratio of percentage value of marketed output to total farm production. Market-oriented production entails modernization of systems, which depends heavily on the intensification of production processes, adoption of new technology and farm mechanization. As the marketed share of agricultural output increases, input utilization decisions and output combinations are progressively guided by profit maximization objectives. This process leads to the systematic substitution of non-traded inputs with purchased inputs, the gradual decline of integrated farming systems, and the emergence of specialized high-value farm enterprises (Omamo et al., 2006).

Commercial orientation of smallholder agriculture leads to a gradual decline in real food prices due to increased competition and lower costs in food marketing and processing (Jayne et al.,1995). These changes improve the welfare of smallholder farmers in two ways: for consumers, low food prices increase the purchasing power for food, while for producers a decline in food prices enables the reallocation of limited household incomes to high-value non-food agribusiness sectors and more profitable non-farm enterprises. Promoting investments in agricultural commercialization could reduce poverty but requires great shifts in priority setting in the rural and peri-urban areas. The potential benefits of higher product prices and lower input prices due to commercialization are effectively transmitted to poor households when market access is guaranteed (IFAD, 2001).

Specialization and the development of markets and trade that characterize commercialization are fundamental to economic growth. The principal advantages of market-oriented policies and the powerful forces of trade for development are unquestionable. However, the risks of policy and market failures, deficiencies in knowledge and information of actors in production and markets at all levels, and household-level complexities and intra-household conflicts are real, too, and need to be recognized as determinants of inefficiencies and inequities. Therefore, it should not be taken for granted that the transformation of traditional agriculture

progresses efficiently, not to mention equitably, even if the point of departure—subsistence agriculture—happens to be in a state of "poor but efficient". Subsistence production for home consumption is chosen by farmers because it is subjectively the best option, given all constraints. In a global sense, however, it is one of the largest enduring misallocations of human and natural resources, and, due to population pressure and natural resource constraints, it is becoming less and less viable (von Braun 1994).

According to von Braun (1994), cash crops can be defined as crops for sale. Yet, commercialization of agriculture as a process and a characteristic of agricultural change is more than whether or not a cash crop is present to a certain extent in a production system. Commercialization of subsistence agriculture can take many different forms. Commercialization can occur on the output side of production with increased marketed surplus, but it can also occur on the input side with increased use of purchased inputs. Commercialization is not restricted to just cash crops: The so called traditional food crops are frequently marketed to a considerable extent, and the so-called cash crops are retained, to a substantial extent, on the farm for home consumption. Also, increased commercialization is not necessarily identical with expansion of the cash economy when there is considerable inland transactions and payments with food commodities for land use or laborers. Finally, commercialization of agriculture is not identical with commercialization of the rural economy. The deviation between these two processes becomes all the more obvious when off-farm nonagricultural employment already exists to a large extent in a certain setting.

2.1.1.3 Measuring the level of commercialization

The relevance of measuring the level of smallholder commercialization arises from the interest to make comparisons of households according to their degree of commercialization. In addition, it also helps to gauge to what extent a given farm household is commercialized in its overall production, marketing and consumption decisions, and to analyze the determinants of commercialization. However, there are diverse methods or indicators used for measuring the level of commercialization. As these diverse indicators are emanating from how authors

perceived the concept of commercialization, it is important to discuss the underlying definitions of smallholder commercialization.

In a broad sense, smallholder commercialization could be seen as the strength of the linkage between farm households and markets at a given point in time. This household-to-market linkage could relate to output or input markets either in selling, buying or both. Alternatively, smallholder commercialization could also be seen as a dynamic process: at what speed the proportion of outputs sold and inputs purchased are changing over time at household level. Considering household-market linkages in their static form, it examines how smallholder commercialization has been perceived by different researchers and what different indices are currently available to measure the level of commercialization at household level (Moti Jaleta, Berhanu Gebremedhin and Hoekstra D., 2009).

Focusing on commercialization in its static form, various authors have used different standards in measuring the level of agricultural commercialization at household level. Von Braun et al. (1994) specified three types of commercialization indices at household level: output and input side commercialization, commercialization of the rural economy, and degree of a household's integration into the cash economy. For each type, the author formulated indices measuring the extent of household commercialization. The first index measures proportion of agricultural output sold to the market and input acquired from market to the total value of agricultural production.

$$\text{Commercialization agriculture of (output side)} = \frac{Value\ of\ agricultural\ sales\ in\ markets}{Agricultural\ production\ value}$$

$$\text{Commercialization agriculture of (input side)} = \frac{\text{Value of inputs acquired from market}}{Agricultural\ production\ value}$$

$$\text{Commercialization of rural economy} = \frac{\text{Value of goods and services acquired through Market transactions}}{Total\ Income}$$

$$\text{Degree of integration into the cash economy} = \frac{\text{Value of goods and services acquired through cash transactions}}{\text{Total Income}}$$

In the second type, commercialization of the rural economy is defined as the ratio of the value of goods and services acquired through market transactions to total household income. Here, there is an assumption that some transactions may take place in-kind such as payments with food commodities for land use. Thirdly, the degree of household integration to the cash economy is measured as the ratio of the value of goods and services acquired by cash transaction to the total household income (von Braun et al. 1994). In measuring household-specific level of commercialization, Govereh et al. (1999) and Strasberg et al. (1999) used a household commercialization index (HCI), which is a ratio of the gross value of all crop sales per household per year to the gross value of all crop production.

Recently, Gabremedin et al. (2007) used four approaches to measure the level of household commercialization: sales-to-output and sales-to-income ratios, net and absolute market positions (either as a net buyer, net seller or autarkic/self-sufficient household), and income diversification or level of specialization in agricultural production. According to Gabremedin et al. (2007), the sales-to-output ratio measures the gross value of all agricultural sales by a household as a percentage of the total gross value of its agricultural production. This ratio is similar to what has been developed earlier by different authors (Abercrombie 1961; Cleave 1974; Ruthenburg 1980 as cited in von Braun et al. 1994) as the percentage of agricultural output sold to total agricultural production. The total sales-to-income ratio is the ratio of the gross value of total sales to total income from crop production. In this index, income from crop production is assumed as a proxy to total household income, ignoring income from livestock, and off- and non-farm sources. The market position of a household is evaluated using the ratio of volume of sales and volume of purchases to the total volume of stock: the sum of storage from the previous production year and production in the current year. The specialization index tries to capture to what extent farm households are specialized in their production to capture the benefits from comparative advantages: producing what they can efficiently produce and buying what they cannot. This index measures the proportion of the

value of purchased agricultural products not produced by households to the gross value of agricultural production.

In most literature, the issue of commercialization is based on the proportion of resources allocated to either cash or food crops. However, under the existence of favorable market environment and infrastructure, food crops could also have the potential to be commercial crops (Fafchamps 1992).

2.2 Determinants of commercializing subsistence agriculture

A number of factors have been identified that can influence agricultural commercialization by different researchers. These factors can be grouped into long-term or short term and can either facilitate or impede the commercialization process (Fischer and Qaim, 2012). Some examples of long-term factors are population growth and rural infrastructural development (Ahmed and Hossain, 1990); Barrett, 2008). Some studies show that population growth can increase the quantity of marketable surplus (Barrett, 2008) while other studies find that rural infrastructure affected agricultural commercialization through its impact on prices, diffusion of technology, and efficient combination of inputs and outputs (Barrett, 2008).

Moreover, these determinants can also be broadly categorized as exogenous and endogenous. The exogenous ones are factors beyond the smallholder's control like population growth and demographic change, technological change and introduction of new commodities, development of infrastructure and market institutions, development of the non-farm sector and the broader economy, rising labor opportunity costs, macroeconomic, trade and sectorial policies affecting prices and other driving forces (von Braun et al. 1991). In addition, development of input and output markets, institutions like property rights and land tenure, market regulations, cultural and social factors affecting consumption preferences, production and market opportunities and constraints, agro-climatic conditions, and production and market related risks are other external factors that could affect the commercialization process (Pender et al. 2006). On the other hand, factors like smallholder resource endowments including land and other natural capital, labor, physical capital, human capital, level

education, age, size of the family, etc. are household specific and considered to be endogenous determinants.

Population growth and demographic change are considered as demand-side driving forces for smallholder commercialization resulting from the urbanization effect of economic growth. Demographic change is certainly a key long-term determinant of commercialization. It may facilitate or impede commercialization, depending on the availability of resources. If an expansion of the cultivated area is still possible, and if the marginal labor productivity exceeds the marginal subsistence requirements, population growth may in fact enable an increase of the marketable surplus. However, this situation has certainly become rare. With no concurrent change in the preferences for a high degree of self-sufficiency in staple food (due to perceived food security risks) on the one hand, population growth might lead to a reduced volume of marketed surplus in relative or even absolute terms in regions with deficient market connections.

On the other hand, an increased person-land ratio might lead to an increased demand for off-farm employment in order to generate cash income, of which a high proportion will be spent on food (von Braun et al. 1994). Urbanization and higher income from economic growth increases demand for marketed agricultural products which will tend to increase commodity prices and stimulate agricultural production for the market. However, by creating pressure on farmland, population growth may retard the commercialization process as food self-sufficiency on smaller plots becomes a priority over producing for markets. Moreover, population pressures may result in land degradation and lower productivity. Therefore, the direction of the influence of population growth on commercialization can be ambiguous (Moti et al. 2009).

Institutions are ‘rules of the game’ comprising of both formal rules (laws, constitutions, property rights etc.) and informal constraints such as norms, conventions, and codes of conduct that provide the structure for human interactions through their influence on human behavior, institutions influence economic performance, growth, and development (North, 1990). To better understand the role of institutions in smallholder commercialization, it is important to disentangle and briefly discuss institutional environments and institutional

arrangements. Institutional environments refer to the fundamental political, social, and legal ground rules that establish the basis for production, exchange, and distribution. For instance, rules governing property rights and the right to contract are under this category. On the other hand, institutional arrangements refer to relations between economic units that define how these units can cooperate or compete (Williamson 2000). A good example is market arrangements such as contracts, auctions, exchanges, co-operatives etc (Omamo 2006).

Formal institutions like laws, constitutions, rules, regulations, contracts, property rights, and legal frameworks facilitate the playing ground for economic actors (North 1990). In one way or another, these institutions contribute to the overall smallholder commercialization process. For instance, experiences from grain markets in Ethiopia (Gabremedin 2001) and Madagascar (Fafchamps and Minten 2001) showed how the scope of spatial and temporal arbitrages in grain marketing is limited due to a weak legal system for contract enforcement and the demand for personal inspections for grades and quality standards of each grain delivery. Such poor institutional arrangements result in higher transaction costs of trade that must be paid by producers and consumers, which, in turn, results in a wide spread between farm gate and retailer prices. The categories of formal institutions can also include institutions like: Legal enforcement, Extension Service Providers, Input Suppliers, Financial Institutions, Farmer Organizations, Political institutions, Research Institutes, etc

Although it is relatively more difficult to study the extent of constraints imposed by informal institutions on economic performance (North 1990), these institutions are as important as the formal ones, if not more, in facilitating or hindering a smallholder commercialization process. Values, norms, sanctions, taboos, cultures, traditions etc. have strong influences on smallholder production and marketing decisions, including those related to input use. Socio-cultural and religious factors determine consumption preferences of households, which can be a motivating or de-motivating factor for household commercialization (Pender et al. 2006). The role of informal institutions in governing market exchange is paramount particularly when formal institutions are missing. A case in point is the set of informal institutions used in setting grades and standards for commodities in the Ethiopian grain markets through the use of brokers and other market intermediaries (Gabremedin 2001).

When production is market related, risk has a direct impact on farm household decision-making behavior. While production risks are assumed to be the same both for subsistence and marketed goods, major risks to smallholder commercialization usually arise from market and policy failures (von Braun et al. 1994). In most rural economies, land, labour, financial, and insurance markets are either non-existent or imperfect Under such circumstances, risk-averse semi-subsistence households tend to produce more of the market-risky subsistence goods (consumption commodities). This situation holds particularly when the effects of shocks are triggering changes in household consumption more than in income (von Braun et al. 1994).

According to von Braun et al. (1994), the degree of change in household consumption due to shocks depends on the share of risky crops in total consumption, the income elasticity of demand for risky crops, risk preferences of the household and the covariance between consumption prices of risky crops and the revenue they generate. The higher the share of risky crops in the household's total consumption, the more is household consumption influenced by market shocks. Under such circumstances, households tend to allocate fewer resources to commercial commodities in favour of more resources towards food production for home consumption. If the demand for home consumed risky crops is largely affected by changes in household income due to market shocks, then households prefer to be self-sufficient in production and consumption of risky crops rather than allocating resources to cash crops.

The availability of Technologies, such as improved seeds and agronomic practices, and investment in infrastructure and policies for market creation are key factors that facilitate the commercialization process. Increased commercialization can occur without technological change in agriculture, but technological change without increased commercialization seems unlikely because the increased use of purchased inputs and specialization are inherent elements of most technological innovations in agricultural production. Policies for the promotion of commercialization and technological change may focus on either one or in a more complex, dynamic fashion-on both. Technological change implies increased total factor productivity. Policies that generate technological change focus on human capital

improvement, research and extension, and related institution building. In order to have a sustainable effect on the food security of the poor, the income streams resulting from technological change must reach them, directly or indirectly, through employment expansion, returns to their resources, or favorable food-price effects. Commercialization implies increased market transactions for capturing the gains from specialization. Policies that foster commercialization focus on facilitating an open international and domestic trade environment, improving hard and soft infrastructure for opening up new market opportunities, and ensuring legal security (von Braun et al. 1994).

As cited by Moti et al. (2009), the existence of low-cost, well-integrated and efficient rural markets is a key element in agricultural commercialization. Using a crop portfolio choice under income and consumption price risk model, Fafchamps (1992) showed that the crop portfolio of households consists of more cash crops when agricultural productivity is increased and rural markets are well integrated. deJanvry et al. (1991) also showed that resource allocation to cash crops substantially diminishes in the absence of food markets since the aim of food self-sufficiency at a household level takes prominence. In explaining the importance of well-integrated markets for household market participation and better returns from technology adoption, Barrett (2008) argued that well-integrated markets transmit excess supply to distant locations, and because of this, the returns to increased output due to technology adoption diminish less quickly in well-integrated markets than in segmented or poorly integrated markets. According to Barrett (2008), the potential for adverse welfare effects on non-adopters due to a fall in output prices is also lower in well-integrated markets.

Participation in market exchange is a core element in smallholder commercialization. However, transactions in markets are not frictionless and without cost. There are physical marketing costs like transport and storage costs and, also importantly, transaction costs related to searching and processing information, negotiating contracts, monitoring agents, and enforcing contracts (Gabremedin 2001; Jabbar et al. 2008). The role of transaction costs in completely hindering or limiting the level of smallholder market participation has been examined by several authors (de Janvry et al. 1991; Gabre-Madhin 2001; Pender and Alemu 2007), among others. Transaction costs can be classified into two types: fixed and

proportional transaction costs (Key et al. 2000). Searching, monitoring, screening etc. are some of the fixed transaction costs. This category of transaction cost is highly household or commodity-specific, non-variant with the volume of transaction, and basically deters smallholder participation in markets. Proportional transaction costs, as the name indicates, are proportional to the volume under transaction (Key et al. 2000).

Apart from its direct impact in deterring or limiting household participation in cash crop markets, the prevalence of higher market transaction costs also limits household involvement in cash crop production by discouraging participation in food markets and prompting them to give priority to subsistence food production (Fafchamps 1992; Omamo 1998b; Key et al. 2000; Govereh and Jayne 2003; Pingali et al. 2005). As a result, agricultural resources are diverted away from their potential use in cash crop production that would generate higher household income.

According to barley strategy developed by ATA and MoA(2012), more than 85% of the produce is consumed by the producers themselves in different forms which includes: injera, bread, beso, Tella(Local drink), kolo, and others. Combined with small farm sizes and unreliable food markets that characterize smallholders and the rural markets they operate in, food habits could also be a reason for farmers not to commercialize (von Braun 1994; Pender et al. 2006). Even if markets may exist for some of the food commodities, preferences to consume own production is sometimes observed as a reason for self-sufficiency objectives.

Household resource endowments, both in terms of capital and as a safeguard to mitigate any production and market related shocks, are relevant in a smallholder commercialization process. The principal argument for household asset holding as a determining factor in smallholder commercialization assumes a consumption-side perspective by highlighting its role in mitigating unexpected shocks in the commercialization process. Reductions in yields or unfavorable market prices may affect household income and consumption adversely. Under such circumstances and in the absence of credit markets for consumption, asset liquidation may be the only option available to households to smooth their consumption (Moti et al. 2009). On the other hand, the importance of assets for smallholder

commercialization can be seen from the production side. Assets like land, oxen, farm implements, and human capital are essential for marketable surplus production at a smallholder level. Larger farm holdings enable households to exercise economies of scale by adopting modern technologies. These and other assets for surplus production become critical especially when markets for land and oxen power are completely missing or less functional. When factor markets are imperfect, resource ownership matters for efficiency (von Braun and Immink 1994).

The household asset can be explained in the form of human capital as one of the crucial elements in commercializing smallholder agriculture (World Bank 2007). Human capital comprises education, experience, skills, capabilities etc. of the household members engaged in pursuing new opportunities that could change the household's overall living standards (Moti et al. 2009). Even if a farming community is exposed to a favorable environment that facilitates smallholder commercialization, all community members may not commercialize their production system to the same level. There are some individuals who inherently have better skills and capabilities to do the implicit cost–benefit analyses required and apply their talents to quickly adapt to and exploit new opportunities while others are either adapting slowly or not at all. The contributions of human factors in the overall commercialization process have generally been given little attention.

Smallholder commercialization cannot be left to the market alone (von Braun et al. 1994). Pingali and Rosegrant (1995) emphasized the importance of appropriate government policies to facilitate the smooth transition from subsistence to commercialized agriculture. According to these authors, priority areas where a government should take actions are investments in the development of rural markets, transportation and communication infrastructure, crop management, research and extension, secured property rights to land and water, development of a liberalized capital market, and provision of support services such as market information, credit services, extension services, health, sanitation and nutrition to rural households (Pingali and Rosegrant 1995; Pingali 1997). Pingali (2006) generalized that governments ought to help in creating enabling policy environments for smallholder commercialization through investing in rural infrastructure and undertaking institutional reforms that could

encourage the private sector to participate in the development of the rural economy. Moreover, the role of government is crucial in specifying property rights and enforcing contracts to promote specialization and reduce the costs of market exchange (North 1990).

2.3 Related Empirical Studies

2.3.1 Empirical studies related with Barley Production in Ethiopia

There are two varieties of barley: food barley and malt barley. In Ethiopia, roughly 15% of barley production is in the form of malt barley. Food barley is grown primarily for human consumption, with smallholder farmers consuming upwards of 60% of the food barley they produce. In Ethiopia, the market potential for malt barley is directly dependent on the market for beer; as such, its potential can best be assessed by looking at the evolving dynamics of Ethiopia's growing brewery sector. Barley is the fifth most important cereal crop after teff, wheat, corn, and sorghum. It is the staple food grain especially for Ethiopian highlanders who produce the crop with indigenous technologies. It is cultivated by smallholders in every region of Ethiopia, since it is able to grow at all elevations, but it performs best at the higher elevations in the northern and central regions of the country (USDA, 2012).

Barley production has been growing in Ethiopia as both the number of barley farmers and barley yields increase, linked to growth in demand for food and malt barley. It is among the top 5 crops grown in Ethiopia along with teff, wheat, maize and sorghum. Very well suited to growing in temperate climates especially 2,000 meters above sea level, ideal for Ethiopia, 80% of production is in the Oromia and Amhara regions, increasing numbers of farmers, yields and production of barley in Ethiopia as demand for malt and food barley grows(Mulatu et. al., 2011).

The current productivity level presents both opportunities and challenges. There are reasons to be optimistic because the average yield in 2014 (1.97 tons /ha) was far below the yield achieved (4 ton/ ha) in research station trials. Increasing yield to 3 tons per hectare (Kenya has achieved higher rates) can result in a host of benefits to the country. Such an increase in yield

can potentially make the country a net exporter, improve farmers' income, generate local employment, and reduce pressure (over mining of soil nutrients) on the land. Ethiopia exhibits large spatial variations in barley yields. For instance, in the 2013/14 meher season, average barley yields in Oromia were 2.17 t/ha, which is 16 percent higher than the national average and much higher than the yields in other regions in the country (Shahidur et.al., 2015).

Table 1: Barley Area, production and yield

Year	Area in hectare	Production(Tones)	Yield in quintals
2007	1,019,314	1,270,680	12.5
2008	984,942	1,352,148	13.7
2009	1,129,112	1,750,444	15.5
2010	1,046,555	1,703,347	16.3
2011	948,107	1,585,287	16.7
2012	1,018,753	1,781,652	17.5
2013	1,019,478	1,908,262	18.7
2014	993,940	1,953,385	19.7

Source: Faostat, 2015

Barley farmers in Ethiopia have not fully adopted modern inputs like fertilizer and modern seeds that help boost production (Mulatu , 2011). On average, two third of the barley growers did not apply any fertilizer to their plots. Even though more barley farmers have started to use fertilizer in recent years (42 percent in 2014), the rate is far below all other cereals except sorghum. Second, a similar trend is observed in fertilizer application rates (dosage). On average, barley growers applied only about 30 kilograms of fertilizer, which again is far lower than all other cereals except sorghum. Finally, even when only fertilized areas are

considered, average fertilizer application rates remain far below the recommended dosage, which also contributes to lower yields. For example, two studies argued that proper application of fertilizer can double barley yields in most of the barley producing regions in Ethiopia (Agegnehu et al., 2011; Abera et al., 2011).

Barley production and its use in malt beer dates back to Egyptian times. The ancient Barley is the fourth most important cereal crop grown in Ethiopia today. While being Africa's largest Barley producer, shouldering Morocco, its share of world production is rather insignificant with economic powerhouses like Canada, US, Russia, Australia and the EU in the lead. The malt barley is differentiated from the food barley by the different varieties characterized by low protein but high carbohydrate values, yielding a higher extraction rates during processing. Malt Barley is mainly grown in Arsi and West-Arsi production area (Oromia region), and recently introduced in North and South Gondar (Amhara region) to supply the newly constructed factory in Gondar. While the malting varieties where set out as a cash crop in both regions, local population favors the malt barley over food barley for its high extraction rates in flour milling. Consequently, the majority of malt barley grown is kept for own consumption and used as barley flour (milled in local mills or at home) in Injera, the traditional staple food in Ethiopia. Approximately 40% of the malt barley marketed surplus feeds into the malting factory, which offers a premium for quality produce (SNV, 2012).

Barley is crop of strategic importance to Ethiopia, ranking 5th among cereal crops production, with 4 million smallholder farmers growing ~1.6 million MT annually and ~85% of cereal produced in Ethiopia is consumed by farmers producing it, while the remaining cereal is sold at the local/city markets as cereal production in Ethiopia is emphasized to meet food security goals (ATA, 2012).

Malt barley production in Ethiopia is increasing at 11% annually, while food barley production is rapidly declining at 8% annually; yield and acreage are the two key factors. Both food and malt barley have increased in productivity, 3% and 6% respectively, while food barley cultivated land has decreased significantly by 11%. Malt barley increase in yield and acreage has contributed to its 11% production increase, while food barley production has decreased as a result of acreage (CSA, 2014).

Smallholder farmers in Ethiopia consume the majority of the barley they produce at home, regardless of whether its food or malt barley, meaning very little reaches markets and sold either to local market or malt factory if it's malt barley. There are six major products from barley widely in use and five(5) of them can be produced by farmers and consumed at home except beer.

Barley is a staple food crop for many Ethiopians, and is substituted for wheat when wheat prices are high. It is consumed in the Ethiopian fermented bread injera in the highlands, as porridge, as a roasted snack, and in homemade beer. For millennia, barley has been supplying the basic necessities of life (food, feed, beverages and roof thatch) for many in the Ethiopian highlands. However, the ever-increasing human and livestock populations are placing increasing pressure on the land normally used for barley production. Because of its wide range of uses, barley is considered the "king of grains" in much of the country and low farm input supplies such as fertilizer and improved seed (FAO, 2009).

2.3.2 Empirical studies related with Barley Marketing in Ethiopia

Malt is the second largest use of barley after food, and it is an important crop for farmers in the cool highlands of Ethiopia. Beer production in Ethiopia has increased from 1million hectolitres in 2003 to roughly 4 million HL in 2011, growth of nearly 20% annually. The growth in beer production has led to corresponding growth for malt barley demand, which is the key raw in-put for beer production.

In Ethiopia, there is high demand of Malt barley grain both in quantity and quality. Number of breweries is increasing. The existing breweries are expanding their capacity. New ones are coming: Habesha, Raya, Zebidar, Heineken and Dashen (No.2). Local malt barley production is 55 % and 45 % imported at present, thus huge expenditure of foreign Currency 27 Million USD in 2013 alone (Sinana ARC, 2014).

Table 2: Malt Barley Import from 1998-2013.

Year	Quantity(MT)	Value (USD)
1998	3,502	1,500,217
1999	19,857	3,054,498
2000	3,042	1,596,311
2001	9,624	4,344,634
2002	5,509	2,516,095
2003	5,428	2,807,411
2004	6,200	3,574,719
2005	10,913	6,048,585
2006	26,967	14,394,223
2007	32,195	23,887,718
2008	34,597	35,458,696
2009	25,649	23,125,722
2010	34,306	21,625,148
2011	34,677	25,947,892
2012	42,465	30,739,921
2013	33,987	26,457,913

Source: Ethiopian Revenue and Customs Authority, 2014

The existing brewers are expanding their beer production capacity and requiring quite a large volume of malt for their factories. Moreover, new ones are coming in and the total volume required will rise approximately to 248,353 MT of malt annually which is equivalent to 351,661 MT of raw Malt Barley. For this the country is going to spent more than 245 million USD (AMF, 2012).

Table 3: Existing Capacity of Breweries

Factory	Capacity (HL)	Share (%)	Malt Requirement	Barley grain requirement
St. George (BGI)	2,000,000	52.5	34,000	49,300
Dashen	709,000	18.6	12,053	16,633
Meta Diageo	500000	3.1	85000	11730
Harar(Heineken)	300,000	7.9	5,100	7,038
Bedele(Heineken)	300,000	7.9	5,100	7,038

Source: Compilation from Asella Malt Factories and Brewers, 2013

Table 4: New Breweries & Expansions in Progress

Factory	Capacity (HL)	Malt Requirement	Barley grain requirement
Dashen No.2	2,000,000	51,000	73,950
Raya Beer	300,000	5,100	7,242
Habesha Beer	300,000	5,100	7,242
Meta Expansion	600,000	10,200	14,484
BGI Expansion	300,000	5,100	7,242
Dashen Expansion	300,000	5,100	7,242
Heineken's New brewery	1,500,000	25,500	36,210

Source: Compilation from AMF, 2014

Barley is strategically important to the world and Ethiopia, as it is prevalent crop that can be made into attractive end products: beer, livestock feed and human food. Currently, 85% the barley produced in Ethiopia is the food variety, as most of it is consumed at home and retained as seed for up-coming seasons by farmers with only 15% of the product sold at the local/city market. Although ~80% of Ethiopian barley land is cultivated for food, ~150,000 Ha (15% of total barley acreage) is malt barley cultivated, which is ideal for beer production. This potential and beer consumption growth has led to a strong and growing interest from large international players like Heineken, Diageo, MaltEurop, Boortmalt and Bavaria (ATA, 2012).

The major market places are in woredas from the two zones of Arsi that include Shashemene, Kofele, Serufta, Siltana, Bokoji, Merarro, Degelu, Tijo and Sagure. Most of the malt barley produced is supplied to the factory by individual merchants. In most cases there are at least two market participants in the supply chain between the producer and the factory. Small merchants collect the barley from the farmers and supply to the large buyers. The large buyers in turn supply to AMF in trucks. Thus the profit is shared among the farmers, the small merchants and the large buyers. To avoid this ladder and to make the farmer the prime beneficiary, efforts are being made to organize farmers' service cooperatives and unions to collect the barley from the farmer and supply directly to the factory. To facilitate this effort, the factory has arranged to provide its own trucks to transport the barley to the factory at a

reasonable price. AMF extension agents also provide consultancy services to the barley purchase committees of these cooperatives to help identify the best quality barley in the market (Tadesse, 2011).

In the Ethiopian malt barley chain smallholder farmers are supplying about 94% of the total malt barley demand to the Assela Malt Factory (AMF). The market power of cooperative unions and multipurpose primary cooperatives is considered to be weak as more than 90% of the supply to the AMF is handled by traders. The AMF used to be the dominant actor in the Ethiopian supply chain. However, power in the malt barley chain has moved since the 2013/2014 cropping season as a result of several developments. First of all, in 2013 the new-established private Gondar Malt Factory (GMF) has started production in the North-Gondar zone in the Amhara region. In addition, contract farming is a new development in the Ethiopian malt barley chain. After different pilots in the 2013/2014 cropping season Heineken, Diageo, and the AMF itself, have scaled up their contracting operations in 2014/2015 in order to secure sufficient local supply. While there are regional variations, a tiny fraction (12-13 percent nationally) of the total barley production is marketed and the share of marketed proportion (not volume) has remained relatively constant over the past decade or so (Shahidur et.al. 2015).

The major players in the barley value chain are the input suppliers, smallholders, state and commercial farms, rural assemblers, cooperative unions, grain wholesalers, flourmills, processed food wholesalers, grain retailers, bakeries and pastries, and retailers of processed food. Donors and NGOs also play some role in procuring barley locally for their relief and development activities (Tadesse et.al, 2011).

Small traders (mainly local assemblers) are the main actors in the barley value chain. As the value chain develops, the role of these actors will diminish, and the farmer will have more direct access to the terminal markets. However, given the current state of the market fundamentals—that is, infrastructure, institutions, and information—these actors perform an important market function, namely product aggregation. The majority of these traders are also smallholders who conduct commodity trade as a secondary business. Therefore, the

surpluses generated through trading ultimately contribute to improving well-being and food security (Shahidur et.al., 2015).

Table 5: Functions of Actors

Function	Actors
Input supply	Seed enterprises, private input suppliers, cooperative union ,Agricultural office
Production	Farmers, commercial farms
Storage	Input supplier, state and private farms, cooperative union, wholesaler,
Assembly/collecting bulking	Assembler, cooperative
Grain whole selling	Grain whole sellers, cooperative
Malting/Processing	Malt factories
Brewing	Beer factories

Source: Tura et. al, 2015

Though there are wide variation across the regions when determining which farmers sell their barley, at the national level, traders are the single largest actor in barley marketing, handling over 70 percent of the marketed surplus. Next in line are consumers and farmers, accounting for 17.1 and 10.4 percent, respectively. Most of the sales to farmers consisted of seed, and the consumers are the deficit households in the community (Shahidur et.al., 2015).

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Description of the study area

The research is conducted in Oromia Region, Digalu Tijo woreda of Arsi Zone. The woreda is one of the major producers of Malt Braley in the region.There are about 23(twenty three) rural kebels in the woredas. The woreda is located at the altitude of 2000-3600 meter above sea level and characterized by more of highland environment with average temperature of 11-22ºC and annual rainfall of 900-1400mm on average. About 78% of the woreda is high land and the remaining 22% is mid-altitude. The soil types of the woreda are red soil(44%), clay soil(35%) and brown soil which covers about 21% of the area. The total population of the woreda is close to 140,000 with about 50% female. There are about 15,859 male and 2,853 female headed households in the woreda. Among the farming households more than 97% of them have access to extension services through woreda agriculture office and development agents in each kebele (Woreda Ariculture Office, 2014).

The major economic activity of the majority of the people living in the woreda is crop production and rearing of livestock. The major crops grown with higher economic return are: Wheat, Food Barley, Malt Barley, Faba bean, Field Pea, Linseed, Maize, Rape Seed,Teff, etc. Livestock is also the major source of income for the smallholder farmers in Digalu Tijo woreda with Cattle, Sheep, and Horse higher in number. The marketing of the agricultural crops is conducted through different channels with the bulk of the produce going through local traders followed by the farmer's cooperatives and unions Woreda Ariculture Office, 2014).

In the woreda, there are 23(twenty three) cooperatives supporting farmers through the supply of improved inputs such as fertilizers and different kinds of improved seeds and also serve as a market out let for them. In addition to cooperatives and local traders, there a number of buyers involved in the bulk purchase of Malt Barley ranging from companies to development partners supporting smallholders in market linkage and facilitation. Companies like Asella Malt Factory, Meta Diageo, and Heineken brewery and development partners such as Techno

Serve(International NGO) and HUNDEE(Local NGO) are actively engaging with farmers in sourcing the raw materials from the woreda (Woreda Ariculture Office, 2014).

3.2 Sampling Technique and Sample Size.

For the household survey, a stratified two-stage sampling design was employed within each wereda. First, all *kebeles*(sub-districts) in the selected wereda was listed, and 5(five)of the major producing kebeles are randomly selected based on their access to road to proximity to woredas town to save time and expenses of data collection. Then the households were randomly selected based on the list of individual farmers obtained from woreda agriculture office for the kebeles selected. While selecting the households, sex of the farmers are considered to include female headed households in the research to see the level of involvement in Malt Barley production and marketing

The sample size was determined based on the formula by Krejcie& Morgan (1970).

$$n = \frac{Z^2 NP(1-P)}{e^2(N-1) + Z^2 P(1-P)}$$

Where:

n = Sample size

Z = Z value (1.96 for 95% confidence level)

N= Number of target Population

P = Population proportion (assumed to be 0.5 (50%) – this provides the maximum sample size).

e = Degree of accuracy (10%), expressed as a proportion (0.10); It is margin of error.

With the target population of the whole farming households in the woreda of 18,712 households and using the formula above with the confidence level of 95% and margin error of 10%, the sample size for the research is 95 respondents. Nineteen (**19)** households were

randomly selected from each kebele (giving a target sample size of **95** households). Since the study also aimed to investigate gender-related differences in agricultural commercialization, the sample also stratified by gender of the household head. The kebeles is chosen on grounds of logistics and accessibility, in order to maximize the time spent in field research and minimize the cost for field work.

For the key informant's interview, people from woreda agriculture office, cooperative promotion office and leadership from cooperatives and unions were contacted from the grassroots level. To have the views of the major buyers, Asella Malt, Heineken and Diageo are also interviewed regarding the production and marketing of the malt barley in the woreda and to identify opportunities and challenges in working with smallholders. Moreover, ATA wheat and Barley team also approached to explore the issues related with policies and regulations regarding contract between producers and buyers involved in malt barley business.

3.3 Data Type, Sources and Data Collection Techniques

3.3.1 Data Type and Sources

Primary data was collected through structured household questionnaire which cover both qualitative and quantitative data on production, consumption, and marketing of farm produce, as well as demographics, resource ownership, infrastructure availability, distance from the nearby market, involvement in cooperatives, number of family, level of education, and off-farm activities, etc were collected from sampled respondents. In addition to the primary data above, secondary data was also collected from office of agriculture, key informant interviews (Breweries, Malt Factory, Researchers, etc), and focal group discussions. The survey conducted in February 2015, and the data collected for last 2013/14 cropping season and some information on current production year to better understand the existing situation and trends in the Digalu Tijo woreda.

3.3.2 Data Collection Methods

The data used for this study was collected both from primary and secondary sources. Secondary data was collected from different institutions, organizations and offices as well as through reviewing documents and publications. Primary data on the production and marketing system was collected from the producing farmer and companies using malt barley as raw materials.

3.4 Methods of Data Analysis

Both descriptive statistics and econometric methods of data analysis were used.

3.4.1 Econometric Methods of Data Analysis

Different methods can be employed to analyze farm household production decision. One approach to analyze the issue is to use the well-known Tobit model. However, Tobit model assumes that both the decision to participate in activity and the level of participation are determined by the same variables and with the same sign (Wooldridge, 2002). That is, according to Tobit model, the decision to participate in production of a certain crop and the intensity of production participation are jointly determined and influenced by the same parameters. This is the main limitation of the Tobit model in which it restricts variables and coefficients in the two decisions (production participation and the level of participation decisions) to the same sign and signature (Wooldridge, 2002). That is why recent empirical studies have shown the inadequacy of the Tobit model in cross-sectional analysis, stressing the relevance of alternative approaches.

In this regard, an alternative approach is to employ the Heckman two step procedures. This model assumes that the decision to produce a crop and the intensity of production participation may not necessarily be jointly determined (Brad R. Humphreys,2010). In this case, factors that determine the production participation decision and the decision on extent of participation could be different. However, the Heckman selection model is appropriate if there is a censoring process in measuring the intensity of production participation. That is, the Heckman procedure assumes there is some potential production levels in the sample population, but are not observed due to sample selection problem. In general Heckman's

sample selection model is designed to account for the fact that the observed sample may be non-random.

In this case, the appropriate approach is to use the double-hurdle model. This model assumes farmers faced with two hurdles in any agricultural decision making processes (Cragg, 1993; Brad R. Humphreys, 2010). Accordingly, the decision to participate in an activity is made first and then the decision regarding the level of participation in the activity follows. In this study, thus, double-hurdle model was chosen because it allows for the distinction between the determinants of production participation and the level of participation in Malt Barley marketing or volume of supply through two separate stages.

According to Burke (2009), double hurdle model is useful because it allows a subset of the data to pile-up at some value without causing bias in estimating the determinants of the continuous dependent variable in the second stage, hence you can obtain all the data in the remaining sample for the participants. Thus, in double hurdle model, there are no restrictions regarding the elements of explanatory variables in each decision stages. That means it is possible to separately analyze the determinants of production participation decision and the decisions on the volume of supply.

This model estimation procedure involves running a probit regression model:

The probit model

Standard probit model to assess the household production decision and its specification is given below. Following Wooldridge (2002), the decision to produce can be modeled as a:

$$y_i^* = x_i\beta + \varepsilon_i$$

$$y_i = 1 \text{ if } y^*i > 0$$

$$y_i = 0 \text{ if } y^*i \leq 0,$$

where, y_i^* is a latent (unobservable) variable representing households' discrete decision whether or not to participate in Malt Barley Production; x_i is a vector of independent

variables hypothesized to affect household's decision to participate in the production; β is a vector of parameters to be estimated. y_i is a discrete response variable for status of households' participation in the production which takes value of 1 if the household participates in the market and 0 if the producer households reported no production. Probit model was estimated using maximum likelihood estimation using STATA Version 12. Maximum likelihood estimates are consistent, asymptotically normal, and asymptotically efficient.

In the second stage, Truncated Regression Model was employed to explore the determinants of the volume of malt barley that are marketed which is referred to as the level of commercialization in this study:

Truncated regression

A truncated regression fits a regression model on a sample drawn from a restricted part of the population. The intensity of commercialization is modeled as a regression truncated at zero:

$$z^*_i = x_i\gamma + \mu_i,$$

$$Zi = z^*i \text{ , } if\ z^*i > 0\ and\ yi=1,$$

$$Zi = 0 \text{ otherwise}$$

where, zi is the intensity of commercialization which depends on latent variable zi* being greater than zero and conditional to the decision to produce yi, γ is parameter to be estimated. Truncation reduces variance compared to the variance in the un-truncated distribution. As the result, the truncated regression model with the lower left truncation equal to 0 was used to determine factors influencing sales value of malt barley.

3.5 Variable definitions and Hypothesis

3.5.1 Dependent variables

Malt Barley Production decision (MPD):

The dummy production participation decision variable is the dependent variable in the first stage of the Double - Hurdle two stage estimation procedures. For the respondents who will participate in malt barley production is = 1, and = 0 for the respondents who did not participate in the year 2013/14.

Malt Barley Marketed Volume (MMV):

It is a continuous variable which represents the actual amount of malt barley supplied to the market by the farm household.

3.5.2 Independent variables

Sex of the household head (SEX): This is a dummy variable. No sign could be expected a priori for this variable. It could take positive or negative signs. A study by Makhura (2001) on the households' participation process in livestock markets indicated that women are more inclined to sell their livestock than men. It was indicated as 1 for male headed households and 0 for female headed. A study by Lewis *et al. (*2008) on gender difference and the marketing styles at Oklahoma wheat producers showed that men tend to sell grain more frequently than women (men trade more than women) and women tend store longer and receive 1.4 cents/bushel less than men.

Age of the household head (AGE): Age is continuous variable and measured in years. The expected influence of age was assumed negative taking the presumption that as farmers' gets older they face challenge in making decision to produce different crops because of shortage of enough market information and labor to work on their farm. According to Tshiunza et al. (2001) found that younger farmers tended to produce and sale more cooking banana for

market than older farmers. It is expected that as age of the household head increase, their decision to produce and volume of supply to the market decrease.

Education level of the household head (EDU): This is a continues variable expressed by number of years which the household head has attended formal education which can help to uptake new technologies and better understanding of improved practices. It is a variable hypothesized to affect both production decision and volume of market supply positively. It is a continues variable.

Total land holding size (TL): The total size of farm land measured in hectare (ha) and owned by a farmer is among the variables that could influence both production participation and market supply. If a farmer owns more land, the probability of allocating land for malt barley would increase. It is a continuous variable expected to influence participation and supply decision in similar direction, both positively.

Family Size (NFM): This is the total number of family members that can be taken as a proxy for the level of consumption. This continuous variable is expected to influence participation decision and supply negatively. Study by Chauhan and Singh (2002) in India, indicated that the marketed surplus is negatively related with the size of family and level of consumption.

Non-farm income (NFIN): It is a continuous variable that obtained from non-farming activities by the household head. It was expressed by the amount of birr obtained through non-farm activities. A study by Iddo *et al.* (2006) confirmed that non-farm income has affected the decision of farmers to produce and sell their farm output (market participation) negatively in the study of rural Georgia.

Oxen Ownership (OXEN): It is a continuous variable indicated by the number of oxen owned and which is expected to influence production participation positively. It was expected that participation probability of farmers to produce malt barley would increase as farmers increased their number of oxen because even if there is a limited land there will be proper and timely land preparation then by increase in productivity.

Cooperative Membership (COMB): it is a dummy variable indicated as 1 for participating households and 0 for non-participants. It is the membership status of the household heads in the farmer's cooperatives. Those farmers who are members of the cooperatives believed to have more information on the available improved agricultural inputs and the existence of market opportunities. Being a membership to farmer's cooperatives has positive effect on production participation decision and volume of supply.

Credit Access (CREDIT): This is a dummy variable, which credit indicates taken for malt barley production. Households with access to credit were indicated as 1 and those without access as 0 for the participating farmers. Access to credit would enhance the financial capacity of the farmer to purchase the necessary inputs. Therefore, it is hypothesized that access to credit would have positive influence on production participation and volume of sale.

Distance to market (DSTMKT): This is a variable used to measure access to markets measured in travel minutes from their home. It is a continuous variable and expected to influence production participation and supply negatively.

Extension Advisory (ADVISORY): This is a dummy variable indicating the extension service farmers were getting. This variable was measured as a dummy taking a value of 1 if the household head has contact with a development agent and 0 otherwiseThis variable was expected to influence participation and supply positively. Obviously, as farmers learned more and knew much it would be obvious that they would produce much and ultimately participated in a market.

Market price trend (PTRD): This variable is a dummy variable indicating the market price trend in the previous production seasons. It was indicated as 1 for increasing trends and 0 if decreasing trend. This has either negative or positive effect on current season production. If the price for last year was higher, current year production coverage will be higher and vice versa.

Access to market information (MINFO): This is a variable taking a value of 1 if the farmer had access to market information from different sources and 0 otherwise. It is hypothesized to affect malt barley marketable supply of the farm households positively. Because, producers that have access to market information are likely to supply more malt barley to the market. Obtaining information through extension contacts increased the chance of household selling malt barley. Study by Makhura (2001) implies that getting information through extension contacts has a considerable marginal effect on increasing the probability of selling horticultural crops.

Type of Seed Used (SEED): this indicates the type of malt barley used for production. For improved seeds 1 was used and 0 for local varieties or old generation seeds. The availability of improved seeds encourages farmers to allocate more land as it is very productive as compared to local varieties. The use of improved seeds hence also improves volume of supply. It was expected that it has either positive or negative effect on production decision and volume of supply.

Production Cost (PRCST): this is a continues variable indicated on the amount of birr per hectare of land. The higher cost of production, the lower the farmer's participation in the production. It was expected that it has negative effect on the production participation decision.

Transaction Costs (TRANCST): apart from its direct impact in deterring or limiting household participation in cash crop markets, the prevalence of higher market transaction costs also limits household involvement in the market. It was indicated by the amount in birr per quintal of malt barley. As the cost increases the farmer's market supply will be decreased (Fafchamps 1992; Omamo 1998b; Key et al. 2000; Pingali et al. 2005). It was expected that transaction cost has negative impact on the volume of supply.

Table 6: Expected sign of the variables

Name of Variables	Probit Regression	Truncated Regression
Sex of the household head (SEX)	-/+	-/+
Age of the household head (AGE)		-/+
Education level of the household head (EDU)	+	+
Total land holding size (TL)	+	+
Family Size (NFM)	-	-
Non-farm income (NFIN)	+	-
Oxen Ownership (OXEN)	+	
Cooperative Membership (COMB)	+	+
Credit Access (CREDIT)	+	+
Distance to market (DSTMKT)		-
Extension Advisory (ADVISORY)	+	+
Market price trend (PTRD)	-/+	-/+
Access to market information (MINFO)	+	+
Type of Seed Used (SEED)	-/+	
Production Cost (PRCST)	-	
Transaction Costs (TRANCST)		-

CHAPTER FOUR: RESULTS AND DISCUSSIONS

This chapter presents the results of descriptive, qualitative and econometric analysis of the study. The descriptive and qualitative analyses has been done to describe the general characteristics of sample farm households while the econometric analysis is used to identify factors that affect farm households' decision to participate in the production and level of market supply.

4.1 Socio-Demographic Characteristics of Sample Farmers

4.1.1 Demographic Characteristics of Sample Farmers

The household characteristics like sex, age, level education, and family size are believed to influence the production participation decision and the volume of supply to the market. The results of descriptive statistics indicated that, 84.2% and 15.8% of the sampled households were male and female headed households respectively. From the total of male farmers in the sample, 81.3% of them have participated in the production of malt barley while 18.7% of them didn't in the 2013/14 production season. Among female headed households in the sample, 73.3% of them have produced malt barley and 26.7% of them were not engaged in the production of the crop. According to the result from descriptive statistics, the percentage of male headed farming households that participated in malt barley production were higher than the female headed households(Appendix table 1).

The mean age of the sample respondents was about 40 years with the youngest being 25 and the oldest 65 years. The average years of formal education attended by the sampled households was 5.52 with maximum years of 12 and minimum of 0 years. About 59% of the households included were between 31-55 years old and 21.2% and 18.8% of them between 18-30 and 56-95 years old respectively. The average number of family size for the sample respondents were about 7(seven)(Appendix table 1).

4.1.2 Socio-economic Characteristics of the sampled farmers

The socio-economic characteristics considered were land size, types of crops grown, types of livestock owned, non-farm activities and others. The average land size allotted under the crop per sample household head was about 1.75 ha while the average size of land allotted for malt barley was about 0.85 ha. The major crops grown in the woreda were wheat, malt barley, food barley, faba bean, field pea, linseed and some teff. Majority of the households produce wheat and the two types of barley than the other crops in terms of land coverage. The average malt barley supplied to the market was about 5.7 quintals and on average the value of malt barley sold per sample household head was estimated to be about ETB 5, 390(five thousand three hundred ninety)(Appendix table 1).

4.2 Results of econometric model analysis

There are many problems expected to be encountered in conducting research. The problem of multicollinearity is very common in cross-section data. While appropriate variables are important in the models a test for multicollinearity problem among variables was performed by using VIF and Correlation Coefficient and there was no serious problem as indicated in appendix Table 2 and 3.

4.2.1 Determinants of household production and marketing decision

The result of probit model estimation for the determinants of the probabilities of household to produce and sell malt barley or not are presented in Table 1. The decision to participate in the malt barley business (production and marketing) was estimated by maximum likelihood method. The model pseudo R2 values indicate that, the independent variables included and used in the probit regression model explain about 20.3% variations in the likelihood to produce and sale malt barley.

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Table 7: Probit regression for commercialization decision

Malt Barley Production participation	Coef.	Std. Err.	z	P>|z|
SEX	-0.25786	0.474179	-0.54	0.587
EDU	0.097572	0.072346	1.35	0.177
TL	0.296614	0.206584	1.44	0.151
NFM	0.382711	0.528115	0.72	0.469
NFIN	-0.00736	0.384432	-0.02	0.985
OXEN	0.22942	0.399959	0.57	0.566
COMB	0.481676	0.369358	1.30	0.192
CREDIT	0.33263	0.390717	0.85	0.395
ADVISORY	0.515786	0.370786	1.39	0.164
PTRD	-1.41927	0.682206	-2.08*	0.037
SEED	1.132178	0.434634	2.60**	0.009
MINFO	0.69462	0.359518	1.93*	0.053
PRCST	-0.00077	0.000341	-2.26*	0.024
_cons	-3.96084	2.34107	-1.69	0.091

** and * implies statistically significance at 5, and 10% level respectively; Number of obs = 93; Wald chi2(17) = 23.46; Prob > chi2 = 1349; Log pseudolikelihood = -39.610427; Pseudo R2 = 0.2026

The result of probit estimation shows that, the likelihood of household participation in malt barley production was influenced by the type of seed used(improved or local variety), price trend for the malt barley grain, access to market information and the total production cost in a given season, with price trend unexpected sign.

Price trend for malt barley was found to be a negative and significant factor in explaining the decision of households to participate in production of malt barley at 10% significant level. But it was expected that the decision change with the increase or decreasing malt barley price and the result is unexpected. An increase in the price of malt barley in the previous cropping season can motivate farmers to allocate more land and also encourages others to involve in the current production season. In the other way, a decrease in the price during the previous

season also limits the production participation. The unexpected sign could be due to this effect on the production decision.

The positive coefficient on type of seed used i.e improved or local varieties indicate that production decision was influenced by the type of seed available for the participating households. Farmers who have access to improved varieties involve in malt barley production as the use of improved seed increase productivity per ha which can result in marketable surplus hence famers decide to sell the grain. This result was also confirmed by Getachew et.al (2007) in which the result showed availability and use of improved seeds affect farmers decision to engage in the production of malt barley. As farmers access to improved seed increases, their decision to participate in the malt barley production also increases motivated by the expected yield due to the use improved seed. The use of local varieties reduce yield and hence reduce the quantity to be sold.

The possession of own oxen have positive influence on the famers production participation decision. Farmers who have their own oxen produce more malt barley as compared to those who don't have oxen.

Access to credit was expected to influence the farmer's decision on the production of malt barley. It was believed that farmers who have better access to credit can make use of the money to buy improved inputs like better seeds and fertilizers and other additional inputs expecting better production and productivity. The analysis result also showed that, farmer's access to credit has positive influence on their decision to produce malt barley.

Access to market information has positive influence on malt barley production as expected. Farmers who have access to market information were in a better position in production participation than those who don't have access to malt barley market information i.e having market information and using this information to make decision of production in the current production year. Access to market information is extremely limited in the Ethiopian grain market at producer level; farmers have very limited information on price prevailing even in nearby markets (Wolday, 1994).

The total production cost for the production of malt barley on one ha of land has negative influence on the production and marketing of malt barley. It was expected that as production cost increases, the farmers refrain from producing malt barley and shift their farm to other crops. This decision reduces the production per household and the amount of marketed product.

Level of education attended by the head of the household has positive impact on the famer's decision to engage in the production of malt barley. Farmers who have more years of formal education can get better information on the malt barley business and analyze to make use of the available opportunity in the production of the crop.

The total area of land owned by the farmers has also positive effect on the involvement of the households in the production of the crop. As one own more land, it easy to make decision to allocate the land among different crops with better market opportunities in addition to using for other purposes like grazing land. As the size of owned land increases, the chance of growing malt barley also increases.

Having income from non-farm activities has negative effect on farmer's decision to participate in the production of malt barley. Farmers who have other sources of income might focus on production of other crops with better market opportunities.

4.2.2 Determinants of the level of commercialization

This part deals with results of truncated regression model estimating the determinants of the level of commercialization that was measured by volume of malt barley supplied to the market. It is important to mention at this stage that only farm households who sell the crop are considered in the analysis because truncated regression is used to omit values which are not useful to determine the level of supply. The number of respondents to be used at this stage was already determined at the first stage by using probit regression. Results showed

that, the model was statistically significant at 1% level indicating the goodness of fit of the model to explain the relationships of the hypothesized variables.

Moreover, the estimation result also showed that, level of malt barley commercialization was influenced by age of the household, level of education, their total land holding size, price trend, and transaction cost .

Table 8: Results of truncated regression

Volume of Market Supply	Coef.	Std. Err.	Z	P>|z|
SEX	0.266034	0.737003	0.36	0.718
AGE	-0.05969	0.027417	-2.18	0.029*
EDU	0.153126	0.091338	1.68	0.094*
NFM	-0.132809	0.099406	-1.34	0.182
TL	1.300158	0.352376	3.69	0.000***
NFIN	-0.26972	0.577214	-0.47	0.640
COMB	0.93078	0.608656	1.53	0.126
CREDIT	0.53369	0.557603	0.96	0.339
DSTMKT	-0.00421	0.009351	-0.45	0.652
ADVISORY	0.552526	0.512324	1.08	0.281
PTRD	7.507718	2.455018	3.06	0.002**
MINFO	0.445475	0.520078	0.86	0.392
TRANCST	-0.0974	0.033194	-2.93	0.003**
_cons	-2.22448	2.221903	-1.00	0.317
/sigma	2.06834	0.173354	11.93	0.000

***, **, and * implies statistically significance at 1, 5, and 10% level respectively Limit: lower = 0; upper = +inf; Number of obs = 85; Wald chi2(17) = 75.19; Log likelihood = -169.53193; Prob > chi2 = 0.0000

Age of the head of the household is found to be significant at 10% level of significance in deciding the volume of supply to the market. It has a negative coefficient value which shows that young farmers were selling larger volume of malt barley as compared to older ones. Younger farmers are active and in a better position to access to technologies and market information that can enable them decide how much to sale as compared to the farmers who have lived for long years. It also can be related with the capacity to look for different

marketing channels in which also youngsters have better capacity and opportunities. According to Bedada et. al (2013), it is clear that the age of the household head can determine agricultural activities which ranges from production to marketing of the crops produced.

The education level of the household heads was found to have positive impact on the quantity of supply of malt barley in the market and significant at 10% level. An increase in level of education by one year increases the volume of supply and educated family heads have better understanding of the market and decide to sell more in the market. It was expected and confirmed by the model that education increases the ability of famers to gather and analyze relevant market information which would improve the marketing performance. Education is one of the important variables which increase an individual's ability to acquire, process, and use agricultural information. In fact, education level of individuals assumed to increase the ability to use the obtained information in a better way (Bedada et. al 2013).

The total land size owned by the household also found to positively influence the volume of malt barley marketed and significant at 1% level. As a household own more land, the decision to allocate the land for different kinds of crops that can be consumed by the family. This has also influence on the amount of malt barley consumed by the household and instead of malt barley, the family consumes more of other crops and the household can sell more in the market. Moreover, the decision to allocate more land for malt barley production can be easy and as more malt barley produced by the household, more grain supplied to the market. One ha increases in land holding size will increase the amount of malt barley to be supplied to the market.

Transaction costs related to the marketing of malt barley has found to be significantly and negatively influencing the volume of supply. Participation in market exchange is a core element in smallholder commercialization. However, transactions in markets are not frictionless and without cost. There are physical marketing costs like transport and storage costs and, also importantly, transaction costs related to searching and processing information, negotiating contracts, monitoring agents, and enforcing contracts (Jabbar et al. 2008). Apart

from its direct impact in deterring or limiting household participation in cash crop markets, the prevalence of higher market transaction costs also limits household involvement in cash crop production by discouraging participation in food markets and prompting them to give priority to subsistence food production (Fafchamps 1992; Omamo 1998b). As a result, agricultural resources are diverted away from their potential use in cash crop production that would generate higher household income.

The prices of malt barley in the last seasons have significant effect on the volume of supply. Considering higher price during the last season famers decide to produce more and supply increases due to price speculation. The higher price trend has a positive influence on the supply volume by individual famers.

The membership status in the cooperatives also found to positively influence the volume of market supply an. It was expected that household heads who are members of the cooperatives sell more than those who are not. Being a membership of cooperatives improves famer's access to better advisory services and market information which they use to decide the volume of supply. As most of the farmers are members of the cooperatives and there are active cooperative unions, it has impacted farmers supply volume.

Having multiple source of income apart from farming activities have negative impact on the market supply volume. Farmers who have additional source of income might not supply larger volume to the market as they can use for home consumption and cover their cost from the income obtained from the other sources.

Distance to the nearest market was again found to be negatively influencing the volume of the malt barley supply and sell in the market. The shorter the time taken to the nearest market would result in higher degree of commercialization. Distance to the market was negatively affecting the malt barley sold possibly due to increase in transaction costs associated with marketing of agricultural produces by farmers. This result is confirmed by Berhanu and Moti(2010) which found that famers close to the market participate more than those far from the nearest market. Moreover, the study conducted by Wolday (1994) on food grain market in

Alaba Siraro identified that poor access to market and volume of food grain supplied to market related negatively. This implies that the level of sales would be increased if the variable transaction costs could overcome through urbanization or expansion of market to the vicinity of butter producing households. The variable transaction costs will be reduced if the markets would be located closer to the farmers.

The extension service or malt barley advisory was found to influence the supply of malt barley in the market positively. Farmers who have access to extension or advisory service have better information of production methods and the marketing channels. They can use the information to decide on the production and then volume of marketed malt barley as compared to other who don't have chance to get the service.

Farmer's access to market information was found to influence the marketed volume positively. It was expected that the smallholder farmers who have better access to market information can sell more than the others who don't access market information. The estimation result shows having market information can increase the sells volume.

CHAPTER FIVE: CONCLUSSION AND RECOMMENDATIONS

5.1 Conclusion

Shifting the subsistence-oriented production system into a market-oriented production system as a way to increase the smallholder farmer's income and reduce rural poverty has been in the policy spotlight of many developing countries, including Ethiopia. The process of transforming the Ethiopian smallholder farmers from subsistence farming to commercialization to improve their income has been in the rural development policy of the government since many years. Though there are fragmented markets here and there in areas where large national and international buyers are looking for raw materials like malt barley, farmer's awareness level to produce the quantity and quality required as needed is still at early stage. From this study, it was revealed that there are number of determining factors influencing farmer's decision to engage in the marketing of malt barley in terms of production and volume of supply.

The fact that type of seed available and used, production cost, price trend for the crop and access to market information has become important determinants of farmers production participation in malt barley suggests the role of policies geared towards improving physical access to market places could yield positive results towards improving commercialization of smallholder farmers of malt barley. These improvements will lead to better flow of market information which can be used as an opportunity by the farmers. Having better access to market information will also lead to having stable marketing channels that can help to have stable price.

Famer's decision was also affected by whether they access improved and good quality seeds or not. Farmers who access improved seeds participating in the production which then affect the total production per unit of area. During the focus group discussion it was revealed that farmers hardly get improved high yielding varieties and they face the challenge in shortage of improved seeds. In addition to shortage of improved seeds and high prices of related costs, the production cost became very high that farmers are deciding to limit the production of malt barley.

On the other side, there are a number of factors determining the supply volume to the market by the farmers. The transaction costs and price fluctuation, expressed in terms of trend in malt barley price, were the main factors limiting the supply capacity of the smallholder farmers.

5.2 Recommendation

To improve the situation there is a need to deliberately improve the smallholder farmer's malt barley production decision as well as the level of commercialization (Volume of Supply) in order to facilitate stable incomes and sustainable livelihoods. Some relevant policy implications can be drawn from the findings of this study that can help to design appropriate intervention mechanisms to improve the smallholder famer's commercialization in the study area.

In addition to improving the physical access (roads) to market places and nearby market centers to facilitate easy accessibility by the famers, it is also important to introduce contract faming system in the study area so that the large companies operating in the area in disintegrated way can work with the smallholder farmers. These can help the farmers in such a way that they can get access to improve inputs like seeds and fertilizers and credit, which are the crucial factors of production and productivity for smallholder farmers through contract faming arrangement with the large buyers. For companies the contract farming not only help them find the right quantity and quality of malt barley it also help them save resources like time and money.

Continues awareness creation and support of smallholder farmers in accessing the improved agricultural inputs through different channels can also help them in using better inputs that can yield higher output per unit of land. As their yield per unit increases, the production cost decreases which can indirectly motivates farmers to produce more and supply more to the market to tap the existing market opportunities in the area.

Supporting the existing research system in the process of releasing high yielding varieties through public funding and some contributions from the private with additional sourcing from development partners is important. There should be close follow and strong monitoring system to make sure that the research centers are working towards resolving such bottlenecks as national

priority. The availability of improved seed is base for all other process and it has potential to drive the sector. Farmers in the study area have better understanding in using improved seed and can easily take up if there access.

Though the public Medias are working on market promotion and dissemination of market information, it is not as expected and in most of the cases not accessible to these groups of the society. Such information should be transferred though institutions working at grass root level to facilitate easy access to market information while farmers are in their village.

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Annex

Annex Table 1: Descriptive statistics of selected continuous variables used in for analyses

continuous Variables	N	Minimum	Maximum	Mean	Std. Deviation
AGE	95	25	65	40.38	11.61
EDU	95	0	1	.66	.475
NFM	95	3	14	6.31	2.518
TL	95	.50	5.00	1.9500	.89145
DSTMKT	95	30.00	180.00	95.1579	41.11124
TRANCST	92	10.00	115.00	61.3	36.69
PRCST	95	2400.00	4850.00	3951.5	838.97

Annex Table 2 : Descriptive statistics of selected dummy variables used in analysis

Dummy Variables		Frequency	Percent (%)
Sex	Female	15	15.8
	Male	80	84.2
Nonfarm activities	No	65	68.4
	Yes	30	31.6
Oxen Ownership	No	23	24.2
	Yes	72	75.8
Cooperative Mebership	No	28	29.5
	Yes	67	70.5
Access to Credit	No	42	44.2
	Yes	53	55.8
Type of Seed	Local	95	100.0
Access to Market Information	No	33	34.7
	Yes	62	65.3

Annex Table 3: The VIF

Variable	VIF	1/VIF
AGE	1.83	0.54596
EDU	1.96	0.50932
NFM	1.68	0.59623
TL	1.49	0.67249
DSTMKT	1.21	0.8277
TRANCST	1.44	0.69649
PRCST	3.18	0.3143
Mean VIF	1.82	

Source: own computation

Note: In all cases, VIF is less than 10 hence, no high degree of multicollinearity

Annex Table 4: The Correlation Coefficients

	SEX	NFIN	OXEN	COMB	CREDIT	ADVISORY	SEED	MINFO
SEX	1							
NFIN	-.078	1						
OXEN	-.245*	-.092	1					
COMB	.037	.191	-.042	1				
CREDIT	.080	.058	-.206*	.308**	1			
ADVISORY	-.073	.258*	.052	.013	.152	1		
SEED	.b	.b	.b	.b	.b	.b	.b	
MINFO	-.013	-.075	.259*	.013	.063	-.022	.b	1

*Correlation is significant at the 0.05 level (2-tailed)

**Correlation is significant at the 0.01 level (2-tailed)

b. Cannot be computed because at least one of the variables is constant

Source: own computation

Note: In all cases contingency coefficient is less than one hence, no high degree of association is observed.

Annex 3: Survey Questionnaire

Title:

Woreda/District _____ Kebele_____

Date of interview _____

A. Household Head Demographic Characteristics

1. Sex: 1=male 0=female 2. Age (in years)_____ 3. Educational level of hh head (in years of schooling) _____ 4. Number of total family members' _____

5. Number of active household members aged between 15 and 64 years fulltime on farm activity _____

Age and Educational Level of family members			
Name	Sex	Age	Educational Level

6. Is your family labor adequate for farm activities? 1= Yes 2 = No

7. Total amount of hired labor for the production year (2013/14) _____

8. Total land holding size (in hectare) _____

9. Land size allocated for Malt Barley production _____ (in hectare)

10. Did you involve in land renting activity in 2013/2014 production year? 1=Yes 2= No

11. If your answer to question #10 is "Yes" , are you: 1 = Rented out 2 = Rented in

12. Do you participate in non-farm income generating activities? 1= Yes 2 = No

13. If Yes, 1= Employed 2= Trader 3= Family/Children supported 4= others Specify

B. Source of Household Income

1. From where did you get income you used to cover all family expenditures?

1=crop sales 2=livestock sales 3=remittances 4=credit 5= labor sale

6=others (please specify----------)

2. Would you rank your income sources from major to minor (use the above? code):

1st=_____ 2nd =_____ 3rd =_____ 4th = _____ 5th = _____

3. Would you list the major crops you grow currently? In order of importance

Type of Crop	Area planted 2013/14	Quantity Produced	Quantity sold	Price per quintal	Total Value in birr

4. What are the major crops produced for market (cash crops) you grow in your area?

1 ----------

2----------

3 ----------

4 ----------

5 ----------

5. Would you list these according to your level of production participation?

1st_____

2nd_____

3rd _____

4th _____

5th _____

6. Livestock ownership

	Cows	Oxen	Donkeys	Mules	Sheep	Goats	Poultry	Heifers
Do you have?	1=Yes	1=Yes	1=Yes	1=Yes	1=Yes	1=Yes	1=Yes	1=Yes
	2=No	2=No	2=No	2=No	2=No	2=No	2=No	2=No
Have you sold last year?	1=Yes	1=Yes	1=Yes	1=Yes	1=Yes	1=Yes	1=Yes	1=Yes
	2=No	2=No	2=No	2=No	2=No	2=No	2=No	2=No

9. Are you a member of any rural cooperatives? 1= Yes 2=No

10. Do you have access to credit/loan? 1=Yes 2=No

11. Do you produce sufficient food for your family for the whole year? 1= Yes 2 = No

12. Traveling time from home settlement to extension services _____(in minutes)

13. Traveling time from home to farm places _____ (in minutes)

14. Traveling time from home to nearby markets _____ (in minutes)

15. Traveling time from home to nearby rural weather road _____ (in minutes)

16. Do you have any contracts for any agricultural products with any organization?

    1 = Yes 2 = No

17. If you have contract, for what? 1 = cash crops 2= food crops 3= livestock 4= other _____

18. Did you receive advisory services on Malt Barley production? 1 = Yes 2 = No

19. Did you participate in production of Malt Barley in any year of the last two crop seasons?

    2012/13; 1 = Yes 2 = No

    2013/2014; 1 = Yes 2 = No

20. How is the trend of the farm gate price for Malt Barley the last two years? 1= increased 2 = decreased 3= remain the same

21. Did you face Malt Barley crop failure in any of these years? 1 = Yes 2 = No

22. If yes, what are the sources of such failures? (Multiple answers are possible)

1 = disease 2 = pest infestations 3= long/short rain 4 = other_____

26. Which means of land preparation methods you used for Malt Barley production:-

1= own oxen/donkey 2 = rented oxen/donkey 3 = traditional instruments 4= rented tractors

27. Type of seed you used:1= traditional 2 = improved

28. From where did you get the seed? 1= own production 2=Market 3= cooperatives

4 = agricultural offices5 =buyer contractor 6 = other _____

29. Amount of Malt barley seed used as input per hectare _____ (kg)

30. Amount of money spent on seed per hectare_____(in birr)

31. Amount of fertilizer used as input per hectare _____ (kg)

32. Amount of money spent on fertilizer per hectare_____ (in birr)

33. Are you producing Malt Barley for continuous years in the same land?1= Yes 2 = No

34. If your answer for question **#33** is "**No**" what is the reason? 1 = due to decrease in productivity 2= cannot grow Malt Barley 3 = other_____

35. What do you think to be done to improve productivity of Malt Barley?_____

_____

_____

37. If you are currently not producing Malt Barley, why?

Possible reasons	1=Serious Problem	2= Minor Problem
Decreased productivity of Malt Barley from year to year		
Lack of improved seeds		

Fear of crop failure		
Shortage of land		
Poor soil fertility		
Lack of markets		
Lack of awareness about its importance		
Shortage of input supply		
Fear of food shortages		
Others		

C. Marketing Aspects:

1. Quantity of Malt Barley marketed in 2013/14 _____ (in quintal)

3. Quantity of Malt Barley consumed 2013/14_____

4. Quantity of Malt Barley saved for seed _____

5. Time of sale: 1= immediately after harvest 2= after a month 3=after two months

4= after three months 5=after four months 6 = after five months/later

6. On which month you usually prefer to sell your Malt Barley produce?

1=December 2=January 3=February 4=March 5=April 6=May 7=others

7. How did you sale your Malt Barley produce?

1=directly to the purchaser/traders 2=through brokers 3=others

8. Where did you sell mostly your Malt Barley? 1= local buyers (collectors) 2= Cooperatives 3= traders at primary market 4=Companies 5=Others

9. From whom you get better price? 1= local buyers (collectors) 2= Cooperatives 3= traders at primary market 4=Companies 5=others

10. Is there any problems created by any marketing agents? 1= Yes 2 = No

11. If your answer to question #10 is "**Yes**", the problems are: 1= weight/scale cheating 2=Limit client 3= Charge high brokers price 4= Meeting quality requirements 5=Untimely payment

12. Did you face difficulty in finding Malt Barley buyers? 1= Yes 2= No

13. If your answer to question #12 is "**Yes**", is it due to: 1 = inaccessibility of market

2= low Price offer 3= lack of price information 4= other

14. Who set your selling price? 1 = yourself 2=market 3= Buyers 4= negotiations 5 =other ____

15. Did you know the nearby market price before you transport to your Malt barley to market? 1=Yes 2= No

16. What is the price of Malt barley per kilogram in your kebele/woreda? _____

17. What is the price of Malt Barley per Kilogram at nearby market? _____

18. Do you have a transport access to the nearest market? **1= yes 2= No**

19. How did you transport your Malt barley from home to market places? 1 = head/back loading 2= pack animals 3 = Tracks 4 = other _____

20. Do you have access to market information? **1= Yes 2= No**

21. From where did you get market information? 1= local traders 2= neighbor 3= cooperatives 4=media 5= other_____

22. Are you confident enough in your buyer? **1=Yes 2=No**

23. What are the major costs you incur in selling your Malt Barley?

1. Transportation cost_____ (birr per quintal)
2. Packaging Cost_____ (birr per quintal)
3. Threshing and cleaning cost_____ (birr per quintal)
4. Costs while waiting at the market _____ (birr per quintal)
5. Others _____ (birr per quintal)

24. Have you ever had any marketing contracts with commercial buyers? 1 = Yes 2 =No

25. If yes, who?_____

26. What is the farm gate price of Malt Barley per kilogram last year-2012/13 _____(in birr)

27. Did you considered this price when you decide to produce in 2013/2014?1 = Yes 2 = No

28. What is your prediction about the coming year Malt Barley price? 1= increase 2= decrease 3=remain constant 4 = no idea

Why? _____

30. If you have any comment please list here: _____

Key Informant Interview with Agriculture and rural development experts

A. Personal background

1. What is your job responsibility?
2. How long have you served in this sub-district and in what capacity?

B. Production, Marketing, and Farm Characteristics

1. What is the primary means of livelihoods for the people in this District?
2. What are the main food and cash crops grown in this District and why?
3. What are the major non-farm activities farmers in your District mainly engaged in?
4. What portion of land is allocated for the production of Malt Barley currently?
5. What services and assistance do the farmers get from your office?
6. Who is the primary buyer of the commodity from the farmers?
7. What efforts are done to integrate the smallholder farmers with the market?
8. What are the challenges and opportunities at their disposal?
9. Are there any marketing cooperatives in this District?
10. If so, is Malt Barley traded through these cooperatives