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Maize Value Chain Analysis in Ethiopia:
Implication of challenges and opportunities on Food security

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List of Acronyms

ADLI - Agricultural Development Led Industrialization

CSA – Central Statistics Authority of Ethiopia

ECX – Ethiopian commodity Exchange

EGTE – Ethiopian Grain Trade Enterprise

ESE – Ethiopian Seed Enterprise

ETB – Ethiopian Birr

FAD – Food Availability Decline

FEWS – Famine Early warning system

GoE – Government of Ethiopia

IFPRI – International Food Policy Research Institute

MoARD – Ministry of Agriculture and Rural Development

MoFED – Ministry of Finance and Economic Development

NGO – Non Government Organisation

P4P – Purchase for Progress

PASDEP - Plan for Accelerated and Sustained Development to End Poverty

SDPRP - Sustainable Development and Poverty Reduction Plan

RATES - Regional Agricultural Trade Expansion Support Program

SCP – Structure conduct and performance

VCA – Value Chain Analysis

WFP – World Food Programme

Abstract

This study critically examines the maize value chain in Ethiopia with the view to understand the challenges and opportunities on Ethiopian food security. More specifically, the paper considers costs, risks and opportunities in maize production and marketing system that have an impact on food security of the producer household as well as households that depend on the maize market for all or part of their food. This is because food insecurity in Ethiopia is a result of both decline in food availability and failure in entitlement. Availability in the country is mainly dependent on domestic production, while accessibility is dependent on price and income, which are determined by the market.

Accordingly, findings of the study reveal both maize production and marketing are constrained by the related risks and costs that constrain food security. Production costs are related to application technologies while weather is the risk that limits availability. Market impediments such as: lack of well adequate and appropriate rural infrastructures including storage, road, telecommunication and institutions are found to be responsible for pushing consumer food cost and limiting benefits farmers could get from commercialisation. Therefore subsistence farming and market impediments are responsible for food security problems in Ethiopia

Relevance to Development Studies

The study contributes to knowledge on application of value chain approach to address food security issues – particularly in identifying and discussing costs, risks and potentials related to maize production and marketing, that have an impact on maize availability and accessibility. The knowledge would help to understand how the poor in the chain – particularly maize producers, consumers and traders, can benefit from participation in the market, through higher prices for producers and lower prices for consumers. Though maize is not the only staple crop in Ethiopia, the production and marketing pattern of the other staples also follow the same pattern, that findings of the study could give insight for food security in the country. Food security is one of the development issues in Ethiopia, thus addressing the issue using holistic approach like value chain analysis, provides in depth understanding of costs, risks and potentials at each point in the chain, that enables to identify key intervention points for government and other development institutions to address food security.

Keywords - Agriculture, Value chain analysis, Food security, Food entitlement, Institutions, agricultural productivity, agricultural marketing, Ethiopia.

Chapter 1
Introduction

Elimination of hunger and poverty is arguably the greatest challenge facing sub-Saharan Africa. The history of economic development indicates that agricultural productivity growth has been the major source of sustained improvements in food entitlements and nutrition. Agricultural productivity growth requires some form of transformation out of the semi-subsistence, low-input, low-productivity poverty trap that characterizes much of rural Sub Saharan Africa (Mellor J. 1990).Thus, transformation of agriculture from subsistence to commercial agriculture - commercialization of agriculture -, has long been considered an important part of the agrarian transformation of low income economies and a means of ensuring food security, enhanced nutrition, and incomes (Maarten et al, 1995; Strasberg et al, 1995; Kurosaki, 2003, as cited in Gabre-Madhin , 2009).

At the World Food Summit held in 1996, countries agreed that: 'Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy lifestyle'(FAO 1996). According to this definition, food security is built on three pillars:

- **Food availability**: addresses the "supply side" of food security, which is determined by the food production level, stock levels and net trade, so as to ensure consistent availability of food (FAO, 2008).
- **Food access:** refers Access by individuals to adequate resources (entitlements) for acquiring appropriate foods for a nutritious diet. Entitlements are defined as the set of all commodity bundles over which a person can establish command given the legal, political, economic and social arrangements of the community in which they live (including traditional rights such as access to common resources) (FAO, 2006)
- **Food use**: Utilization of food through adequate diet, clean water, sanitation and health care to reach a state of nutritional well-being where all physiological needs are met. This brings out the importance of non-food inputs in food security (FAO, 2006).

In many ways, famine is the antithesis of food security. In a simplified sense, food security represents the absences of conditions necessary for famine. Conversely, food insecurity an endogenous outcome of resource availability of policies and potentials dictating resource use can be seen as one of the roots of famine. Food security is ensured when the following complementary conditions are met: i) an efficient mobilisation of resources; ii) Increase in

production and productivity; iii) increased and stable income from both farming and non farming activities; iv) increased and stabilised food intake and; v) improved income distribution of food and better health/sanitation environment, nutrition and health (Webb and Braun, 1994).

On the contrary, food insecurity can happen as a result of: i) social, economic and political factors affecting the distribution of and local provision, rather than the overall supply, of food and ii) poverty, war and civil conflict, corruption, environmental degradation, barriers to trade, ill defined property rights, insufficient agricultural development, population, poor health and education, social and gender inequality, and natural disasters. High oil prices and increasing global trends towards the use of food crops as bio-fuel have increased anxieties in developing countries that a continuation of such trends will reduce physical food security and create instability in world markets (FAO, June 2009).

Food availability decline and failure to food entitlement are the two approaches to famine. Food Availability decline (FAD) is a supply focused approach that emphasises that a decline in production and productivity will result in famine while, food entitlement, as defined by, Amartya Sen (1981) (as cited in Saad, 1999), refers to the capability of individuals and households to obtain food. It suggests that people do not necessarily starve because of an insufficient supply of food but due to insufficient resources, including money ('entitlements'), to acquire it.

Ethiopia has been experiencing food insecurity for decades, as the country is mostly dependent on drought-exposed, rain fed agriculture, and high transaction costs that inhibit trade in staples (Caria et al, 2011). Food insecurity in the country is a result of both decline in availability and lack of food entitlement. A number of studies on food security in Ethiopia indicated that the food insecurity condition in the country, particularly since the 1970s are results of a number of factors including: a series of rain failure; the fastest growing population with a sluggish growth in productivity, war, market policy - which changes with the shift in ideology and lower purchasing power of the people (Webb and Braun, 1994).

Ethiopia experienced the worst famine in 1980s, with a series of rain failures and substantial livestock loss. The famine also had longer term effects in that many of the poor had depleted their assets to deal with the famine, which left them even more vulnerable to future crises. Famine vulnerability continued through the mid-1990s owing to conflict in the northern regions and

protracted drought in other regions of the country (Webb and Braun 1994). In 2002, Ethiopia was food insecure, despite good harvests in 2000/2001 and 2001/2002. Grain prices fell below the historic average. Maize prices in surplus regions fell by almost 80 percent. Although reduced prices favoured the rural and urban poor, it created a disincentive for input use by producers. By late 2002 the increase in production and the lower prices were not sufficient to combat the chronic food insecurity that affected the majority of poor households; the number of people in dire need of food had more than doubled (Kuma 2002; Gabre-Madhin 2003; as cited in Braun and Tolulope 2007).

This paper focuses on conducting maize value chain analysis to critically examine how opportunities, costs and risk related with production marketing and distribution, influence food security in Ethiopia. Value chain approach is adopted to analyse food security, for the reason that it provides a holistic view of maize from production to consumption.

Domestic production is the main source of maize supply in Ethiopia. This production is centred on subsistence farming, which is characterized by seasonality and geographical dispersion. Seasonality provides farmers many of the essential inputs for production - like: solar energy, water, carbon dioxide, temperature control, and essential nutrients from natural soils, -freely. Therefore farmers' decision on production - such as: what input to use; when to plant, plough and harvest – and marketing decisions - including how much to consume, store and sell- depends on the season.

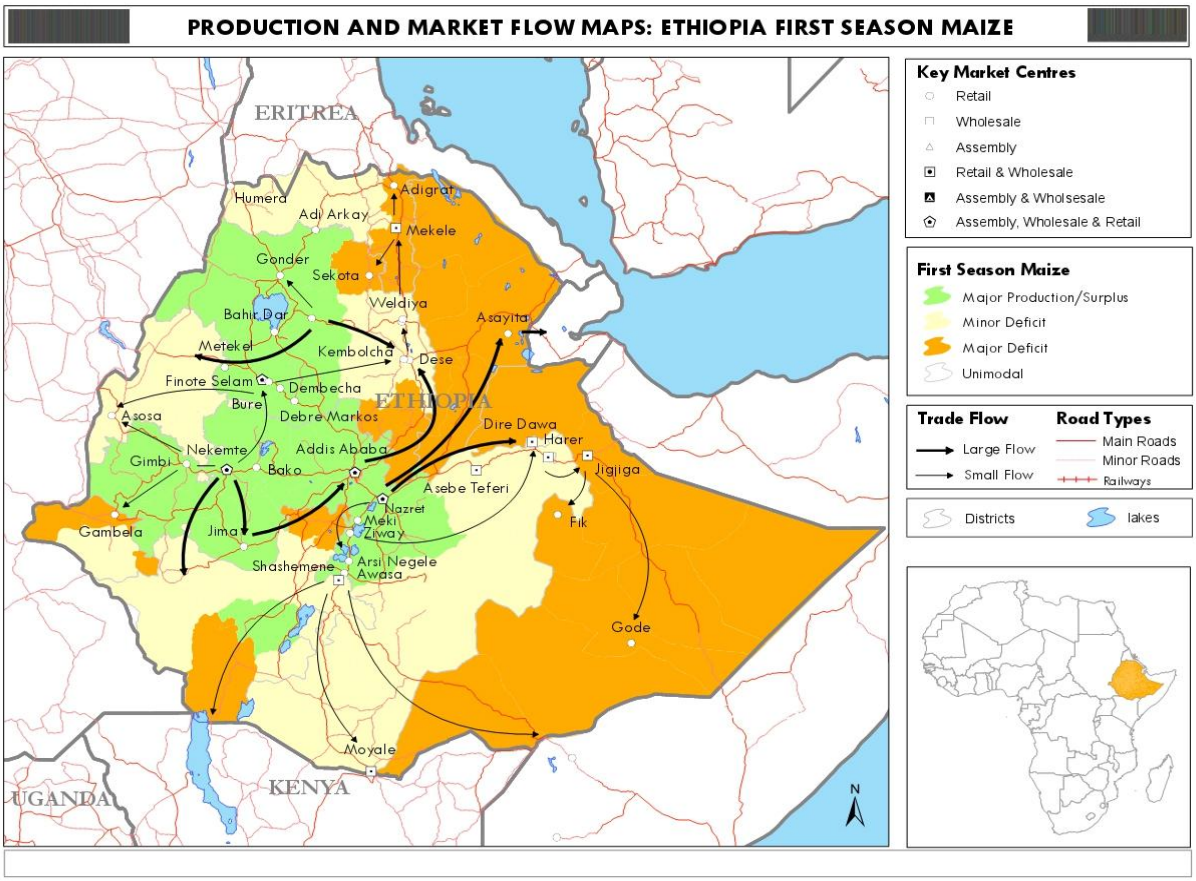
However, subsistence farming is risky for the following reasons. Firstly, change in weather severely influences availability while loss of essential nutrients, in soil, unless restored by applying fertilisers, results in a decline in productivity, which endangers the food security of the fastest growing population in the country. Lower productivity also has an impact on producer households, because of low market surplus.

Thus, one essential component of increasing productivity in the country, is transforming the agriculture system from subsistence to small scale commercial farming. If farmers can produce more market surplus, through improved productivity, then market supply will be increased. However in order for farmers to apply these technologies they need to have higher and stable income, which can be gained from a well functioning market. Higher and stable income for producer household is a prerequisite for producers household food security as it enables them to apply modern technology as well to increase their purchasing power, to buy food from markets.

As shown in map 1, Geographical dispersion is the other feature of domestic maize production in Ethiopia. That is production takes place in a geographically dispersed locations, which has important implication on availability and accessibility of maize in urban and deficit areas. Therefore maize availability and accessibility to urban and deficit areas depends on functioning of the market and distribution mechanism. Agricultural marketing includes everything that happens between the farm gate and the consumer, including food processing. Indeed the size of the marketing sector is sometimes defined in terms of the difference between farm-gate receipts and consumer expenditure on food (Wollen and Turner, 1970).

Map 1

"Production and market flow maps: Ethiopia First Season Maize]"



Source: FEWS NET

As indicated by Bonnard and Sheahhan (2009), markets play a vital role in the provision of goods and services critical to survival, promotion and protection of livelihoods. Markets determine food prices, and the incomes that producer households receive from the sale of own products and labor. These, coupled with physical market factors such as: storage facilities, road and telecommunication infrastructures; influence access to adequate quantities and quality of food. Markets promote the stability of food supply and prices by ensuring food distribution from surplus to deficit areas, effective demand that promotes production.

Similarly, Lutz (1994) indicated that, a well-developed market for food crops in developing countries provides access to consumers, who depend on the market for their food supplies, and to farmers, who shift from subsistence to market-oriented production. Farmers tend to specialize more in the cultivation of crops for which they have a comparative advantage, when their household needs can be satisfied at low costs on the market and when prices for their marketable surpluses are attractive.

In the case of Ethiopia, rural households produce their own food and also purchase from the market, while the majority of urban households are only purchasers of food. Accordingly, 42 percent of Ethiopian population is dependent on the market for all or part of its food demand Alemayehu (1993:48). In addition, 65 percent of total urban consumer household expenditure is on food; where 21 percent of it is on cereals (Bereket et al. 1996, as cited in Gabre-Madhin, 2001).

Therefore, the reducing marketing costs represents a major opportunity to improve farm production incentives and simultaneously make food more affordable to low-income consumers (Dessalegn.G et al. 1998).

The Ethiopian grain market underwent a series of changes associated with changes in ideology of the different regimes. Until early 1990s, markets were controlled by the state, where prices were controlled, sales were made on quota, and complex institutional arrangements were state controlled. A state controlled market was blamed for resulting in lower competition among traders for non quota grains, limited inter regional trade, fixed prices, which were disincentives for farmers to use improved input and to earn more income (Franzel et al. 1989). In addition, state efforts to improve food distribution,

through control of marketing, has served neither equity nor efficiency (Lema, 1986 as cited in Bacha D. and G. Abdissa (2001).

With the enactment of a major market reform in the 1990s, the country saw some progress. Trade was left to the private sector, Ethiopian Grain trade Enterprise started involving in price stabilisation, quota and fixed price systems were abolished. Maize markets remained thin, however, with wide price spreads among different market places and volatility (Braun J. and Tolulope O. 2007). Thus in line with this market reform, one strategy adopted by the government to improve food security in the country and for poverty reduction was, to transform the agriculture sector from subsistence farming to small scale commercial farming. Therefore, this paper aims at identifying and analysing the major costs and risks related to maize production and marketing that have an impact on food security.

In sum, seasonality of subsistence farming - particularly series failure of rainfall and lower application of technologies) and price are the major determinants of producer and consumer households, in Ethiopia, as it influences food security. Thus, analysing costs risks and opportunities related to production and marketing is important to address the issue of food security

1.1 Research objective and questions

Research Objective: To critically examine maize value chain in Ethiopia, with the view to understand how opportunities, costs and risks related to maize production, marketing and distribution influence food security.

Research question: What is the implication of the current maize production, marketing and distribution mechanism on food security?

Sub questions:

- What are the main factors affecting maize productivity, and hence maize availability in Ethiopia?
- What are the major maize marketing costs and that have an impact on maize availability and accessibility?
- What opportunities are there in the current maize production and marketing system, to enhance production and marketing efficiency?

1.2 Background

In order for Ethiopia to make substantial inroads against food insecurity, concerted and strategic choices in the agriculture sector are vital. Agriculture is central to development policy of the Government of Ethiopia (GOE).Food insecurity and malnutrition are endemic in rural areas, with a population of six to seven million chronically food insecure, and up to 13 million seasonally food insecure. Over 90 percent of agricultural output is driven by smallholder farmers. Without expanding cultivated land, and given projected population growth, the average land holding size in highland areas will be reduced to 0.7 hectares by 2020, placing further pressure on rural incomes and food security (Bill & Melinda Gates Foundation, 2010).

Agriculture has been the core driver of Ethiopia's economic growth and long-term food security, in Ethiopia. Agriculture The stakes are high: 15 to 17 percent of Government of Ethiopia's expenditures are committed to the sector, it covers 45 percent of gross domestic product (GDP), over 80 percent of export value and directly supports 85 percent of the population's livelihoods (Rashid S. et al. 2010). The sector also drives aggregate employment figures. Estimates show 83 percent of the population relies on agriculture for their livelihoods (with many more dependent on agriculture-related cottage industries such as textiles(Bill & Melinda Gates Foundation, 2010).

The main crop production in Ethiopia include: cereals, pulses, oilseeds, vegetables, root crops, fruit crops, Chat, coffee, hops, sugarcane, and "enset". Of this production, cereals constitute the largest share (about 80 percent) of the total crop production. The five major food grains—teff, maize, sorghum, wheat, and barley—make up 96 percent of total cereal production (Braun J. And Tolulope O. 2007).

Why Maize?

This paper focuses on maize, Because as discussed in Rashid S. et al. (2010), it has been a significant contributor to the economic and social development of Ethiopia and plays a critical role in smallholder livelihood and food security. Rashid S. et al 2010 indicated that maize is:

i) the crop with the largest smallholder coverage at 7.1 million holders (compared to 5.6 million for teff and 4.7 million for wheat),

ii) the staple crop with the greatest production at 3.9 million tons, compared to teff at 3.2 million tons and sorghum at 3.0 million tons (CSA 2009/10)

iii) the lowest cost source of cereal calories, providing 1½ times and two times the calories per dollar compared to wheat and teff respectively,

iv) whose unit cost of calories per US dollar for maize is one-and-a-half and two times lower than wheat and teff respectively,

v) a low-cost source of protein in comparison to other cereals: maize provides 0.2 kg of protein per USD, compared to 0.1 kg of protein per USD from teff and 0.2 kg of protein from wheat and sorghum and

vi) As studies indicated, an average Ethiopian consumes a total of 1,858 kilocalories daily of which four major cereals (maize, teff, wheat, and sorghum) account for more than 60 percent, with maize and wheat representing 20 percent each.

Thus, when a commodity plays a critical role in households' diets, such as maize in Ethiopia, variations in tradability and price can have serious implications for food security.

Though maize is not the only staple crop in Ethiopia, it has the potential to bring a significant change in food security for the reasons mentioned above. In addition, since the production and marketing of other staples also follow the same pattern like maize, finding of this study likely applies to the other crops.

The rest of the paper is organized as follows: it begins with literature review on food insecurity causes in Ethiopia, since the 1950s and the relevance of value chain analysis in analysing food security. Chapter three describes the data and methodology. The data analysis and findings of the paper will be discussed in chapter four and finally summary of the findings and the conclusion will be presented in chapter five.

Chapter 2
Literature review

2.1 Famine and Food Security

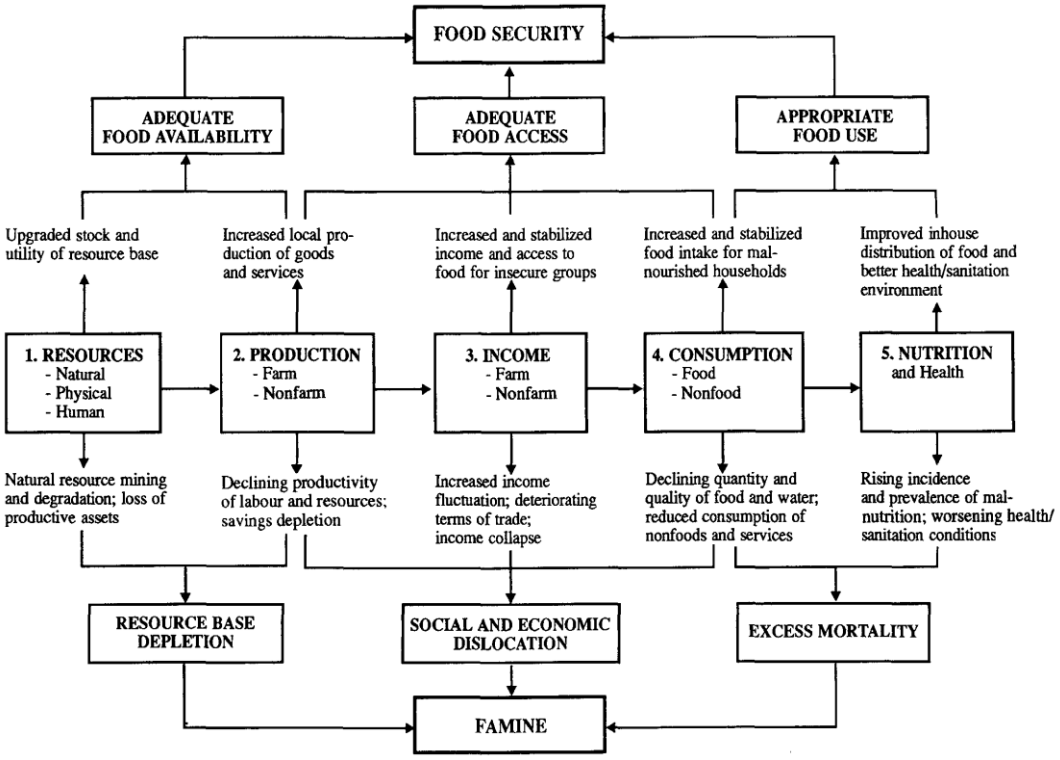
The literature contains several distinct approaches to define famine. Many academic definitions of famine were proposed from various scholars with a different view. For instance: Rangasami (1985), (as cited in Devereux S. 2007) considered famine as a protracted 'politico-social-economic process' of oppression comprising three stages: dearth, famishment and mortality. Currey and Hugo (1984) (as cited in Devereux S. 2007) regard famine as 'community disaster'; that is a syndrome with webs of causation which communities lose their ability to support marginal members who consequently either migrate in families because of lack of access to food, or die to starvation or starvation related disease. Walker (1989) (as cited in Devereux S. 2007) considers it as a 'socio economic process', which causes the accelerated destitution of the most vulnerable, marginal and least powerful groups in the community, to a point where they can no longer, as a group, maintain sustainable livelihood.

Though these and other definitions were forwarded for the term famine, most of them are ambiguous or lack clarity that an operationally useful definition is required (Howe et al 2004, as cited in Webb and Braun). However, this paper borrows the definition given by Webb and Braun (1994) that defined famine as a catastrophic disruption of society as manifested in a cumulative failure of production, distribution and consumption systems.

2.1.1 Link between Famine and Food Security

In many ways, famine is the antithesis of food security. In a simplified sense, food security represents the absences of conditions necessary for famine. Conversely, food insecurity an endogenous outcome of resource availability of policies and potentials dictating resource use can be seen as one of the roots of famine (Webb and Braun 1994). However, having enough food doesn't necessarily mean food security, as individuals might starve, without a decline in per capita food availability.

Figure 1 Conceptual framework for understanding famine and food security



Source: Webb and Braun (1994)

From the framework: i) a decline in food availability is caused by either an inadequate mobilization of natural, material and human resources for food or when production from farm and off farm activities fail, or when both happens; ii) access to available food could be constrained by a) decline in productivity of resources that results in depletion of saving; b) when income fluctuations deteriorate terms of trade saving depletion; c) a breakdown in access to available food occurs as markets fails – due to failure in policy, logistical or infrastructure reasons – causing prices to rise sharply and the terms of trade with saleable household commodities collapse; and iii) under periods of sustained food constraint the use of food becomes increasingly inappropriate in terms of the quantity and quality consumed. The number of meals per day reduces, the amount of eaten food reduces and the type of food eaten deviates increasingly from the norm.

Ethiopia has been experiencing food insecurity for decades, as the country is mostly dependent on drought-exposed, rain fed agriculture, and high transaction costs that inhibit trade in staples. Both availability and access issues underpin Ethiopia's food security challenges. More than 82% of the

population lives in rural areas where poverty is widespread and livelihoods vulnerable to shocks and poverty traps (Caria et al, 2011).

2.1.2 Causes of Famine in Ethiopia

Some famine casual factors operate as process over a long period of time while others are more discrete short-term events. For instance, the initial, underlying or factors like: population growth and ecological degradation are widely seen as processes of a Malthusian nature that increase the likelihood of food supply failure in the event of a drought or economic crisis, while policy mismanagement, military conflict, drought and market collapse are factors of a proximate nature that can trigger a crisis where only the threat of crisis existed before. They are called immediate factors that are most commonly raised in explanation of famine in Ethiopia during the 60s and 70s (Constable 1984; Hurni 1988; Dejene 1990, Degefu 1988; Winer 1989, as cited in Webb and Braun 1994).

Population growth as a cause of food insecurity - Malthus (1798), indicated the dependence of population growth on economy's material condition, especially food supply. He indicated that mankind's biological capacity to reproduce, in the long run is assumed to exceed its physical capacity to produce. Without restraint, population would increase geometrically, but food production would increase only arithmetically. This outcome is commonly called 'Malthusian Trap' (as cited in Ehrlich I. and K. Jinyoung, 2005). In the case of Ethiopia, the trend in growth of domestic food production matched population growth only in the 1960s (Markos, 2001). Recently, the Ethiopian Population and Housing Census from CSA (2007), showed that the Ethiopian population in 1984, 1994 and 2007 was: 39.9 million, 53.4 million and 79.9 million, respectively. Showing that the population grew at an average annual rate of 2.8%, between 1984 and 1994 and 2.6% between 1994 and 2007.84% of this population lives in the rural areas. Thus, without a simultaneous growth in production and productivity, the mere growth of population, will inevitably cause of food shortage in the country.

War as cause of food insecurity: Ethiopia has a long history of civil war that ended in may 1991. It also had a border conflict; with Somalia in 1977, and for two years, from 1998 – 2000 with Eritrea. Though the existence of war bears large share of the blame for food insecurity, it doesn't explain the entire food insecurity problem during the war years. For instance: 50% of people identified as vulnerable to famine during the late 1980s and the early 1990's were located outside of the main zone of conflict. Rather chronically low and

variable farm productivity, lack of valuable household assets and low income level and widespread shortfalls in food consumption certainly reflect a lack of public investment in rural development (due largely to military expenditure), but other factors are also important (Webb and Braun 1994).

Agricultural drought and crop failure as cause of food insecurity: Drought is a natural disaster that has a major impact on Ethiopian food security, owing to the vulnerability agricultural sector to weather variability. Agricultural drought has been defined as an interval of time, generally of the order of months or years, when the moisture supply of a region consistently falls below the climatically appropriate moisture supply, such that crop production or range productivity is adversely affected. In Ethiopia, drought is defined by farmers as the absences of rain when required for seed germination, plant fertilization and crop growth. Because of the seasonality characteristics, the Ethiopian agriculture is operating in a risky environment to food security. Applying modern technologies of farming is quite difficult for the smallholder rural poor, due to the costly nature of agricultural technologies. High yielding and drought resistant seeds fertilizers, pesticides, and other chemicals are generally expensive in Ethiopia (Palmer 1965; Rosenberg, 1978; Wolde-Mariam 1991 as cited in Webb and Braun 1994).

Drought has a direct impact on productivity. A sharp decline in rainfall plays an overriding role in cereal production where farming is carried out at a low level of technology and inputs. Effect of drought on yields and production vary across time and regions. In Ethiopia, drought plays important role in food supply shortage. However, neither food supply nor drought, in itself determines whether a famine will occur. The importance of drought – production and production - availability linkage to famine is mediated by domestic policies and functioning of domestic markets (Webb and Braun 1994).

Policies as a cause of food insecurity – The Ethiopian agricultural and development policy underwent dramatic changes since 1950s, as result of the shift in ideological position of the successive governments. The country had feudalistic system in 1950's and 60's; state led growth in agriculture in 1970s and 1980's; followed by market led agricultural policy, under the current government since 1991. Accordingly these policies include different strategies to address the issue of hunger.

As discusses in Webb and Braun (1994) from 1974 – 1991, the government of Ethiopia (GOE) focused on increasing output to mitigate food insecurity,

taking three policy initiatives namely: land reform, aggregation of production unit (cooperativization and association) and geographical concentration of investment. However, these policies failed to bring the desired results to poverty eradication and food security, as the respective policies failed to consider some basic issues. For instance the land reform policy failed to consider quality of land, cultivation are per capital, redistribution of tenure etc which have a bigger impact on productivity. In addition, farmers' response to cooperatives policies was also very low, as the cooperative fail to deliver appropriate inputs (improved seed, fertiliser etc) with price incentives due to shortage in resources. Besides, farmers perceive them as a means of state to control the rural agriculture.

After the change in regime in 1991 to overcome structural causes of low agricultural productivity reforms were made in three key areas namely:

i) more secure, individual, tenure rights to land and other natural resources;

ii) re-focus of agricultural investment towards the smallholder sector and;

iii) a fully implemented political, as well as economic liberalisation of the rural environment leading to genuinely participatory planning and implementation of development activities (Manyazewal 1992 as cited in , Richburg 1992).

As mentioned earlier, domestic production is the main source of maize supply. Thus, any factor that influences production, also influence maize availability.

Markets as a cause of food insecurity - Agricultural marketing encompasses everything that happens between the farm gate and the consumer, including food processing. Indeed the size of the marketing sector is sometimes defined in terms of the difference between farm-gate receipts and consumer expenditure on food (Wollen and Turner, 1970). Like the agricultural policy, the Ethiopian grain market policies underwent dramatic changes, with change in regime and ideology.

In 1950s and 1960s – during the Imperial era – the major market policy objective was to support and promote the interests of few land lords and urban consumers, with limited government interventions, which was ineffective. In 1974 the socialist regime came to power, which had a marketing policy in line with the socialist ideology which brought about socialist ideas. (Rashid and Asfaw, 2009). In 1975 the share tenancy ended, and had an immediate effect on the cereal market. Relieved of the obligation of paying rents and tributes to

landlords, smallholders ate more of their production, causing share of market surplus to fall. It is estimated that by 1977/78 the market surplus of cereals dropped to around 11 percent (Webb and Broun 1994).

In response to this, the government established Agricultural Market cooperation (AMC) to smooth food distribution and stabilize prices through quota system and fixed prices. AMC used to offer lower prices for farmers than market prices. Thus, this resulted in being a disincentive to farmers to grow more cereal, and thus led to lower productivity during that period. Prices in deficit areas were much higher than in surplus areas, which exacerbated the food insecurity situation. In addition, the grain market was highly concentrated among private merchants to the extent that that 90% of marketed grain was handled by 20,000 – 30,000 private merchants. This number declined further due to the emergence of AMC that in 1986, only 5000 trade licenses were issued in the country (Holmberg 1977). However, as indicated in the neoclassical theory of Structure conduct and performance, as market structure deviates away from the paradigm of perfect competition, the extent of competitiveness of the market will decrease; and consequently a decline in market efficiency will take place (Scarborough and Kydd 1992; Scott 1995). And as stated by Rubey (1995), an inefficient food marketing system is among the main causes of hunger.

Following the change of regime in 1991 the current government designed a marketing policy aimed at promoting private sector grain trade and price stabilisation. Though progress has been observed in infrastructure, market efficiency and others, the ad hoc nature of policy interventions frustrated the good intention of government (Rashid and Asfaw, 2009).

Markets are an important facet of food security, as producer households use the market to sell the surplus they have and to buy production inputs and to access other food foods, while consumer use markets to purchase their food. Understanding the role of each actor in the maize supply chain helps in analyzing their differential access to markets, purchasing and bargaining power, and determination of their profit margin, which helps to understand the constraints and the bottlenecks of the income they could potentially be earning from their livelihood activity. Understanding the maize market will help to understand the cause of inadequate food consumption which may be related to the purchase and the sale on the market of household. Studies made on grain markets in Ethiopia have indicated that i) 42 percent of Ethiopian population is dependent on the market for all or part of its food demand (Alemayehu

1993:48), while 65 percent of total urban consumer household expenditure is on food; where 21 percent of it is on cereals (Bereket et al. 1996);

Infrastructure constraints as a cause of food insecurity – Policy restriction and market dysfunctions were not the only constraint to market operations. A lack of adequate infrastructure also hindered market integration and a more equal sharing of scarcity among regions and is largely responsible for the high margins characteristic of private sector marketing. Weather roads, make movement of food to remote market extremely difficult (OXFAM 1984). The network connecting different regions, independently of Addis is very underdeveloped. Almost 90% of the country's population still lives more than 48 hours walk from primary road (WFP 1989).

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 market development; poor linkage of research and extension; absence of market information and intelligent service; excessive price and supply fluctuations; limited access to credit; inefficient handling, including grading, storage, packaging, transport and management; weak legal system to enforce contracts; lack of institution to study, evaluate, plan and implement market development; inadequate government interventions and absence of market regulations and legislations; presence of too many intermediaries; lack of vertical and horizontal coordination; lack of integration of farmers to the marketing system; multiple tariffs charged on grain both at production area and market centres; food aid distorting the market; lack of effective demand (the capacity to absorb large amount of agricultural produce) and poor connection with international markets.

2.2 Economic approaches to study Famine

In economics, food availability decline and Sen's entitlement approach are the two approaches in understanding famine. The problems of famine and food shortages have received much attention from economics because such crises continue to occur despite persistent progress in agricultural production and technology. The traditional approach to famine analysis, which dates back to the writings of Adam Smith and Malthus, proposes that famines are primarily caused by sudden decline in food availability (Lin J. et al 2000).

This supply based FAD account was an accepted explanation of famines before the influential work of Sen (1977, 1981 a,b), who proposed a more general entitlement approach. Sen emphasized that famine was a situation in

which a significant number of people in a region failed to acquire enough food to eat. While a shortage in per capita food output may cause famine, it is only one of many possible causes. In his Study, Sen found out that famine results, either from sudden collapse in the endowments of population subgroups or from dramatic changes in relative prices, which caused some of the population to fail to acquire enough food. Sen showed that famine could happen without, a reduction in per capital food supply (Lin J. et al 2000)..

According to Sen, rather than examining food availability at aggregate level, local supply conditions should be given more emphasis. He argue that crop failure due to natural calamities often result in high food prices because of supply shortages, speculative behavior, increased demand to deal with uncertainty and sale of possessions to obtain food. Ultimately, the poor and those who are negatively affected by bad weather become famine victims because of reduced purchasing power. Since crop failures initiate the chain of effects, the proponents of this approach argue that the best way to understand famines is to look at what happened to food availability (Lin J. et al 2000).

However, Sen's entitlement approach is challenged by scholars for the gap it has in potential application. For instance: Swift (1989) noted that the approach is a historical explanation that doesn't treat changing vulnerability over time; that is, the link between past, current and future crisis. Watts and Hans (1992) argue that the approach is often interpreted too narrowly thereby failing to account for the social determinants of 'power' that account for differential vulnerability across gender, ethnicity and caste. Similarly, Locke and Ahmedi-Esfahani (1993) propose that the entitlement focus on legal structures tend to discount the role of illegal transactions (stealing, smuggling etc). And Clay (1991) as cited in Webb and Braun (1994) argued, the theory is linked inadequately to 'the vast body of work written the organizing concepts of food security'.

As indicated by, Webb and Braun (1994) there is no standard explanation for the occurrence of famine. Multiple factors are at work to generate conditions conducive to societal breakdown and individual starvation. This intrinsic ambiguity has provided a fertile ground for debate. In the 60's famine in the newly independent African states were frequently discussed in the light of theories about colonial exploitation and the dependency of 'periphery countries' on more developed western economies (Bhatia 1967; Amin 1976; Franke and Chasin 1980, as cited in Webb and Braun, 1994). Widespread drought in the early 1970s generated an out pouring of literature on the 'people versus nature' theme (Bryson and Murray 1977; Schneider 1977 as cited in

Webb and Braun, 1994). The 1980's focused on issues relating to the breakdown of markets and to the collapse of household entitlements (Sen 1981; Vaughn 1987; Curtis, Hubbard, and Shepherd 1988 as cited in Webb and Braun, 1994). The 1990's appear to be talking on all of the above, with attention being paid to the interaction between multiple elements that are no longer seen as alternatives but as complements (Shipton 1990; Currey 1992; Watts and Bohle 1992 as cited in Webb and Braun, 1994). As literatures about famine and food security of Ethiopia revealed, famine happens as a result of interaction of many elements. Thus this paper adopts the ideology in the 1990's that there is no alternate element that can significantly contribute to famine; rather it's a result of complementary elements.

2.3 Analytical Framework

2.3.1 *What is value chain Analysis*

Value chain is a market oriented approach that is used to explain why the poor may face barrier to trade and how to overcome these (Mitchell et al, 2009). This approach is adopted to study food security in Ethiopia, for the reason that it provides a holistic view of the maize chain, from conception to consumption. In addition, this paper focuses on analyzing the challenges and opportunities in the chain that have an impact on maize productivity and food security.

VCA a reformulation of the Orthodox trade theory - which is based on Ricardo's (1817) law of comparative advantage, and the Heckscher-Ohlin theorem which argues that countries will gain by specializing in the production of goods which use their most abundant factor of production (Heckscher, 1919; Ohlin, 1933 as cited in Mitchell, et al, 2009). Value chain approach has a more realistic assumption as compared to the Orthodox trade theory, that it's now being more widely applied, to address how poverty alleviation activities – including efforts towards food security - can be made using markets (Trade), particularly by supporting specific groups –rural poor - to access particular value chains (Mitchell et al, 2009).

Value chain concepts have been applied in some very different contexts. The francophone filière approach, started by studying contract farming and vertical integration in French agriculture in the 1960s (Raikes et al, 2000 as cited in Mitchell, et al, 2009). This was essentially a technocratic exercise undertaken by agricultural scientists motivated by a desire to improve the efficiency of the

value chains. VCA concept was also applied to the management science approach to supply chain management and outsourcing, particularly to explore 'make or buy' decisions based on the distinction between core and noncore competencies of corporations (Mitchell et al, 2009).

The original value chain formulation by Porter (1985) was that a firm could improve and maintain its competitive advantage by identifying core activities such as acquisition of inputs as well as production and delivery of outputs which it can perform more cheaply and better than its competitors. This was done by disaggregating and quantifying the value of each core function of the firm (Stamm, 2004 as cited in UNECA, 2009). Porter's value chain concept, which is based on the observation that location specific conditions, (rather than the factor cost differentials of neoclassical theory) determine the competitive advantage of locations. Porter's analysis emphasizes the importance of local rivalry and specific demand conditions. This approach has had a large influence on local economic development and cluster thinking (UNECA, 2009).

Thus, value chain consists of all value-generating activities, sequential or otherwise, required to produce, deliver and dispose of a commodity (Schmitz, 2005 as cited in UNECA, 2009). More specifically, it "describes the full range of activities which are required to bring a product or service from conception, through the different phases of production (involving a combination of physical transformations and the input of various producer services), to delivery to the final consumer and final disposal after use" (Kaplinksy and Morris, 2007 as cited in UNECA, 2009). Particularly, in the context of food production, value chain activities include farm production, trade and support to get food commodities to the end consumer (e.g. transport, processing). The VCA extends traditional supply chain analysis by identifying values at each stage of the chain (WFP, 2010). This paper adopts the definition given by Kaplinksy and Morris, (2000)

Since activities may belong to different sectors of the economy, commodity value chain analysis is a multi-sectoral framework for studying the inter-linkages among the activities associated with the commodity (UNECA, 2009).

Value chain is approach, where all points in the chain are directed towards markets and coordination of actors in the key to achieve systematic competitiveness. Thus, It's a framework to understand how the poor people in rural areas of developing countries can engage, or improve their terms of engagement with trade. It is a way of understanding how people and firms

interact with markets. It recognizes that firms are critical determinants of trade. In addition it recognizes that trade takes place in a more coordinated way than standard trade theory would suggest, often involving close coordination between parties in the chain which have no equity links with each other. As chain coordination allows 'driving' agents to institute measures which reduce costs and risks while increasing the speed and reliability of supply, or which increase sales (Gibbon 2001 as cited in Mitchell, et al, 2009).

The VCA is built on a market system (in particular a supply chain), detailing both structural and dynamic factors that affect the contributions of each actor to the chain (WFP, 2010). The structural components include the end market, the business enabling environment (laws, policies, transport etc); vertical and horizontal linkages among actors in the chain and support markets like: credit market, legal services, telecommunication etc. The response actors make to adjust to the structure of the chain creates dynamic elements including: upgrading in production and marketing techniques or processes, upgrading in horizontal linkages to increase their bargaining power, and to benefit more from the chain, increase cooperation in vertical linkages to achieve competitiveness, sharing of knowledge and information (Campbell, R. 2008).

2.3.2 Why Value Chain Analysis for Food Security

Following Chambers (1983), analysts of food insecurity in Ethiopia can be divided into two groups: the 'physical ecology cluster', which focus on population growth, declining soil fertility and drought, and the 'political economy cluster', who blame government policies, weak markets and institutional failure. Both the 'Malthusian' and 'governance' approaches have some merit as partial explanations, but neither is sufficient in itself. A holistic analysis is needed (Devereux 2007). Thus, the adoption of value chain framework for food security analysis can be justified for the following reasons. The first reason for adopting VCA for household food security analysis is mainly for the reason that the three pillars of food security – food availability, food accessibility and use are directly related to the three pillars of Value Chain Analysis – production, marketing and processing. Analysis of production falls in the two pillars of food security: availability and access, while analyzing the markets helps us to better understand the food access (WFP 2010). The second reason is: value chain approach can be pursued into two interrelated steps. That is it can be used as a tool to locate points in the chain where i) productivity and operational efficiencies could be enhanced; and ii) marketing efficiency could be achieved by minimizing the related costs and risks. (Gow et al. 2002 as cited in UNECA, 2009).

In the case of Ethiopia, the food insecurity problem is caused by a web factors. Given the high population growth rate, rain fed low productive agriculture sector, the recurrent drought in the country, market impedimets, the country is suffering from both transitory and chronic food insecurity. Chronic food insecurity is a continuously inadequate diet caused by the inability to gain food. It affects households that lack the ability either to buy enough or to produce their own. Transitory food insecurity is a temporary decline in households' access to enough food because of: Instability in food prices, world food prices, and domestic food prices, instability in food production, instability in household's incomes, war, blockade and sanctions (Saad, 2009).

Thus, we argue that enhancing agricultural yield through efficient production and marketing system can be one way of dealing with food security issues, in coordination with other related efforts. Thus, conducting value chain analysis for staple commodities, such as maize, provides a holistic insight in the chain – in identifying who the actors are, including input suppliers and rural farmers; what their functions are; how the actors and functions are interlinked, where inefficiencies in the chain are and the existing opportunities that could be utilized to improve the benefit - actors can get. The approach also enables us to analyze the benefits accrued by each actors and ways to improve the benefits of target groups, in this case maize producers and consumers that use the market to access maize.

In addition, effective and efficient way of addressing food security issues also requires a clear understanding on the pattern of distribution of cereals across regions of the country particularly from surplus areas to deficit and urban areas. Thus, conducting VCA enables us to factors that determine the price difference between the regions, which has an impact on food security. Therefore, conducting VCA helps us to understand how opportunities, costs and risks associated with production, marketing and distribution influences household food security.

Chapter 3
Data and Methodology

This study embarked on both quantitative and qualitative research methods and used data from both primary and secondary sources. As indicated by Silverman (2005), an effort was made to keep the balance between the qualitative and quantitative data. This is because, neither of the two methods is sufficient by themselves to capture the trends and details of the situation that they need to complement each other, to allow a complete analysis and generate reliable information. Qualitative research is concerned with finding answers to questions which begin with: why? How? and in what way?, While Quantitative research, on the other hand, is more concerned with questions about: how much? how many? how often? to what extent? (Hancock B. 1998).

Information generated using qualitative data only are considered as unscientific, or only exploratory or entirely personal and full of biases (Denzin and Lincoln, 1994; 4 as cited in Silverman, 1975). Thus a simultaneous use of quantitative data makes the information more scientific, and minimises biases. On the other hand, quantitative method by itself also fails to generate reliable information, as it needs some qualitative data to support it. This is basically because, quantitative data ignores the difference between the natural and social world – i.e it fails to understand the meanings that are brought to social life (Silverman, 1975).

Extensive literature review – extensive literature review was also done to get background information about food security, value chain analysis, the link between the two. List of literatures reviewed is attached in reference section.

More than 20 market actors were consulted using semi structured interview, to get: i) an overall understanding of market chain and maize flow – including integrations among market actors; ii) understanding on the implications of costs, risks and opportunities in the supply chain that have an impact on maize availability and accessibility for producer households and household that depends on the market to get their food. Interviewees include: farmers, assembler, retailers, traders, institutions and other knowledgeable individuals involved. The complete list of interviewees is shown in appendix (1 and 2).

In addition, quantitative data was also collected from relevant sources to understand, smallholder farmers' volume of maize production per year, portion

of their consumption from what they produce, volume of marketable surplus, price information for different periods, and different spaces etc. Sources of this information include: Central Statistics Authority, Ethiopian revenues and customs Authority, Ethiopian Grain trade Enterprise, Addis Ababa Trade and Industry Bureau and others.

3.1 Sampling Technique

The sampling technique applied for this study is purposive sampling. This is because, though random sampling technique is recommended, - as a means of informant selection, for reducing biases and allows for extension of results to the entire sampling population, it's not always feasible and efficient as higher dispersion of samples is costly (Alexiades 1996, Bernard 2002, Snedecor 1939 as cited in Tongco. D, 2007). Thus, purposive sampling can be more realistic than randomization in terms of time, effort and cost needed in finding informants (Seidler 1974, Snedecor 1939 as cited in Tongco. D, 2007). In the case of this study, finding data for maize traders alone was not possible, as the available data about traders from Addis Ababa Trade and Industry bureau, shows only grain traders – without details about what kind of grain is. Thus, as the focus of the paper is on maize traders, interviewees were selected based on recommendation from individual who know maize traders and out of convenience. The weakness of using such a technique unlike Random sampling is, it's subjected to biases and interpretation of results is limited to the population under study (Bernard 2002 as cited in Tongco. D, 2007).

3.2 Data Analysis

The interviews made were tape-recorded and transcribed verbatim and the findings – including quantitative data- are presented using a chart and graphs. The chart provides a clear picture about the chain including: the actors, their relationships and maize flow, from producers to consumers. For the quantitative data collected, descriptive statistics is applied to explain trends and patters of data across certain period.

Though drawing a conclusion about food security for a household based on a supply chain analysis of a single staple is impossible, the similarity of the supply chain across the staples - in production and marketing pattern – empowers this analysis, to give an insight of what the implications of costs, risks and opportunities in the supply chain are, that have an impact on food security.

3.3 Challenges and criticisms of the sources and methodology

The data collection process from market actors was not difficult, though there were some challenges. First, picking maize traders from the grain traders was challenging, as the traders data from Trade and Industry bureaus only show list of grain traders, and not maize traders, specifically. Thus, I used individuals, who know maize traders to get the traders. In addition, because of time and cost reasons, only 10 traders from surplus area and 10 traders from terminal market were interviewed. Conducting, the interview was also challenging -particularly, while collecting information from traders – particularly issues related to prices and costs - they were reluctant to give the right information, no matter how I tried to convince them that I'm a student writing a research paper. Thus, extra efforts were made to collect these data.

Chapter 4
Data Analysis and Discussion

This section presents the discussion and analysis of the finding on the implication of the current structure and operation of maize production, marketing and distribution system on food security, using value chain framework. As mentioned in Chapter two, since 1990s GOE's strategies were made promote the participation of rural producers in the market chain to improve market supply and simultaneously to improve their income and livelihood, and ensuring entitlement of consumers in deficit area. However, despite these efforts of the government, benefits producer households get from participating in the market is very limited and consumers in deficit are the most vulnerable, because of the production and marketing related costs and risks.

Thus, the next section discusses what the challenges related to maize production, marketing and distribution are, that constrain food security of producer households and consumer households that depend on markets to access their food. We start by analyzing the implication of the Ethiopian grain market structure on food security since 1950s. Then, costs and risks, related to maize production and marketing, including their implication on maize availability and accessibility will be discussed later.

4.1 Maize Market Structure

The structure of Ethiopian cereal markets has undergone dramatic changes throughout the past several decades. To a large extent, these shifts mirror the underlying ideological positions of successive governments, from the feudalistic system of the 1950s and 1960s to the pervasive state interventions under the Derg regime to an extended period of major investments in road and telecommunications infrastructure, accompanied by considerable liberalization of markets, under the current regime (Rashid S. et al 2010).

Grain marketing during the Derg regime involved a complex set of institutional arrangements, quotas and price controls which were further complicated by regional disparity in the application of the rules and its stringency (Lemek, 1986,as cited in Bacha and Abdissa 2001). This fact is still considered as the main reason for the food crisis during the regime. The state used to involve in determination of annual quotas, restrictions on private grain

trade and interregional grain movement, determination of days on which the local markets were to be held, and rationing of grain to urban consumers. The administration set wholesale prices of cereals for many provincial markets and changed little between 1976 and the late 1980s (Webb and von Braun 1994, 48).

The Ethiopian grain market was liberalized in early 1990s. Accordingly, strategies for both growth and poverty reduction have placed a heavy emphasis on cereal production and marketing. The Agricultural Development Led Industrialization (ADLI) strategy, the Sustainable Development and Poverty Reduction Plan (SDPRP), and the Plan for Accelerated and Sustained Development to End Poverty (PASDEP) all highlight the importance of cereals in Ethiopia's overall economic development. As part of these strategies, the Government of Ethiopia (GoE) has undertaken substantial market reforms, accelerated investments in road and communication networks and established institutions that can enhance the efficiency of the market channel (Rashid S. et al 2011).

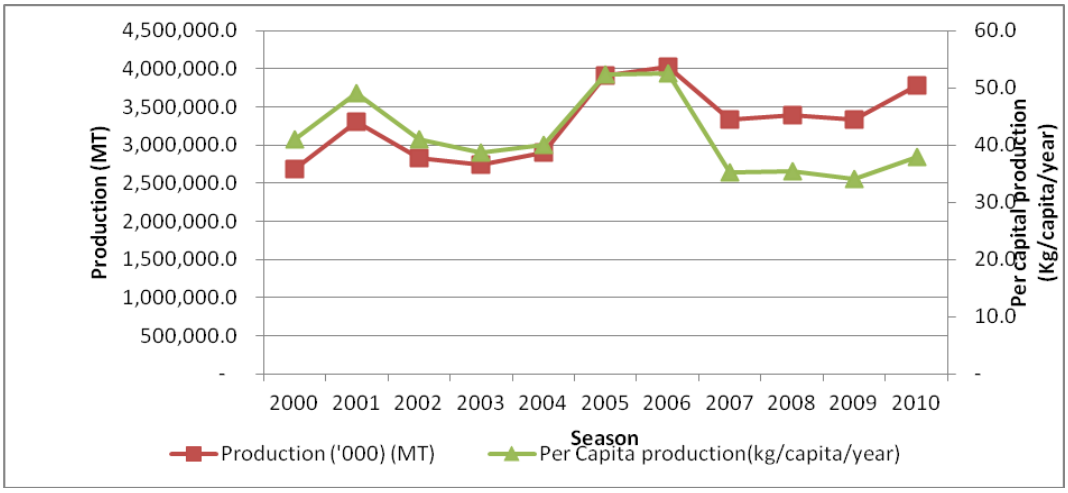
To address the issue of food security, the strategies adopted rests on increasing food availability through increased domestic production and ensuring access to food for food deficit households, by transforming subsistence farming to small-scale commercial farming (Ministry of foreign affairs of Ethiopia, n.d.). However, despite these efforts by the government, Ethiopia has been experiencing food insecurity as the country is mostly dependent on drought-exposed, rain fed agriculture, and high transaction costs that inhibit trade in staples – that underpin both availability and access issues (Caria et al, 2011).

As discussed by Has S. (2011), recently, more than 12 million people in Ethiopia, Kenya, and Somalia are in need of life-saving care and 29,000 children dead since mid-May 2011. Three consecutive poor rainy seasons led to reduced harvests, and it is projected that crop yields will continue to be weak later this year. Food prices throughout the region soared—for example, the price of maize rose by 89 percent in Addis Ababa during the first half of 2011 alone. This implies that though the strategies are there, in real terms, they are less effective, because of web factors. Thus, the next section discusses the constraints that constrain maize availability and access– focusing on production, marketing and distribution mechanism in the chain.

4.2 Implication of maize production costs and risk on maize availability

As indicated in FAO (2008), food availability addresses the "supply side" of food security, which is determined by the domestic food production level, stock levels and net trade for availability of sufficient quantities of food on a consistent basis. In Ethiopia, maize supply for consumption - (availability) - is mainly dependent on domestic production, import and stock level at the national reserves. As indicated in RATES (2003), 83 percent of the total produced maize is available for consumption, while the remaining 17% is allotted for seed, waste and feed. The figure below shows the maize production (MT) and per capita production (Kg/capita/year) trend from 2000-2010.

Figure 2 Domestic Maize supply and production per capita, from 2000-2010



Source: CSA for maize production, World Bank for Population data

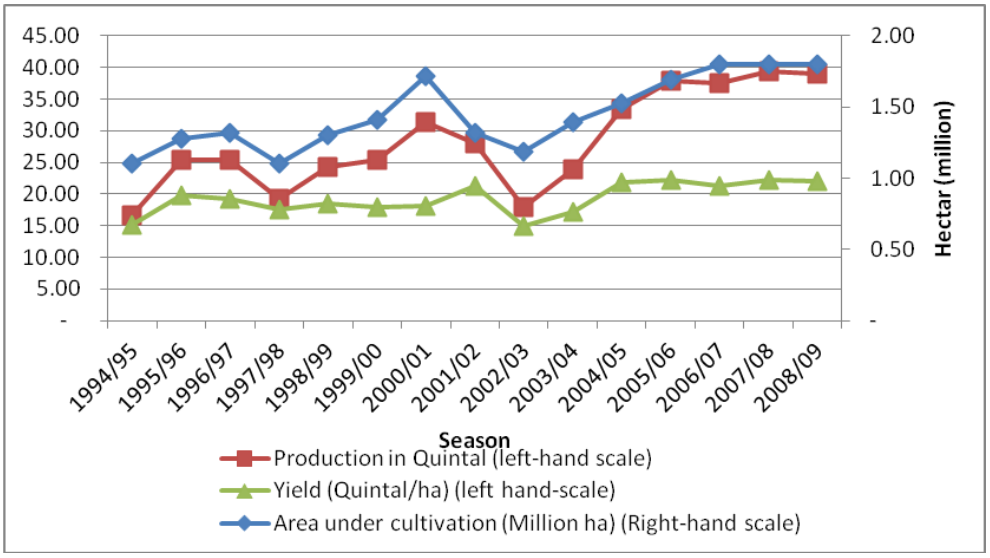
Figure 2, illustrates domestic maize supply and maize per capita production from 2000-2010. Accordingly, maize supply showed increment from 2.7 million MT, in 2000, to 3.7 million MT in 2010, while the per capita production showed a slight decline in 2010, as compared to 40 kg/capita/year in 2000. However, both maize production and per capital maize production has fluctuated across the years.

The fluctuation for production can partly be explained by seasonality of maize production – poor rain season - and the change in pattern of modern technologies uptake like: fertilizers, chemicals, improved seed and others. Similarly, the fluctuation in per capita production can be partly explained by factors that caused changes in production and growth in population. Thus, the next section discusses, in detail the cases of the fluctuation in maize production and the implication on food availability.

4.2.1 Maize production and productivity trend

Like the other staple crops, availability of maize in Ethiopia, is mainly dependent on domestic production. As discussed by (Sharp and Ludi, 2007), the three grain producers in Ethiopia are: family farms, small investor farmers and large-scale capital-intensive enterprises/investors (private and state). Family farms are traditionally market oriented producers of a certain commodity at some location, including farmers in marginal or low potential areas, 'subsistence oriented' but interacting with markets as buyers and sellers. In this paper the term 'family farms' and subsistent farms are used interchangeably.

Figure 3 Maize cultivation areas, production area and yield in Ethiopia, 1995-96 to 2008-09



Source: CSA

Figure 3, illustrates maize production, yield and cultivation area, trend from 1994-95 to 2008-09. During this period, maize production and cultivation area have fluctuating trends while productivity – which is directly related to maize production, with a given cultivation area – has steady trend, except a slight decline in 2002-03. Thus, the steady growth in productivity can partly e explained by the fact that, the growth in production doesn't outweigh the maize cultivation area expansion.

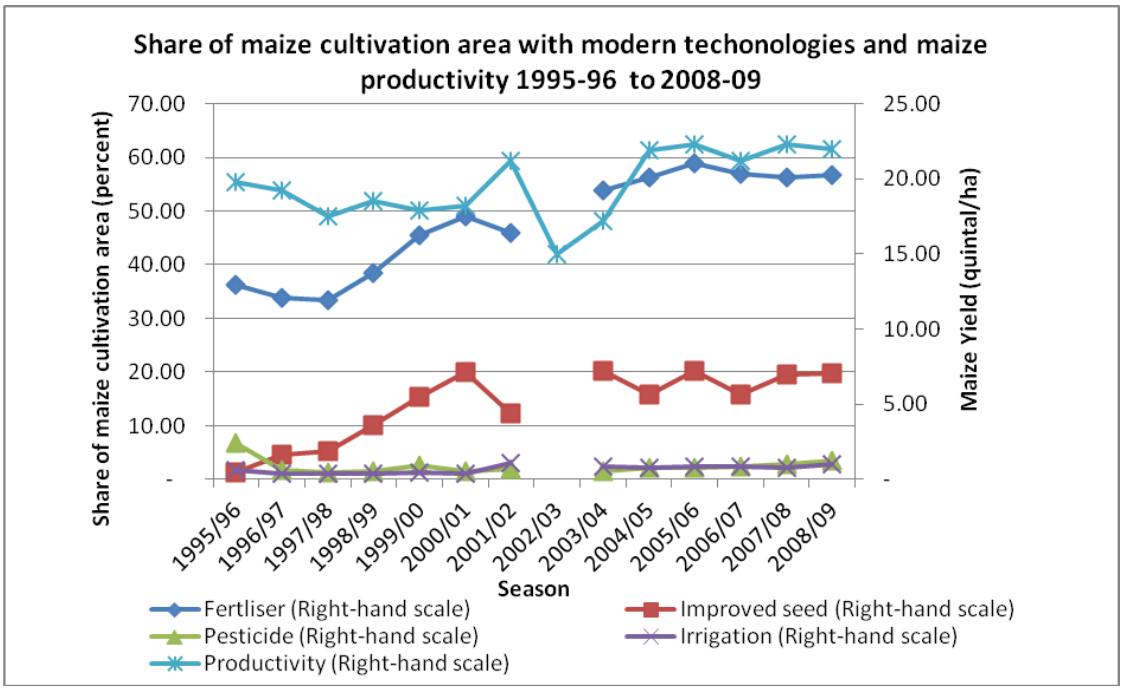
As discussed earlier, fluctuation in maize production can partly be explained by seasonality and lower uptake of modern technologies to these farms, particularly by smallholder producers. Seasonality factors such as climate

change that resulted in recurrent drought, where rain fed agriculture is practiced, has a serious implication on supply of maize. In addition, lower uptake of technologies, such as: drought resistant seeds, improved seed, and fertilizers also contributed for production fluctuations. The implication of lower productivity on food security is severe. That is, with a higher population growth rate, limited availability of arable land and little soil nutrient, meeting the maize requirement of the wider consumers is unrealistic, unless an effort is made to boost productivity.

4.2.2 Farm Input Application Trend in Ethiopia

One strategy adopted by GoE since the 1960's to ensure food security has been enhancing productivity, through application of modern farming technologies including: fertilizers; improved seeds; irrigation and pesticides. In addition, the government has been providing extension and training services and expands education through Agricultural technical and vocational Education and Training (ATVET).The most widely used inputs to date are fertilisers and improved seeds, while the application of irrigation and pesticides is very minimal.

Figure 4 Percent of maize cultivation area using modern inputs and maize productivity trend 1995-96 to 2008-09



Source: CSA

As can be seen in figure 4 indicates the share of maize cultivation area on which modern inputs namely: fertilisers, improved seed, pesticides and irrigation are from 1995-96 to 2008-09, except 2002-03, where a data is missing. Accordingly, application of fertiliser as compared to the other modern

inputs is the highest, covering more than 50% of the total cultivation area since 2003-04, followed by application of improved seed. Less than 10 percent of the total maize cultivation land that improved seed was applied prior to 1998-99. This share ranges between 10 and 20 percent, from 1998-09 to 2008-09, reaching peaks in 2000-01, 2003-04, 2005-06 and 2008-09. Application of irrigation and pesticide on maize cultivation land is very small, less than 4 percent, except the 6% share of land that used pesticide 1995-96.

Share of maize cultivation area, on which Fertiliser and improved seed was applied, had an increasing trend, except a slight decline on the share of areas using retailer, since 1997-98 to 2000-01 followed by a decline in 2001-02. The main reason for this trend is government intervention through Participatory Demonstration and Training Extension System (PADETES) from 1993-99, which is aimed at promoting improved seed-fertiliser-credit package (primarily for maize and wheat) through a 'training and visit' approach piloted by Sasakawa[1] Global 2000 (Spleinman et al, 2011). A number of factors contributed for the decline in 2001-02. Afterwards, since 2003-04 the share of land on which fertiliser is applied showed a slight increase until 2005/06 followed by a slight decrease until 2008-09. Improved seed application also showed a slight increase and decline below 20 percent share during 2003-04 and 2008-09.

As discussed in ((Stepanek, 1999), the low uptake of these technologies can justified by supply side and demand side problems. Supply of fertilizer is solely dependent on import. Thus, the supply side problems for fertilizer include: structure of the market – where the state controls the input markets, dependence on donors for supply because of financial constraint and low quality of extension services delivered to farmers. The supply side problem for improved seed, which is produced domestically, is mainly due to insufficient supply - which is a result of wrong estimation of demand, insufficient provision of pre and post basic seed by the research centre, limited capacity of Ethiopian Seed Enterprise.

On the other hand, the major problem in the demand side high fertilizer price and tight credit repayment schedules as problems that constrain application of these technologies, specifically, fertilizers and improved seed (Zerfu D. et al, 2011)

[1] Sasakawa Global 2000 is a pilot extension programme in Ethiopia that aims at providing agricultural input, credit and extension services to farmers from 1993-97.

4.3 Maize Markets

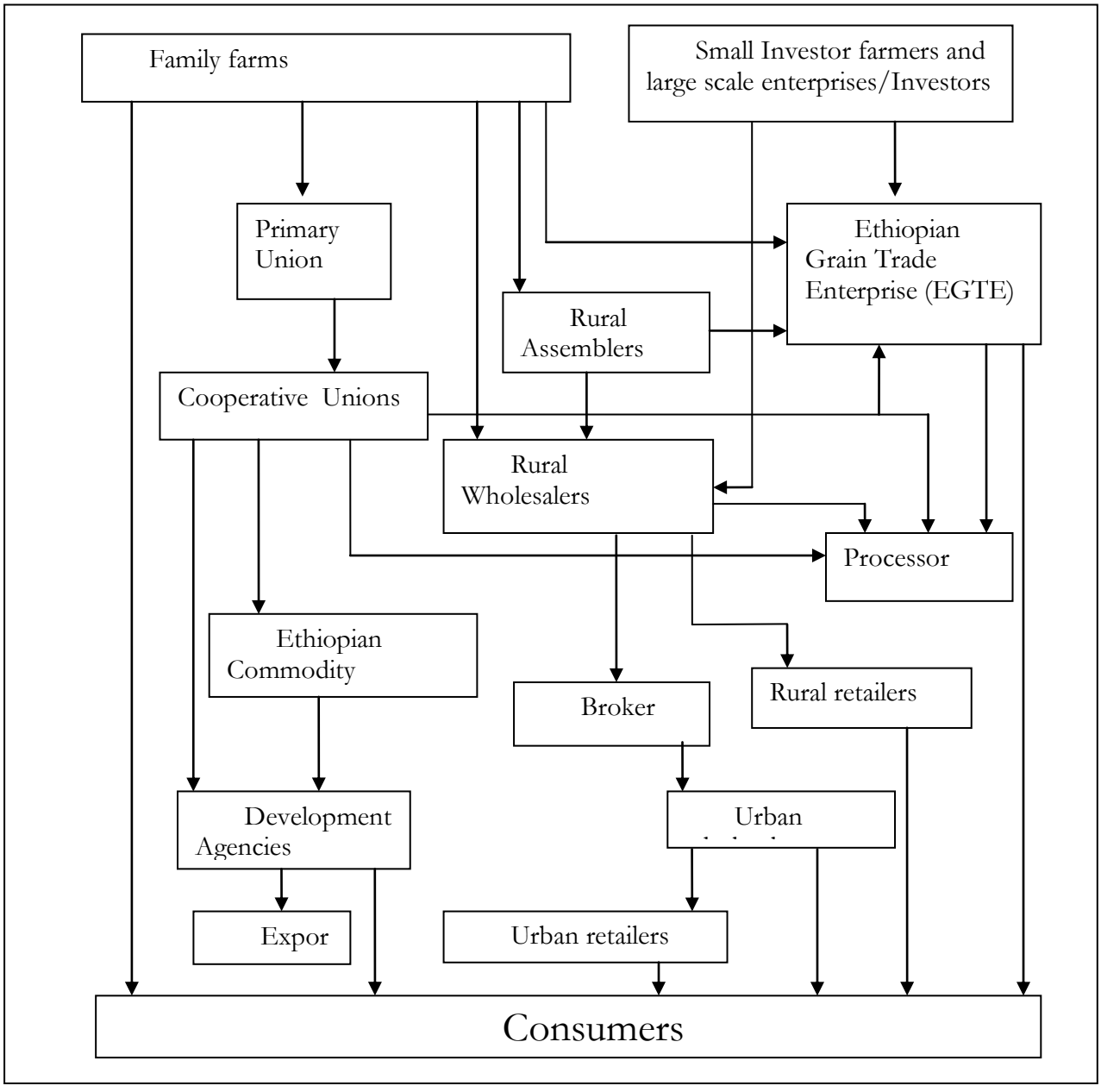
Markets are important aspect of food security that influences both availability and access. Rural households produce their own food and also purchase from the market, while the majority of urban households are only purchasers of food, some engage in urban agriculture (mainly livestock and produce) both for their own consumption and for the market (Adenew, 2004). In Ethiopia, a study by Alemayehu (1993:48), indicated that 42 percent of the population is dependent on the market for all or part of its food demand. In addition, 65 percent of total household expenditure is on food; where expenditure on cereals alone constitutes about 21% of total household expenditure (Bereket et al. 1996).

Urban and peri-urban agriculture is intensive in nature and plays an important role in ensuring food security. Most smallholder agriculture in Ethiopia is characterized by a mixed farming system combining livestock and crop activities. Their products are used for both home consumption and sale at the market. In cash crop producing areas, farmers sell cash crops (coffee, chat, fruits and vegetables, etc.) and purchase food grains from the market. For them, the effectiveness of food market systems is as important as the reliability of food production for personal use. In urban areas, where household food security is dependent on household income, work opportunities as well as an efficient food market system are crucial to improving access to food (Adenew 2004). The next section discusses the implication of the current maize market channel and implication of prices on food security.

4.3.1 Market Channels

Marketing channel as defined by Stern et al. (1996), is a set of interdependent organizations involved in the process of making a product or service available for consumption or use. The complexity and length of a market channel depends on farm size, the distance between farmers and consumers, availability and accessibility of marketing facilities (like storage, transport, infrastructures and others). Maize flow begins with producers who, after harvest, decide how much to store for household consumption, seed and payment in kind and sell the remaining food grain (market supply) to a trader or consumer in order to settle debts and contributions, taxes and to purchase consumer good (Rashid S. et al, 2010).

Figure 5 Maize market channels in Ethiopia



Source: Rashid S. (et al. 2010) , with some changes by the author

Figure 5 shows the flow of maize from producers until it reaches to consumers. The next section discusses the role of market actors and the implication of the channel on food security.

Maize producers – as mentioned earlier, the three major maize producers in Ethiopia are family farms, small investor farmers and large-scale capital-intensive enterprises/investors (private and state). These producers decide, what input to use, when to seed and harvest, how much to consume, and how much to sell, considering the available resource. One determinant factor, for availability of maize, is risk and cost related to production. Production risk is related to weather conditions, outbreak of bacteria, insects etc, whereas production cost is mainly related to uptake of technologies.

As discussed RATES (2003), the link between maize production and availability are described in three ways: i) subsistence farmers sell 20% of their total production; ii) of the total maize produced, 95 percent of marketable surplus comes from subsistence farmers, while the remaining 5 percent comes from the other two producers and; iii) subsistence farmers sell 60% of their marketable surplus immediately after harvest for immediate cash need purposes and for fear of loss due to poor storage. That is despite the smaller volume of market surplus as compared to production, family farms are the source of 95 percent of the maize supply. This supply is seasonal, because of financial and storage constraints.

Assemblers - are independent operators at primary markets who assemble and transport maize surpluses from smallholder farmers, using pack animals and small trucks for sale to larger markets (RATES 2003). Their major sales outlets are the relatively larger wholesalers/unions (Primary private individuals and other actors including: EGTE and commercial farms). And most of these outlets own or rent storage but usually do not store for more than one month. They typically have limited scale - Transaction of one truckload (about 5 tons), and typically trade 4 market days a month (Rashid S. et al, 2010).

Wholesellers - the maize marketing channel in Ethiopia has five types of wholesalers: i) wholesalers in surplus areas; ii) wholesalers in major terminal markets; iii) wholesalers in deficit areas; iv) Farmer cooperatives; and private companies that carry out diversified business activities, and v)the Ethiopian Grain Trade Enterprise. They handle more than 70% of the total maize marketed surplus. They mostly receive maize from farmers, assemblers, primary unions (RATES 2003).

Brokers – are agents, operating on a commission basis, who only transact on behalf of a principal. The major services provided by brokers include: (1) selling grain on behalf of the regional merchants; (2) providing market information; (3) collecting and haul back grain sacks; (4) collecting and send

back money from the sale of grain; (5) identifying grain buyers from deficit areas; (6) providing temporary storage services; and (7) arranging transport for transferring the grain. (Gebremeskel et al, 1998).

Processors - in Ethiopia, a significant proportion of grain produced is consumed on-farm. In extremely remote rural areas of Ethiopia, cereals are still processed manually using mortar and pestle or grinding stones or both. In relatively accessible rural areas, small-scale water mills, diesel flour mills, and small-scale flour mills are used to process cereals. Rural households bring their grain to the mills to be processed and pay the processing fee based on the weight of grain processed. Until the early 1990s, the government owned all commercial flour mills. There was no private sector owned flour mills until the mid-1990s. This started changing rapidly in the early 2000s. In 2008, there were 65 large commercial flour mills in the country with annual processing capacity of 968,000 tons, which is roughly equivalent to about 30 percent of the market surplus in the country (Rashid et al 2011).

Retailers - Retailers play an important role in delivering the grain to the final consumer, which they collected from wholesalers, particularly to the consumer household.

As shown in figure 5, the maize market channel is long that maize passes through a number of channels before reaching to consumers, implying likelihood of possible operational losses and higher marketing costs. The channel is lengthy because i) geographical dispersion of markets and market actors and ii) absence or limited availability of adequate and appropriate institutions to shorten it. In addition, the figure shows that the channel is middlemen based one that most transactions are carried out with the help of middlemen or brokers. The dominance of these middlemen in the chain can be partly explained by geographical dispersion of actors and limited availability of market information.

As shown in the maize flow map, maize is cultivated in specific locations in the country, while the demand is high across the country. Thus, maize demand in urban areas and deficit regions is met from regional trade between the surplus area and these areas, or from import, which involves a number of actors. Due to the distance barrier between the different market places, traders at one place need an agent or middlemen to sell their produce in other markets. The flow of maize to these regions is dependent on a number of factors including: proximity between surplus markets and -terminal and deficit markets, road infrastructure that connects these areas, weather conditions,

price difference and the demand level in the markets. This implies that food security of producer and consumer in cities and deficit areas are highly dependent on the functioning of markets.

In sum, the maize market channel is lengthy and complex, which is likely to result in high marketing costs, including: transport, brokerage, packing, labor, storage, information and other transaction costs, that pushes the food cost of the consumer. Thus, higher food costs for consumer, who spends more than 65 percent of their income on food, threatens their food security. The next section discusses costs and risks related to maize marketing that have an impact on availability and accessibility.

4.3.2 Maize market costs and risks

Marketing costs and risks are the major determinants of household food security. That is, higher marketing costs implies higher food costs and a high marketing risk, particularly related to price, is a disincentive for farmers from producing market surplus. The next sections discuss the major marketing costs and risks in the channel and their implications.

Marketing costs as discussed by Andrew (2007), the major agricultural marketing costs include: produce preparation - like cleaning, sorting and grading- and packaging costs; handling costs; transport costs; Information cost, storage costs; processing cost, capital cost and other costs. Though all costs are common, the significant maize marketing costs, depending on my findings are all, except processing cost, capital cost and other costs

Produce preparation and packaging costs - are costs incurred by farmers to sell their surplus, this includes cleaning, sorting and grading. Most subsistence farmers lack the awareness on post harvest management, particularly related to quality, that they lose part of their produce (Mesfin 2011 personal interview)[2]. Thus poor post harvest management increases marketing costs through physical loss of food and by lower prices for poor quality. It also constrain availability of maize.

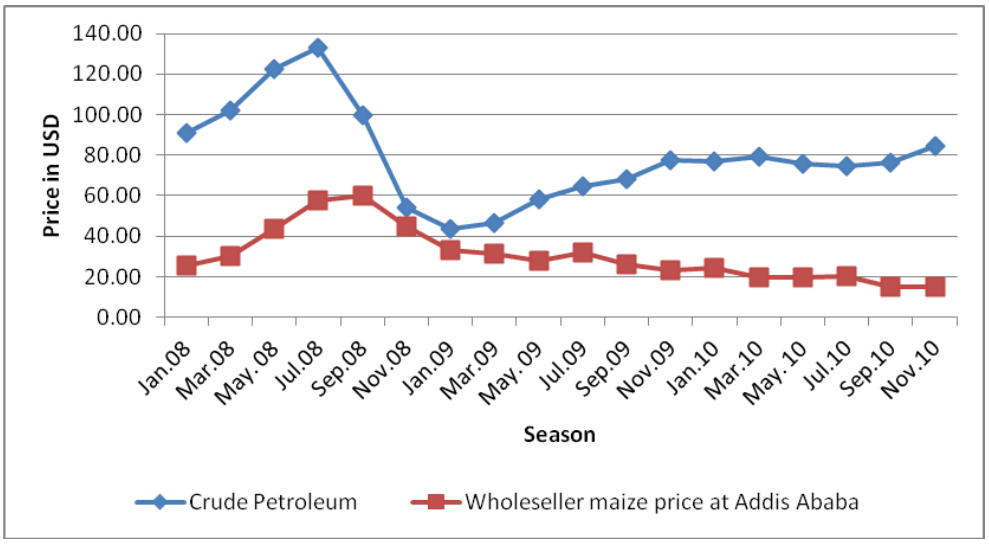
[2] Personal interview with Mesfin on Maize marketing in Ethiopia, at World Food Programme, Addis Ababa, 20 January 2011.

Handling costs –are related to loading and unloading costs. These are made every time; ownership of the maize is changed, pushing the marketing cost and food cost for consumers (Traders 2011, personal Interview) [3].

Transport costs- are also important components of the marketing costs that influence maize availability and accessibility. As discussed earlier maize markets are located in geographically dispersed area in the country, that transport plays a critical role for availability and accessibility of maize particularly in urban and deficit areas Transport cost is mainly determined by distance between markets, cost of fuel, the quality of road and availability of transporters.

Ethiopia, imports fuel for consumption, thus, fuel prices in Ethiopia has a similar trend with the global fuel price. Figure 6, shows crude petroleum price at the global level and Maize wholesale price at Addis Ababa- a terminal market from January, 2008 – December, 2008.

Figure 6 Price trend for crude petroleum and maize wholesale price at Addis Ababa



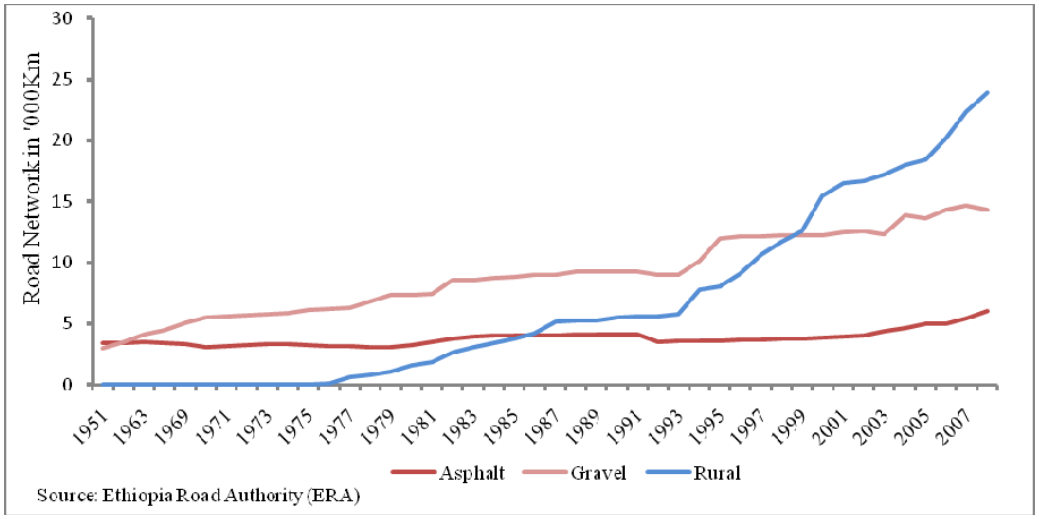
Source: Ethiopian Grain Trade Enterprise for price at Addis Ababa Market and the World Bank – for global fuel

As can be seen from the graph, though price of maize is determined by a number of factors other than the price of fuel, the sharp rise in the price of crude petroleum in 2008 is responsible for the sharp increase in maize price in the same year.

[3] Personal Interview with maize traders in Ethiopia, at their warehouses, in Addis Ababa (Ehil berenda) and Hawassa markets

Quality of road also determines the marketing costs. That is transport costs are lower, when the quality of the road is high. In Ethiopia, depending on the quality, roads are categorized into three, namely: Asphalt, gravel and rural road. The length of these roads since 1951 to 2007 is shown in figure 7.

Figure 7 Trends in road development in Ethiopia 1951 -2007



Source: Ethiopian Road Authority

As shown in the figure 7, rural road network is the longest road in the country followed by gravel road. The length of rural road was increasing dramatically, particularly since 1993. Though the length is increasing, transportation cost for these roads is quite expensive as compared to the other roads, as they are not suitable for transports. In addition, as this road is typically used by the rural poor the impact on food security of – both producers and consumers is significant in raising their marketing costs and food costs. Unlike rural roads, the length of gravel road is increasing steadily, while the length of asphalt, the most quality road, in 2008 is almost similar with the length in 1951.

Availability of tracks also determines transport costs as prices are determined by the structure of the transport market. As shown in the table 1, though the number of tracks is increasing across the year, the number is too small for the country, implying oligopolistic nature of the structure, where transport owners are likely to secure higher margin, at the expense of high marketing costs.

Table 1 Number of tracks by size

Year	Number of tracks by size		
	3-7 tons	8-18 tons	Trailers
Average 1993-99	10.42	10.67	4.81
2000	24.42	10.11	5.6
2001	27.07	10.52	5.67
2002	25.33	12.91	5.65
2003	25.39	13.82	6.13
2004	32.52	10.72	6.01
2005	32.6	11.28	7.13
2006	39.72	11.38	6.89
2007	43.96	11.57	7.31
2008	48.2	11.76	7.73

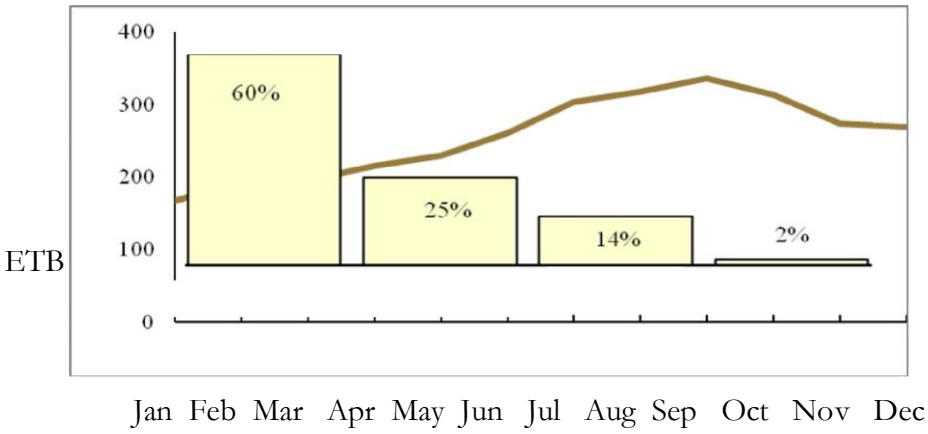
Source: Ministry of transport and communication (2008), Government of Ethiopia as stated in Rashid S. et al (2011)

Information costs - Information is essential for farmers who wish to become fully market orientated and ensure that their production is in line with market demand. In theory, the availability of reliable market information can assist farmers to: i) reduce the risks associated with marketing; ii) decide where to sell produce; iii) check whether or not the prices they are offered are in line with market prices; iv) decide whether or not to store; v) decide whether to grow produce "out-of-season"; vi) decide whether or not to grow different products (Shepherd, 2000). However, in Ethiopia, market information is not readily available, that it involves costs. Market actors indicated that they don't have a reliable source for market information that they have to check market prices from different source, which is costly. (Farmers and traders 2011, personal interview). In addition to high marketing cost, lack of reliable market information could means: farmer are likely to sell their produce with lower prices while consumers might be charged higher prices. However, since 2008, with the introduction of ECX in the channel, this problem is partially addressed (details about ECX will be discussed later).

Storage costs - Farm-level storage, in Ethiopia is carried out by means of primarily traditional basket granaries, while traders generally store grain in

warehouses with an average capacity of 100 tons with poor ventilation and dirt floors (Dadi, et al 1992). Cost of storage, in this context implies physical loss of maize and monetary expense for storage. Actors decide to store maize only if the benefit of is at least equal to the cost of it. However, due to poor storage facilities, added to other factors, farmers prefer selling their produce immediately after harvest. One manifestation of poor storage facility is the seasonal maize price swings, and fluctuation in the volume of marketable surplus.

Figure 8 Volume of marketable surplus and maize price trend in 2010



Source: Price Source: EGTE, marketed volume data are based on Abebe and Hundie (2002) and participatory rapid assessment in January 2010 as cited in (Rashid S. et al 2010)

As shown in the figure 8, farmers sell 60% of their marketable surplus within the first three months after harvest, and these percent declines to 25 percent, 14 percent and 2 percent in the successive quarters, respectively. On the contrary, prices have an increasing trend, as the volume of marketable surplus declines. This implies that the poor storage facility constrains i) producers' capacity to store the maize during peak supply season, so as to meet demands during peak season and ii) their potential to benefit from the markets, as prices are lower during harvest season, where they sell about 60 percent of their market surplus, while it's higher in lean season, where they have little marketable surplus or they become buyers.

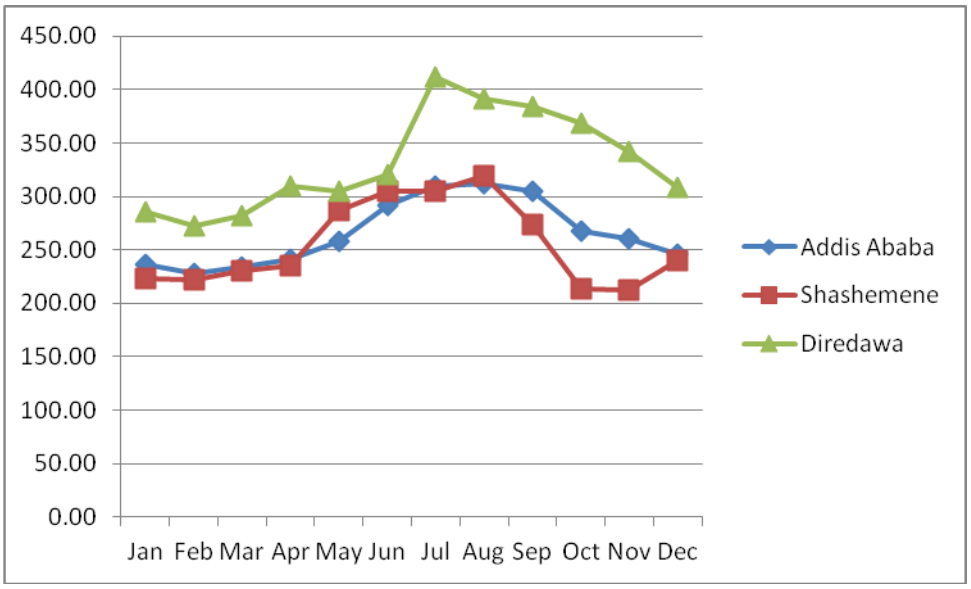
In sum, Marketing costs in Ethiopia are high because of the market impediments including: poor know how about post-harvest management, and lack of adequate, appropriate and well developed storage and rural infrastructure like: roads and information sources. Higher marketing costs constrain producers' income and consumers' food costs. This is because in order to achieve food security, producer household need higher and stable income, while consumer households need lower and stable prices.

Output market risks - The major concerns of farmers' after harvest is price, as it determines the income they earn to meet their food and other demands. Price is also a concern for consumers, as their ability to buy food from market depends on market prices of staples.

As indicated in FAO, agricultural extension paper 1, in a market-oriented system the price of a product is determined by supply and demand. Basically, a balance is achieved between what people are prepared to supply at a price and what people are prepared to buy from the market. The prices of agricultural products are influenced by many factors - such as supply and demand situations, the changes in the costs of production and marketing, government marketing policies, and, structure and concentration of marketing channels, etc – (Negassa, 1998). Though supply of maize is determined by domestic production, it's not always equal to production. This is because, market actors particularly producers and traders may decide to store, in the hope to sell when prices go up. The act of the middlemen also has an impact on consumer prices as they sometimes hoard, and distort the market prices. Thus, the major market risk, that have an impact on food security, of both producer and consumer households, is related to prices. The next sections discuss seasonal maize price movement and long term maize price trend and the implication on food security.

Seasonal maize price movement in order to analyze the maize seasonal price movement, a five year average monthly wholesale prices from three different markets: - Shashemene market, which is one of maize surplus markets, Addis Ababa, 'Ehil-berenda' from terminal markets and Diredawa market, from deficit market - was taken , from 2006 -2010 was taken.

Figure 9 Monthly average seasonal price movement of Maize during 2006 and 2010



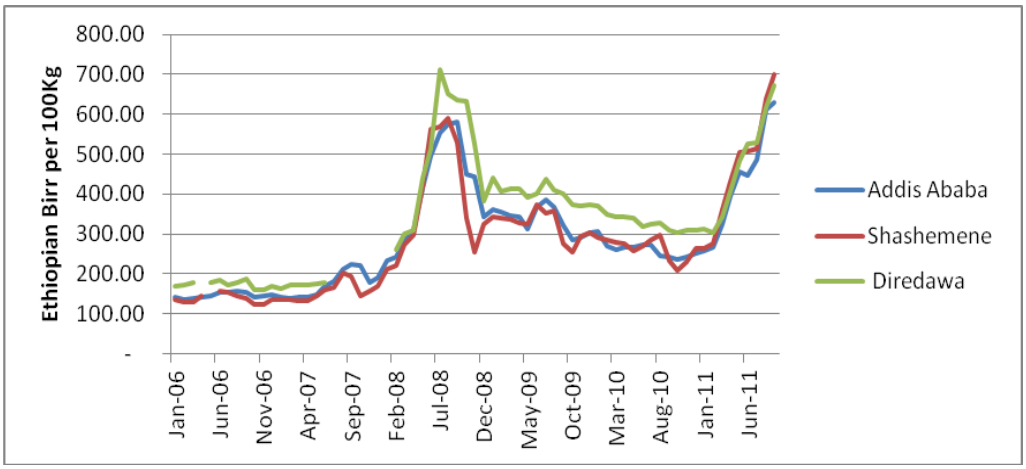
Source: Ethiopian Grain Trade Enterprise

As shown in the figure 9, maize prices at the three markets are lower during harvest season that ranges from October to February, followed by a rise until they reach their peak, in July and August. Higher supply during harvest season could be partly explained by lack of storage facility and immediate cash needs by farmers. It's also shown that prices in deficit areas are higher than the surplus area and terminal markets. The price difference between the three regions could be explained by the higher transaction costs due to the location of this area from surplus areas. The implication of the seasonal price fluctuation on producer and consumer households is that, though during harvest season, consumers may benefit from the lower prices; their benefit is at the cost of the producers. This leads to sub optimal production decision by producers and results in a decline in availability. On the other hand, during lean season, both producers and consumers will suffer from higher prices because of low purchasing power, and those in deficit areas will be more vulnerable doe to the related high transaction costs.

Long term maize price trend -In a purely descriptive sense, volatility refers to variations in economic variables over time. Not all price variations are problematic, such as when prices move along a smooth and well-established trend reflecting market fundamentals or when they exhibit a typical and well known seasonal pattern. But variations in prices become problematic when they are large and cannot be anticipated and, as a result, create a level of uncertainty which increases risks for producers, traders, consumers and governments and may lead to sub-optimal decisions (Han S., 2011).Behind concerns about price volatility lie concerns about food security. This is

because; though higher prices benefit maize producers –particularly the net producers – it severely affects poor consumers. As most households in Ethiopia are both producers and purchasers of maize, the impact of volatility is severe.

Figure 10 Maize price trend for Addis Ababa, Shashemene and Diredawa markets from January 2006 to June 2011



Source: Ethiopian Grain Trade Enterprise (EGTE)

As shown in the picture, maize price at the three markets was lowest – i.e below ETB 200 - until the last quarter of 2007. Prices rose sharply in 2008, reaching its peak and fell sharply at the end of the same year. Though maize prices fell dramatically in the second half on 2008, prices remain above just before the run up of prices began. Price tension began again at the second quarter of 2011, where prices start increasing sharply, and reached at the peak where it had been in 2008. As indicated by Han S.(2011), factors that contributed for higher price volatility in 2008 have contributed for the price volatility in 2011. These include: – weather-related crop losses, export restrictions in other countries, high oil prices and a depreciating US dollar, against a background of a continuing tight supply-demand balance. In addition, the current drought in the horn of Africa, also contributes for the current price shoot.

Higher prices grave hardship for the poor consumer households, who spend more than 65% of their income on food as well for producer households, who become buyers during lean season. This hardship on households in the short run, results in decline in purchasing power, while in the long run, it results malnutrition- as consumers cannot afford nutritious foods. In addition consumers might be forced to forgo other needs, to meet their food demand, implying vicious cycle of poverty.

In addition to higher food costs, lack of awareness about the future market is another problem for farmers. Because farmers in Ethiopia, hardly know what the price of their produce will be after harvest. Therefore, though, higher prices benefit them, sometimes the volatility might result in lower prices, in case of glut.

Generally, the maize market impediments – costs and risks – are partly responsible for food security problem in the country. Therefore, to cushion problem, particularly related to marketing GoE, and other development organizations have been making efforts, by establishing institutions that enable farmers to gain from participating in the market. Some of these institutions include: Cooperatives, Ethiopian Grain Trade Enterprise (EGTE), and Ethiopian Commodity Exchange (ECX) and development programmers like Purchase for Progress (P4P). The next section discusses each of them in detail.

Cooperatives – are given special emphasis by GoE, to enhance the benefit producers can get from participating in the market, through vertical and horizontal integration of smallholder farmers, by enhancing their bargaining power, eliminating some of the middlemen and thereby reducing the length of the value chain and increasing margins for smallholders. Farmers who are members of cooperatives, get better market benefit than those who are not for the following reasons:

i) they have better access to input market, output market and market information;

ii) they have better bargaining power and benefit from large economies of scale (through horizontal and vertical integration);

iii) Cooperatives provide farmers the opportunity to earn twice, from a single sale - one at a time of sale and one at the end of the year, as a dividend. And as this dividend is paid during lean seasons, it improves their income and hence purchasing power to buy food in the season;

iv) Cooperatives offer credit access to farmers, which is partly an incentive to apply modern technologies (Zewdu 2011, personal interview)[4].

[4] Personal Interview with Zewdu Sarsemo, Sidama Elito Cooperative delegate, on the role of cooperatives in maize marketing, at Sidama Elito cooperative, Hawassa, 18 August, 2011

However, the number of farmers participating in these cooperatives is very limited, though the number is increasing from time to time. For instance in 2005, only 9 percent of total Smallholders in Ethiopia were members of cooperatives; and this number jumped to 36 percent in 2008. For all regions, in 2008, on average, 28 percent of cooperative members sold grains through their cooperative (Rashid s et al 2011). The two reasons given by farmers for being reluctant to join cooperatives despite their benefits is the benefit of being a member is not at least equal to the cost of it. Others also mentioned a relatively higher entrance fee, as a barrier from joining the cooperative (Farmers 2011, personal Interview)[5].

Ethiopian Grain Trade Enterprise (EGTE) – is an institution, established to reduce market costs and risks. It's a state owned enterprise, mandated to stabilize prices. Though this responsibility has been mandated since 1970's the change in mandate was made in 2002 - to perform, on commercial basis and earn foreign currency – and then re-instated in 2008, because of the food price spikes in the country. For this purpose, the enterprise imports and export maize; provide storage services and provide fumigation services, to prevent possible physical losses (Gebre-egziabher 2011, personal interview)[6]

However, conflict occurs where the mandate of price stabilization, which is a social function requiring subsidies, competes with the mandate to earn foreign exchange which requires making profits, which is not a social function. Furthermore, EGTE intervenes as and when necessary, making such interventions ad hoc while sending inconsistent signals to the actors in the value chain. Moreover, EGTE purchases on an ad hoc basis, without set rules such as price floors to protect farmers from further price decline, and usually intervene immediately after harvest while it sells the stocks around the year. EGTE has also a mandate to import and gather market prices (Rashid S. 2010).

Therefore, in order to protect producers and consumers from possible price volatility that constrains household food security: first, floor prices need to be set for buying from producers and; second ceiling prices need to be set to protect consumers from price spikes. In addition the intervention should run across the year, than concentrating only during harvest seasons, as prices shoot up in lean seasons, when there is a shortage in supply.

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[5] Personal Interview with farmers who are not members of cooperatives, on their opinions about cooperatives, Hawassa, 16 August, 2011

[6] Personal interview with Ato Gebre-Egziabher, on the role of EGTE on maize market at EGTE, Addis Ababa, 25 August 2011

Ethiopian Commodity Exchange (ECX) is an institution established in 2008 to revolutionize Ethiopia's tradition bound agriculture through creating a new marketplace. It was aimed to serve all market actors, from farmers to traders to processors to exporters to consumers, to trade grains including cereals, as it brings more order to the market. However, the share of cereals traded via ECX has declined through time for the following reasons: First, the launching coincided with global price hikes thus, cereal prices were further escalated in domestic markets due to its involvement and; Second the balance-of-payment crisis in the country led to a rationing of foreign exchange, (Rashid and Negassa, 2011). This fact, led ECX to focus on exportable items, and since maize export was banned soon after the establishment of the institution, the volume of transaction traded through it declined.

In addition, other reasons for the decline in the volume of maize traded through ECX include: lack of awareness about the institution - that traders prefer to trade through the traditional brokers – and; supply problem, particularly due to quality and quantity problems. The quality problem is caused by farmers' poor knowhow about grades and standards, while the quantity problem is mainly due to failure in horizontal integration (Anteneh 2011, personal interview)[7].

In addition, though, ECX was supposed to become "a marketplace for all" it plays a marginal role in rural Ethiopia, the quota of farmers directly involved in the market does not exceed 5%, and farmers co-operative make up just 12% of market memberships (Dettoni J., 2011).

However, despite the shift in some dimensions, from the original concept, as mentioned above, the institution brings a significant change by reducing information costs as market information is disseminated immediately, after few seconds of transactions, across the regions, where ECX warehouses are operating via price tickers. Besides, since ECX has grade and standards specification, it brings a change in quality awareness to the actors, that: i) prevents possible physical loss of maize and; ii) enhances farmers income through premiums for the quality. Added to that, it has a proven trading system, without default in quantity, quality and cash payment.

[7] Personal Interview with Ato Anteneh Mitiku, on the role of ECX in maize marketing, at ECX, 25 August 2011

To address the issue of price risk and other marketing problems, development organizations, specifically, Purchase for Progress (P4P), a programme undertaken by World Food Programme (WFP). The program me is aimed at developing markets, to enable farmer cooperative members to produce more and market their crops, so that they can engage more profitably and sustainably in markets (WFP, 2011).

Cooperatives were taken as an entry point to reach farmers because of large economies of scale. WFP conducts a portion of its P4P procurement across the commodity exchange (ECX) to help establish the exchange as a transparent and quality oriented market for staple commodities. This is because, by participating in the exchange, the cooperatives will gain access to quality oriented markets, enabling higher profits for its members (WFP, 2011).

The initiative currently uses two purchase modalities, to buy from cooperatives. One is soft tendering – through ECX while the other is direct/contract procurement. The second modality is specifically aimed at protecting farmers from possible price volatility, which is their major concern.

Added to that, P4P will use its procurement of processed foods to encourage increased private sector investment in the processing industry, link processors to participating Cooperative Unions, and thus increase demand for smallholder produce from an expanding processing industry (WFP, 2011).

However, the initiative identified that challenges that the programme faces including lack of capacity by cooperative unions to provide the specified quality and quantity and commitment problem by the cooperatives is also another problem.

All in all, though commercialization of smallholders is important for household food security, the market impediments constrain it. Market impediments including farmers' awareness about post harvest management, poor storage facility, and poor infrastructure, lack of appropriate and adequate institutions are responsible for limited availability and accessibility of maize. Though maize is one of the staples, most of the issues discussed here, are also issues of the other staples to show that market impediments are one factors for food insecurity problems in Ethiopia.

Chapter 5
Conclusion

Ethiopia has been experiencing food insecurity for decades as a result of both decline in availability and a failure in entitlement to access food. Conducting a value chain analysis provides an opportunity to critically examine the opportunities, costs and risks in the chain that have an impact on food security.

Food availability is mainly a supply issue which is influenced by domestic production and distribution mechanisms. Agricultural production in Ethiopia is mainly centered on subsistence farming meaning that supply volume is mainly influenced by drought and rain. In addition, soil fertility is very low, and increased agricultural production is dependent on increased use of fertilizer However in Ethiopia, fertilizer and other technologies - to enhance productivity - are not widely applied due to both low levels of supply and demand.

But one means to achieve increased agricultural productivity is to transform the subsistence farming to modern small scale commercial farming. This strategy requires an integrated effort from all actors in the maize supply chain and an enabling environment from the government. Accordingly, the Ethiopian government has embarked on market reforms so that farmers can get benefit from participating in the chain. In addition GOE made a significant investment in road and telecommunication infrastructure.

However, despite government effort in designing policies, maize production and marketing activities are constrained by number of factors. Production is characterized by seasonality, which is involves costs and risk. This is because; the main cause for a decline in availability is drought and low uptake of inputs. Farmers in Ethiopia, have no mechanisms to mitigate the risk of frequent droughts. However, government is trying to provide drought resistant seeds to farmers, though the application is quite low, because of problems from both the supply and demand side.

Decline in production is not responsible for food insecurity. But the complex interaction of an ever increasing population growth rate and limited levels of agricultural productivity affects food security. Thus, matching the increasing population by increasing productivity requires increased use of fertilizers, machinery, and improved seed varieties. In order for farmers to have the purchasing power to access these modern technologies they need a higher and stable income through commercialization, and taking a more active role in markets.

In order for farmers and consumers to achieve food security, a well functioning market should be in place. Markets are important component of food security, as they affect both food availability and accessibility for producers and consumers alike. Producer and consumer households can benefit from commercialization if they can get a price that is high enough to remunerate producers for the production investment they made, and low enough for consumer to purchase food grains.

However, the Ethiopian grain market is constrained by market risks and costs that limit the benefit of producer and consumer households from market participation. Market impediments including Middle men centered, ling and complex market channel, farmers' awareness about post harvest management, poor storage facility, and poor infrastructure, information asymmetry, lack of appropriate and adequate institutions

The maize market channel is long and complex, that it results in higher food costs. It is lengthy because i) geographic dispersion of the markets in the country; ii) agro climatic reasons maize grows in limited parts of the country while it's demanded across the country. The channel is also complex, as it depends on middlemen to mediate the flow of maize from producers to consumers. Because of the geographic dispersion, actors on the chain require an agent that can act on behalf of them in other markets and who provide them market information, including: potential buyer, price and demand. However, the rent seeking behavior of middlemen influence the benefits producers could potentially get from commercialization through lower prices and pushing food costs up for consumers.

Farmers in Ethiopia use traditional storage facilities, which are made of mud and leather to store their produce. However, maize stored in such facilities, is vulnerable to losses due to moisture, mice, termites and other pests. Thus, to avoid possible losses, farmers prefer to sell their produce immediately after harvest that 60 percent of the market surpluses are sold immediately after harvest, while prices are lower. This results in lower producer income. And on the other hand, during lean season, when producers also become buyers, prices are higher, which limits their purchasing power, and making them vulnerable to food insecurity.

Though improvements in rural roads began in the 1990s, the road infrastructure has not been sufficiently developed to underpin increased participation of farmers and traders in maize market. Most rural roads are still not tarred, thereby still vulnerable to damages during the rainy season. Consequently, vehicles find it to navigate and transport maize produce from the farm gate to the market. In addition the cost of transport is also dependent on the quality of road, distance between producers and consumers and fuel costs. Thus, the quality of the rural road, the wide geographical dispersion and the increasing fuel costs pushes food costs for consumers.

Producers and consumers also have a problem of accessing reliable market information. After harvest the major concern for producers is prices. Thus the implication of reliable price information leads farmers to sell their produce with whatever price traders are offering them, limiting their potential benefit. Information is also equally important for consumers that enable them to know exactly what the price of the food they are buying is –i.e to protect them from being charged more by the middle men. Thus in Ethiopia, where storage, road and telecommunication infrastructure are not well developed, farmers' access to alternate markets to sell their produce and bargaining power - due to lack of market information is very limited.

Therefore, the market impediments in the grain markets are responsible for the high marketing costs and risks in Ethiopia, which implicitly implies higher food costs for consumer households. Thus, the impact of higher food costs for food security of consumers - where more than 42 percent of the population is dependent on market to access their food; and where more than 60 percent of the food costs are related to marketing costs – is severe.

To cushion problem, particularly related to marketing GOE, and other development organizations has been making efforts by establishing institutions that can empower farmers with coordination and market information. Some of these institutions include: Cooperatives, Ethiopian Grain Trade Enterprise (EGTE), and Ethiopian Commodity Exchange (ECX) and development programmers like Purchase for Progress (P4P).

Ethiopian Grain Trade Enterprise was initially established to stabilize prices, i.e to protect both producers and consumers from possible price volatility, which was supported by a subsidy from the government. However in 2002, the mandate to stabilize prices was given less attention because of the fact that the same enterprise was given the to make profit by exporting items, to address the problem of balance of payment issues in the country, before it was reinstated in 2008, because of food shortage. In order to have consistent supply of maize across the year and at all places; and in order to protect producers and consumers from price volatility that could influence the higher and stable income for producers and lower purchasing power for consumers, an effort should be made to enhance the operational efficiency of EGTE .

Cooperatives also play a major role, particularly for producer households as a means to integrate them vertically and horizontally. Cooperatives, are the major source of production inputs, thus, they can provide credit to the farmers so that they can apply modern technologies, which enhances availability. In addition, farmers' vertical and horizontal integration in the chain enables them to improve their bargaining power, to reduce transaction costs through larger economies of scale, so that farmers can get higher and stable incomes, which are bases to ensure food security. This is because cooperatives provide market information to farmers in addition to supplying production inputs. The market information enables farmers to decide what crop to produce, where to sell it,

when to sell it at what price.. Besides, the presence of cooperatives in rural areas is an advantage even for those who are not members as the spillover effect is significant

Ethiopian Commodity Exchange (ECX) is also another institution in place to make order in the grain market. Despite little maize volume passing through it, ECX has brought a significant change through instant dissemination of price information to actors. That is, maize prices, which are determined at ECX trading floor, are displayed via price tickers immediately in fraction of a second. And since most ECX offices are located in surplus areas, it partly addresses the issue of market information, though a lot has to be done to enable rural farmers to access this information.

Another institution that is currently operating in some parts of maize surplus areas to protect producers who are cooperative members, from possible marketing costs and risks is a project called Purchase for Progress (P4P). P4P helps farmers to deliver quality products to the market, mainly P4P, and get premium price. . For such purposes the institution closely works with cooperatives in capacity building for post harvest management, and easy access to market that can reward the producers.

All in all, though the market reform since 1990s enable farmers to have access to markets, the lengthy, and complex and middlemen based nature of the market channel along with market impediments including: poor infrastructure – storage, road and telecommunication-; lack of adequate and appropriate institutions in place, limit farmers return from market participation. These impediments constrain farmers from getting higher and stable income – which they could have used to apply modern technologies to improve productivity and hence availability. In addition lower and unstable income makes producer household's livelihood vulnerable as it limits their capability to have access to food.

The market impediments also influence the household food security, for the fact that these impediments pushes the food prices up, that results in decline in purchasing power of food security.

Thus, ensuring higher and stable income should be given a priority in order to achieve food security. This requires more investment in infrastructure and well functioning, appropriate and adequate institutions that can enhance the benefit producers and consumers can get from the market. Institutions that can protect producers and consumers from possible price volatility and that can reduce transaction costs to push food prices down.

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Appendices

Appendix 1

List of questions used in data collection

I. Interview questions for maize market actors in Ethiopia:

5 Organisation Profile/Interviewee profile

Name
Age
Sex
Level of education

5.1 Could you please give a little background about your organisation? When it was established, it's mission and objective, etc?

5.2 What is the role of the organisation in the maize market system?
5.3 Could you describe your role within the organisation?
5.4 How long have you been working for this organisation?
5.5 How long have you been working in the Maize market?

2 Market Conduct (Price determination)

2.1 Could you please tell step by step the process of purchasing maize in the market?
2.2 Who do you usually buy maize from? (Farmers, cooperatives, wholesalers, retailers or any other) and from which market? - (Is it from spot, terminal or auction market?)

2.3 Do you have a regular maize supplier? How long is your relationship with the supplier/s? How likely are you to get a potential new supplier?

2.4 What determines your decision to buy maize from a particular source? Quality, price,
2.5 When do you usually buy maize? Do you get the quantity you want from your suppliers?

2.6 In the purchase process, how do you decide market prices? What information do you base to buy? And how reliable is this information?

2.7 Is there a standard and grading system for marketing maize? What measures do you use to grade?

2.8 Do you agree with other similar traders on prices to offer to suppliers and consumers?

2.9 What means of transport do you use to take produces to the local market? Individually hired trucks, Collectively shared trucks or Transporter-trader trucks

2.10 Could you describe step by step the process of selling maize? (For traders including farmers)

2.11 Who do you supply to? Consumers, whole sellers, retailers, organisations, or others? And at which market? (spot market, auction, terminal market) And who do you prefer most to sell to? and why?

2.12 When do you usually sell more quantity? And why do you prefer this particular season?

2.13 Do you use standard units of measurement for volumes traded? What is your preference: standard unit or traditional measurement units?

3 Market structure (market concentration, barrier to entry and exit, and vertical coordination)

3.1 Can you explain the major steps you took to join the maize marketing system? How easy was it to get into the system? (In getting finance/credit, licences, tax issues etc) – For traders and transporters

3.2 Which of the steps taken were challenging, as compared to the others, and why?

3.3 What major constraints do you face in maize trading system? What are challenges and opportunities of the system? Eg. Are there informal traders? Do you have an association or a union with other traders to influence the market?

3.4 Are there any efforts being made by the government or NGOs to improve the market access and development? For eg. In the process of price stabilisation, to pay premium for quality products, to enable easy market access to producers... (like Purchase for progress)

3.5 What credit options are available? (for maize farmers, cooperatives, transporters and maize traders) What conditions should be met to get loan? How often are these loans taken up?

3.6 Do you have your own storage facility? If no, Are there storage facilities at the nearby? If so, how easy is it to access them? (Not to sell products during peak season, where prices are lowest.)

3.7 What is the average duration a stock is kept in the store?

3.8 What government policies have an effect on maize marketing system? (Food aid, taxes, subsidies, policies related to export.....)

3.9 How much quintals of maize did you buy this year?

4. Market performance

4. 1 What was the average price range for maize?

4.2 How much were prices of these items?

Sacks/baggging	Loading off loading	brokerage	storage
transport	Kella charges	information cost	others

4 Risk Management

4.1 What risk do you face when you trade maize in the market? (Ceiling prices set by government, storage facility, credit facility)?

4.2 What measures do you take to mitigate such risks? Do you think that such measures are effective?

5 Snowballing and Triangulation

5.1 Is it possible to get any useful information, about the discussion we have? (company reports, promotional material, product information, press release etc)

5.2 Who else do you recommend to talk to? (I would be interested talking to Traders, agents, transporters, cooperatives, government offices, researchers, brokerage, warehouse operations, quality control, Credit associations, farmers Associations).

Appendix 2

No	Name	Organisation
1	Ato Anteneh Mitiku	Ethiopian Commodity Exchange
2	W/z Elleni Yilma	World food programme - Ethiopia
3	Ato Mesfin Tesfaye	World food programme - Ethiopia
4	Ato Yoseph Yilak	Addis Ababa Grain Traders Association
5	Ato Gebreegziabher	Ethiopian Grain Trade Enterprise
6	Ato Teshome Dessie	Hawassa Bureau of Agriculture
7	Ato Ewnet	Hawassa Bureau of Agriculture
8	Ato Zewdu Sarmeso	Sidama Elito Farmers' Association
9	Ato Awoke	Addis Ababa Trade and Industry Bureau
10	W/z Rahima Mussema	PHD student Addis Ababa University
11	Ato Melese	Sidama Elito Farmers' Association
12	Ato berhanu hatiso	Sidama Elito Farmers' Association
13	Ato Desta Demboba	Sidama Elito Farmers' Association
14	Ato Tadesse	Sidama Elito Farmers' Association
15	Ato Tilahun	Sidama Elito Farmers' Association

Appendix 3

List of Traders Interviewed

No	Name	Trader type	Market Location
1	Ato Yoseph yilak	Retailer	Ehil Berenda
2	Ato Zenebe	Retailer	Ehil Berenda
3	Ato Legesse	Retailer	Ehil Berenda
4	Ato Shegaw	Retailer	Ehil Berenda
5	Ato Atilaw	Retailer	Ehil Berenda
6	Ato Shewangizaw	Retailer	Ehil Berenda
7	Ato Hagos	Retailer	Ehil Berenda
8	W/z Yeshi	Retailer	Ehil Berenda
9	Ato Hailu	Retailer	Ehil Berenda
10	W/z Meseret	Retailer	Ehil Berenda
11	Ato Takele	Wholeseller/Exporter	Ehil Berenda
12	W/z Aynalem Dendene	Retailer	Hawassa
13	W/z Amarech Geta	Retailer	Hawassa
14	W/z Fasika Denemo	Retailer	Hawassa
15	Ato Daniel Getahun	Retailer	Hawassa
16	W/z Merkeb Mamo	Retailer	Hawassa
17	Ato Abebe Lombebo	Rural Assembler	Hawassa
18	Ato Tarekegn Fantaye	Retailer	Hawassa
19	AtoTamene Muluneh	Retailer	Hawassa