VALUE CHAIN ANALYSIS OF NIGER SEED: THE CASE OF JARDEGA JARTE DISTRICT, WESTERN ETHIOPIA

MSc. THESIS

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VALUE CHAIN ANALYSIS OF NIGER SEED: THE CASE OF JARDEGA JARTE DISTRICT, WESTERN ETHIOPIA

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DEDICATION

I dedicate this thesis manuscript to my families for their continuous encouragement throughout my life

STATEMENT OF AUTHOR

I the undersigned, hereby declare that the thesis- **Value Chain Analysis of Niger seed: The case of Jardegajarte District, Western Ethiopia** is the outcome of my own work and all sources of materials used for this thesis have been duly acknowledged. This thesis has been submitted in partial fulfillment of the requirements for MSc. degree at Jimma University and is deposited at the University Library to be available to borrowers under rules of the library. I solemnly declare that this thesis is not submitted to any other institution anywhere for the award of any academic degree, diploma, or certificate. Brief quotations from this thesis are allowable without special permission provided that accurate acknowledgement of the source is made. Requests for permission for extended quotation from this manuscript in whole or part may be granted by the head Department of Agricultural Economics and Extensions or the Dean of the School of Graduate Studies when in his/her judgment the proposed use of the material is in the interest of scholarship. In all other instances, however, permission must be obtained from the author.

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BIBLOGRAPHICAL SKETCH

The author was born on March 11, 1988 in Sombowato kebele, Jardegajarte district of Horro Guduru Wollega zone, Oromia regional state. He attended his elementary and junior education at Harolego primary school and Secondary School in Amuru Senior Secondary School. Then he joined Algae ATVET College in 2004 and graduated with Diploma in Animal Science on 30, July 2006. After graduation he served in Jardegajarte district Office of Livestock Development and Fishery as forage development expert for three years. Then he joined Jimma University for his BSc. in 2009/10 and graduated with BSc. Degree in Animal Science on 09, June 2011. After his BSc. graduation he also served in Jardegajarte district Office of Livestock Development and Fishery office as livestock and fishery development extension team leader for three years then he has a total of six year working experience. Again He joined Jimma University in October 13, 2014 to pursue his MSc. degree in Agribusiness and Value Chain Management program.

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ACRONYMS AND ABBREVIATIONS

AGNRM	Agriculture And Natural Resource Management
CC	Contingency Coefficient
CSA	Central Stastical Agency
DA	Development Agent
DLFDO	District Livestock And Fishery Development Office
DRRAO	District Rural Road Authority Office
DSHO	District Social Humanity Office
DTMDO	District Trade And Market Development Office
EARO	Ethiopian Agricultural Research Organization
FAO	Food And Agricultural Organization
GDP	Gross Domestic Product
GIS	Geographic Information System
GMM	Gross Marketing Margin
ILO	International Labor Organization
INFCIN	Informal Credit Institutions
LML	Local Money Lender
MktO	Marketing Outlet
MOFED	Ministry Of Finance And Economic Development
MSPA	Mauritius Sugar Producers' Association
MVPM	Multivariate Probit Model
NMM	Net Marketing Margin
NOFI	Income From None/Off Farming Activities
OBOPED	Oromia Bureau Of Planning And Economic Development
OLS	Ordinary Least Square
OSCSC	Oromia Saving And Credit Share Company
SNNRS	Southern Nation And Nationalities Regional State
TGMM	Total Gross Marketing Margin
TOE	Total Operating Expense
UNIDO	United Nation Industrial Development Organization
USDA	United State Department Of Agriculture
VIF	Variance Inflation Factor

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ABSTRACT

The study aimed *at analyzing value chain of Niger seed in Jardega Jarte district of Oromia national regional state with specific objective of identifying Niger seed value chain and analysis the performance of actors , analyzing the determinants of Niger seed supply to the market, identifying marketing channel, analyzing factors affecting outlet choice decisions and identifying the major constraints and opportunities. The data were collected from both primary and secondary sources. The primary data were collected from 165 farmers, 65 traders and 20 consumers through an appropriate application of sampling and stastical procedures. Multi-stage random sampling techniques were employed to select Niger seed producers of sample respondents. The value chain analysis result revealed that, the major actors in niger seed value chain are input suppliers, producers, collectors, cooperatives, rural wholesalers, brokers, unions, urban wholesalers, retailers, and consumer and also governed by urban wholesalers and processors. The result of multiple liner regression models indicated that, sex of household head, quantity of Niger seed produced, land allocated to niger seed, educational status, ownership of oxen, access to market information, access to credit and price affect marketable supply positively. The multivariate probit model result revealed that late of the year affect the probability to choose collectors outlet negatively. At the same time, quantity produced, membership to cooperatives and late of the year affect to choose cooperative out let positively where as quantity produced, late of the year, access to market information and frequency of extension contact affect wholesalers outlet positively. Lack of inputs, disease and pests, lack of oil milling industry to the area, poor information flow and lack of capital were identified as the main niger seed production and marketing constraints. It is better if, the significance variable result and those identified constraints and opportunities could be taken into consideration to accelerate Niger seed value chain development in the study area.*

Key Words: Actors, Multiple Linear Regression and Multivariate Probit Model, Niger Seed, Value Chain Analysis

1. INTRODUCTION

1.1. Background

The Ethiopian economy depends up on 42.9 % GDP agricultural sector, 12.4% GDP industrial sector and 45.2% GDP service sector. Agricultural sector is the main driver of the rapid economic growth in Ethiopia especially in supply side. In particular, crop production which accounted for about 30% of the total agricultural GDP constitutes a significant share in the agriculture sector and contributes a considerable amount to the national economy and also improves the income and living conditions of the majority of citizens (MOFED, 2014).

According to Chavin (2012) cash crops are a major source of export revenue for a large number of sub- Saharan African countries and the livelihood basis for millions of rural households who grow those crops. Currently, among the major Ethiopian export crops, oil seed crops are one in which Ethiopia is known in international markets (Soressasa, 2009).

In Ethiopia, oil seed being the mainstay of national economy and the second largest export earner next to coffee (USDA, 2010). More than three million small holders are already involved in their own production of oilseeds. Therefore improvement in oilseed sector significantly contributes to the national as well as local; and family economy (Fikre, 2011).

The oilseeds value chain makes an important contribution to the Ethiopian economy, accounting for more than 20% of the total foreign exchange earnings of the country and supports the livelihoods of many Ethiopians, particularly small farmers, traders, transporters, and oil millers. The enhanced competitiveness of the value chain hinges on improved efficiency and effective vertical and horizontal integration of different functions, including improved farm practices, input supply, processing, and marketing (UNIDO, FAO, and ILO,2011).

The transformation of production system both for domestic and export agricultural commodities requires efficient marketing system that can transfer agricultural commodities from the point of production to the domestic consumption and export in terms of quantity and quality at the required time and possible cost. Then, scientific investigation to identify the marketing constraints and opportunities for the sector as whole, and by commodity in

particular is important to tackle the constraints and to utilize the opportunities. Thus, promotion of export potential cash crop is one among the current governments' strategy for raising agricultural GDP and rural income through diversification of low-value crops into higher value crops for the markets. Especially, promotion of export potential cash crop is crucial since it generates income for the producers and government and it is one of the fundamental government policies for acquiring foreign currency. In this regard, the empirical record suggests that export potential cash crops can provide higher returns to land and labor than food grains and thus present major opportunities to promote smallholders income growth, food security, and national foreign exchange generation (Poulton *et al.,* 2001; Lukanu *et al.,* 2004; Poulton *et al.*; 2006; Schneider and Gugerty, 2010).

Niger seed (*Guizota abyssinica* Cass), is indigenous to Ethiopia and one of the widely cultivated cash crops of oil seed particularly in the highlands where it is grown in rotation with cereals and pulses this contributes a great deal to soil conservation, land rehabilitation and increase the yield of following crops. Its primary uses are sources of oil for local consumption, to make paste mixed with roasted cereals, sandwiched with flat bread or during holidays. The roasted and pounded into flour was boiled and inhaled and then drunk as a remedy for common cold and also contribute to the national economy through import substitution by helping save scarce foreign currency spent for importing cooking oil and also famous for its high quality oil although productivity per unit area is still very low (Melaku, 2013).

According to ILO (2016) Niger seed is the second most widely-produced oilseed crop in Ethiopia, accounting for a little more than a quarter of total oilseed production and accounting for 28 percent of area planted to oilseeds and more than 95 percent of production is concentrated in the highlands of Oromia and Amhara regions. Horro Guduru, East Wollega and West Wollega zones are the main surplus-producing areas in the Oromia region, while East Gojjam, West Gojjam, North Gondar, and South Gondar zones are the top surplus-producing areas in the Amhara region. From these areas, the study was mainly focused on the Niger seed value chain analysis in Jardegajarte district, Horro Guduru Wollega zone of Oromia regional state.

Four Niger seed varieties were identified and approved officially and released by the Ethiopian national variety approval committee along with the recommended cultural practices that have a remarkable achievement as: Fogera, Este, Kuyu, and Shambu type (Jarso *et al*, 2011). The seed yield also reported varies from variety to variety 911 kg/ ha Este, 1100-1300 kg/ha, Kuyu, 911 kg/ha Fogera, and 947 kg/ ha Shambu. The oil extraction from 100kg also varies similarly 37.41% Este, 38.39% Kuyu, 37.41% Fogera, and 39.3% Shambu (EARO, 2004).

Research on Niger seed is designed to improve the yield and quality of this neglected and underutilized species so it can contribute to the food security and income of subsistence farmers. More projects of this kind on a wide range of neglected and underutilized species are needed to work towards a sustainable solution for increased food security and poverty alleviation as stated in the United Nations Millennium Development Goals" (Rieseberg lab, 2007). In this regard, Niger seed were selected among the oilseed for edible oil value chain enhancement in Ethiopia together with linseed (Lefebvre, 2012). It is also known that the small scale oil millers cover only two third of the domestic edible oil production and lack of competitiveness of niger seed compared to other oilseeds particularly in the domestic market is reflected almost across all the value chain. Therefore the small scale oil mills are also selected for the edible oil value chain enhancement program (Wijnands *et al.,* 2009).

Value chain links agricultural products to consumers through activities from production at the farm through processing, marketing, distribution, and finally to the consumer and has its own dynamicity and peculiarities in developing countries due to population pressure, urbanization, and introduction of global firms. Therefore, any shock at a point on the value chain will be felt at any other point in one way or another and sometimes in a way difficult to predict thus, majority of actors in the value chain are involved as a secondary or ready to leave the business when challenges reach maximum (Gomez *et al.*,2011). Therefore the role of every component and its impact in Niger seed value chain are addressed and supported by evidences.

1.2. Statement of the Problem

Ethiopia has a huge potential for the production of edible oil: favorable agro-climatic conditions for increased oil seed cultivation, less labor-intensive nature, conducive business environment, willingness of oilseed crushers to work at full capacity to meet huge local demand and the income earned from the business also increased from time to time. Despite this potential, the profit gain from the business is not fairly distributed to reach the primary producers who find them at the end of an extended value chain and have no proper access to the final market and lacked knowledge on how to add value through processing the oilseed products before it is supplied to the market (Elias, 2005).

The edible oil processing industry remains under developed and working below their capacity the mills were operational only for 20-30% of their potential due to weak linkage among value chain actors ,limited access to local and international market, and poor oilseeds supply of niger seed (Schenk et al., 2009 and Wijnands et. al., 2009). Prioritization of food grains, less attention given to the oilseed sector resulted in a progressive decrease of niger seed supply especially by highland farmers (Getnet, 2011).

Poor market coordination among actors, in terms of information flow, narrows market channels and working capitals are the major constraints. These create risk resulted in limited and weak investments by private traders, leading to limited market supply and affect Niger seed producer livelihoods negatively (Alemu and W.Meijerink, 2010).

The chance given to imported edible oil to be free from tax duty created unbalanced field among Niger seed value chain actors this affect Niger seed value chain industry negatively (Wijnands, 2009).

Some case studies regarding agro-industry value chain in Ethiopia indicates that the sector faces many challenges due to limited market outlets, limited efforts in market linkage activities and poor market information among actors (Dereje, 2007; Kaleb, 2008; Dendena *et al.*, 2009).

Mamo (2009) argued that small scale, dispersed and unorganized producers are unlikely to exploit market opportunities as they cannot attain the necessary economies of scale and lack

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of bargaining power in negotiating prices. Despite, the district is known for surplus production of niger seed in the area, there was no research conducted to address its value chain analysis by other researchers so far. So, this investigation was conducted mainly on Niger seed to found out its value chain development in a completive way in the study area.

A good marketing system generates increased production by seeking out extra supplies. If the production system works efficiently, it produces suitable incentives to meet producers and enhance consumer's needs more accurately in terms of type, efficient quality and quantity of supply. Generally of these facts, this study was undertaken to seek possible answers to the following problems by conducting Niger seed value chain analysis in the selected study area.

1.3. Research Questions

The study tries to answer the following questions:
1. What does Niger seed` value chain look like in the study area?
2. How are the performances of actors in the value chains?
3. What are the key factors affecting farmers marketable supply of Niger seed?
4. What are the key factors affecting farmers Niger seed market outlet choice decision?
5. What are the major opportunities and constraints in the Niger seed value chain?

1.4. Objectives of the Study

The general objective of the study was to analyze Niger seed value chain in the study area.

 The specific objectives of the study are:
1. To identify Niger seed value chain actors and analyze the performance of actors along the chain;
2. To analyze factors affecting farmers marketable supply of Niger seed producers
3. To analyze factors affecting outlet choice decisions of Niger seed producers; and
4. To identify the major constraints and opportunities in Niger seed value chain in the study area.

1.5. Scope and Limitations of the Study

The study was conducted in Jardegajarte district and important information was collected from sample households, marketing actors involved in the chains and subsector organization in the study areas. The study was restricted to value chain analysis of Niger seed from oil seed crops in the district because of limited resource including time and the shortage of logistics and budgets made the researcher unable to consider additional sample of Niger seed producer kebeles and other neighboring markets found in and out of the study area. In addition, the study may be limited to make more representatives in terms of wider range of area, and time horizon. Since Ethiopia has a wide range of diverse agro-ecologies, institutional capacities, organizations and environmental conditions. However, it may be useful for areas with similar context with the specific study areas.

1.6. Significance of the Study

The study analyzes the entire Niger seed value chain from input supplier to consumer within Jardegajarte district, Horro Guduru Wollega via from input supplier to consumer. It also provides a holistic picture of existing challenges, opportunities and entry points in the Niger seed value chain. The information generated, also helps a number of organizations including research and development organizations, traders, producers, oil processors, policy makers, extension service providers, government and non-governmental organizations to assess their activities and redesign their mode of operations and ultimately influence the design and implementation of policies and strategies. It could also help different actors to identify and analyze new ways of stimulating innovation on Niger seed value chain.

1.7. Organization of the Thesis

The study is organized into five chapters. Chapter one presents the background of the study. The rest of chapters are organized as follows. Chapter two deals with the review of related theoretical and empirical literature, in order to identify directions for this study. Chapter three deal with the description of the study area and the methodology used in the study. Chapter four presents and discusses the results of the study in relation to past studies. Finally, chapter five gives summary, conclusions and policy recommendations based on the findings of the study.

2. LITERATURE REVIEW

2.1. Theoretical Literature Review

2.1.1. Definition and basic concepts

The concept of value chains was initially popularized by Michael Porter (1985) as a tool for enhancing competitiveness of enterprises. The concept has since been expanded to cater for larger units such as industry sub-sectors. Industry chains are classified as either 'supply' or 'value' chains.

The value chain concept entails the addition of value as the product progresses from input suppliers to producers and consumers. A value chain, therefore, incorporates productive transformation and value addition at each stage of the value chain. At each stage in the value chain, the product changes hands through chain actors, transaction costs are incurred, and generally, some form of value is added. Value addition results from diverse activities including bulking, cleaning, grading, and packaging, transporting, storing and processing (Anandajayasekeram and Berhanu, 2009).

Supply chain: is the logistical and procedural activity involved in producing and delivering a final product or service, from the production area to customer or end users (Callarman, *et al.,* 2006).

A value chain : is The set of actors (private, public, and including service providers) and the sequence of value-adding activities involved in bringing a product from production to the final consumer (Miller and da Silva, 2007). Bammann (2007) has identified three important levels of value chain

Value chain actors: The chain of actors who directly deal with the products, i.e. produce, process, trade and own them.

Value chain supporters: The services provided by various actors who never directly deal with the product, but whose services add value to the product.

Value chain influencers*:* The regulatory framework, policies, infrastructures.

Value Addition: A fundamental aspect of global value chain research is how 'value' itself, is conceptualized and measured. According to Gereffi (1999) profit, value addition and price markups are indications of income shares across value chain actors and also value–added

shares can be calculated for different links in the chain to look in to its distribution by each value chain actors.

Value addition: Value addition is the difference in sales price and cost of inputs (raw materials) at each stage of the value chain (Bezabih and Mengistu, 2011).

Competitiveness: is the firm's ability to perform the required activities, either at lower costs, or in ways able to create value for the client and that allow the firm to ask for a higher price. In order to examine the ways through which a firm can obtain and support a competitive advantage, it is necessary to observe, individually, the activities generating value, along the value chain (Kotler et al., 2003).

Value chain analysis: The assessment of the actors and factors influencing the performance of an industry, and relationships among participants to identify the driving constraints to increase efficiency, productivity and competitiveness of an industry and how these constraints can be overcome (Fries, 2007).

Market: Market can be defined as an area in which one or more sellers of given products/services and their close substitutes exchange with and compete for the patronage of a group of buyers. Originally, the term market stood for the place where buyers and sellers are gathered to exchange their goods, such as village square. A market is a point, or a place or sphere within which price making force operates and in which exchanges of title tend to be accompanied by the actual movement of the goods affected (Backman and Davidson, 1962). The concept of exchange and relationships lead to the concept of market. It is the set of the actual and potential buyers of a product (Kotler and Armstong, 2003). Conceptually, a market can be visualized as a process in which ownership of goods are transferred from sellers to buyers who may be final consumers or intermediaries.

Marketable surplus: is refers to the quantity of produce left out after meeting farmers consumption and utilization requirements for kind payments and other obligations (gifts, donation, charity, etc). (Thakur *et al*., 1997).

Marketing is the performance of business activities that direct the flow of goods and services from producer to consumer or user or the process in a society by which the demand structure for economic goods and services is anticipated and satisfied through the conception,

promotion, and physical distribution of such goods and services or the process of planning production, pricing, promotion, and distribution of ideas, goods, and services to create exchanges that satisfy individual and organizational goals (Kotler, 2003).

Agricultural marketing is the performance of all business activities involved in the flow of goods and services from the point of initial agricultural production until they are in the hands of the ultimate consumer (Kohls and Uhl, 1985).

 Marketing efficiency: Efficiency in marketing is the measure of market performance. Improved marketing efficiency is a common goal of farmers, marketing organizations, consumers and society. It is a commonplace notation that higher efficiency means better performance whereas declining efficiency denotes poor performance. Most of the changes proposed in marketing are justified on the grounds of improved efficiency (Kohls and Uhl, 1985).

(Kaplinsky and Morris, 2000) indicates that systemic efficiency within the value chain is derived from upgrading both horizontal and vertical integrations between enterprises. In other words systemic efficiency is a concept that requires efficiency throughout the whole line of the value chain.

Marketing channel: Marketing channel is a business structure of interdependent organizations that reach from the point of product or origin to the consumer with the purpose of moving products to their final consumption or destination (Kotler and Armstong, 2003). This channel may be short or long depending on kind and quality of the product marketed, available marketing services, and prevailing social and physical environment (Islam *et al*., 2001).

Market Performance: Market performance can be evaluated by analyzing costs and margins of marketing agents in different channels. A commonly used measure of system performance is the marketing margin or price spread. Margin or spread can be useful descriptive statistics and it is used to show how the consumer's price is divided among participants at different levels of marketing system (Mendoza, 1995*).*

Marketing costs: It refers to those costs, which are incurred to perform various marketing activities in the transportation of goods from producer to consumers. Marketing costs includes handling cost (labour, loading and unloading, costs of damage, transportation and etc) to reach an agreement, transferring the product, monitoring the agreement to see that its conditions are fulfilled, and enforcing the exchange agreement (Holloway *et al.*, 2002).

Marketing margin: It is a commonly used measure of the performance of a marketing system (Abbot and Makeham, 1981). It is defined as the difference between the price the consumer pays and the price that is obtained by producers. The size of market margins is largely dependent upon a combination of the quality and quantity of marketing services provided the cost of providing such services, and the efficiency with which they are undertaken and priced. For instance, a big margin may result in little or no profit or even a loss for the seller involved depending upon the marketing costs as well as on the selling buying prices (Mendoza, 1995).

2.1.2. Value chain stage

 2.1.2.1. Production

In agricultural value chain analysis, a stage of production can be referred to as any operating stage capable of producing a saleable product serving as an input to the next stage in the chain or for final consumption or use. Typical value chain linkages include input supply, production, assembly, transport, storage, processing, wholesaling, retailing, and utilization, with exportation included as a major stage for products destined for international markets. A stage of production in a value chain performs a function that makes significant contribution to the effective operation of the value chain and in the process adds value (Anandajayasekeram and Berhanu, 2009).

Producing the required amount effectively is a necessary condition for responsible and sustainable relationships among chain actors. Thus, one of the aims of agricultural value chain analysis is to increase the quantity of agricultural production. Understanding the mechanisms of the agricultural production greatly help to design appropriate policy that bring more gain to farmers and the whole society at large. For a long time, sector analyses have been used to measure the different economic aspects of production. However, sector analyses have not

been without weaknesses. In particular, sector analysis tends to be static and suffers from the weakness of its own bounded parameters. Such analysis struggles to deal with dynamic linkages between productive activities that go beyond that particular sector and the traditional narrow focus on production, value chain analysis scrutinize interactions and synergies among actor. And thus, it overcomes several important limitations of traditional sector assessments (Kaplinisky and Morris, 2000).

2.1.2.2. *Effective demand*

Effective demand can be defined as the force that pulls goods and services through the vertical system, in agricultural value chain analysis. Hence, value chain analysis need to understand the dynamics of how demand is changing at both domestic and international markets and the implications for value chain organization and performance. Value chain analysis also needs to examine barriers to the transmission of information in the changing nature of demand and incentives back to producers at various levels of the value chain (MSPA, 2010).

2.1.2.3. *Marketing*

The crop agriculture in Ethiopia is dominated by numerous small holder farmers in the country cultivating mainly cereals for both household consumption and sells the remaining. Since smallholders account for about 97 % of the total area cultivated and more than 96 % of the overall agricultural production in Ethiopia (CSA, 2011), their decision of whether to produce oil seed or any other crop based on very limited information they have or experience is the other big challenge on the supply side.

The case of nigerseed value chain source of information is another source of confusion and instability of the market and source of price speculation. As is true for many developing countries, small holder farmers are nearly major sources of agricultural products and this is true in Ethiopia too (CSA, 2011). The oil millers and the seed collectors therefore need an organized approach to deal with the individual farmers and unions to establish a thrust worthy relationship that can solve the problem in a sustainable way (Lefebvre, 2012).

2.1.2.4. Value chain mapping

According to Gebremedhin *et al*.(,2012) mapping the value chain helps to identify value chain actors, service providers, their roles and functions; the various channels of product flows the stages involved in the value chain identify the location and position of particular chain actors of interest and visualize networks to get a better understanding of connections and interdependencies between actors and processes in a value chain, identify constraints and opportunities at different stages of the chain. The mapping process is also important in demonstrating interdependency between actors and processes in the value chain. The mapping process further helps to create awareness of stakeholders to look beyond own involvement in the value chain.

According to McCormick and Schmitz (2002), value chain mapping enables to visualize the flow of the product from conception to end consumer through various actors. It also helps to identify the different actors involved in the value chain, and to understand their roles and linkages.

Value chain mapping is drawing a visual representation of the value chain system and identify business operations, chain operators and their linkages, as well as the chain supporters within the value chain. Chain maps are the core of any value chain analysis and therefore indispensable. It serves both an analytical purpose and a communication purpose, as chain maps reduce the complexity of economic reality with its diverse functions, multiple stakeholders, interdependencies and relationships to a comprehensible visual model (GTZ, 2007).

2.1.2.5. Value chain governance

Governance refers to the role of coordination and associated roles of identifying dynamic profitable opportunities and apportioning roles to key players (Kaplinsky and Morries, 2000). Governance ensures that interactions between actors along a value chain reflect organization, rather than randomness. The governance of value chains emanate from the requirement to set product, process, and logistic standards, which then influence upstream or downstream chain actors results in activities, roles and functions.

Value chains can be classified into two based on the governance structures: buyer-driven value chains, and producer-driven value chains (Kaplinisky and Morris, 2000). Buyer-driven chains are usually labor intensive industries, and so more important in international development and agriculture. In such industries, buyers undertake the lead coordination

activities and influence product specifications. In producer-driven value chains which are more capital intensive, key producers in the chain, usually controlling key technologies, influence product specifications and play the lead role in coordinating the various links. Some chains may involve both producer and buyer driven governance.

Gibbon and Ponte, (2005) argued that governance, in the sense of a clear dominance structure, is not necessary a constitutive element of value chains. Some value chains may exhibit no governance at all, or very thin governance. In most value chains, there may be multiple points of governance, involved in setting rules, monitoring performance or assisting producers. Chain governance should also be viewed in terms of 'richness' and 'reach', *i.e.,* in terms of its depth and pervasiveness (Evans and Wurster, 2000).

Richness or depth of value chain governance refers to the extent to which governance affects the core activities of individual actors in the chain. Reach or pervasiveness refers to how widely the governance is applied and whether or not competing bases of power exists. In the real world, value chains may be subject to multiplicity of governance structure, often laying down conflicting rules to the poor producers (MSPA, 2010).

2.1.2.6. Value chain upgrading

Upgrading refers to the acquisition of technological capabilities and market linkages that enable firms to improve their competitiveness and move into higher-value activities (Kaplinsky and Morris, 2000). Upgrading in firms can take place in the form of process upgrading, product upgrading, functional upgrading and chain upgrading. Upgrading entails not only improvements in products, but also investments in people, knowhow, processes, equipment and favorable work conditions. Empirical research in a number of countries and sectors (*e.g.* Humphrey and Schmitz, 2000; Humphrey, 2003) provide evidence on the importance of upgrading in agricultural sector.

Gibbon and Ponte (2005) point out upgrading in the oilseeds sector in four forms as:
1. Introducing efficient production, harvest and storage practices and enhancing the quantity of oilseeds production

2. Increasing the production of high value oilseeds (oilseeds with high oil content) and maintaining the quality of oilseeds produced (example, low foreign matter, no adulteration);

3. Processing oilseeds produce edible oil and oilcake instead of selling raw oilseeds.

4. Creating a condition under which farmers could directly sell their products to exporters. This also generates, additional income by reducing actors (middlemen) involved in the value chain and retain the income gain that used to go to these actors. One or more of the measures mentioned could bring additional income. The main issue when taking an upgrading decision is to investigate which approach could bring the highest rent to farmers.

2.2. Empirical Literature Review

2.2.1. Determinants of niger seed value chain actors

Emana (2010) identified the key actors and functions of oil seeds value chain in Benishangul Gumuz. The same author identified the role of oil seeds value chain actors and its activity such as producers, collectors (local traders), Local/Regional wholesalers, and commission agents, Wholesalers in Addis Ababa, Exporter, Processors, and Consumers. He also examined other actors along the value chain include transporters and facilitators like the agricultural inputs suppliers, extension services by the government institutions, research centers who generate and disseminate improved agricultural technologies.

 Bammann (2007) has identified three important levels of value chain. Value chain actors**;** the chain of actors who directly deal with the products, i.e. produce, process, trade and own them, value chain supporters; the services provided by various actors who never directly deal with the product, but whose services add value to the product and value chain influencers; the regulatory framework, policies, infrastructures, etc.

Elias (2005) identified actors and their functions in Niger seed value chain in Sedika district of Arsi Robe oromia region. The same author identified the role of oil seeds value chain actors and its activity as producers, assemblers(local collector),regional traders, brokers, wholesalers, price speculators wholesalers, , oil processors**,** cooperatives, retailers, exporters and consumers. He describes the oilseed products pass through the different phases of

production, processing, marketing, and final use by consumers. There are also various actors in oil seed value chain. These include producers, small traders (collecting middle men**),** Wholesalers/brokers, oil millers, retailers, local consumers and exporters (Winjands and Biersteker, 2007).

2.2.2. Determinants of marketable surplus

Kindie (2007) identified the major factors that affect the marketable supply of oil seed of farm households at Metema district. He examined the relationship of marketable supply and the determinant factors using Ordinary Least Squares (OLS). Factors that he has identified to affect the household level of marketable supply include; yield number of oxen, number of foreign languages spoken by the head of the household, modern inputs used, area and time of selling influenced positively the marketable supply as expected.

Geremew (2012) examined factors affecting oil seed market supply in Diga district based on the Hausman test and the post estimation tests of Durbin-Wu-Hausman endogeneity test. According to his study the quantity of oil seed marketed is likely endogenous variable to the model, which may result in inefficient estimation result. Basically such problems arise if some factors explaining the variation in the dependent variable (in this case, total income generated from oil seed sale) could also affect the potential regressors (e.g. quantity of oil seed marketed). In sum, empirical evidences indicate that marketable supply approach has become an important framework to analyze economic agents in agricultural sector. In this study, an attempt was made to identify factors affecting the marketable supply of Nigerseed.

2.2.3. Determinants of market channel choices

Concerning factors affecting channel choices of the households, different researchers used conditional logit and probit for categorical market outlet choices for different agricultural commodities. Multivariate probit estimation has already been used in a number of studies that evaluate factors that affect adoption of agricultural technologies (Gillespie, *et al*., 2004; Jenkins *et al*., 2011) uses this approach to evaluate factors that affect cotton producers' adoption pattern of different information sources i.e. private, extension and media and to estimate factors that affect adoption of four breeding technologies in hog production. They

argue that modeling adoption decisions using a multivariate probit framework allows for increased efficiency in estimation in the case of simultaneity of adoption

Jari and Fraser (2009) identified that market information, expertise on grades and standards, contractual agreements, social capital, market infrastructure, group participation and tradition significantly influence household marketing behavior. The study uses multivariate probit model to investigate the factors that influence marketing choices among smallholder and emerging farmers.

Padmanand *et al*. (2015) used multivariate probit model and confirmed that, income, education, employment status, household size, and distance influence shopping frequency in all five outlet types selected. Income had positive effect where as household size, was negatively associated with supper marketing channel choices. Higher education increases the knowledge about healthy consumption, which requires different products with good quality. Such high quality products are usually available in supermarkets. Also educated shoppers may have higher demand for fresh food, leading to more trips to shopping centers. However, households with highly educated respondents shop less frequently at garden sales outlets. An increase in respondent's age increases the frequency of shopping at garden sales outlets. The effect of respondent's age on supermarket shopping frequency is negative, meaning households with older respondents make fewer trips to supermarkets. Effect of respondent's age on supermarket shopping frequency is negative, meaning households with older respondents make fewer trips to supermarkets

A multivariate probit model was used to analyze the diversification of the marketing chains and channel choices among oil seed producers. The results suggest that farmers" personal characteristics influence their choice, and that more educated and skilled farmers are less likely to choose traditional marketing chains and more likely to engage in the new marketing chains. Also, there is evidence that large farmers choose traditional chains rather than direct and short chains. The other main determinant of the choice is the type of farming, with some types more fit for the traditional chains, and other for the direct and short ones(Corsi *et al.,* 2009).

2.2.4. Evidence on opportunity and constraints

Ethiopia consists of favorable agro-climate zones that enable to grow a wide range of oilseeds; existence of large areas of lands offers good opportunities for organic and

sustainable oilseeds production. Demand for oilseeds is not a problem since opportunities for oilseeds export are not fully exploited yet because of inefficient marketing, improper cleaning and sometimes poor contract discipline but the sector still constitutes an important contribution to both rural and national economy since it represents the second largest export earner next to coffee (Wijnands *et al*., 2007).

Despite the vast opportunities and a number of comparative advantages, the edible oil and oilseeds sector have several constraints to its growth related to production, processing and marketing issues. Oilseeds production is limited by backward agricultural practices; lack of awareness, high costs and limited accessibility of inputs (particularly improved variety seeds), lack of credit facilities; and processing is dominated by traditional and small crushers characterized by very inadequate capacity, low hygiene and safety standards (Wijnands *et al.,*2009).

Fanta *et, al*. (2011) identified three main problems of Niger seed value chain in Ethiopia as: production, marketing and processing constraints. On the production side, the sector is dominated by smallholder farmers who suffer from low yield/productivity and volatile prices. As a result, oilseeds are considered as secondary crops among smallholder farmers due to limited technological support, training and input supply to improve productivity and interests of the farmers in oilseeds production. Lack of differential farm gate price is another constraint that undermined the need for and effort in improving the quality of oilseeds this encourages adulteration of oilseeds. Regarding to oil processing industry: backward processing technology resulted in inefficient production and substandard of crude oil, duty and VAT free import of palm oil, shortage and seasonal supply of oilseeds, adulteration of edible oil, and insufficient training to oil mill workers were identified as the main processing constraints.

2.3. Conceptual Frame Work

Conceptual frame work is a visually representation and interpretation of the underlying theory, principles and concepts of a researcher's visual presentation of variables that interrelate with one another as perceived by the researcher before an actual empirical

investigation is done to prove its relationships. Smith et al. (2012) identified a theoretical framework before researching the knowledge base of screening tools.

The second way in which researchers use theoretical and conceptual frameworks is developing its own framework. Polit and Tatano Beck (2004) suggested that the role of conceptual and theoretical frameworks is to make the research findings meaningful and generalizable. They suggested that the linking together of findings into a coherent structure can make them more accessible and so more useful to others.

Demographiccharacterstice
- Age of household(+/-
- Sex of household(+)
- Educational status(+)
- Family size(+)

Institutional characteristics
- Credit service(+)
- Extension service(+
- Information service(+)
- Cooperative membership(+)

Quantity supplied
&
Determinants of
MKT outlet choice

Socioeconomic characteristics
- Quantity produced(+)
- Distance(+/-)
- Price (+/-)
- Total land(+)
- Livestock holding(+)

Expected Out put

- Higher income and output

- Improve competitiveness and

market linkage along value chain

actors

Source: Own constriction

Figure 1: Conceptual frame work

3. METHODOLOGY

3.1. Description of the Study Area

The study was conducted in Jardegajarte district, Horro Guduru Wollega Zone, Oromia national regional state of Ethiopia. It is located at 55 km from the zonal capital Shambu and 369 from Addis Ababa to the west. It is bordered on the east by Abay Chomen, on the south by Horro, on the southwest by Abe Dongoro, on the west by East Wollega Zone, on the northwest by Amuru on the north by the Abay River which separates it from the Amahara region. The agro-ecology of the district is classified as 65% sub-tropical, 21% temperate and 10% tropical type of climatic condition. The altitude of the district ranges from 860m to 2657m above sea level and an annual rain fall of 800mm-2500mm.The total area coverage of the district is 103804ha, of this, 31748ha cultivated land, 333oha grazing land, 32962ha forest land and 32464ha non-cultivated lands(OBOPED, 2000).

The district has a total livestock population of 138320 of these 88674 cattle, 13423 sheep, 19502 goats, 10477 equines and 6244 poultry. This resource helps to facilitate niger seed value chain in providing inputs like organic fertilizers, draft power or plouphing and transportation services (DLDFO, 2016).

The CSA (2013) population projection of Ethiopia reported a total population for this district was 59,235, of whom 49.85% were men and 50.15% were women; from those 6,664, and 52,571 of its population were urban and rular dwellers respectively.

Teff, wheat, barley, maize, millet and sorghum from cereals, horse beans, and peas are important major crops grown in the district. The local cash crops of the district are: niger seed, rape seed and linseed. The oil seeds are supplied to the central market in large quantities (OBOPED, 2000). The district has seven market centers namely Alibo, Jardega, Harolego, Akeyu, Koyya, Birbirsanega and Dand market of these the first three are the main and dominant market center of the district and also there are 45 grain mill processing to add value to the product but have no oil mills although the availability of higher potential of niger seed production in the area (DTMDO, 2016).

In addition to the district- Shambu 55km road which cross the district, and pass through Amuru to Amahara region of all weather road, the district has 284 km of dry weather roads that was constructed by rular road project that connects the rural kebeles and district town. This is an opportunity that helps to accelerate niger seed value chain development in the area (DRRAO, 2016).

Oromia saving and credit share company and Commercial bank of Ethiopia are the two main financial institutions that can support niger seed producers and traders in providing credit to enhance niger seed value chain development in the district. That is used in purchasing of inputs like fertilizers, oxen and equines for producers and marketing of Niger seed for traders (DSHO, 2016).
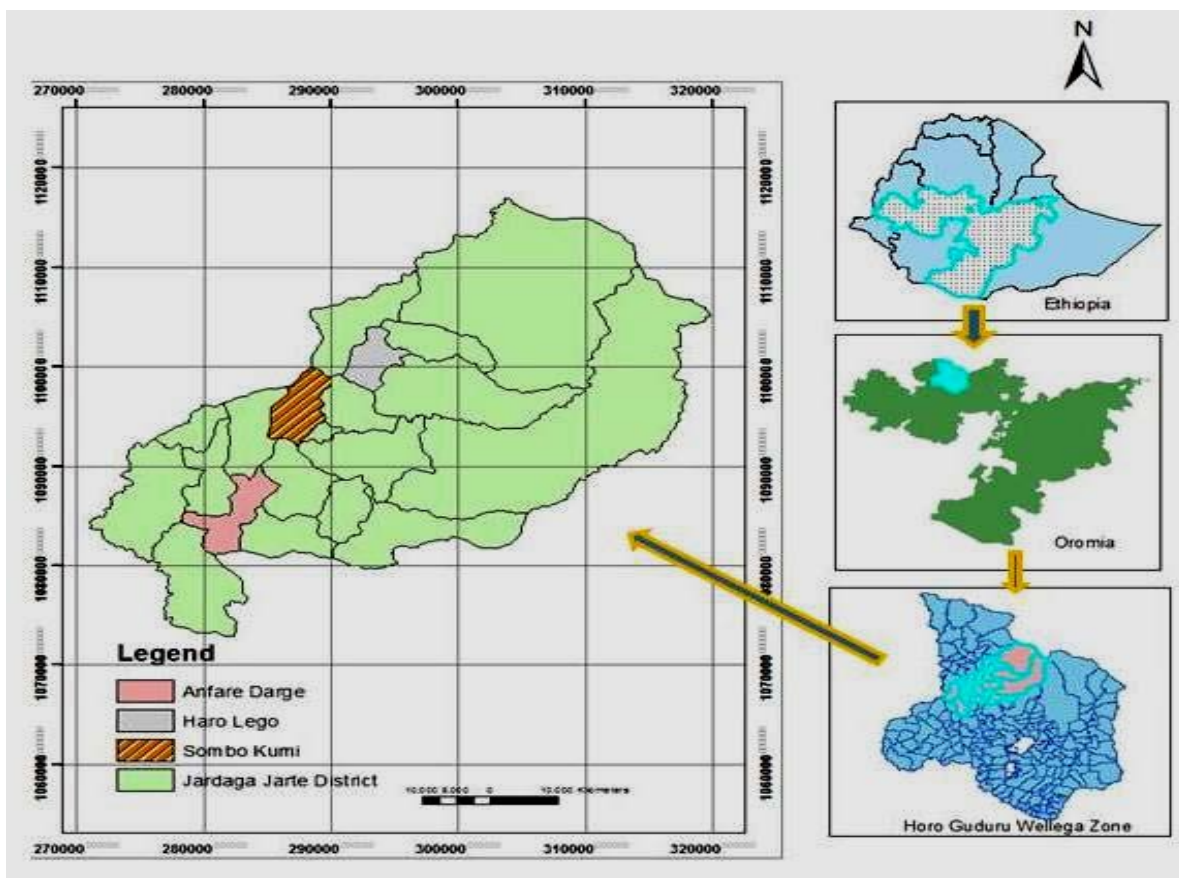
Source: GIS out put

Figure 1 : Map of the study area

3.2. Sampling Method and Sample Size Determination

3.2.1. Sampling method

For this study, three-stage sampling technique was used to select Niger seed producer kebeles and sample farm households. In the first stage, of nine district of Horro Guduru Wollega Zone, Jardegajarte district was purposively selected based on its actual potential and amount of Niger seed supplied in 2016. In the second stage, since all 21 rural kebeles of Jardega Jarte district produce Niger seed and have similar production potential; 3 Niger seed producer kebeles were randomly selected. In the third stage, 165 sample farmers were selected randomly by using simple random sampling methods.

3.2.2. Sample Size determination

The sample size determination was computed by Yamane (1967) sampling formula at 93% confidence level, 7% margin of error.

$$n = \frac{N}{1+N(e)2} \ldots\ldots\ldots\ldots\ldots\ldots\ldots Yemane (1967)\ldots\ldots\ldots\ldots (1)$$

$$n = \frac{886}{1+886(0.07)2} = 165$$

Where: n is the sample size, N is the population size, and

e is the level of precision.

In general, using the above sample size and the total number of Niger seed producers from the selected Keble's, the proportion and the number of sample households from the three kebeles have been summarized according in the following table.

Table 1: Sample distributions of niger seed producers in the study area

Selected Keble	Total number of Niger seed producers	Proportion	Sampled Households	% Female Households
AnfareDarge	404	0.46	76	7.27
Sombokum	321	0.36	59	5.45
Harolego	161	0.18	30	3.64
Total	886	1	165	16.36

Source: Author computation of survey result 2016

3.2.3 Traders sampling

For this study, in addition to producers, data from traders were also collected. The sites for the trader surveys were market towns in which a good sample of Niger seed traders exists. On the basis of flow of Niger seed, three markets centers (Harolego, Alibo and Jardega) were selected purposively, which are the main Niger seed marketing sites in the study area. As a result, data from 65 niger seed traders including 3 cooperative, 15 local collectors, 21 rural wholesaler, 5 urban wholesalers, 15 Retailers, 1 union, 5 processors and 20 consumers were collected. Farmers' cooperative union and five processors from Burayu area were randomly selected based on accessibility to the researchers and used for the study to generate relevant information concerning opportunity, constraints and to analyze benefit share of actors along niger seed value chain.

Table 2: Sample distribution of niger seed traders

Traders	Harolego		Alibo		Jardega		Total		%
	P	S	P	S	P	S	P	S	females
Collectors	6	6	4	4	5	5	15	15	3.12
Rural wholesaler	5	5	9	9	7	7	21	21	-
Cooperative	1	1	1	1	1	1	1	3	-
Union	-	-	-	-	-	-	1	1	-
Urban wholesalers	-	-	3	3	2	2	5	5	-
Retailer	3	3	7	7	5	5	15	15	10.8
Processors	-	-	-	-	-	-	5	5	1.53
Consumers	3	3	10	10	7	7	20	20	45

P= population, S=Sample

Source: own computation, 2016

3.3. Data Source and Methods of Data Collection

3.3.1. Data sources

Both primary and secondary data were collected and used to generate valuable information. **Primary data sources** were collected from three randomly selected kebeles of 165

Smallholder farmers, 65 traders including collectors, cooperatives, wholesalers, retailers, oil processors, and also from key informant interview and focus group discussions. **Secondary data sources** were collected from Jardegajarte district and Zonal Trade and Market Development office, Zonal and district cooperative office and its associated Primary cooperatives, district and Zonal office of agriculture, different publications, of Ministry of agriculture and relevant published and unpublished reports, bulletins, and websites were used to generate relevant secondary data on Niger seed supply chain.

3.3.2. Methods of data collection

Individual interview: Totally, 165 sample respondents were selected and considered for interview. Enumerators who have a college diploma and working, as development agents were recruited and trained to implement both qualitative and quantitative data collection using semi-structured questionnaire. Before data collection, the questionnaire was translated to Afan-Oromo (local language of the research area) and pre-tested on five farmers and three traders with the similar characteristics to the final sample households, but not included in the final sample, to evaluate the appropriateness of the design, clarity and interpretation of the questions, relevance of the questions and time taken for an interview. Hence, appropriate modifications and corrections were made on the questionnaire and data were collected under continuous supervision of the researcher.

Key informant Interview: For this study, in addition to individual interview, data from key informant interview were also collected from DA's, district and zonal level professional experts of different organization and sectors including Trade and Market Development office, cooperative office, and its associated Primary cooperatives, agricultural office, and also micro-financial institution.

Focus group discussion: Focus group discussions were also held with three groups each 10-12 members in three selected kebeles to generate qualitative data that support the result of the findings based on predetermined checklists. Both focus group and key informant interview were used to generate qualitative data to identify and describe niger seed value chain constraint and opportunities in the area.

3.4. Methods of Data Analysis

Descriptive statistics and econometric analysis were used to analyze the data collected from producers, traders, oil processors and consumers.

3.4.1. Descriptive statistics

These methods of data analysis refer to the use of percentages, means, standard deviations, F-test and household characteristics.

3.4.1.1. Value chain analysis

The analysis of niger seed value chains highlights the need for enterprise development, enhancement of product quality, and quantitative measurement of value addition along the chain, promotion of coordinated linkages among producers and improvement of the competitive position of individual enterprises in the marketplace. Moreover, individual enterprises may feed into numerous chains; hence, which chain was targeted depends largely on the point of entry for the research inquiries (Kaplinsky and Morris, 2001). The following four steps of value chain analysis were applied to this study:

1. Mapping the value chain was a tool used to understand the characteristics of the chain actors and their relationships among them, including the flow of information, product, and finance and describing marketing functions, facilities and service throughout all actors in the chain. This information was obtained by conducting surveys and interviews as well as by collecting secondary data from various sources.

2. Identifying the distribution of actors' benefits in the chain. This involves analyzing the margins and profits within the chain and therefore determines who benefits from participating in the chain and who would need support to improve performance and gains. In the prevailed context of market liberalization, this step is particularly important, since the poor involved in value chain promotion were the most vulnerable.

3. Defining upgrading needed within the chain. By assessing profitability within the chain and identifying chain constraints, upgrading solutions could be defined. These may include interventions to:

(i) improve product design and quality and move into more sophisticated product lines to gain higher value and/or diversify production; (ii) reorganize the production system or invest in new technology to upgrade the process and enhance chain efficiencies; (iii) introduce new functions where in the chain to increase the overall skill content of activities; and (iv) adapt the knowledge gained in particular chain functions in order to redeploy it.

4. Emphasizing the governance role. Within the concept of value chain, governance defines the structure of relationships and coordination mechanisms that exist among chain actors. By focusing on governance, the analysis identified actors that may require support to improve capabilities in the value chain, increase value added in the sector and correct distributional distortions. Thus, governance constituted a key factor in defining how the upgrading objectives could be achieved.

Following the above procedure, the main aspects of Niger seed value chain analysis was done by applying some quantitative and qualitative data   analysis. First, an initial map was drawn which depicts the structure and flow of the chain in logical clusters. This exercise was carried out in qualitative and quantitative terms through graphs presenting the various actors of the chain, their linkages and all operations of the chain from pre-production (supply of inputs) to consumption. After having developed the general conceptual map of the value chain, the next step is analyzing the chain's economic performance and benefit share of actors.

3.4.1.2. Analysis of niger seed value chain performance

3.4.1.2.1. Marketing margin

Computing the total gross marketing margin (TGMM) is always related to the final price paid by the end buyer and is expressed as percentage (Mendoza, 1995)

$$TGMM = \frac{\text{Consumer price - producer price}}{\text{Consumer price}} \times 1oo \% \dots\dots\dots\dots\dots\dots(2)$$

It is useful to introduce the idea of 'farmer's portion', or 'producer's gross margin' (GMMp) which is the share of the price paid by the consumer that goes to the producer.

The producer's margin is calculated as:

$$GMMp = \frac{\text{Consumer price—Gross Marketing Margin}}{\text{Consumer price}} \times 100 \% \dots\dots\dots\dots\dots(3)$$

25

Where, GMMp = the producer's share in consumer price

3.4.1.2.2. Net marketing margin

The net marketing margin (NMM) is the percentage of the final price earned by the intermediaries as their net income after their marketing costs are deducted.

The percentages of net income that can be classified as profit (i.e. return on capital), depends on the extension to such factors as the intermediaries' own (working capital) costs.

NMM=$\underline{\text{Gross Margin---Marketing cost}}$ x100 %...(4)

     End buyer price

Where, NMM = Net marketing margin

To find the benefit share of each actor the same concept were applied with some adjustments. In analyzing margins, first the Total Gross Marketing Margin (TGMM) was calculated. This is the difference between producer's (farmer's) price and consumer's price (price paid by final Consumer).

   TGMM = Consumer Price –Farmers (producer Price)…………………… (5)

Then, marketing margin at a given stage 'i' (GMMi) computed as:

$$\text{GMMi} = \frac{sp_i - pp_i}{\text{TGMM}} \times 100\%$$

Where, SPi is selling price at i^{th} link and PPi is purchase price at i^{th} link.

Total gross profit margin also will be computed as:

 TGPM=TGMM_TOE

Where, TGPM is total gross profit margin, TGMM is total gross marketing margin and TOE is total operating expense.

Similar concept of profit margin that deducts operating expense from marketing margin was done by Dawit (2010) and Marshal (2011).Then profit margin at stage "i" is given as:

$$\text{GPMi} = \text{GPM} = \frac{\text{GMMi} - \text{OEx } 100}{\text{TGPM}}\% \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots.(6)$$

Where, GPMi =Gross profit margin at i^{th} link, OEi =Operating expense at i^{th} link

GMMi =Gross marketing margin at i^{th} link, TGPM=Total gross profit margin.

3.4.2. Econometric analysis

This method of data analysis refers to the use of econometrics models and soft ware's ie.Spss and stata to analyze the data.

3.4.2.1. Market supply model

In order to expand the leading role agriculture plays in economic growth and poverty reduction, small holder farmers need to improve their marketable surplus. A higher marketable surplus can help farmers to participate in a high value crops and increasing their level of income. Therefore, investigating the nature of marketable surplus is a major component of agro-value chains. In this study, a multiple linear regression model was used to analyze factors affecting household level Niger seed supply to the market in the study area, because farmers in the study area produce niger seed mainly for cash and all of the respondents supply niger seed to the market. This model is also selected for its simplicity and practical applicability (Greene, 2000).

Econometric model specifications of supply function in matrix notation as follows:

$$\mathbf{Y=X'\beta+U} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots(7)$$

Where Y = quantity of Niger seed supplied to market Y

X' = Vectors of explanatory variables X'

β= a vector of parameters to be estimated

U= disturbance term U

3.4.2.2. Market outlet choice model

A multivariate probit model was applied to explain the effect of different factors on the choice of market channels. A multivariate probit was used previously in a number of adoption studies to account for simultaneous adoption of multiple varieties and the potential correlations among the adoption decisions. The multivariate probit is an extension of the probit model and used to estimate several correlated binary outcomes jointly. With respect to the structure of the theoretical model and the dependent variables, a recursive multivariate probit model is as a generalization of the bivariate probit model as presented in Maddala (1983).

Generally, for this study the multivariate probit model was employed to determine the market out let choice of Niger seed producers since farmers have more than one option to sale their product.

The equation can be written as follws:

$$y^*_{im=}\beta_m X_m + \varepsilon_{im} \quad \text{...} \quad (8)$$

Where y_{im} (m= 1... k) represent the dependent variable of Niger seed market outlet selected by the ith farmer. (i = 1... n). The dependent variables are the polychotomous variable indicating whether sales are made through the relevant marketing outlet. The outlet has been aggregated into many groups: cooperatives, collectors and wholesalers. Each farm can use one or more marketing outlet. X_{im} is a $1 \times k$ independent variables that affect the choice of marketing outlet decisions and βm is a k× 1 vector of unknown parameters to be estimated ε_{im}, m = 1, …, M are the error terms distributed as multivariate normal, each with a mean of zero, and variance-covariance matrix V, where V has values of 1 on the leading diagonal and `correlations. The system of multivariate probit equations has been shown in the following ways.

$$y^*_{1i} = \beta'_1 X_{1i} + \varepsilon_{1i} \text{...} \quad (9)$$
$$y^*_{2i} = \beta'_2 X_{2i} + \varepsilon_{2i} \text{...} \quad (10)$$
$$y^*_{3i} = \beta'_3 X_{3i} + \varepsilon_{3i} \text{...} \quad (11)$$

The latent dependent variables are observed through the decision to choose outlet or not (yki).

Yim = {1 if * >0   k=1, 2, 3……………………………………………………….. (12)
        0, Otherwise

There are six joint probabilities corresponding to six possible combinations of choosing and not choosing each of the three outlets. The probability that all three component of the Niger seed market outlet have been selected by household 'i' is given as:

Pr(y1i=1, y2i=1, y3i=1) =Pr $(\varepsilon_{1i} < \beta'_1 x1i, \varepsilon_{2i} < \beta'_2 X_{2i} \varepsilon_{3i} < \beta'_3 X_{3i}$ … … … … … …..13

Pr(y1i=1, y2i=1, y3i=1) =pr $(\varepsilon_{3i} < \beta'_3 X_{3i}, \varepsilon_{2i} < \beta'_2 X_{2i}, \varepsilon_{1i} < \beta'_1 X_{1i})$….……………14

Pr(y1i=1, y2i=1, y3i=1) =Xpr $(\varepsilon_{2i} < \beta'_2 X_{2i}, \varepsilon_{1i} < \beta'_1 X_{1i}, \varepsilon_{1i} < \beta'_1 X_{1i})$ … … … … …..15

Where:

Y1i= for household who choose Collectors outlet other wise, 0

Y2i= for household who choose Cooperative outlet otherwise, 0

Y3i= for household who choose Wholesalers out let otherwise, 0

and X1i, X2i, X3i……….Xn represents dependent variable used in the model.

$= X_{1i}, X_{2i} and X_{3i}$ =are Vectors of explanatory variables X' for each outlet

$\beta_1', \beta_2', and \beta_3'$= are vector of parameters to be estimated for each channel

$\varepsilon_{1i}, \varepsilon_{2i}, and \ \varepsilon_{3i}$ =are Error term for each outlet.

The system of equations is jointly estimated using maximum likelihood method. The estimation was done using the user-written STATA mv.probit procedure (Capellari and Jenkins, 2003) that employs the Gewek-Hajivassiliour-keane smooth recursive conditioning simulator to evaluate the multivariate normal distribution (Train, 2003). The GHK simulator was indicated (Capellari and Jenkins, 2003) to have desirable properties in the context of multivariate normal limited dependent variables that stimulated probabilities are unbiased, they are bounded within (0,1) interval   and the simulator is a continuous and differentiable function of the model parameters.

3.4. Definition of Variables and Working Hypothesis

In this study factors influencing Niger seed marketable supply to the market and market channel choice decisions, are the two dependent variable and the main task were explored which factors potentially influence and how (the direction of the relationship) these factors are related with the dependent variables.

3.4.1. Market supply model

It is continuous dependent variable used in the multiple linear regression model equation measured in quintal (100kg) and represents the independent variables.

Age of Household Head (Age): It is a continuous variable and measured in years. Aged households are believed to be wise in resource use, on the other hand young household heads have long investment horizon and it is expected to have either positive or negative effect on volume of Niger seed sales. Berem (2009) which reveal that the older the household head, the less likely that a household would practice value addition in honey. In the same way, Barret *et*

al. (2008), concluded that younger people participated more in the market of agricultural crops because they are more receptive to new ideas than the older people.

Sex of the Household Head (Sex): A dummy variable taking 0 if female headed and 1 if male headed for variable to be considered. It will be expected to have positive relationship with market supply of Niger seed producers since male household headed participate in Niger seed market and supply more than the female headed household. Mohammed,(2011) identified sex of the household head influenced the marketable supply of teff significantly and positively.

Quantity produced (yield): It is an economic factor and continuous variable that can affect the Household level marketable supply and measured in quintals per hectare (qt/ha). It is assumed that the marketing of Niger seed by the farmer is positively related to the amount of production. This means, each household produces different amount of outputs, sometimes on the same land size will be cultivated. The study of Agete (2014) who found that in Ethiopia when farmers produce more red bean, it motivates them to sell more. The study by Chauhan and Singh (2002) also showed that, marketable surplus of paddy is positively related to the volume of production as well as with area under crop. Therefore, this variable is hypothesized as one possible explanatory variable in determining the level of Niger seed production and amount of market supply.

Distance to Nearest Market (DMkt): is continuous variable measured in kilometers**.** It is the distance of Niger seed producer households from the nearest market The closer the market, the lesser would be the transportation charges, reduced walking time, and reduced other marketing costs, better access to market information and facilities this variables have negative or positive impact on marketable supply. Kindie (2007) reported that distance to nearest market affects volume of commodity sales negatively. Ali (2005) found that rural road improvement and nearness to market increases total acreage for crops and increases value of agricultural output by showing that rural road improvement also intensifies production through technology adoption.

Education of the Household Head (HEduc): It is continuous variable and measured using formal Schooling or Grade level of the household head and hypothesized to affect marketable supply positively. This is due to the fact that a farmer with good Knowledge can adopt better practices than illiterates that would increase marketable supply. Formal education enhances the information acquisition and adjustment abilities of the farmer, Thereby improving the quality of decision making (Fakoya *et al*., 2007).

Land allocated for Niger seed: This refers to the area of land that a farm household allocated to niger seed in hectares. In agriculture, land is one of the major factors of production. The availability of land enables the owner to earn more agricultural output which in turn increases the marketable supply (Desta, 2004), Rehima, (2005). And also Dawit (2010) found that expanding the area under crop increased the marketable supply of the crop. Therefore, land holding and marketable supply are expected to have direct relationship.

Number of oxen owned (OXOW- No): This is a continuous variable measured by the number of oxen owned by the household and expected to affect the marketable supply of Niger seed positively. This is due to the fact that producers who own oxen are more likely to till in time than producers who no own oxen. Thus, they produce more which can be reflected on marketable supply of producers positively. Kinde (2007) found that number of oxen owned affect significantly and positively sesame marketable supply.

Livestock (TLU): This is a continuous variable measured in tropical livestock unit. Farmers who have a number of livestock are anticipated to specialize in livestock production so that they allocate large share of their land for pasture. It is assumed that household with larger TLU have better economic strength and financial position to purchase sufficient amount of input. For this study TLU have negative impact on niger seed marketable supply. A study by Rehima (2006) on pepper marketing showed that TLU showed a negative impact on marketable supply.

Frequency of Extension Contact (EXT_SER): The variable extension contact is continuous variable has been measured as number of contact times a days per month household head has

contacted with a development agent. Extension is expected to have positive effect for market participation through its stimulation of production and productivity. Farmers that have frequent contact with DAs have better access to information and could adopt better technology that would increase their marketable supply of oil seed and affects marketable supply positively. For instance, Yishak (2005), Rehima (2006), and Rahmeto (2007) found that access to extension service on improved maize seed; red pepper and improved haricot bean respectively affected Marketable supply of each of the commodities significantly and positively.

Income from None/Off Farming Activities (NOFI): It is continuous variable measured in terms of birr and amount of income earned from none/ off farm. Farmers who gain more income from non/off farm income tends to purchase agricultural inputs like fertilizers and increase Niger seed production thus increase niger seed marketable supply. Therefore, in this study, non-farm income expected to have positive impact on market supply of Niger seed.

Perception of current price (MRKTPRICE): This is dummy variable take 1 if farmers satisfied other wise 0. It represents satisfaction of market price of Niger seed. This variable is important in determining the amount of income earned from Niger seed sale. If the price of Niger seed is attractive, there would be an increase in market participation and quantity of marketable surplus; and if the price is not attractive, he/she would be forced to decreases or even stops to supply Niger seed to the market. In accordance with the present results, previous studies by Sarkar and Roy (2013) and (Adesiyan *et al.* (2012) found that an average price of paddy received by farmers affects marketable surplus of crops positively. This variable was expected to have a positive impact on niger seed marketable supply.

Access to Market Information (Acc_MktI): This is measured as a dummy variable taking a Value of 1 if the farmer had access to market information and 0 otherwise. This study hypothesized to influence Niger seed marketable supply positively of farm households. Because, producers that have access to market information are likely to supply more Niger seed to the market. Goetz (1992) noted that better market information significantly raises the probability of market participation for potential selling households.

Credit Access (Credit): This is dummy variable takes a value of 1 if credit taken by the household otherwise 0. Access to credit enhances the financial capacity of the farmer to purchase the inputs; thereby increasing Niger seed production and market share size this affects marketable supply positively. Urquieta (2009) found that access to loan was significant determinant of market channel choice.

3.4.1.   Market outlet choice model

In the analysis it is measured by the probability of selling Niger seed to either of the markets and used in multivariate probit model. The outlet choices might be along farmer's decision involving greater than two alternative markets. It is represented in the model as Y1 for household who choose to sell Niger seed mainly to collectors market or either of outlets, Y2 for producers that mainly sell their Niger seed to cooperative and either of outlets Y3 for producers who mainly sell Niger seed wholesalers outlet or either of the market.

Age of Household Head (Age): It is a continuous variable and measured in years. Aged households are believed to be wise in resource use, on the other hand young household heads have long investment horizon and it is expected to have either positive or negative effect on outlet choice. Bongiwe and Masuku (2012) found that age of the farmers was significant determinant of the choice to use wholesale market outlet.

Sex of the Household Head (Sex): A dummy variable taking zero if female and one if male for variable to be considered. Sign could not be attached with the variable. It will be expected to have positive relationship with outlet choice decision of Niger seed producers. Mamo and Deginet (2012) found that sex of the household head has statistically significant effect on whether or not a farmer participates in the livestock market and his/her choice of a market channel.

Quantity of Niger seed produced (Qt.): It is an economic factor and continuous variable that can affect the Household level marketable supply and measured in quintals. It is assumed that market outlet choice by the farmer is positively related to the amount of production. This means, those households who produces more quantity of Niger seed sold; the higher would be the chances of using different market alternatives than farmers producing small quantities.

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Therefore, this variable is hypothesized to have positive impact on wholesalers market outlet choice. Emana *et al*. (2015) and Chalwe (2011) also indicated that quantities produced have positive impact on channel choice.

Distance to Nearest Market (DMkt): is continuous variable measured in kilometers. It is the distance of the Niger seed producer households from the nearest market. The closer the market, the lesser would be the transportation charges, reduced walking time, and reduced other marketing costs, better access to market information and facilities. Also those households who are close to Markets were assumed to have more probability to choose better market outlet. In this study, distance from market is hypothesized to influence the decision of farmers to choose the wholesalers market outlet positively. Therefore, distance to the nearest market is hypothesized to influence the decision of producers on channel selection. The studies by Emana *et al*. (2015) and Djalalou *et al.* (2015) also found that distance has direct relationship with market outlet choice.

Education of the Household Head (HEduc): It is continuous variable and measured using formal Schooling or Grade level of the household head and hypothesized to affect market outlet choice positively. This is due to the fact that a farmer with good Knowledge can adopt better practices than illiterates that to choose better outlet.

This is supported by studies of Bongiwe *et al*, (2013).Therefore; this variable is hypothesized to choose wholesalers outlet choice of producers positively.

Access to Market Information (Acc_MktI): This is measured as a dummy variable taking a Value of 1 if the farmer had access to market information and 0 otherwise. This study will be hypothesized to influence Niger seed producer's outlet choice positively. Access to market information would increase the probability of choosing wholesalers and consumers' channel. Djalalou *et al*. (2012) also noted that up-to-date market information could enhance the quality and increase incomes for actors along the market chain participating in the marketing of pineapple in Benin.

Credit Access (Credit): This is dummy variable takes a value of 1 if credit taken by the household otherwise 0. Access to credit enhances the financial capacity of the farmer and to

sale his product to any nearest market in assisting transportation; cost thereby increasing bargaining power this affects the probability to choose wholesalers positively. Urquieta (2009) found that access to loan was significant determinant of wholesalers' market channel choice.

Frequency of Extension Contact (EXT_SER): The variable extension is continuous variable has been measured as number of contact times a days in month household head has contacted with a development agent. Extension is expected to have positive effect for market outlet choice through its stimulation of production and acquiring better access to market information that helps to choose wholesalers outlet. The study of Negash (2007) who found that frequent extension visits increased the likelihood of adoption of improved haricot beans and increase production thereby improve market channel choice. This variable hypnotized to affects market outlets choice of Niger seed producers positively.

Income from None/Off Farming Activities (NOFI): It is continuous variable measured in terms of birr or amount of income the household obtained from off and non-farming activities that are used for transportation purpose. Those farmers who gain more income from non/off farm income tends to sale any distance market outlet. Therefore, this variable is expected to have a positive impact on market supply.

Membership to any Cooperative (MCoop): It is binary variable and takes the value of 1 if the household is membership of any cooperatives engaged in any business, otherwise 0. Thus Cooperatives improve understanding of members about market and strengthen the relationship among the members. Therefore, it is expected to be associated with market outlet choice decision positively.

Access to transportation service (Atserve): It is dummy variable taking value 1if access otherwise 0. Specifically vehicles, carts and back animals would be used to measure the availability of produce transportation facilities by households. In cases where households owned transportation facilities, the variable took the value of one, and zero if the household did not own any form of transport facility. This variable is expected to have positive influence on the market outlet choice of Niger seed producers. The availability of transportation

facilities helps to reduce long market distance constraint, offering greater depth in market channel choices (Jagwe, 2011).

Perception of current price (MRKTPRICE): This is dummy variable take 1 if farmers satisfied other wise 0. It represents satisfaction of farmers from market price of Niger seed. This variable is important in determining market outlet choice of Niger seed producers. Farmers choose the best outlets if the price is an attractive. The study by Boughton (2007) who argues that local maize prices had a strong positive and highly significant effect on the probability of maize market participation in Mozambique. This variable is expected to have a positive impact on niger seed producers market outlet choice decision of producers.

Time of sale (TIM_SEL): This is a categorical variable indicating the time in which farmers sale their produce. (Immediately After harvest (January-March) soon after harvest (April-June) and Late of the year (July-October**)** these categorical variables allow us to understand the role of time in which farmers has sold their Niger seed produce in explaining the price they received and, income they earned. Thus, we expect that this variable explain the income of farmers earned from Niger seed sale. Time of sale expected to affect the out let choice of Niger seed producers positively. Because, a farmer that supplies his Niger seed to the market lately is assumed to get better prices than a farmer supplies immediately and soon after.

Table 3: Summaries of variables and working hypothesis

Independent variables	Category	Measurement	Expected effect	
			Market supply	Market Outlet Choice
Quantity produced	Continuous	100kg/quintal	Positive	Positive
Age of Household Head	Continuous	Year	positive/Negative	positive/Negative
Sex of the Household Head	Dummy	0=Female,1=Male	Positive	Positive
Distance to Nearest Market	Continuous	Km	Positive/Negative	Positive
Education of the Household Head	Continuous	Grade	Positive	Positive
Area of Land used for niger seed	Continuous	Hectare	Positive	-
Access to Market Information	Dummy	0=No,1=yes	Positive	Positive
Ox ownership	Continuous	Number	Positive	-
Total Livestock unit	Continuous	TLU	Negative	-
Frequency of Extension Contact	Continuous	Times of contact per month	Positive	Positive
Income from None/Off Farming	Continuous	ETB	Positive	Positive
Membership to any cooperative	Dummy	0=No,1=yes	-	Positive
Acess to transport facilities	Dummy	0=No,1=yes	-	Positive
Perception of current price	Continuous	0=No, 1=yes	Positive	Positive
Time of sale	Dummy	January–March(Immediately after harvest)	-	Positive
		April-June (soon after harvest)	-	''
		July –October (Late of the year)	-	''

Source: Own computation 2016

4. RESULT AND DISCUSSIONS

This chapter presents the major findings of the study. It has five main sections. The first section deals with descriptive and inferential statistics of the sample households. The second section presents value chain analysis of Niger seed which includes value chain map, actors and their roles, and value chain governance. The third section presents marketing channel and performance analysis of the value chain which includes marketing channels, marketing costs, margins and benefit shares of actors in the value chain. The fourth section presents results of econometric analysis which contains the determinants of market supply of Niger seed by using Multiple Linear regression and the determinants of outlet choice of Niger seed producers by using Multivariateprobit model. And the final section deals with the constraints and opportunities of Niger seed production and marketing in the study area.

4.1. Descriptive Results

4.1.1. Demographic and socio-economic Characteristics of producers sample households

Totally, 165 sample household heads were considered in this study. Out of the total sample respondents, 27 (16.4 %) of them were female headed and the remaining 138 (83.6%) were male headed. The marital statuses of producers sample respondents were 75.2% married, 4.2% single, 6.7%divorced, and 13.9 %widowed. Credit is one way of stimulating incentive in improving crop production from the total sample respondents, 77(47.9%) took credit and 86 (52.1%) not access to credit.

Market information is one of the important issues in supplying Niger seed to the market to get high profit from their sale and from the sample respondents, 88(53.3 %) access to market information and 77(46.7%) were not access. Perception of current price is one of the main determinants of supply and the survey result revealed that, from the sample respondents, 83(50.3%) not satisfied and 82(49.7%) of them satisfied with current price. Membership to cooperative is an important to strengthen the bargaining power of Niger seed producers and the survey result revealed that, 140(84.8%) the sample respondent were members of multipurpose cooperatives and 25(15.2%) non-members.

Table 4: Demographic and socio-economic characteristics of producers' samples for dummy
variables

Variables		N	%
Sex of household head	Male	138	83.6
	Female	27	16.4
Marital status	Married	124	75.2
	single	7	4.2
	divorced	11	6.7
	widowed	23	13.9
Access to credit	Yes	77	47.9
	No	86	52.1
Access to market information	Yes	88	53.3
	No	77	46.7
Perception of current price	Yes	82	49.7
	No	83	50.3
Cooperative membership	Yes	140	84.8
	No	25	15.2

N=frequency, %=percentage

Source: Authors survey result 2016

4.1.2. Demographic and socio-economic characteristics of producers samples for continues
variables

The overall mean age of the sampled household head is about 46.1 years implies that majority of
them were working groups. The average family size for Niger seed producer was 5 persons per
household almost similar to the national average which is 5.1 per household (CSA, 2013)
thus, family size is a distinguishing characteristic in rural communities of many developing
countries such as Ethiopia (Mamo, 2009). The average educational statues of sample
respondents were 4.58 with standard devation of 4.29 thus educations contribute to improve
the production of Niger seed. The Survey result indicated that about 98.5% of respondents
own land and only 1.5% of sampled farmers did not posses their own land. The average land

size for these sampled farmers is found to be 4.3 hectare this is greater than the national average which is 1.37hecktare but it varies from place to place as (CSA,2013) of this on average 1.29 hectare of land was allocated for Niger seed production. The average of livestock holding per household was 6.61 with standard devation of 3.96 of the total, on average 2.25 oxen with standard devation of 1.32. On average the total quantity of Niger seed produced per household was 7.84qt.of this on average 7.32 qt.was sold to the market with standard devation of 3.34 and 3.29 respectively.

Table 5: Demographic and socio-economic characteristics of samples for continues variables

Explanatory Variables	Unit	Minimum	Maximum	Mean	SD
Age of Household head	Year	26	71	46.1	11.02
Total family size	Number	2	9	5	1.001
Educational statues	Grade	0	12	4.58	4.29
Total land holding	Hectare	0.75	11	4.31	1.74
Area of land used for niger seed	Hectare	0.5	3	1.29	.538
Quantity produced	Quintal	3.25	17.00	7.84	3.34
Quantity sold	Quintal	3.00	16.00	7.32	3.29
Oxen ownership in number	Number	0	8	2.25	1.32
Total livestock holding	Number	1.3	23.36	6.61	3.96

SD=Standard deviation

Source: Authors survey result 2016

4.1.3. Demographic and Socio-economic characteristics of traders samples for dummy variables

In addition to producers, a total of 65 traders were used for the study. From the total sample respondents, 46(70.8) % were male and the remaining 19 (29.02%) female headed household. The marital statuses of traders sample respondents were 84.6% married, 10.8% single, and 4.6%divorced.Credit is one of the main inputs for traders in buying and selling of Niger seed. Among traders sample respondents 81.5% access to credit and 18.5% not access to credit

service. Regarding market information, %90.8 of the respondents' access to market information and 9.2% not accessed hence information is   important in facilitation of niger seed value chain.

Table 6: Demographic and socio-economic characteristics of traders samples for dummy variables

Variables		N	%
Sex of household head	Male	46	70.8
	Female	19	29.02
Marital status	Married	55	84.6
	Single	7	10.8
	Divorced	3	4.6
	Widowed	-	-
Access to credit	Yes	53	81.5
	No	12	18.5
Access to information	Yes	59	90.8
	No	6	9.2

N=frequency, %=percentage

 Source: Authors survey result 2016

4.1.4. Demographic and socio-economic characteristics of traders samples for continuous variables

The average age of traders were 35.5 years with standard devation of 6.5 it implies that majority of the respondents were working groups and the average family size of sample traders were 5.58 per household with standard devation of 6.5 and the educational status of sample traders are 6.5 in year of schooling with standard devation of 1.25. The average trading experience of sample   traders were 6.22 with standard devation of 3.66 Table 7: Demographic and Socio-economic characteristics of traders' samples for continuous variables

Table 7: Demographic and socio-economic characteristics of traders samples for continuous variables

Variables	Unit	Minimum	Maximum	Mean	Std. Deviation
Age	Year	26	45	35.5	6.5
Educational status	Grade	1.00	12.00	6.5	1.25
Family size	No	1.00	13.00	5.58	2.77
Trading experience	Year	1.00	14.00	6.22	3.66

Source: Authors survey result 2016

4.1.5. Major crops production

Due to favorable agro-climatic condition of the area farmers produce different types of food and cash crops to sustain and improve their livelihoods by increasing production and income. The major crops grown to the study area were cereals, grains, pulses and oilseed. According to district agricultural office, Niger seed is the first oil seed crops grown and covers an area of 7513 ha with the total production of 57,656 quintal and 52313 quintal of teff in 2015 /2016 production year. Teff is the first food crops grown in the study area next to niger seed in terms of their area coverage followed by maize, Wheat, sesame, Barely, Pulses ,linseed and rape seed. Niger seed is the main cash crop and high income generating among other crops to farmers of the area thus improve the living standards of producers since it was produced mainly for sale with small amount used for household consumption and supplied to the central market in large quantity.

Table 8: Major crops grown of the study area

Crop type	Area/ ha	Production in qt	Productivity qt/ha
Teff	3077	52,313	17
Niger seed	7513	57,656	7
Maize	4414	247,184	56
Wheat	7155	342,574	47.8
Barley	2841	710,25	25
Sesame	1050	8400	8
Pulses	312	3870	12
Lin seed	181	905	5
Rape seed	138	1427	10.3

Ha=Area in hectare, Qt/100kg=production in quintal or per 100k

Source: District Agricultural office

4.1.6. Producers' characteristics by marketing outlets

For this study, three major Niger seed market outlets were identified through which farmers sell their products. These were collectors which accounts for 83% of total sells followed by 69.1% wholesalers and 45.5%cooperatives. Conversely, about17% collectors, 54.5% cooperative and 39.1%wholesaler not to choose each market outlet respectively.

Table 9: Proportion of market outlet choice of the households

Market outlet	Category	Frequency(N)	Percentage
Collectors	Yes	137	83
	No	28	17
Cooperatives	Yes	75	45.5
	No	90	54.5
Wholesalers	Yes	114	69.1
	No	51	39.1

Source: Authors survey result 2016

4.1.6.1. Household characteristics by market outlets choice for continuous variables

The effect of continuous variables can be estimated by using the mean that was done by (Birehanu et al., 2012). The mean age of household to choose Collectors, Cooperatives, Wholesalers outlet were 47, 45. 46.5, years respectively and conversely the mean age of household 43, 47, 46.6 years could not choose the above outlet accordingly. Regarding educational statuse, the mean of household head in year of schooling to choose Collectors, Cooperatives and Wholesalers outlet were4.5, 4.7, 4.8,respectively at the same time the mean school of 4.9 4.4, and 4 cannot choose Collectors, Cooperatives and Wholesalers outlet respectively. The mean of distance to reach the nearest market of those household to choose Collectors, Cooperatives and Wholesalers outlet were 4, 4, and 4.3km respectively and in opposite side those household whose mean distance 5, 4.5 ,4.5km not choose the above outlet accordingly. The mean quantity of niger seed produced for those to choose Collectors, Cooperatives and Wholesalers outlet were 8.4, 9.5, 8.9qt respectively and those mean of 7.2, 7.4 and 7.1 not choose Collectors, Cooperatives, and Wholesalers outlet in reverse direction.

Table 10: Mean household characteristics by market outlet choice

Variables	Category	Collector	cooperative	Wholesaler
Age HH in year	Yes	47	45	46.5
	No	43	47	46.8
Educational status	Yes	4.5	4.7	4.8
	No	4.9	4.4	4
Distance in km	Yes	4	4	4.3
	No	5	4.5	4.5
Quantity produced in qt.	Yes	8.4	9 .5	8.9
	No	8.2	7.4	7.1

4.1.6.2. Household characteristics by market outlet choices for dummy variables

As depicted in table 11 revealed that; Based on access of market information, wholesalers outlet (40.61%) was preferably selected by households that have got market information about Niger seed production and marketing on time, while those did not get market information would choose collector outlet (93.7%). Hence, producers those have access to information got price of Niger seed and buyers information.

 In addition, those households that have an opportunity of access to credit have used wholesaler (50.30%) as best outlet than non- users of credit those prefer collector (80.6%), the reason behind is that, hence, the households that have accessibility of credit got additional capital (from financial services providers) they produce their product with required quality than non -users of credit, and sale their product with higher price than non users of credit. Concerning the time of sale producers those sold their niger seed immediately after harvest prefer collector (17.58%), and sold his niger seed soon after harvest prefer collector by (32.12%) but those farmers who store their niger seed and sale late of the year would select wholesaler (37.78%) than other outlet, this implies that, collectors purchase niger seed from producers immediately and soon after harvest since ample supply was exist at that time and use the margin got from it by themselves, further sale to wholesaler. Regarding membership of any cooperative, producers those who members of cooperatives were select collectors' outlet (82.8%) while non-members of cooperatives choices collectors' outlet (84%). This indicated members of any cooperative less to choose collectors outlet than non-members of cooperative this is due to the fact that, cooperatives get benefit in the form of dividend from Niger seed sell .

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Table 11: Household characteristics by market outlet choices for dummy variables

| Variables | Category | Market Outlets | | | | | |
| | | Collectors | | Cooperatives. | | Wholesalers | |
		N	%	N	%	N	%
Sex	Male	16	11.59	80	48.48	88	53.33
	Female	24	88.8	11	6.67	7	4.24
Credit Access	Yes	11	10.6	70	42.42	83	50.30
	No	50	80.6	19	11.52	20	12.12
Information	Yes	19	35.8	68	14.21	67	40.61
access	No	105	93.7	27	16.36	14	8.48
Transportation	Yes	20	15.05	76	46.06	89	53.94
services	No	28	87.5	12	7.27	13	7.88
	Immediate	29	17.58	6	3.64	13	7.88
	Mid-year	53	32.12	20	12.12	33	20.00
Time of sale	Late of the						
	year	52	31.52	43	26.06	62	37.58
Coop member	Yes	116	82.8	61	43.5	61	43.5
Non-members	No	21	84	14	56	14	56

Source: Authors survey result 2016

4.2. Analysis of Niger Seed Value Chain and Examine their Performance

4.2.1. Value chain map of niger seed in the study area

The value chain map highlighted the involvement of diverse actors who are participated directly or indirectly in the value chain. The direct actors are those involved in commercial activities in the chain (input suppliers, producers, traders, and consumers) and indirect actors are those that provide financial or non-financial support services, such as credit agencies, service providers, government, cooperatives, and extension agents in the study area.

The major actors involved directly in Niger seed value chain in the study area were input suppliers, producers, collectors, Primary cooperatives, cooperative union, wholesalers,

processors retailers and consumers. Each of the whole actors play crucial role in value adding activities from input suppliers to final consumers. The indirect actors or supporters are office of agriculture; Cooperative promotion office and Trade and Market development office. The role and functions of each actor among Niger seed value chain was presented in detailed of Niger seed value chain map.

| Seed
Fertilizer
Land | Production
Ploughing
Weeding
Harvesting
Cleaning
Transporting | Collecting or
buckling
Cleaning
Transporting | Buying
Storing
Packaging
Transporting | Processing
Sorting
Grading
Packaging
Transporting | Collecting or
bulcking
Repackaging
Transporting
Distribution | Collecting or
buying
Transporting
Retailing |

Union

Exporter

Consumers

Cooperatives

Broker

| Input
Suppliers | Farmers | Collectors | Rularwholesalers | Processors | Urban
wholesalers | Retailers |

| OoAGNRM
Extension service
Information
service | OoTMD
Regulation and
Licensing | Packaging service
Sacks
Rope
Containers | Transporters
Transport service | Financial service
Bank
OCSC
LM L |

- - - - ▶   = Flow of information

◀━━━━   =   Flow of finance or money

━━━━▶   = Flow of product

Figure 3: value chain map of Niger seed

4.2.2. Niger seed Value chain actors and their Roles

4.2.2.1. Value chain actors

Niger seed value chain actors include those actors in the chain who play an intermediary role between producers and final consumers at the local and international levels, such as producers, local collectors, Primery cooperatives, cooperative union, broker, processors, wholesalers and retailers. Each of these actors adds value in the process of changing the product to the usable or valuable one and some actors may perform more than one role.

Input Suppliers: At this stage of the value chain, there are many actors who are involved directly or indirectly in agricultural input supply in the study area. Currently District Agricultural office, primary cooperatives and private input suppliers are the main source of input supply. All such actors are responsible to supply agricultural inputs like fertilizers, farm implements or information which are essential inputs at the production stage.

Producers: Niger seed producers are the main actors who perform most of the value chain functions right from procurement of the inputs to pre-and post harvest handling and marketing .Farmers use fertilizer, seeds and pesticides as agricultural inputs to produce oilseeds. Hence, the value chain of oilseeds starts from input suppliers, the farmers applying their labor, capital, land and technology to produce a certain quantity of Niger seed out of a given plot of land and sell their products to different market actors, which include local collectors, wholesalers, cooperative retailers, processors and consumers

Local collectors: Are mostly those farmer traders who usually better off in terms of income than the average farmers and buying oilseed products from farmers in the village and resell it later in premium price to wholesalers. They use their financial resources and local knowledge to collect in bulk from the surrounding area and play an important role because they knew areas of surplus very well and also responsible for the supply of wholesalers. The trading activities performed by collectors include buying and assembling, packing, sorting, transporting and selling to wholesale markets in the study area.

Rular wholesalers: Wholesalers are traders those stationed mainly on main market routs named as Alibo Jardega and Harolego markets and participate in buying of Niger seed from collectors, service cooperatives, and producers in larger volume than any other actors and supplying to processors and union, along the chain. They also store product, until price rise. Survey result indicates that wholesale markets are the main assembly centers for Niger seed in their respective surrounding areas. They have better storage, transport and communication access than other traders of the district. Usually, wholesalers purchase oilseeds during the harvest seasons when the market is flooded with new oilseed products by competing with Local collectors and cooperatives and also have higher opportunity to get Niger seed supply even during low supply seasons due to higher income and access to information than local collectors and cooperatives.

Brokers: Are commission agents usually stationed in the terminal markets and inspect quality by his naked eye and also play a mediation role in market negotiation between buyers and sellers then finally take a decision on the daily market-clearing price after they hear the views of buyers and sellers.

Processors: Processors mainly get oilseeds from Wholesaler traders with the assistance of brokers and transfer it to buyers after processing and also Local oilseed processors are entrepreneurs who press oilseeds and produce edible oil and oilcake. Then they supply their products to urban wholesalers or retailers and sometimes small-scale oil processors could sell their products directly to local consumers.

Urban Wholesalers: Are two types those buy Niger seed from urban wholesalers' and sell to processors and those buy edible oil from processors and distribute edible oil to retailers or sometimes sales to consumers.

Retailers: Are those traders buying oilseed products directly from processors and urban wholesalers for resell the edible oil directly to consumers.

Local consumers: Consumers are the final users of oilseed products including people who are using oilseeds and oilseed products such as unprocessed oilseeds for home consumption, edible oil. Local consumers get their oilseed and oil seed products from farmers, and edible oil from retailers or from oil pressing mills directly.

4.2.3. Supporting Service

Such actors are those who provide supportive services including training and extension, information, and financial services. Offices of agriculture, primary cooperatives, cooperative promotion office,   and micro finance, Office of trade and market development are the main supporting actors who play a central role in the provision of such services in the study area.

Extension Services

As depicted in appendix of table 5, DAs and Office of agriculture were the main sources of advisory service in the district. The survey result explained that, out of a total of 165 respondents, 90(54.5%) and 75(45.5%) of them were participated and un participated in training respectively that were organized in 2016 year cropping season. The result shows that most of the trainings were given on fertilizer application, sowing methods and improved technology adoption for crop management, harvesting and post harvest handling of other crops. In addition, sample farmers indicated that they are getting information particularly of input availability and price from primary cooperatives and kebeles administration.

Financial services

In the study area, service cooperatives, Oromia Credit and Saving Share Company and individual or local money lenders (Traders that serve as forward selling) have been identified as a potential source for credit in cash basis. The survey result revealed that of total farmers sample respondents, 118(71.5%) accessed credit and while 47(28.5) % have not accessed to credit as depicted in appendix of table 5 and the Sources of credit for traders are micro finance and banks.

4.2.4. Marketing channels

4.2.4.1. Marketing Channels and Performance Analysis

A marketing channel is a business structure of interdependent organizations that reach from the point of product origin to the consumer with the purpose of moving products to their final destination. The analysis of marketing channels is intended to provide a systematic knowledge and the flow of the goods and services from producer to the final consumer. The result revealed that, from the total of 1293.6qt. Niger seed produced, 93.36 %(1207.8) was supplied to the market through the seven identified channels.

The major Niger seed marketing channel

The major Marketing channel known in the study areas can be described in the following ways.

I.   Producers ⟶ Consumers (22qt.)

II.   Producers ⟶ Collectors ⟶ Rural wholesalers Broker ⟶ Processors ⟶
       ⟶ Consumers ⟶ (121.7qt)

III.   Producers ⟶ Collectors ⟶ Wholesalers ⟶ Broker ⟶ Processors
       Urban wholesaler ⟶ Retailers ⟶ Consumers (434.25qt)

IV.   Producers ⟶ Rural wholesalers ⟶ Brokers ⟶ Processors ⟶ Urban wholesalers
       Retailers ⟶ Consumers (307.25qt)

V.   Producers ⟶ Rural wholesalers Broker ⟶ Processors ⟶
       ⟶ Consumers (111.55qt).

VI.   Producers ⟶ Cooperatives Union ⟶ Processors ⟶ Consumers(94.05qt) ⟶

VII.   Producers ⟶ Cooperatives ⟶ Rural wholesalers ⟶ processors ⟶
       Urban wholesalers ⟶ Retailers ⟶ Consumers (117.qt).

Source: Authors survey result 2016
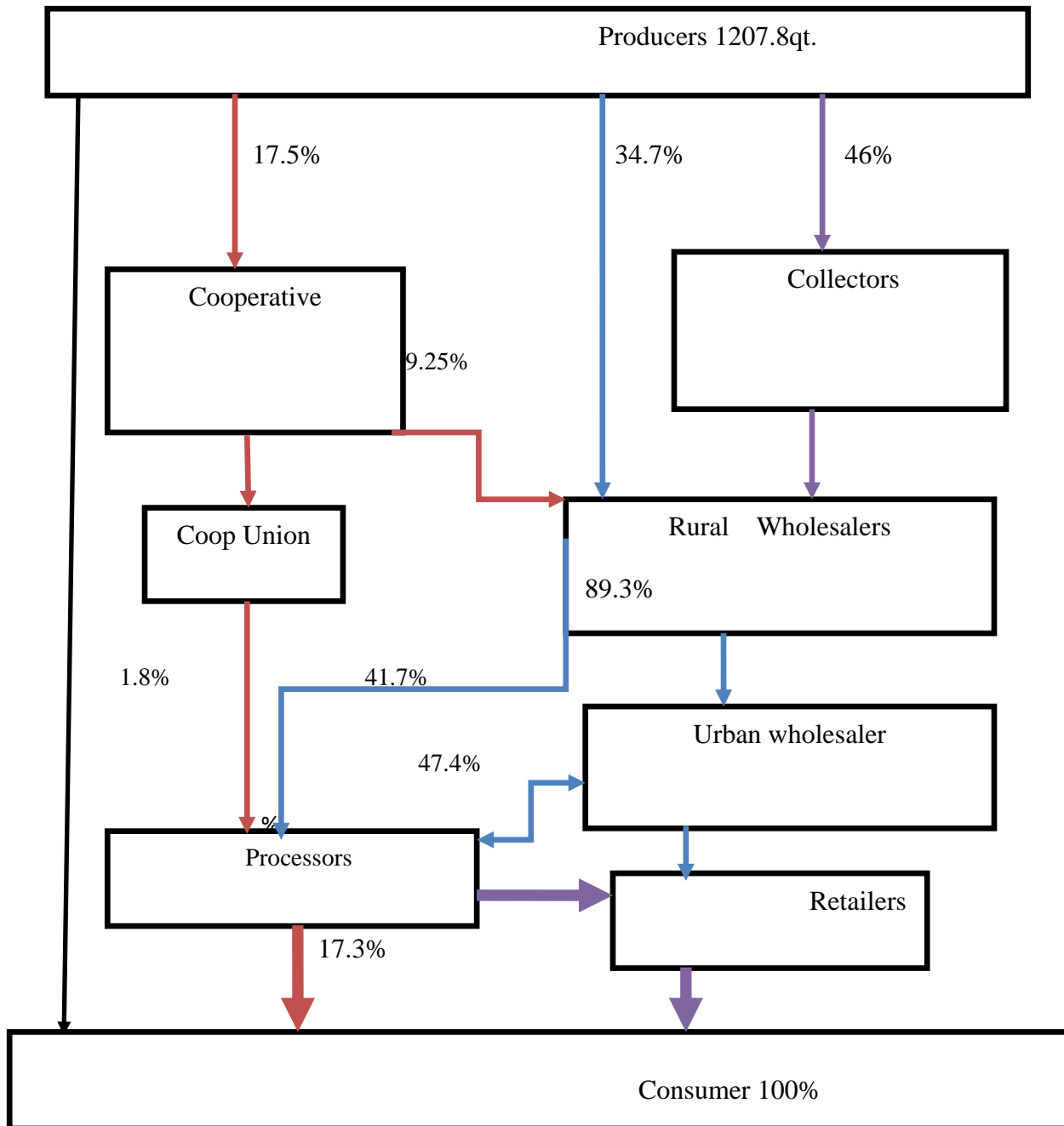
Source: Authors survey result 2016

Figure 4: Niger seed market channels

4.2.4.2. Production cost of Niger seed

Niger seed is one of the major local cash crops of farmers in the study area and incur higher cost of production than cost of marketing. The type of cost expense include land clearing,

poling, seed, fertilizer, sawing weeding, harvesting ,threshing, sack purchasing, rent of land and oxen, transportation from farm to home and labors. The highest costs were incurred for rent of oxen and lowest for transportation and the total cost of production incurred was 1150 birr per quintal as depicted in the next table.

Table 12: Niger seed production cost (Birr/Qt.)

Lists of Expenses	Cost in birr /quintal
Land clearing	80
Plowing	130
Seed	103
Fertilizer	153
Sawing	80
Weeding	30
Harvesting/collection	100
Threshing and winnowing	101
Sack	7
Land rent	130
Oxen rent	216
Transportation farm-home	5
Laborers	15
Total production cost	1150

Source: Own computation from survey result 2016

4.2.4. 3. Niger seed marketing costs and Margin

Each of the Niger seed value chain actors adds value to the product as the product passes from one actor to another. In a way, the actors change the form of the product through improving the grade by sorting, cleaning, processing, packaging or create place and time utility. Compared to farmers, traders including (collectors, cooperative, Rural wholesalers, union, processors and retailers) operating expense is less than that of producers. But the highest marketing margin is earned by % 18.25 urban wholesalers, 24.33% processors, 14.84% Union and 13.38% rural wholesaler followed by 7.3% producers, 9.73% cooperative,

9.73% retailers, and 2.43% collectors. That means the higher total expense get less margin compared to less expense cost along the value chin actors. While the highest profit margin was earned by 21%urban wholesalers, 19% processors, 18% Union and 16% rural wholesaler followed by 12% cooperative, 7% producers, 6% retailers, and 2% collectors. The survey result revealed that urban wholesalers get the highest profit margin followed by processors, union and rular wholesalers compared to other actors. Cooperatives, producers, retailers and collectors took the lowest profit margin of the total actors. The disproportionate share of benefits is the reflection of power relationship among actors. Niger seed producers added only 7.3% % of the total value proceeded by 24.33% processors, % 18.25 urban wholesalers, 14.84% Union and 13.38% rural wholesaler and thus producers   add value higher than collectors which contribute only 2.43% in the study area.

Table 13: Niger seed marketing costs and benefit shares of actors

Item in birr/qt/100kg.	Producer	Collectors	Cooperative	Rural Whole Sellers	Union	Processors	Urban Wholesaler	Urban Retailer	Horizontal Sum
Purchase price	0	1500	1600	1700	1790	2400	3200	4000	16190
Production cost	1150	0	0	0	0	0	0	0	1150
Marketing cost	-	-	-	-	-	-	-	-	-
Labor	20	7	5	10	10	60	20	15	147
Transport	30	8	15	20	20	10	30	20	153
Packaging	12	15	9	15	15	17.5	25	10	118.5
Loading and unloading	5	6	5	20	5	5	15	5.5	66.5
Loss	4	3	2	3	3	30	1	2	48
Overhead cost	2	2	1	3	3	2	3	3	19
Processing cost	0	0	0	0	0	250	0	0	250
Commission	0	0	0	20	0	20	0	0	40
Tax	0	2	0	2	0	3	3	1.5	11.5
Total marketing cost	73	43	37	56	56	397.5	97	200	959.5
Total cost	1223	43	37	56	56	397.5	97	200	2109.5
Sale price	1450	1600	2000	2250	2400	3400	3950	4400	21450
Marketing margin	300	100	400	550	610	1000	750	400	4110
% share of margin	7.30	2.43	9.73	13.38	14.84	24.33	18.25	9.73	100
Profit margin	227	57	363	494	554	602.5	653	200	3150.5
% share of profit	7	2	12	16	18	19	21	6	100

Source: Authors survey result 2016

4.2.4.3. Marketing margins of Niger seed in different channels

Marketing margins of Niger seed in the seven channels for each group of market player are shown in table 14. GMMp, GMMc, GMMcop, GMMw, GMMUn GMMPRo, GMMUw and, GMMr are gross marketing margins of producers, collectors, cooperatives, rural wholesalers, union, Processors,uriban wholesalers and retailers respectively. And also NMMc, NMMCp NMMRw, NMMUn, NMMpro, NMMuw and NMMr are net marketing margins of collectors, Cooperatives, Rural wholesalers, union, processors, urban wholesalers and retailers respectively.

The total gross marketing margin (TGMM) is highest in channel III, IV, VII which is processors, rular wholesaler, and unions have got the highest gross marketing margin in each channel respectively whereas collectors have got the lowest marketing margin in channel III. In channel I (producers sell directly to consumer) producer's share (GMMp) is highest which is (100%) followed by 40.3% in channel VI from producers to total consumers' price and lowest in channel III, V, and VII this is due to the longest market channel in the chain and involvement of collectors in channel III and participation of, urban wholesalers, and retailers in both of this three channels.

NMM is highest for producers in channel I (94.97%), channel V (41.9%), channel VI (38.25%) and channel II (38%) this is due to the fact that, the shortest chain of those three channels as compared to others and also for example producers directly sale to end buyers or consumers this helps both producers and consumer benefit from this channel with minimum cost. These result revealed that, channel I, V, VI, and II are the best outlet for producers and channel V, IV, III best for processors, channel V and II best for rural wholesalers, and channel VI best for union. The result of margin analysis along each value chain actors explained that, as the marketing channels increase from producers to consumers through the involvement of many actors in the chain decrease the net marketing margin of producers this lead consumers to pay higher price. Conversely, when the marketing channel become shorter or less involvement of actors in the chain, producers get higher net marketing margin this makes consumer to pay less price and benefit from the chain with minimum cost.

Table 14: Gross and net-marketing margins of actors along different marketing channel of Niger seed

Marketing	I	II	III	IV	V	VI	VII
TGMM	0	60	66.7	63.6	60.5	59.7	62.6
GMMp	100	40	33.3	36.4	39.5	40.3	37.4
GMMc	-	4.4	3.3	-	-	-	-
GMMcop	-	-	-	-	-	9.7	10.3
GMMUn	-	-	-	-	-	19.4	-
GMMrw,	-	29	12.3	9	22.7	-	9.5
GMMPRo	-	26.6	28.9	36.4	37.8	30.6	23.8
GMMUw	-	-	11.1	11.4	-	-	7.1
GMMr	-	-	11.1	6.8	-	-	11.9
NMMP	94.97	38	31.7	34.6	41.9	38.25	35.6
NMMc,	-	3	2.3	-	-	-	-
NMMCop	-	-	-	-	-	8.7	9.3
NMMUn	-	-	-	-	-	17.9	-
NMMRw	-	27.5	10.9	7.7	20.95	-	9.7
NMMpro	-	16	20.2	27.5	27	19.86	14.8
NMMuw	-	-	8.7	9.2	-	-	4.76
NMMr	-	-	6.7	2.7	-	-	7.6

Source: Owen computation from survey result 2016

4.2.4.5. Value addition

Value addition is the difference in sales price and cost of inputs (raw materials) at each stage of the value chain. Each of the Niger seed value chain actors adds value to the product as the product passes from one actor to another. The actors change the form of the product through processing or improve the grade through sorting, cleaning, packaging, transporting, making time and place utility. Adding value does not necessarily involve altering a product; it can be the adoption of new production or handling methods that increase a farmer's capacity and reliability in meeting market demand. For farmers, value addition has a particular importance in that it offers a strategy for transforming an unprofitable enterprise into a profitable one. The farmer is not only involved in production of a raw commodity but also takes part in value addition and distribution.

This allows the farmer to create new markets or differentiate a product from others and gain advantage over competitors.

Niger seed producers' added only a value of 7.3% share of margin proceeded by 24.33% processors,18.25%uriban wholesalers, 14.84% union,13.3% rular wholesalers,9.73% cooperative and retailers per quintal on average and collectors were the list value added only 2.43% of all the actors along niger seed value chain in the study area. The analysis of value addition at different market channels was intended to provide a systematic knowledge of the flow of Niger seed products from its origin of production to final destination. The distribution of value additions among the value chain actors and across marketing channel were depicted in Table13 and 14 respectively.

The total value addition along each channel is highest in channel III, IV, VII which is processors, rural wholesaler, and unions in each channel respectively whereas collectors have got the lowest value added in channel III. In channel I producers added the highest value which is (100%) followed by 40.3% in channel VI from producers to total consumers' price and producers added lowest value in channel III, IV, and VII due to the longest chain of those channels.

4.2.5. Value chain governance

Value chain governance refers the extent to which governance affects the core activities of individual actors in the chain. Reach or pervasiveness refers to how widely the governance is applied and whether or not competing bases of power exists. The dominant value chain actors play facilitation role and determine the flow of commodities and level of prices. In effect they govern the value chain and most other chain actors subscribe to the rules set in the marketing process. The study result indicates that urban wholesalers, processors, and rural wholesalers assisted by the brokers are the key Niger seed value chain governors. The district Niger seed market is heavily dependent on central market. Therefore, Niger seed value chains are highly influenced by urban wholesalers and processors.

 In most cases, the business relations between the various operational actors are of free market exchange and uncoordinated. Due to the lack of a proper market information system and minimal bargaining power, farmers forced to sell their product at the price offered by traders.

Traders in the district usually refer to central markets through brokers for price fixation. There is no vertical linkage between value chain actors even though Niger seed value chain formed at skeletal level. In some cases, there are conflicts among the traders regarding payment and failure to keep their commitment. Overall, the governance of Niger seed value chain is producer driven with minimum trust between various actors. The result of margin analysis between Niger seed value chain actors indicated that producers were governed by 21% urban wholesaler, 19% processors, 18%union, 16% rular wholesalers, and %12 Cooperatives. This indicated that intervention is needed to upgrade a producer which is only 7% of profit share along value chain actors.

4.3. Econometric Model Result

4.3.1. Determinants of niger seed market supply

Niger seed are mainly produced for market with small amount used for household consumption and also an important local cash crop of the district. According to the result of this study, all sample households are good suppliers of Niger seed to the market. Analysis of factors affecting farm level marketable supply of Niger seed was found to be important to identify factors affecting Niger seed supply to the market. Therefore, multiple linear regression model was employed to identify factors affecting market supply. For the parameter estimates to be efficient, unbiased and consistent assumptions of Classical Linear Regression model should hold true. Hence, multicolliniarity and heteroscedasticity detection test were performed using appropriate test statistics.

Prior to running, multicolliniarity and heteroscedasticity problem were checked by using Variance inflation factor for continues and contingency coefficient for dummy variables and also the ime test was used to correct heteroscedasticity problems. VIF value greater than 10 indicates severe co linearity among regressors. Similarly, Contingency Coefficient (CC) test uses a correlation coefficient of 0.75 as its tolerable critical value in which CC value more than 0.75 indicates co linearity problem Gujarati (2004).Since the mean value of VIF is 1.32 that is less than 10 and Contingency Coefficient (CC) value less than 0.75 the test estimates show that there is no serious correlation among the proposed explanatory variables. For this reason, thirteen explanatory variables were included in the model estimation to identify factors affecting Niger seed Marketable supply at household level. In this regard, the result of multiple

linear regression models revealed that, of thirteen variables included in the model eight variables affect marketable supply of Niger seed positively at house hold level. Thus marketable supply is affected by area of land used for Niger seed production, educational status, ownership of oxen, sex of household, quantity of Niger seed produced, perception of current price, market information and access to credit. The detail results of this regression were presented in table 15.

Table: 15   Factors affecting niger seed marketable supply at household level

Variables	Coef.	Std. Err.	P>|t|
AGE	.0095	.0124	0.443
SEX(Male)	.8473**	.3236	0.010
EDU	.1924*	.1115	0.087
FS	-.2183	.1525	0.154
ALUNP	.7488**	.2869	0.010
TLU	.0311	.0347	0.371
QPRO	.3363***	.0427	0.000
PRICE	.6692***	.2519	0.009
ONOXE	.8053***	.1204	0.000
FEXCON	-.0684	.1244	0.583
DNSTM	.0109	.0917	0.905
ACSE	1.022***	.2767	0.000
ACMINFO	.6985**	.2907	0.017
_cons	.0580	1.153	0.960

Number of obs = 165, Prob > F = 0.0000, R^2 =80.27%, Adj R^2 = 78.57 %, Root MSE = 1.57

Where: ***, ** and * are statistically significant at 1%, 5% and 10%, respectively.
Source: Own computation from survey result, 2016

Sex of the Household Head (Sex): The estimated coefficient of this variables revealed that sex of the household head influenced marketable supply of Niger seed positively at 5% significance level. This implies that if the household headed is male, the marketable supply of Niger seed is increased by 0.8473quntal compared to female headed household. This can be explained by the fact that males have relatively better labor advantage to produce and supply more volume. Secondly, males are subjected to different expenditure. The need of cash for

expenditure of agricultural inputs like fertilizer, herbicide, insecticide, and transportation costs. The need of cash made them to supply higher volume of Niger seed to the market. This study was supported by (Mohammed, 2011) the sexes of household head affect teff marketable supply positively in Halaba special district of southern Ethiopia.

Education of the Household Head (HEduc): This variable affects marketable supply of niger seed positively at 5% significance level. This implies that as an increase in year of schooling by one year, quantity of niger seed supply increased by 0.1924qunital.This is in line with (Fakoya *et al*., 2007) found that, formal education enhances the information acquisition and adjustment abilities of the farmer in improving the quality of decision making.

Quantity of Niger seed produced (yield): The estimated coefficient of this variable revealed that quantity of niger seed produced at household level affect marketable supply of niger seed positively at 1% significance level. This implies that an increase in niger seed production by one quintal results an increase niger seed marketable supply by 0.3363quintal. This finding is in line with the study by Chauhan and Singh (2002) also showed that, marketable surplus of paddy is positively related to the volume of production as well as with area under crop.

Land allocated for Niger seed production (Land): The estimated coefficient of this variable was found to be positively significant at 5% level and affect Niger seed marketable supply positively. This implies that, as the area of land allocated for Niger seed increased by one hectare, quantity of Niger seed supplied to the market increased by 0.7488qunital. This result revealed that farmers, who have more farm size, are most likely to produce Niger seed. Desta, (2004) and Geremew, (2012) reported that availability of land enables the owner to earn more agricultural output which in turn increases the marketable supply and farmers who have more farm size, are most likely to produce sesame, keeping the effects of other variables constant it indicates as households' farm size increases, the probability to produce sesame increases, ceteris paribus or other things constant and in turn increase marketable supply.

Ox ownership (OX- No): Ownership of oxen was highly and positively significant at 1% level .This implies that, as the number of oxen ownership increased by one ox, the amount of Niger seed marketable supply increased by 0.8053qunital. This is due to the fact that those household's who have a large number of oxen are more likely to till land on time and prepare

the land for Niger seed production. This is so since oxen were used as a major means of land preparation in the study area. This finding is in line with Kinde (2007), number of oxen, owned affect significantly and positively sesame marketable supply in Metema district.

Perception of current price (MRKTPRICE): This is variable affects marketable supply of Niger seed positively at 1% significance level. This implies that, if the price of Niger seed was attractive, the quantity of marketable supply increased by 0.6692qunital.This is in line with the results of previous studies by Sarkar and Roy (2013) and (Adesiyan *et al.* (2012) found that an average price of paddy received by farmers affects marketable surplus of crops positively.

Access to Information (Acc_MktI): The result of estimated coefficient of this variable was negatively significant at 5% significance level and affects marketable supply of Niger seed positively. This means as the farmer access to market inforimation by one unit, amount of niger seed marketable supply increased by 0.6985 quintal. This study agree with Goetz (1992) noted that better market information significantly raises the probability of market participation for potential selling households.

Access to credit (ACSE): The result indicated that, the estimated coefficient of this variable affects positively at 1% significance level means that as niger seed producers being access to credit, the quantity of niger seed supply to the market increased by 1.022quintal. From this result it can be stated that those farmers who have access to credit, in cash cover purchasing of agricultural inputs and increase production thereby increase marketable supply. This study agree with earlier study Rahmeto, 2007 reveals that credit affect the probability of adoption of improved varieties, the quantity of fertilizer farmers apply increase production thereby improve marketable supply of haricot bean.

4.3.2. Determinants of Niger seed market outlet choices

A Multivariate probit model was used to estimate three binary dependent variables namely collectors, cooperatives and wholesalers market out let because of these variables are the dominant outlet compared to consumers outlet since the commodity mainly produced for sale rather than consumption. The P-value of the Wald test statistics for the overall significance of the regression is low (p value=0.0000) indicating that the multivariate regression is significant. Further, the likelihood ratio test of rho is significant (P- value = 0.0001) indicating

that a multivariate probit specification fits the data. The significance of the off-diagonal elements of the covariance matrix shows that there are unobserved heterogeneities that influence the choice decisions on the different market outlets.

The correlation coefficients among the error terms are significant indicating that the decision to choose one market outlet affects the decision of choosing the other. The correlation coefficients between the collector and cooperative and collector and wholesaler market outlets is negative and significant at 5% level indicating that farmers who choose one market outlet are less likely to choose another. All of the interpretation for the multivariate probit model result for Niger seed outlet choice was presented in table 16 of next page.

Table 16: Multivariate probit model Result

	Collector			Cooperative			Wholesalers		
Variable	Coef.	Std. Err.	P>|z|	Coef.	Std. Err.	P>|z|	Coef.	Std. Err.	P>|z|
Age |	.0164	.0128	0.203	-.0112	.0103	0.275	-.0019	.0104	0.848
Sex |	.1678	.4269	0.694	.0944	3194	0.768	.4201	.3501	0.207
EDU |	-.0390	.1098	0.722	-.0590	.0970	0.543	-.0870	.0949	0.359
NOFI |	0.000	0.000	0.582	-0.000	0.000	0.465	-0.000	0.000	0.251
FEXC |	.0827	.1068	0.438	.0286	.0908	0.753	.2735**	.0960	0.004
ACTS |	-.1683	.3500	0.631	-.2484	.2905	0.393	-.1111	.2718	0.683
ACS |	.0118	.3072	0.969	-.0717	.2490	0.773	0.124	0.271	0.648
AMI |	-.2273	.2585	0.379	0.109	.2334	0.513	.6102**	.2598	0.019
TOS |	-.5014*	.1996	0.012	.5258***	.1677	0.002	.8839***	.1692	0.000
QPR_o |	0.000	0.0003	0.902	.0016***	.0003	.000	.0017***	.0004	0.000
DST |	-.0008	.0084	0.921	.0314	.0790	0.690	-.0030	.0193	0.873
MCOOP	-.3402	.3904	0.383	.6128**	.3214	0.057	.4424	.3129	0.157
PRICE	-.2239	.2578	0.385	.0466	.2207	0.833	.2187	.2303	0.342
_cons |	1.912	1.239	0.123	-2.698	1.009	0.007	-4.018	1.036	0.000

Where,N=165, Wald chi2(39) = 91.19,Prob > chi2 = 0.0000, Likelihood =--242.17049, rho21 = rho31 = rho32 = 0: Where,1,2,3, stands for collectors, cooperative and wholesalers respectively and ***,**,*,represents level of significance at 1%,5%,and 10% respectively.

The result implies that, the probability of choosing collector market outlet was influenced by time of sale negatively at 5% level of significance. This is due to the fact that those households who store their product to sale late of the year lost large amount of birr from their Niger seed sale because they were accountable for loss, even exposed to price fluctuation since collectors buying price is less than wholesalers and cooperatives. Geremew, (2012) found that the negative correlation between selling of sesame in latter months after harvest to local collectors compared to cooperatives and other traders.

The probability of choosing cooperatives, market outlet was determined by quantity of Niger seed produced at 1% significance level. This is due to the fact that farmers those who produce large quantity of Niger seed increase the probability to choose cooperative outlet rather than collectors since the price of cooperative is greater than collector price in the study area. The study by Emana *et al*. (2015) also indicated that large volume of sales motivate households to prioritize the channels and decide to use the best alternative.

The probability to choose cooperative outlet is affected by membership to cooperative at 5% significance level. This implies that as farmers become members to cooperative, he/she choose cooperative outlet in order to maximize benefit share through dividends from their sale.

Time of sale affects cooperative outlet positively at 5% significance level this implies that as the time of selling increase from immediately after harvest to late of the year ,farmers choose cooperative outlet because cooperatives pay affordable price than collectors.

The probability of choosing wholesaler outlet is positively affected by quantity produced and times of sale at 1% significance level. This explained that, those farmers who produce large quantity of Niger seed, the probability to sale his product to wholesalers also increase by increasing their bargaining power. This result is consistent with the result from a study by Emana *et al.* (2015) has positive relationship with the likelihood of choosing wholesalers channel. At the same time, those farmers who store Niger seed in his/her home until price rise or to sale late of the year also choose wholesaler outlet than other outlet and get high benefit from the sale of Niger seed. Again the probability to choose wholesaler market outlet were influenced by frequency of extension contact and market information positively at 5%

significance level. Implies that as producers regularly contact with DA's he/she improve his/her knowledge and skill on niger seed production and marketing thus increase volume of niger seed produced and strengthen their bargaining power thus increase the probability to choose wholesaler market outlet choice.

4.4. Constraints and opportunities of Niger seed value chain

4.4.1. Constraints of input suppliers

The most important physical inputs for Niger seed production are improved seeds, fertilizers, pesticide/herbicides, Research and development, extension services, information and appropriate technological support are non-physical inputs that are important for higher outputs of Niger seed. Among the total sample of respondents explained that, all (100%) of producers in the area use local seed for Niger seed production due to unavailability of improved seed varieties and only 27% of the respondents use fertilizer for production and also138(83.6%) of the farmers not used in organic fertilizer due to lack of awareness in use of fertilizer for niger seed production and limited access to supply of inputs like improved seed, lack of research and development service for the improvement of oil seed production in the study area.

Table 17: Type of input used and source for niger seed production

Input type	Source	N	%
Local seed	Owen	165	100
Improved seed	-	-	
inorganic fertilizer used	Cooperatives	27	16.4
inorganic fertilizer un used	-	138	83.6
Total		165	100

Source: Owen computation from survey result 2016

4.4.2. Opportunities of input suppliers

The availability of Development agent that provide extension service, micro- financial institutions like oromia credit and saving share company that provide financial services, Offices of agriculture, primary cooperatives, cooperative promotion office, and Office of

trade and market development are the main supporting actors who play a central role in the provision of supportive services mentioned as an opportunity for input suppliers in the study area. The other opportunity is the infrastructural development like road and net-work availability to facilitate information and dissemination of technological inputs to overcome the problem of Niger seed producers concerning production input in terms of finance or capital, labor, land, knowledge and skills.

4.4.3. Constraints of niger seed production

There are many factors that hinder the production of Niger seeds in the study area. The majority of the sample producers respond that, natural factors such as drought, frosts, weeds and high rain fall were identified as major Niger seed production constraints. Drought, frost and Rain fall affects its yield especially at flowering stage this often beyond the control of farmers and institutions while weeds were scientifically controlled by biological (crop rotation) and mechanical methods.

Diseases and pests: This was directly related to agricultural input access problem. Unavailability of favorable pesticide and herbicides mainly create these problems in addition to the problem of accessing to improve and diseases resistance seeds varieties. This forced farmers to use poor quality seeds, as high quality seeds are often not available at planting time. The other reason for this problem is the problem of management skill. Inadequate farmer skills and knowledge on production and poor agronomic practice and farm management creates problems in production. This is mainly related with poor extension service on Niger seed production in the study areas.

Table 18: Major niger seed production constraints

Major constraints	N	%
pest and ,disease,	26	15.8
Drought and Frost	32	19.4
weeds problem	15	9.1
All of the above	79	47.9
seed shortage	13	7.8
Total	165	100

Source: Own computation from survey result, 2016

4.4.4. Production opportunities

The favorable agro-climatic conditions, land and labor availability that are used for Niger seed production and its land rehabilitation capacity can make Niger seed producers highly cost-effective, competitive, and provide huge opportunities in the study area. Unfortunately, these opportunities have not been exploited by the farmers due to the lower price they receive for their produce in the markets, as well as bearing the cost of post-harvest losses especially weight loss problem is the main common in Niger seed.

Availability of high production potential of land, high income generating capacity of cash crops within a short period of time or season ,opportunity to improve agronomic practice for following crops and it used as cash income source for livelihood consumption, and its continuous demand in the market were some of the opportunities of Niger seed production. The survey result revealed that producers expand niger seed production 64.8% for High cash crop and earn more income than other crops, 4.2% to maintain or improve soil fertility and 30.9%% for both of the above reason.

Table 19: Opportunities in niger seed Production

Purpose	N	%
High cash crop	107	64.8
To improve soil fertility	7	4.2
Both	51	30.9
Total	165	100

N=frequency, %=percentage

Source: Authors survey result 2016

Although Niger seed have some production and marketing constraints, The district have naturally endowed   potentials that are very suitable to produce Niger seed that helps to improve production and productivity of following crops like teff, sorghum, maize, barley and wheat. Government suitable agricultural policies designed to support farmers at the grass-root level especially emphasis given for cereal crop production in Growth and Transformation Plan (GTP) is the other opportunity dimension. The deployment of development agents at each kebeles based on their academic back ground are also an important policy dimension.

4.4.5. Marketing constraints

Almost all Niger seed producer farmers responded that there were market problems in the study area. The major Niger seed marketing constraints are related with market fluctuations or limited access to market. This is due to Lack of oil milling or processing facilties, Lack of storage facilities, Lack of capital, Poor linkage between value chain actor, Poor market information, lack of market arrangement, unfair payment paid by traders, low price of the product, low quality product supplied by some farmers that cannot meet consumers demand especially in threshing and lack of quality standards were mentioned as the major marketing problems in the study area.

Table 20: Major marketing constraints of niger seed producers

Major Constraints	N	%
Lack of oil milling in the area	53	32.1
Lack of capital	57	34.5
Poor linkage between actor	22	13.3
Poor market information flow	22	13.3
unfair payment paid by traders	11	6.7
Total	165	100

Source: Authors survey result, 2016

4.4.5.1. Major marketing constraints of Niger seed Traders

Again all traders engage in Niger seed value chain confirmed that there is marketing problems in Niger seed value chain. The major Niger seed marketing constraints mentioned by traders are related with the limited power of price setting, problem in information flow, price fluctuation, problem of supply shortage, low quality product. Traders also mention that the main cause of these problems are high monopolistic power of Brokers, lack of processing facilties in the area, poor linkage between value chain actors, long chain condition of the market and lack of support from responsible bodies in terms of finance, quality standardization, information flow and market arrangement or unavailability of market collection centers in the study area.

Table 21: Major marketing constraints of niger seed Traders

Major Constraints	N	%
Limited power in price setting	14	21.9
price fluctuation	17	26.6
shortage of supply	11	17.2
lack of storage facility	7	10.9
Poor information flow	10	15.3
low quality of product	3	4.7
Lack of quality standard	3	4.7
lack of financial support from government	5	7.7
Total	64	100

Source: Authors survey result, 2016

In addition to traders, data collected from key informant interview and focus group discussion showed that the absence of policy instrument that governs trade rule and regulation of Niger seed market route is a serious and main marketing problem. Processors buy the products at central market with high prices through brokers and after processing sell to urban wholesalers, Retailers and consumers. Producers sell at minimum price in local market and Processors get less margin compared to urban wholesalers because of illegal actors that involve in Niger seed value chain through brokers and transportation of long distance from production area to Addis Ababa markets. This shows that there were high losses of margin among Niger seed value chain actors due to lack of appropriate policy issue to control brokers.

4.4.5.2. Marketing opportunities

The availability of high market demand throughout the year, growing a number of buyers, high experience in Niger seed trade, were some of the opportunities of Niger seed marketing, and high oil content of Niger seed produced compared to other areas. The oil extraction rate per quintal of Niger seed varies with type of varieties as 37. 11% Este, 38.39% Kuyu, 37.41% Fogera, and 39.3% Shambu (EARO, 2004) were an important opportunity for Niger seed marketing in the area. Furthermore, provision of infrastructure facilities like roads,

telecommunication, power supply and financial service are the major opportunities that facilitate the production and marketing of Niger seed in the study area.

4.4.6. Constraints of oil seed processing

The entire respondent revealed that oil seed processing produce organic Niger seed edible oil, but they produce under capacity due to uncoordinated Niger seed value chain actors both in horizontal and vertical direction starting from input suppliers, producers, traders, brokers and consumers. The main identified problems that affect oil seed processors are unreliable supply of niger seed interims of quality and quantity, long market channels to buy oilseed, poor information flow, Lack of finance, market arrangement, and facilitation role to sustain the key niger seed value chain actors along the value chain. Lack of attention from government to motivate oil seed processing industry. The other main problem reported during survey time was constraints of processing facilities or equipment to process oil seed at its full capacity of oil millers and the over-flooding of imported palm oil over domestic oil millers hinders their business.

4.4.7. Processing opportunities

Even though oil seed processors constraints with many challenges, they have also an opportunity to process oil seeds including availability of high production potential for oil seed production and processing and also the high oil content of Shambu niger seed variety compared to other areas. Road, transportation, electricity, telecommunication or net-work availability that facilitate the processing and marketing. There is also a huge availability of consumer demand mentioned as another opportunity in the area.

5. SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1. Summary

Niger seed is one of the main widely produced oil seed crops mainly in highland parts of Ethiopia and have high contribution to the national economy. The study was aimed at analyzing value chain of Niger seed in Jardegajarte district of Oromia region. With the specific objective of identifying value chain actors and examining their performance, analyzing the determinants of niger seed supply to the market, identifying marketing channels and factors affecting outlet choice decisions of farm households and .identifying opportunity and constraints. Both primary and secondary sources were used to collect data. The primary data were collected from 165 randomly selected households, 65 traders, 20 and consumers, focus group discussion and key informant interview were held using pre-tested semi-structured questionnaire and checklist. While secondary data source were collected from relevant institutions those who have direct or indirect linkage with it. The analysis was done using descriptive statistics and econometric model using SPSS version 20 and STATA version 13 software. All the sampled households were Niger seed producers and good supplier. Market outlet choice decision and marketable surplus of Niger seed found to be an important element for the study. Therefore, multiple regression models was used to identify determinants that affect the marketable surplus and Multivariate probit model was applied to analyze factors affecting market outlet choice of farmers in the study areas.

Out of the total sample respondents, majority of them were male headed and the remaining were female headed households. The average age of the sampled household head were 46 and the average family size was about 5per household. value chain analysis of the study areas revealed that the main value chain actors are input suppliers, producers rural and urban wholesalers, processors cooperatives ,retailers, collectors, and consumers. Office of agriculture, trade and market development office, Oromia saving and credit share company, informal credit suppliers like local money lenders and banks were identified as the main value chain supporters in the study area. The result of value chain performance of actors indicates that the highest profit margin was earned by urban wholesalers' and processors compared to other actors even though producers operating expense is very high but the lowest profit margin was earned by collectors.

The result of multiple linear regression model revealed that, marketable supply of Niger seed was significantly affected by quantity of Niger seed produced, area of land allocated to Niger seed, no oxen owned, sex of household head, educational status, perception of current price, access to market information and access to credit positively.

The result of multivariate probit model indicated that the probability to choose collector outlet was significantly affected by time of negatively compared to cooperative and wholesaler outlet. Similarly, the probability of choosing cooperative marketing outlet was affected by quantity produced, cooperative membership and times of sale positively compared to collectors and wholesaler outlet. The probability of choosing wholesaler outlet was positively affected by quantity of Niger seed produced, times of sale, frequency of extension contact and market information compared to collectors and cooperative, outlet.

The main constraints and opportunity in Niger seed value chain were identified in different stage of actors as input suppliers, production or producers' level, traders, processors and consumers.

5.2. Conclusion

Out of the total sample respondents, 27 (16.4 %) of them were female headed and the remaining 138 (83.6%) were male headed households. The average age of the sampled household head is about 46 years. The average family size was about 5 per household implies that, majority of them are labor forces. value chain analysis of the study areas revealed that the main value chain actors are input suppliers, producers rural and urban wholesalers, processors cooperatives ,retailers, collectors, and consumers. Office of agriculture, trade and market development office, Oromia saving and credit share company, informal credit suppliers (local money lender) and banks were identified as the main value chain supporters in the study area.

The result of value chain performance analysis of actors indicates that traders' operating expense is very low compared to producers but the profit margin of producer is only 7% of the total profit margin. While urban wholesalers, earned 21% of profit margin followed by 19% processors, 18% Union and 16% rural wholesaler, 12% cooperative, 7% producers, 6% retailers, and 2% collectors

The result of multiple linear regression model indicated that, marketable supply of Niger seed was positively affected by quantity of Niger seed produced at 1 % significance level, area of land allocated to niger seed at 5%, no oxen owned at 1%, sex of household head at 1%, educational status at 10%, perception of current price at 1%, access to market information at 5% and access to credit at 1% significance level.

The result of multivariate probit model indicated that the probability to choose collector outlet was affected by time of sale negatively at 10% significance level compared to cooperative and wholesaler outlet. Similarly, the probability of choosing cooperative market outlet was affected by quantity produced, and times of sale positively at 1% significance level and also by cooperative membership at 5% significance level compared to collectors and wholesaler outlet. The probability of choosing wholesale market outlet was highly and positively affected by quantity of Niger seed produced, times of sale at 1% significance level and also positively affected by frequency of extension contact and market information at 5% significance level compared to collectors and cooperative, outlet.

Lack of modern input supply like improved seed, fertilizer, pectised and insecticide, drought, frost and disease Constrains niger seed production and On marketing side, limited access to market, low price of the product, and lack of processing or oil milling facilities, low quality of product or oil seed supply and lack of policy framework to control the illegal district-Addis Ababa broker trade route are the major problems in the area while high availability of production potential, infrastructural facilties and high demand to consume the organic oil seed were mentioned as an opportunity for oil seed processing and Niger seed traders in the study area.

5.3. Recommendations

The recommendations or policy implications to be drawn from this study are based on the significant variables from the analysis of present study. To start with, dissemination of modern input technologies is essential in increasing the productivity of Niger seed. The farmers are small-scale and organized only at skeletal level in the study area, this kind of problem clearly needs strong government intervention. Not only does it require providing input facilities, but also their dissemination to ensure optimal access. Effort should also be

made to strengthen farmers' cooperative and encourage collective action of farmers to lower transaction costs and access inputs.

The result of value chain performance analysis of actors indicates that traders' operating expense is very low compared to producers but the profit margin of producers was less than that of traders among value chain actors. So, strong intervention could be taken by government to upgrade producers through improving trade regulation of niger seed and shorten its marketing channel since many of the activities was done by producers.

The results of econometric analysis indicated that Niger seed supply to the market is positively affected by quantity of Niger seed produced, oxen ownership, area of land allocated to Niger seed, sex of household head, educational statuse, perception of current price, access to market information and access to credit service. Therefore, these factors must be promoted by government and NGOs through facilitation of agricultural inputs including credit service to buy oxen or draft animals, improved seed, fertilizers and improve farmers' skill and knowledge through training or education, extension service (information service) in order to increase production and improve Niger seed marketable supply or commercialization of this crop is better alternative to increase marketable supply of Niger seed through introduction of improved varieties, application of fertilizers, usage of modern technologies, strengthening the linkage of supportive service among value chain actors.

Research and development should work hard on improvement of Niger seed varieties and establish their sub-research centers in the area to follow up their daily working activity concerning oil seeds with minimum cost to improve production and marketable supply hence Niger seed is the main cash crop of producers in the area. The improvement of agronomic practice and management systems should also be taken in to consideration by development agent and office of agriculture through training and awareness creation to increase its production and marketable supply.

The Collector outlet choice was significantly affected by time of sale negatively compared to wholesaler and cooperative. Therefore, these factors must be considered in developing

farmers' awareness about time of sale and post harvest handling by developing farmers' skill and motivating producers in supply of Niger seed to wholesalers since buying price of collectors is less than cooperative and wholesalers.

Quantity produced cooperative membership and times of sale affect Cooperative outlet positively compared to collectors' outlet. This must be motivated by agricultural office and cooperative promotion office to improve market participation, increase producers income share in the form of dividend for members and improve time utility from his/her sale compared to collector outlet.

Quantity of Niger seed produced, times of sale, frequency of extension contact and market information affect wholesaler outlet positively compared to collectors and cooperative outlet. These factors must be promoted to improve the income of farmers' from Niger seed sale. In addition, improving market information system through mass media, organizing agricultural market information system, market arrangement and creating conducive environment by linking producers to oil processors should be taken in to consideration by government to improve farmers benefit share along value chain actors and to accelerate Niger seed value chain development in the study area .

Regarding price fluctuation, traders fix price regularly through brokers by using central market as a base reference and producers' sell to any nearest outlet rather than go far to wholesaler market outlet. So strong government intervention is needed to control district-Addis Ababa illegal broker routs and give awareness or motivates farmers to sell wholesaler outlet in order to get higher profit margin. Finaly, licensing Niger seed traders, contractual farming (agreement between producers and oil processors) and organizing quality inspection department or quality standardization agency for Niger see seed value chain and also give attention for oil processors in building their capacity interims of finance and skill by governmental and non-governmental organizations are an important issue to improve niger seed value chain development in a sustainable ways in the study area.

6. REFERENCES

Abbot, J. and P. Makeham, 1981. Agricultural economics and marketing in the tropics. Wing Tai Cheung Printing Co. Ltd, Rome. 58pp.

Adesiyan, O. F., Adesiyan, A. T., and Oluitan, R.O. 2012. Market supply response of cassava farmers in Ile-Ife, Osun State. *Canadian Social Science,* 61-63.

Adugna.G, 2009. Analysis of fruit and vegetable market chains in Alamata, Southern Zone of Tigray: The case of onion, tomato and papaya. M.Sc thesis presented to the school of graduate studies, Haramaya University. pp98.Africa, 21:3, 531.org/-554. African Centre for Economic Transformation, http://acetforafrica.

Agate. J, 2014. An analysis of factors influencing participation of smallholder farmer in red bean marketing in Halaba Special district, Ethiopia. Msc Thesis, university of Nairobi, Kenya.

Agegnehu, G. (2011) (Ed.) ^ (Eds.) Management Practices in Noug in the Central Highlands of Ethiopia. , Ethiopian Institute of Agriculture, Addis Ababa.

Alemaw, G. and Wold, A. (1995) Agronomic and seed -quality evaluation of noug (*Guizotia abyssinica Cass*.) germplasm in Ethiopia. Short communication. Plant Breeding 114:375–376.

Alexandra, O. and D. Mary. 2006. Implementing sustainable private sector development: striving for tangible results for the poor: Annual BDS Seminar, Turin, Italy.

Ali, R. 2005. Impact of rural road improvement on high yield variety technology adoption among producers in Baringo district, Kenya**.** Evidence from Bangladesh. Doctoral Dissertation, Cornell University, Ithaca. Msc Thesis, Egerton University, Kenya.
Anandajayasekeram, P. and Berhanu Gebremedhin, 2009. Integrating innovation system perspective and value chain analysis in agricultural research for development: implications and challenges. Improving Productivity and Market Success (IPMS) of Ethiopian farmers project working paper 16. ILRI (International Livestock Research Institute), Nairobi, Kenya.

Arinloye, Stefano Pascucci, Anita R. Linnemann, Ousmane, N. Coulibaly, Geoffrey Hagelaar and Onno S. W. F. Omta. 2015. Marketing channel selection by smallholder farmers. *Journal of Food Products Marketing*, 21(4): 337-357.

Backman, T. and R. Davidson, 1962. Marketing principle. The Ronal Presses Co., New York. pp. 3-24.

Bammann, H., 2007. Participatory value chain analysis for improved farmer incomes, employment opportunities and food security. Pacific Economic Bulletin, 22, (3):125.

Barrett, C. 2008. Smallholder market participation: Concepts and evidence from eastern and southern Africa. *Food Policy,* 34: 299-317.

Brehanu.G. and M.Jaleta, 2010. Commercialization of Smallholders: Is Market Participation Enough.   International Livestock Research Institute (ILRI).Addis Ababa. Ethiopia.

Berem, M.R. 2009. Analysis of the constraints and effects of value addition in honey Among Producers. In Baringo District, Kenya. Msc Thesis, university of Egerton, Kenya.

Bezabih, Emana, 2010. Market assessment and value chain analysis in Benishangul Gumuz Regional State, Ethiopia. SID-Consult-Support Integrated Development, Addis Ababa, Ethiopia.

Bezabih Emana and Mengistu Nigussie. 2011. Potato value chain analysis and development in Ethiopia: Case of Tigray and SNNP Regions. International Potato Center (CIP-Ethiopia).

Bezabih Emana, Mengistu Ketema, Jemal Yousuf, Jeffreyso K. 2015. Factors affecting market outlet choice of potato producers in eastern hararghe zone. *Journal of Economics and Sustainable Development*, 6(15): 159-172.

Biodiversity International (2011) Sustainable agriculture. Sustainable agriculture for food and nutrition security. Annual Report. *Bangladesh Journal of Agricultural Economics.* 24(2): 127-142.

Bongiwe G. and B. Masuku, 2012. Factors affecting the choice of marketing channel by vegetable farmers in Swaziland. Canadian Center of Science and Education. Sustainable Agriculture Research; 2, (1); 123.

Burnette, R. (2010). The Recent Introduction of Nigerseed Production in Northern Thailand. ECHO Asia.

Capellari and Jenkins, 2003. Multivariate probit regression using simulated maximum likelihood. *Lorenzo Cappellari* and *Stephen Jenkins* (s.jenkins@lse.ac. Uk). *Stata Journal*, 2003, vol. 3, issue 3, 278-294.

CSA (Central Statistical Agency), CSA 2010. Agricultural Sample Survey 2009/10: Volume II, Report on Livestock and Livestock Characteristics (Private Peasant Holdings)," Statistical Bulletin 468, Federal Democratic Republic of Ethiopia.

CSA (Central Statistical Agency) 2011, Agricultural Sample Survey 2010/2011 (2003 E.C.); Report On Area And Production of Major Crops, Volume I, Statistical Bulletin, April 2011, Addis Ababa Chains (Agriculture).Science (POLICYFORUM) 132:1154–1155.

CSA (Central Statistical Agency 2013) Population Projection of Ethiopia for All Region sat Woreda Level from 2014 – 2017. Federal Democratic Republic of Ethiopia. Addis Ababa, Ethiopia

CSA (Central Statistical Authority. 2013. Agricultural sample survey of Household Characteristics Report Ethiopia. Federal Democratic Republic of Ethiopia. Addis Ababa, Ethiopia.

Chalwe, S. 2011. Factors influencing bean producehoices of marketing channels in Zambia. MSc Thesis, University of Zambia, Zambia. Djalalou-Dine A.

Chauhan, V.K. and Singh, R. 2002. Marketed surplus of paddy-A regression analysis. National level quarterly. *Journal of Agricultural Marketing,* 45 (2):175-187.

Chauvin, Nicolas, 2012 .More cash from cash Crops: Giving Farmers a Better Deal in Africa.

Corsi, A., Borsotto, P., Borri, I. and Strom, S. 2009. Diversification of the marketing chains among organic producers. *Contributed Paper prepared for presentation at the International Association of Agricultural Economists Conference*, Beijing, China.

Dawit Gebregziabher, 2010. Market chain analysis of poultry: The case of Alamata and Atsbi-Wonbertaworedas of Tigray Region. M.Sc thesis submitted to the School of Graduate Studies, Haramaya University. 80p.

Dendena, Getachew, Efrem Lema and Lema Belay, 2009.Fresh mango value chain analysis in Arbaminch area. Organization of value chain competency. Addis Ababa, Ethiopia.

Dereje Birehanu, 2007. Assessment of forest coffee value chains in Ethiopia: A case study in Kafa zone, Gimbo district. Agricultural Science and Resource Management in the Tropics and Subtropics (ARTS).German.

Desta Beyera, 2004. Impact of community managed irrigation on farm production efficiency and household income. The case of Weliso and Wenchi districts of Oromia Regional State. M.Sc. Thesis Presented to the School of Graduate Studies, Haramaya University**.** 46p.

Diao X., 2007. Demand constraints on agricultural growth in east and southern Africa: A general equilibrium analysis. *Development Policy Review*, 25(3): 275-292.

Dorward, A., J. Kydd and C. Poulton, 2005. Beyond liberalization: Developmental coordination policies for African smallholder agriculture. *IDS Bulletin*, 36(2):80-5.

EARO (2004) (Ed.) ^ (Eds.) Directory of Released Crop Varieties and their Recommended   Cultural Practices. , Addis Ababa, Ethiopia.

Elias, G., 2005. The Production of Oilseeds in Ethiopia: Value Chain Analysis and the Benefit that Accrue to the Primary Producer. A minithesis submitted to Institute of Social Development and management science. University of the Western Cape. Cape town**,** December 9, 2005.

Enhancement"-Final Report. Ethiopian Investment Agency (EIA, 2012): Ethiopia Investment Guide_2012.php/.

Evans, P. and T. Wurster, 2000. Blown to bits: How the new economies of information transform strategy. Harvard Business Scholl Press, Cambridge, Massachusetts, USA.

Evans, P. and T. Wurster, 2000.Blown to bits: How the new economies of information transform strategy. Harvard Business Scholl Press, Cambridge, Massachusetts, USA.

Fakoya, O., M. Agbonlahor and A. Dipeolu, 2007. Attitude of women farmers towards sustainable land management practices in South-Western Nigeria. *World Journal of Agricultural Sciences*, 3(4): 536-542.

Feller, A., Shunk, D. and Callarman, T., 2006. Value chains versus supply chains. *BP Trends, March*, pp.1-7.

Fenta. M., J. van Wijk and Sarah Drost, partnerships Resource Centre/. SDC-Maastricht School of Management, 2011. The Edible Oil and Oilseeds Value Chain Contribution to Value Chain   Development in Ethiopia.p.no.594.Addis Ababa Ethiopia.

Ferto, I. and Szabo, G.G., 2002. Vertical coordination in transition agriculture: A cooperative case study. Institute of Economics, Hungarian Academy of Sciences, Discussion Paper.

Fikre, A. (2011) (Ed.) ^ (Eds.) Enhancing Production, Productivity, Quality and Marketing of Oilseeds in Ethiopia. Ethiopian Institute of Agriculture, Addis Ababa. Food Crop Debate" Crop Post Harvest Program, Issue Paper 3.

Francis, C. and Campbell, M.C.M. (2003) New high quality oil seed crops for temperate and tropical Australia. A report for the Rural Industries Research and Development Corporation., Rural Industries Research and Development Corporation.

Fries, B., 2007. "The value chain framework, rural finance, and lessons for TA providers and donors." Presentation at the International Conference: *Agri- Revolution: Financing the Agricultural Value Chain*, Mumbai, India.

Gebremedhin, B., Jemaneh, S., Hoekstra, D. and Anandajayasekeram, P. 2012. A guide to market oriented extension services with special reference to Ethiopia. IPMS,(Improving Productivity and Market Success) of Ethiopian Farmers Project. Nairobi: ILRI.

Gereffi, G. 1999. A commodity chains framework for analyzing global industries. Workshop on spreading the gains from globalization, University of Sussex, Institute of Development Studies.

Geremew, Kefyalew,2012.Analysis of Smallholder Farmer's Participation in Production and Marketing of Export Potential Sesame in Ethiopia, with particular reference to Diga area, MSc Paper, Addis Ababa University.

German Agency for Technical Cooperation (GTZ) (2007). Value Links Manual. The Methodology of Value Chain Promotion. Eschborn, Germany, 2007, GTZ.

Getnet, A. and Sharma, S.M. (1996) Niger. Guizotia abyssinica (L. f.) Cass. , Promoting the conservation and use of underutilized and neglected crops. Rome.

Gibbon, P. and Ponte, S., 2005. *Trading down: Africa, value chains, and the global economy*. Temple University Press.

Gibbon, Peter and Ponte, Stefano (2005) *Trading Down: Africa, Value Chains and the Global Economy*: Philadelphia, Temple University Press

Gomez, M.I., et al. (2011) Research Principles for Developing Country Food Value Chains (Agriculture).Science (POLICYFORUM) 132:1154–1155.

Greene, W., 2000.Econometric Analysis.4th edition. NJ: Prentice Hall, Englewwod Cliffs.

Greene, W., 2003.Econometric Analysis. Fifth edition. Prentice Hall, New Jersey.

Gujarat, D. 2004. *Basic of Econometrics*, 4*th Edition*. McGraw hill Company, In. United States Military Academy, West Point.

Gujarati, D., 2003. Basic Econometrics.4th edition. Tata McGraw-Hill Publishing Company Limited, New Delhi, India. 614p.

Hall. FG, KF Huemmrich, SJ Goetz, PJ Sellers Journal of Geophysical Research: Atmospheres, 1992.

Hobbs, D., Lister, S., Hadfield, P., Winlow, S. and Hall, S., 2000. Receiving shadows: governance and liminality in the night-time economy1. *The British journal of sociology*, *51*(4), pp.701-717.

Hobbs, J., A. Cooney, M. Fulton, 2000. Value market chains in the agri-food sector: Department of Agricultural Economics, University of Saskatchewan, Canada.

Holloway, G. and S. Ehui, 2002. Expanding market participation among smallholder livestock producers: A collection of studies employing gibbs sampling and data from the Ethiopian highlands. Socio-economic and Policy Research Working Paper 48. ILRI, Nairobi, Kenya. 85p.

Humphrey, J. and H. Schmitz, 2002. How does insertion in global value chains affect upgrading in industrial clusters? Institute of Development Studies, Brighton.

Humphrey, J. and O. Memedovic, 2006. Global value chains in the agri-food Sector UNIDO Working Paper, Brighton.

Humphrey, J., 2003. Opportunities for SMEs in developing countries to upgrade in a global economy. ILO SEED Working Paper No. 43, Geneva.

Islam, M., H. Miah, and M. Haque, 2001. Marketing system of marine fish in Bangladish.

Jagwe, J., E, Ouma and C, Machethe, 2007. Transaction costs and smallholder farmers' participation in Banana Markets in the Great Lakes Region, Pretoria, South Africa.

Jagwe, J.N. 2011. The impact of transaction costs on the participation of smallholder farmers and intermediaries in the banana markets of Burundi, Democratic Republic of Congo and Rwanda. Doctoral Dissertation, University of Pretoria, South Africa.

JAJDOAGNRM (Jardegajarte District Office of Agriculture and Natural Resource Management), 2016. Annual report of the District. Alibo, Ethiopia.

JAJDOLDF (Jardegajarte District Office of Livestock and Fishery development), 2016. Annual report of the District. Alibo, Ethiopia.

JAJDRRAO (Jardegajarte District Office of Rular Road Authority), 2016. Annual report of the District. Alibo, Ethiopia.

JAJDSHO (Jardegajarte District Social and Humanity Office). Annual report of the District. Alibo, Ethiopia.

JAJDTMDO (Jardegajarte District Office of Trade and Market Development), 2016. Annual report of the District. Alibo, Ethiopia.

Jari, B. and G. Fraser, 2009. An analysis of institutional and technical factors influencing agricultural marketing amongst smallholder farmers in the Kat River Valley, Eastern Cape Province, South Africa. *African Journal of Agricultural Research,* 4 (11): 1129-1137.

Jarso, M., et al. (2011) (Ed.) ^ (Eds.) Enhancing the Technical Relevance of Pulses and Oilseed Crops through Target Oriented Breeding. Ethiopian Institute of Agricultural Research, Addis Ababa.

Kaleb Shibeshi, 2008. Distributional issues in cereal value chains, the case of wheat market in Arsi. M.Sc thesis presented to the School of Graduate Studies, Addis Ababa University. 70p.

Kaplinsky, R. and M. Morris, 2000. A handbook for value chain research, IDRC. Ottawa, Canada.

Kaplinsky, R. and M. Morris, 2001.A handbook of value chain analysis. Working paper prepared for the IDRC, Institute for Development Studies, Brighton, UK.

Kindie, A, 2007. Sesame Production and Marketing in Ethiopia, with particular reference to Metema area, MA Paper, Haramay University.Haramaya, Ethiopia.

Koenig, T., J. Blatt, K. Brake, K. Kloss, T. Nilges, F. Woellert, 2008. Market-driven development and poverty reduction: a value chain analysis of fresh vegetables in Kenya and Tanzania, Berlin.

Kohls, R.L. and Uhl, J.N., 1985. Standardization and Grading. *Marketing of Agricultural Products, Collier Macmillan,*, pp.350-369.

Kotler, P., Armstrong, G., Saunders, J. and Wong, V., 2003. *Principle di Marketing (Italian Translation of Principles of Marketing).* ISEDE and Prentice Hall International.

Lefebvre, V. (2012) Mid-Term Review of the Joint Program "Edible Oil Value Chain Livestock Product Utilization, Volume II, Addis Ababa, Ethiopia.

Lukanu; Maryann, Green; Peter, Greenfield & Steve, Worth, 2004. Farmers' cash crop cultivation decisions in Southern Niassa province, Mozambique, Development Southern.

Lundy, M., C. Felipe and R. Best, 2002. Value adding, agro enterprise and poverty reduction: a territorial approach for rural business development and rural agro enterprise development project, Colombia

Maddala, G. S. (1983), Limited-Dependent and Qualitative Variables in Economics, New-York.

Mamo G, 2009. Choice of marketing channels and transaction costs: The case of maize marketing in Shashemene District. M.Sc thesis presented to the School of Graduate Studies, Addis Ababa University. 74p.

Mamo Girma and Degnet Abebaw, 2012. Patterns and determinants of livestock farmers' choice of marketing channels: micro-level evidence. Ethiopian Economics Association, Addis Ababa, Ethiopia. P55.

Marshal Nigussie, 2011. Value chain analysis of sugarcane: The case of Kalu district, South Wollo zone of Amhara National Regional state, Ethiopia. M.Sc thesis submitted to the School of Graduate Studies, Haramaya University. 83p.

McCormick, D. and Schmitz H. 2001. *A Guide for Value Chain Analysis and Upgrading.* Available on. Http://www.ids.ac.uk/globalvaluechains/tools.

McFadden, D., 1978. Quintal choice analysis: a survey. *Annals of Economic and Social Measurement*, 5(1976):363-390**.**

Melaku, E., 2013. Evaluation of Ethiopian Nigerseed (*Guizotia abyssinica Cass*) Production, Seed Storage and Virgin Oil Expression.

Mendoza, G., 1995. A premier on marketing channel and margins. Lyme Rimer Publishers Inc., USA.

Miller, C. and da Silva, C., 2007. Value chain financing in agriculture. *Enterprise Development and Microfinance*. 13 (2-3): pp. 95-108.

MOFED (Ministry of Finance and Economic Development), 2014. Growth and Transformation Plan Annual   Progress Report for F.Y. 2012/13 Addis Ababa, Ethiopia.

MSPA (Mauritius Sugar Producers' Association), 2010**.** Value-added products of sugarcane. http://www.mspa.mu/index.php?rubrique=15. Date accessed: December 10, 2012.

Muhammed Urgessa, 2011. Market chain analysis of teff and wheat production in halaba special woreda, southern Ethiopia. M.Sc thesis submitted to the School of Graduate Studies, Haramaya University. 104p.

Mulugeta, F., 2009. Ethiopia Commodity Exchange Authority. Lentil Production, Supply, Demand and Marketing issues in Ethiopia.

Negash Reta. 2007. Determinants of adoption of improved haricot beans production package in Alaba Special Woreda, Southern Ethiopia. MSc Thesis, Haramaya University, Haramaya, Ethiopia.

OBPED (Oromia Bureau of Planning and Economic Development), 2000. Physical and socio-economic profiles districts of Oromia Region. Department of physical planning. Finfine, Ethiopia.

OECD (Organization for Economic Cooperation and Development), 2006. Promoting pro-poor growth – Private Sector Development. Paris.

Padmanand Madhavan Nambiar, Wojciech J. Florkowski, Manjeet S. Chinnan and Anna V. A. Resurrection. 2015. Shopping outlet choice and frequency in Uganda. *Paper presented at the southern agricultural economic association (SAEA)*, Annual meeting, Atlanta, Georgia, USA.

Parahoo, K, 2006   Nursing Research: Principles, Process and Issues. Second edition. Palgrave Macmillan, Basingstoke.

Polit, DF, Tatano Beck C (2004) Nursing Research: Principles and Methods. Seventh edition. Lippincott Williams and Wilkins, Philadelphia PA.

Polit, D.F. and Beck, C.T., 2004. *Nursing research: Principles and methods*. Lippincott Williams & Wilkins.

Porter, M., 1985. Competitive advantage: creating and sustaining superior performance. The Free Press, New York.

Poulton, C., R. Al-Hassan, G. Cadish, C. Reddy and L. Smith, 2001.The Cash Crop versus.

Quinn, J. and Myers, R.L. (2002) (Ed.) ^(Eds.) Specialty Grain Opportunity for Midwestern US. , ASHS press, Alexandria V.

Raikes, P., M. Jensen, and S. Ponte, 2000. Global commodity chain analysis and the Frencfiliére approach: comparison and critique. *Economy and Society*, 29 (3): 390-418.

Rehima. M. 2006. Analysis of red pepper marketing: The case of Alaba and Siltie in SNNPRS of Ethiopia. MSc Thesis, Haramaya University, Haramaya, Ethiopia.

Rieseberglab (2007) Noug (*Guizotia abyssinica*), http://www3.botany.ubc.ca/noug/.

Schenk, P., et al. (2009) Improving Quality and Efficiency of Ethiopian Edible Oil 159 Factories. Summary Report of fact-finding mission, Addis Ababa.

Smith SK, Barratt A, Trevena L et al (2012). A theoretical framework for measuring knowledge in screening decision aid trials. Patient Education and Counseling.89, 2, 330-336.

Smith, D., 1992. Costs and returns in agricultural marketing. Marketing and agribusiness development paper. Department of Political Economy, University of Glasgow. Glasgow, Scotland. 67p.

Smith, F., 2012. Understanding reading: A psycholinguistic analysis of reading and learning to read. Routledge.

Soressa, D. G, 2009. Sesame trade arrangements, costs and risks in Ethiopia: A baseline surveyVC4PD Research Papers.

Thakur, D. S., L. Harbans, D. R. Thakur, K.D. Sharma and Saini A.S. 1997. Market supply response and marketing problems of farmers in the Hills. *Indian Journal of Agricultural Economics*, 52(1): 139-150.

UNIDO and FAO (United Nations Industrial Development Organization and Food and Agricultural Organization), 2009. Ethiopian agro-industry strategy: Oilseeds value chain analysis, Benchmarking, Strategy and Action Plan, unpublished report.

UNIDO; FAO; ILO (2011) Millennium Development Goal Achievement Fund, Spanish MDG Fund, Enhanced Economic Growth/Enhancement of Edible Oil Value Chain.

Urquieta, A., 2009. Effects of access to information on farmer's market channel choice: The case of potato in Tiraque Sub-Watershed (Cochabamba - Bolivia). M.Sc thesis submitted to the Faculty of the Virginia Polytechnic Institute and State University. Blacksburg, Virginia.102p

USAID-Ethiopia Agribusiness and Trade Expansion; Market Bulletin, 2010: No. 9.

Wijnands, J., Biersteker, J. and Hiel, R., 2007. Oilseeds Business Opportunities in Ethiopia. The Netherlands: Ministry of Agriculture. *Nature and Food Quality*.

Wijnands, J.H.M., et al. (2009) Oilseeds Business Opportunities in Ethiopia. , Public Private Partnership on Oil (PPPO).Addis Ababa, Ethiopia.

Williamson, O., 2002. The theory of the firm as governance structure: From choice to contract. Brookfield, VT. Edward Elgar. York: Cambridge University Press, pp. 257-91.

Wolday Amaha. 1994. Food grain marketing development in Ethiopia after reform 1990. A case study of Alaba Siraro. Doctoral Dissertation Presented to Verlag Koster University, Berlin, German.

Yamane, T. 1967. *Statistics, an introductory analysis*, *2nd Edition.* New York: Harper and Row.

7. APPENDIX

Appendix, A. Post estimation result test

Table: 1 Multicolliniarity test for continuous variables used in liner regression

Variable	VIF	1/VIF
QPRO	1.85	0.539755
ONOXE	1.68	0.594495
ALUNP	1.59	0.628575
EDU	1.31	0.760489
TLU	1.26	0.792174
AG	1.24	0.805293
FEXCON	1.12	0.891374
FS	1.08	0.925402
MKTPRICE	1.06	0.941351
DNSTM	1.05	0.955670
Mean VIF	1.32	

Source: Authors survey result 2016

Table 2**:** Multicolliniarity test for dummy variables used in liner regression

	Sex	ACSE	ACMINFO	MKTPRICE
Sex	1.0000			
ACSE	0.2360	1.0000		
ACMINFO	0.4141	0.2643	1.0000	
MKTPRICE	0.1015	0.0422	0.1037	1.0000

Source: Authors survey result 2016

Table 3: Heteroscedasticity test for linear regression model

Source	chi2	Df	P
Heteroscedasticity	107.08	100	0.3206
Skewness	21.98	13	0.0557
Kurtosis	4.54	1	0.0331
Total	133.6	114	0.1133

Source: Ime test of Authors survey result

Table 4: Error covariance matrix and correlation of multivariate probit Model

Correlation	Coefficient	StD.erorr	Z	P (Z)
atrho21	-.253308	.15422	-1.64	0.100
atrho31	-.5927874	.1802144	-3.29	0.001
atrho32 |	-.4390178	.158465	-2.77	0.006
rho21 |	-.2480257	.1447329	-1.71	0.087
rho31	-.5318974	.1292291	-4.12	0.000
rho32 |	-.41283	.1314581	-3.14	0.002

Likelihood ratio test of rho21 = rho31 = rho32 = 0:,   chi2(3) = 20.537 Prob > chi2 = 0.0001.

Source: Authors survey result 2016

Table 5: Type of service given for niger seed producers

Variables	Item	N	%
Training	Yes	90	54.5
	No	75	45.5
Market information	Yes	94	57
	No	71	43
Credit service	Yes	118	71.5
	No	47	28.5
Input access problem	Yes	27	16.4
	No	138	83.6

Source: Authors survey result 2016

Table 6: Conversion factors to estimate tropical livestock unit equivalents

Animal Category	TLU	Animal Category	TLU
Calf	0.25	Donkey(young)	0.35
Weaned Calf	0.34	Camel	1.25
Heifer	0.75	Sheep and Goat(Adult)	0.13
Cow and Ox	1.00	Sheep and Goat(young)	0.06
Horse	1.10	Chicken	0.013
Donkey (adult)	0.70		

Source: Storck *et al*. (1991)

Appendix B. Interview Schedules

I. producers Interview Schedules

A. General background information (√)

1. Name of respondents_____Age_____Woreda_____ kebele ____

2. Time of interview starting _____ End interview_____

3. Sex 1. Female 2. Male

 4. Marital status: 1. Single 2. Married 3. Divorced   4. Widow

5. Religions: 1.Orthodox 2. Catholic 3. Protestant 4. Muslim 5.Traditional bleifers 6. Other

6. Education Level of household head_____Grade/Years of schooling.

7. Distance of your residence from the nearest market center: [____] walking hrs.

a).Distance of your residence to the nearest development center: [____] walking hrs.

b). Distance to all weather road: [   ] OR [   ] walking hrs

8 . Family size: Male_____Female_____ total _____

9. Total land area in hectares_____ Owned _____Rented _____

B. production

10. Crop production during the last cropping season:

No	Crop type	Area in ha	Production qt/ha	Productivity
1	Oil seed			
2	Cereals			
3	Teff			
4	Grain			
5	Others (Specify)			

11. What is your major means of income generation? Rank according to its importance

For all crop production	Yes=1 No=0	Income earned per year	For fruit and vegetables	Yes=1 No=0	Income earned per year
Oil seed			Mango		
Grain			Papaya		
Cereals			Orange		
Teff			Carrot		
Pulses			Onions		
Coffee			Garlic		
Others			Potato		

12. Livestock resource and income gained

Livestock type	Yes=1 No=2	Quantity in no	Amount used or consumed in birr /year	No of sold	Income earned /year
Cow/Heifers					
Calves					
Oxen/Bulls					
Sheep					
Goat					
Poultry					
Mule					
Horses					
Donkey					

13. Type of Oil seed and income generation

Oil seed type	Area/hek	Produ Ction (Qt)	Sold in qt/kg	Consume d in qt/kg	Income generated from sales in birr	Rank
Niger seed						
Linseed						
Sesame						
Rape seed						
Sunflower						
Others						

14.. What is the source of labor used for Niger seed production? (√)

1. Family labor 2.Labor exchange 3.Hired labor 4.Cooperation

15. What type of Niger seeds do you use? (√) 1. Local 2.Improved 3. Both

16. How long have you practiced niger seed production _____in

17. What are the main niger seed production constraints of last five years on your farm? Rank (1= most severe, 2= second severe and etc.)

1. seed shortage 2. Pest and disease 3.Drought4. Frost 5.weed 6.Flood 7. oxen

shortage 8.fertilizer Shortage 9.Lack of pesticides 10 .other

18. How is the trend of volume of crops production during the past 5 years? (√)
1. Increasing 2. Decreasing 3.The same

19. If the production increases, what are the reasons? _____

20. If the production decreases, what are the reasons? _____

21. Would you like to expand Niger seed production? (√) 1. Yes 2. No

22. If your answer is yes, why? _____

23. If your answer is No, why? _____

1. Have you ever used agricultural inputs (fertilizer, chemicals, improved seeds etc.for the

production of Niger seed? (√) 1. Yes 2. No

24. If your answer for **Q.23** is No, what was the main reason behind? _____

 1. Unavailability 2. Far distance 3.both 4. Others

     25. If your answer for **Q.23** is yes, which type and from which source did you get such

       agricultural input? 1. Office of Agriculture 2.Cooperative 3.Research centers 4.others

C. Access to Input and Service

26.Did you borrow money before? (√) 1. Yes 2. No

27. If your answer for **Q.26** is Yes, from where and for what purpose did you used Credit?

 (*Multiple response is possible)

No.	Source	*Purpose (write codes)	1. Payment for hired labor
			2. Purchase of fertilizer and seed
1	Micro finance		3. Purchase of farm implements
2	Cooperatives/unions		4. Payment for rented oxen
3	NGOs (specify)		5. Purchase of transport animals
4	Bank (specify)		6. To rent in land to extend
5	Trader		Niger seed production
			7.To purchase input for niger
			seed production
6	Relatives		8. Others
7	Iqub/Iddir		

8	Others (specify)		

28. If your answer for **Q.26** is Yes, have you paid the loan? (√) 1. Yes   2.. No

.If your answer for **Q.26** is No, what is the reason?

29. Did you face any problem in accessing credit?   1. Yes   2.   No

30. If your answer for **Q.29** is Yes, what was the problem? (√)

   1. Limited supply of credit   2.Limited access to transport

   . 3.Huge bureaucracy   4. Others (specify) _____

31. How did you solve these problems? _____

    32. Have you ever participated in Niger seed production system training in last three?

Years? (√)   1. Yes   2. No

33. If your answer for **Q.32** is No, why

34. If your answer for **Q.32** is yes, on which aspects, by whom and for how long you have got the training?

No.	Training type	By whom	How long (days)	Year
1	Oil seed production			
2	Crop management			
3	Oil seed marketing			
4	Pre and post-harvest handling			
5	Fertilizer/compost application			
6	Others			

35. Did you get advisory service on niger seed production practices before? (√)

      1. Yes   2. No

36. If your answer for **Q.35** is No, why? (√) (Multiple response is possible)

   1. No service provider nearby   2.Possessed the required information

3. Availability of contact 4. Do not have time to get the service

6. Others (specify)

37. How frequent were you visited by development agents last year? (√)

　　1. Once per week　　2. Twice per week　3. Three times per week

　　　　4. Four times per week　5.No contact　5. Others, specify _____

38. Do you have any information about the demand of Niger seed market? 1. Yes   2. Otherwise skip

to next question

39. If yes, what type of information do you get?

1. Buyers information 2.Price information　3.Quality standard　4.others

40. If yes, from where do you get information about price?

1. from radio 2. From extension workers

3. from other farmers 4.From middlemen

5. From brokers 6.others (6) _____ ☐ I don't know (9)

41. How do you get market information?

1. Daily　2. One times per Week　　2.Two times per week 3.Two times per month　4.only in harvest time 5.others

42. How do you see statuse of market information? 1. Sufficient   2.Defficent

43. If deficient, what needs to be done to improve the market information?

1. Advertisement　2.Training　3.Organizing market information system 4.others

D. Marketing service

44. Did you sell Niger seed before? (√)1. Yes　　　2. No

45. If your answer for **Q.44** is No, why you did not sell? _____

46. If your answer for **Q.44** is yes, how much and to whom did you sell possible)

Crop Type	Amount produced(qt)	Amount Sold (qt)	*To Whom	1. Collectors 2. Consumers 3. Retailers 4. Wholesalers 5. Institutions (hotels, Universities, etc) 6. Cooperatives 7. Exporters 8. Processers 9. Brokers 10. Others (specify	Where	1. Farm Gate 2. Market Center 3. Retailing Yourself 4. Others (specify)
Niger seed						

47. Why you preferred the mentioned buyers/markets to sale your production?

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1. Pay higher price 2.Easly accessible 4.Faster payment 5.others

48. Means of transportation used; (√) (multiple response is possible) 1.Vehicles

       2. [ ] Manpower   3. [ ] Back of animals   4. [ ] Others (specify) ___

49. How is the trend of price per unit of sales of Niger seed during the last 5 years?.
1. Increasing 2.Deacrsing 3. The same

50. If increasing, why? _____

51. If decreasing, why?_____

52. Would you like to expand production? (√)   1. Yes   2. No

53. If your answer for **Q.52** is yes, why? _____
54. If your answer for **Q.52** is No, why? _____

55. Did you get buyers when you wanted to sell Niger seed? (√)

      1. Yes   2. No
56. If your answer for **Q.55** is no, why? (√) 1. Inaccessibility of market

                                                                     _____
     3.   Low price offered   4. Others _____

57. Do your Niger seed have preferred qualities by buyers? (√) 1. Yes 2.   No

58. If yes, what criteria buyers use to select their oilseed orders? Please explain the list of criteria's set

by your buyers?

59. If your answer for **Q.57** is No, what interventions are needed to improve quantity and

quality of niger seed production to attract better prices? _____

60. Do you deliver your oilseed in different and attractive ways to your buyers?

      1. Yes   2. No
61. If yes, what is the impact on the price and marketability of your oilseed products?

Otherwise skip to next question _____

62. Are you pay with good price? 1. Yes 2.No

63. Are you satisfied with price? 1. Yes 2.No

64   What is the selling price of niger seed per quintal_____?

65. What are the niger seed marketing constraints? Rank accordingly

   1.   Lack of market 2. Low price of product 3. Lack of storage 4.lack of market

   Information 5.low quality of product 7.price instability 8.poor linkage among actors 9.

   Others

66. Who is setting the price for oilseed when you sell your products?

1. Farmers 2. Local middlemen 3.Brokers 4.Government   5.Brokers

6. Others _____7.I don't know

67. Which time of the year is more appropriate for selling of Niger seed?

   1.   Immediately after harvest 2.soon after harvest of the year 3. Late of the year

68. Which month of the year is more appropriate for selling of niger seed?(tick)

Month	
January	July
February	August
March	September
April	October
May	November
June	December

69. Is there a significant price difference when you sell in harvest season and late in the year? 1. Yes

2. No if yes how much is the price difference per quintal?

70. Is there any kind of support given by an organization to improve the quality of oilseeds in your

area?

1. Yes 2.No If   yes, what kind of support and from whom is it available? Otherwise skip to next
question.

71. Is there a way farmers could increase their income share from the sale of their Niger seed? 1. Yes

         2.No

72. If yes how do you think it is improved?

1.Through making some changes in the oilseed products (process and sell edible oil and oilcake)

2.Selling direct to exporters 3.Selling direct to processors 4.selling direct to cooperative union

5.Other means (6)_____6. I don't know

 E.Non-farm and off-farm activities
 73. Do you purchase and sell noug products? (√) 1. Yes   2. No

 74. Do you practice trading activities other than trading of Niger seed products)? (√)

 1. Yes   2. No

 75. Did you perform other income generating activities? (√) 1. Yes_____
    2. No

76. If your answer for **Q.75** is yes, what are these sources of income? 1. Remittance 2.
Relatives 3. Labor selling 4. Wood working 5. Trading 6. Others_____
77. If **Q.75 is** yes, how much is your income from non-off/farm _____birr/year?

78. Are you a member of any cooperative? (√)   1. Yes   2.No

79 .If your answer f or **Q.77 is** yes, what is the name of the cooperative _____?

80. Is there any cooperative that are involved in Niger seed marketing in your locality?

1. Yes 2.No

81. If yes what are the functions of the associations?

1. Helping each other during production   2. Saving and credit (2)

3. Working and managing social development projects

4. Marketing of buying and selling 5.providing agricultural inputs and supplying of stable food oil

      6.others

82. If yes, how do you think these cooperatives are helpful in upgrading the income of oilseed

farmers? 1. Buying and selling 2.Processig   3. Improve quality standard   4.others

83. What to be done to foster the activities of cooperative in oil seed production and marketing?1.

    Provide working capital 2.strengthen their bargaining power 3.improve its management 4.improve

    internal and External Auditing system 5. Others

84. What kind of strategies is required from relevant government organization, NGOS, and other
responsible bodies to improve the income of farmers concerning oilseed?

    _____

Thank you for responding the Questions

II.Traders Interviewee

A. Background information (√)

1. Name of respondents_____ Age_____Woreda_____kebele _____

2. Type of trader: 1. Assembler 2.Local collector 3.Wholesaler 4. Retailer 5.Broker 6.
Cooperative 7. Union 8. Others_____

3. Sex 1.Female 2. Male

4. Marital status: 1.Single 2.Married 3 . Divorced   4.Widow

5. Religions: 1 Orthodox   2.Catholic   3.Protestant 4.Muslim 5.Traditional bleifers

6. Education Level of household head_____Grade/Years of schooling.

7. Family size: Male_____Female_____ total _____

8. Position of respondent in the business (√): 1.   Owner- manager

    2. Spouse owner   3. Employed manager   4. Daughter of the owner

    5.   Son of the owner 6. Relative to the owner   7. Other (specify)

                    Year

9. How long have you been operating business?   s

10. Are you trading oil seed? 1. Yes 2.No if yes, what kind of oil seed are you trading? Rank

according to its importance as 1st=1, 2nd, =2, 3rd, =3, 4th, =4 5th, =5

1. Niger seed   2.Lin seed 3. Sesame

3. Rape seed 4. Sun flower   5. Others_____.

11. How many quintal of Niger seed are you buy annually?

1. 100- 200   2.201-350   3. 351-400   4.More than 400

12. What is the average buying price of one quintal of Niger seed in Birr_____?

13. What is your yearly average selling price of one quintal of Niger seed in Ethiopian Birr_____?

14. From whom are you buying Niger seed?
1. Producers 2. Local collectors 3. Cooperatives 4.wholesalers

5. Others _____   6. I don't know

15. What is your means of transportation? 1. Cars 2.Draft animals' 3.Others __

16. Where do you sell your oilseed?

1. In local market 2. In regional market 3. To oil processing industry 4.   National market

5.Zonal market 6. Exporters' 7.others _____

16. Who is setting the price for oilseed when you buy and sell oil seed?

1. Farmers   2. Processors 3. Brokers   4.Government   5.others   (6) others ___9 I don't know

17. What are the main problems in niger seed marketing in your locality? List accordingly
a)._____
b)._____
c)._____
d)._____
18. Is there any financial institution, which provides you credit? Yes (1) ☐otherwise =0 If yes, list source of credit facilities?
a)._____
b)._____
c)._____
d)._____

19. What kind of strategies to be designed from relevant government organization, NGOS, and other responsible bodies to improve the income of Niger seed traders?
_____
_____
_____

III. Oilseed processors Interview

A. Interviewee background information

1. Name of the organization: _____

2. Address: Region_____ Zone_____ Woreda_____kebele (PA)

3. Year of establishment _____

4. Ownership and management status:

1. Owner 2. Manager 3. Owner and manager 4. 0thers _____

5. Name of respondents _____Age_____

6. Sex: 1. Female 2.Male

7. Marital status: 1. Single 2.Married 3. Divorced 4.Widow
8. Religions: 1. Orthodox 2.Catholic 3.Protestant .Muslim 5.Traditional bleifers 5. Others ___

9. Education Level of household head_____Grade/Years of schooling.

10. Number of employees in the organization: Male____ Female____ total_____

11. What was the amount of your initial working capital when you start this business in_____ birr?

12. What is the amount of your current working capital? _____birr.
!3.What is your source of working capital? (√);
1. Own   2.Loan   3.Relatives

    4.Share   5. Others (specify)   _____

B. Oil seed buying

11. What type of oilseed are you buying? Rank according to its importance 1st=1, 2nd=2,
3rd=3, 4th=4

1. Sesame seed 2.Nigger seed   3.Lin seeds 4.others _____

12. On average how many quintals of Niger seeds are you buying per year_____qt?

13. On average what is the buying price of one quintal of Nigger seed_____birr?

14. On average what is the selling price for one quintal of Nigger seed_____birr?

15. Who are your suppliers of oilseed?

1. Individual farmers' 2.Farmers cooperatives 3. Middlemen 4. Others _____

16. Who is setting the price when you buy oilseed products?

1. Farmers 2. Middlemen 3. Brokers 4. Government 5.cooperatives 6.others _____

17. What are the main oilseed supply problems that encounter your business?

1. Low availability and un reliable supplier of oilseed 2. Low quality of oilseed

3. High price of oilseed 4.Lack of access to financial problems 5.Trade regulation and institutional problems 6.others _____

18. In your opinion how the above problem could be solved?

1. Large oilseed production 2.increasing quality 3. Better credit facilities 4.Conducive trade regulations 5. Supporting local suppliers and cooperatives 6. others_____

C. Oilseed processing (√)

19. On average how many liters of edible oil are you process (Explore) from niger seed per year _____?

20. On average how much you pay to process (Explore) one liters of edible oil in Ethiopian birr_____?

21. How much Liters of oil explored from one quintal of Niger seed?

22. to whom to sale the processed edible oil?

1. Cooperative 2. Wholesaler 3. Retailers 4. Consumers 5. Others ____

23. What is the selling price of one liters edible oil_____ in birr?

24. Who is setting the price when you sale processed edible oil?

1. Oil processors 2. Trader 3. Brokers 4. Wholesaler Government 5. Others _

25. What are the problems that encounter during processing of edible oil**?**

1. Low availability of oilseed 2. Low quality of oilseed 3. High price of oilseed 4. Lack of reliable processing facilities and equipment 5. Financial problems 6. others_____

26. How to solve the above problem? 1. Increasing oilseed production 2. Increasing quality 3. Better credit facilities 4. Coordinating oilseed producer with processors 5.supporting local suppliers and cooperatives 6. Providing equipment and facility to enhance competiveness 7. Others_____

24. What kind of strategies required from relevant government organization, NGOS,and other responsible bodies to improve the competitiveness niger seed oil processing industry to sustain its value chain?

_____

_____

_____

IV.Consumers Interview

   A. General background information (√)

1. Name of respondents_____ Age: _____ Woreda _____kebele_____
2. Sex: 1. Female 2: Male

3. Marital status: 1. Single 2. Married   3. Divorced 4. Widow

4. Religions: 1. Orthodox   2: Catholic   3: Protestant   4.Muslim   5. Traditional bleifers
5. Education Level of household head_____Grade/Years of schooling.

6. Family size: Male_____Female_____ total _____

7. Are you consuming Niger seed oil in your home? 1. Yes otherwise zero. If yes,

 8. From whom are you buy Niger seed oil?

 1. From processors 2. Cooperatives 3.wholesalers 4.retailers 5. Others _____

9. How many liters of edible oil your family consume /per month_____?

10. How much cost you incurred for edible oil in your family consumption per

month_____in_birr?

11. Haw much to pay for one liter of Niger seed oil _____in birr?

12. Do you get the price information for Niger seed oli? 1. Yes   otherwise 0.If yes

From where do you get information about price source of Niger seed oil products?

   1.   From Mass media

   2.   From oil processors

   3.   From cooperatives

   4.   From middlemen 5. From brokers 5. Others _____

13. What to be done from relevant government organs and other responsible organizations to foster the linkage between oil food processing and individual consumer in order to benefit both of them?

_____

Thank you very much for responding to the questions.

V. Checklist for Focus Group discussions

1. Name of the interview: _____

2. Role of the interviewee in the society:_____

3. Location / kebele_____specific area_____

1. What is the role of you in Niger seed value chain?

2. What are the main constraints and opportunities you faced in undertaking Niger seed value chain?

3. What are the main constraints and opportunities of Niger seed seed production and marketing list accordingly?

4. How the Linkage /coordination between Niger seed value chain actors' functions?

5. What are the main constraints and opportunity in accessing input supply for Niger seed in your area?

6. What are the main constraints and opportunity in accessing of Niger seed oil in relation to its quality product in your area?

7. What to be done to improve Niger seed value chain development in the area?

VI. Checklist for Key Informants Interview

1. Name of the organization:_____

2. Role of the interviewee in the organization: _____

3 Location / contact information Region/Zone/Woreda/Keble/.telephone_____

4. Type of the organization: public/private/NGO/CBO.

5. Organizational mission, vision and objectives

6. What is the role of your organization in Niger seed value chain in the study area?

7. What are the main constraints and opportunities you faced in undertaking Niger seed value chain assigned to your organization?

8. How the Linkage / interaction/ coordination among Niger seed value chain actors'?

9. What to be done to improve Niger seed value chain related to your locality?

Thank you very much for responding to the questions.