VALUE CHAIN ANALYSIS OF POTATO IN DEDO DISTRICT OF JIMMA ZONE, SOUTHWEST ETHIOPIA

M.Sc. Thesis

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By

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Thesis Submission Request Form (F-05)

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I have completed my thesis research work as per the approved proposal and it has been evaluated and accepted by my advisers. Hence, I hereby kindly request the Department to allow me to present the findings of my work and submit the thesis.

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We, the thesis advisers have evaluated the contents of this thesis and found to be satisfactory, executed according to the approved proposal, written according to the standards and format of the University and is ready to be submitted. Hence, we recommend the thesis to be submitted.

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DEDICATION

I dedicated this thesis manuscript to Tofik Faris, Aziza Faris and Fozia Faris, may their lovely soul remain peace.

STATEMENT OF THE AUTHOR

I hereby declare that this thesis is my work and that all references used in the preparation of the thesis have duly acknowledged.

This thesis is submitted in partial fulfillment of the requirement for the award of the degree of Master of Science in Agriculture (Agribusiness and Value Chain Management) at Jimma University and is reserved at the University library to be made available to users. I declare that this thesis has not been submitted to any other institution anywhere for the award of any academic degree, diploma or certificate.

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BIOGRAPHICAL SKETCH

The author was born on June 20, 1988 in Gomma district, Jimma Zone, Oromia Regional State. He attended his primary education at Gogga Kilole Primary School (1995-2003) and his secondary and preparatory education at Agaro Senior Secondary and Preparatory School, Agaro (2003-2007). After passing Ethiopian Higher Education Entrance Qualification Examination, he joined Jimma University College of Agriculture and Veterinary Medicine, Jimma in 2007 and graduated with BSc degree in Agricultural Economics in 2010.

Subsequently, he was employed in Gomma district agriculture office and worked there up to September 1, 2014, then transferred to Gomma irrigation authority office and has been working there until he rejoined Jimma University, College of Agriculture and Veterinary Medicine, Jimma to pursue his M.Sc. study in Agribusiness and Value Chain Management in March, 2015.

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ACRONYMS AND ABBREVIATIONS

ATA	Agricultural Transformation Agency
CSA	Central Statistical Agency
DoANR	District office of Agriculture and Natural Resources
DoIA	District office of Irrigation Authority
ELBP	Ethiopian Late Blight Profile
FAO	Food and Agriculture Organization of the United Nations
GMM	Growth Marketing Margin
MFI	Micro Finance Institutions
NMM	Net Marketing Margin
OCSI	Oromia Credit and Saving Institution
ORS	Oromia Regional State
TGMM	Total Gross Marketing Margins
UNDP	United Nations Development Program
UNIDO	United Nations Industrial Development Organization
USAID	United States Agency for International Development

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VALUE CHAIN ANALYSIS OF POTATO IN DEDO DISTRICT OF JIMMA ZONE, SOUTHWEST ETHIOPIA

ABSTRACT

Potato is number one non-grain food commodity and economically important crop of the world. Even though, Ethiopia is endowed with favorable agro ecology for producing potato. Potato in Ethiopia is characterized by poor seed quality, low management capacity of the farmers, diseases, high post-harvest losses, poor marketing and other challenge is poor organization along the potato supply chain. The study aimed to map potato value chain, identify actors and their roles, analyze marketing margins of actors, identify major constraints and opportunities, and identify the determinants of potato marketed surplus. For this study 136 potato producers were randomly selected, 5wholesalers, 8collectors, 12 retailers and 6 small scale processors were purposively selected. Quantitative and qualitative data were collected from primary and secondary sources. Primary data was collected through interview schedule from actors. Descriptive and econometric data analysis was used to analyze data. Value chain mapping was used to identify actors, their roles and supply linkage. Margin analysis was used to estimate value gained by each actors involved along potato value chain. Tobit model was employed to identify determinants of marketed surplus of potato. The identified key actors in potato value chain were input suppliers, producers, wholesalers, retailers, small scale processors and consumers. Main supporting actors were office of agriculture and natural resources, office of irrigation authority, micro finance institutions, cooperatives office, office of trade and market development, NGOs and bank that found in the district. The results of margin analysis revealed that 65.01% and 63.52 % share of margin and profit goes to small scale potato processors and 12.29% and 15.16 % share of margin and profit respectively, was captured by potato producers. The rest actors (retailers, wholesalers and collectors) received a profit margin of 9.78%, 8.27% and 3.27% respectively. Major constraints identified at producers level were high price of improved seed ,poor infrastructure(road and telecommunication) interferences of brokers, low storage facilities, poor linkages with other actors in the chain, prevalence of disease and pests and parish ability of the product. The identified opportunities were suitable agro-ecology, government support and availability of buyers. The results of econometric analysis shows that active family labor, land allocated for potato, access to improved seed, access to credit and number of extension contact influenced potato marketed surplus significantly and positively. Non-farm income and age of house hold head affects potato marketed surplus negatively. Therefore, concerned bodies should promote land allocation for potato and increase productivity per unit area, provide training for development agents and initiate frequency of contact with producers and supply improved seed timely. District office of agriculture and natural resources and district office of irrigation authority should have close link with research institutions that release improved potato varieties. The micro finance institutions should provide adequate credit service for potato producers. Non-farm income and age of house hold head affects potato marketed surplus negatively. Therefore, concerned bodies should initiate producers to invest their non-farm income on potato production to increase marketed surplus.

Key Words: Value chain analysis; Potato; Constraints and opportunities; Marketed surplus; Tobit model

1. INTRODUCTION

1.1 Background of the Study

Agriculture is main economic pillar of the Ethiopian economy and the overall economic growth of the country is highly dependent on the success of the agricultural sector. The sector represents 42 % of the GDP of the country and about 85 % of the population gains their livelihood directly or indirectly from agricultural production (CSA, 2015).Being main income source for millions of people, Ethiopian agriculture remains low input, low-value and subsistence oriented, and is vulnerable to frequent climatic shocks (UNDP,2011).Moreover, challenges facing Ethiopian smallholder farmer gaining access to some of the most basic and vital inputs necessary to successfully grow their crops, high-quality seeds and fertilizer, as well as credit and financial services are needed to improve and expand the scope of a farmer's operation on the other end, farmers need access to various output markets, such as sales and distribution channels which allow them to sell their harvests at a maximum return (ATA, 2012).

Potato is number one non-grain food commodity and economically important crop of the world (Rykaczewska, 2013). It is grown in more than 125 countries and consumed almost daily by more than a billion people. Hundreds of millions of people in developing countries depend on potatoes for their survival. Potato cultivation is expanding strongly in the developing world, where the potato's ease of cultivation and nutritive content has made it a valuable food security and cash crop for millions of farmers (FAO, 2009).

Potato is an important crop for food security in parts of Ethiopia by virtue of its ability to mature earlier than most other crops at time of critical food need (Asresie *et al*., 2015). Even if, farmers grow potato mainly for marketing purpose, its contribution for food security is not negligible since 0.3 up to 0.9 ton of potato is consumed per household per year in Tigray, SNNPR and Shashemene of Ethiopia (Bezabih and Mengistu, 2011).

The estimated area under potato cultivation in 2013/14 production year was 179,159.27 ha with production of 1.61 million tons in *Meher* and *Belg* season (CSA, 2014). There are five major potato production regions in Ethiopia: Central, Eastern Hararghe, Northwest Ethiopia, South Ethiopia and Western Ethiopia and production is mainly dependent on natural rainfall and smaller proportions of areas the crop is supported by irrigation (ELBP, 2004).

The potato sub-sector in Ethiopia is relatively undeveloped and is faced with low productivity, low prices offered for producers and infrastructure is relatively poor and there are limited opportunities for processing and value addition due to poor processing facilities (Bymolt,2014).The consumption of potato in the form of sauce is the most popular, now a days the consumption of chips is increasing due to increasing urbanization, increasing tourism and change in household's income (Tesfaye *et al.,* 2010).

Oromia is the most populous regional state in Ethiopia with population projection of 34.5 million people in year 2016 (CSA, 2013). The diverse agro ecology, large surface and ground water potential and highly fertile land makes the region suitable for almost any type of fruit and vegetable products. Moreover, the region produced 300,000 metric tons of potato which accounts about 38% of the national potato production (ORS, 2015). Despite this opportunities the potato subsector of the region are facing with problems like diseases, lack of improved varieties, poor crop management practices, use of inferior quality seed tubers of unknown origin, inappropriate storage structure, poor seed system, and poor research-extension linkage are among the key factors contributing to low yield, moreover unfair distribution of returns from potato marketing leads farmers to low gain from the product (Gebremedhin *et al.*, 2001).

Jimma zone is one of potential areas in production of coffee, cereals, vegetable and fruit. Potato production has significant contribution in supporting household income and food source in major potato producing areas of Jimma zone (JZoANR, 2016). Dedo district stands first in vegetable production in general and potato in particular. The estimated area under potato cultivation in district was 2487.33 hectares of land with estimated production of 23629.66 tons of potato produced in 2015/16 production season (DoANR, 2016).

Hence, this study intended to map potato value chain, identify actors and their roles, analyze marketing margins of actors, identifying major constraints and opportunities of potato value chain, and identify the determinants of potato marketed surplus by small holder farmers in Dedo district of Jimma zone, southwest Ethiopia.

1.2 Statement of the Problem

Even though, Ethiopia is endowed with a great variety of agro ecological zones that are favorable for vegetables production in general and potato in particular, potato is grown mainly on small, half hectare farms in the country parts where the potato grows well, which used for home consumption and sale. Potato in Ethiopia is characterized with poor seed quality, low management capacity of the farmers, diseases, high post-harvest losses, poor marketing system and other major challenge is poor organization along the supply chain of potato (Haverkort *et al.,* 2012). A study by Bezabih and Mengistu (2011) in the case of Tigray, SNNPR and Shashemene areas of Ethiopia, stated that potato marketing, characterized by low prices offered for ware potato, is attributed to non-diversified potato consumption culture in the country.

In study area potato is produced by smallholders farmers but benefits to farmers is very low due to instability of market supply, low price received by producers as result of long market chain dominated by traders and brokers who have a relatively strong financial power and limited market access of producers (difficulty to obtain buyers or infrastructural problems to travel a long distance to reach the market place).Imperfections in markets and asymmetric price information hinder the potential gain that could have been attained under the existence of markets with complete information (DoANR, 2016; DoIA, 2016).

Bezabih (2008) conduct value chain analysis for different horticultural crops in Kombolcha district, the results of the study revealed that margin received by different actors along the chain is not fairly distributed and recommended legalizing the function of brokers in such a way that they will be accountable for their practices and enforce true functioning of a competitive marketing system.

Potato value chain analysis was conducted in some parts of Ethiopia (Bezabih and Mengistu, 2011; Kassa, 2014; Habtamu, 2015), the studies explore more about production side of the value chain and with main focus on descriptive analysis of potato value chain. But a detailed potato value chain mapping and analysis of marketing margins along marketing channel in potato value chain has not been addressed in a sufficient manner. Moreover, there is no study conducted that includes the study area. By conducting a study, it is possible to find out the specific factors which affecting potato value chain performance in study area. Since value chain is a key framework for understanding how a product moves from the producer to the end user, provides an important means to understand the actor's relationships, mechanisms for increasing efficiency, and ways to increase productivity and add value. It is also a vehicle for pro-poor initiatives and for linking small business with the market (Webber and Labaste, 2009). Therefore, this study was initiated to conduct value chain analysis of potato in the study area.

1.3 Research Questions

This study tried to address the following basic research questions:

1. Who are actors involved in potato value chain and what are their roles?
2. How marketing margins are shared among actors?
3. What are the major constraints and opportunities in potato value chains?
4. What factors affect the amount of marketed surplus of potato in study area?

1.4 Objectives of the Study

The general objective of the study was to conduct value chain analysis for potato in the study area. The specific objectives of the study were:

1. To map potato value chain, identify actors and their roles
2. To analyze marketing margins of actors in the value chain
3. To identify major constraints and opportunities of potato value chain in the study area
4. To identify the determinants of potato marketed surplus in the study area

1.5 Scope and Limitations of the Study

Despite the existence of many potato producing areas of the region due to suitable agro-ecology, this study focused on Dedo district of Jimma zone due to time and resource constraints. Therefore, the outputs to be obtained and conclusion to be drawn from this study are context specific and cannot be applied to all areas as situations could differ. This study might be limited to some extent, because some farmers and traders might not record all of their costs and income, the information obtained from them were based on evoke, consequently, calculation based on such figures would probably have some errors.

1.6 Significance of the Study

The outcome of this study will be helpful in providing information that can be used as an input for developing value chain for potato. Specifically, the result of the study can be used to provide input for policy makers and planners in designing problem based strategy to improve the value chain of potato, beneficial to development actors in designing and implementing target full value chain development initiatives to improve the income of the producers and can also serve as a baseline information for further and detailed study on the value chain of potato at the zonal and regional level.

1.7 Organization of the Thesis

The thesis has five chapters. The first chapter is introduction that includes background information, statement of the problem, objectives of the study, scope and limitation of the study and significances of the study. Chapter two presents theoretical and empirical literature. Chapter three deals with the methodology, including description of study area, sampling procedure and sample size determination, the type of data required sources of data and methods used to collect data, and methods of data analysis. Chapter four, it is the results and discussion part and provides information on results of descriptive analysis(value chain mapping, margin analysis, constraints and opportunities) and econometric analysis on determinants of potato marketed surplus by farm households. Chapter five deal with summary, conclusion and recommendations of the finding.

2. LITERATURE REVIEW

This chapter provides theoretical and empirical highlights for the study. It is intended to present concepts of value chain, approaches and some review of empirical studies on value chain analysis and determinants of marketed surplus.

2.1. Concepts in Value Chain

Value chain describes the full range of value-adding activities required to bring a product or service through the different phases of production, including procurement of raw materials and other inputs, assembly, physical transformation, acquisition of required services such as transport or cooling, and ultimately respond to consumer demand (Kaplinsky and Morris 2002).Value chain in this study includes activities performed by input suppliers, producers, collectors, traders and consumers.

According to Hobbs *et al.* (2000) a value chain is differentiated from a production / supply chain because participants in the value chain have a long-term strategic vision, participants recognize their interdependence and are disposed to work together to define common object, share risks and benefits, and make the relation work, it is oriented by demand and not by supply, and thus responds to consumer needs, participants have a shared commitment to control product quality and consistency and participants have a high level of confidence in one another that allows greater security in business and facilitates the development of common goals and objectives.

Value addition is simply the act of adding value to a product, whether you have grown the initial produce or not. It involves taking any product from one level to the next (Fleming,2005).

The three important things in value chain; value chain actors, value chain supporters, and value chain influencers. Chain actors are those who directly deal with the commodities, *i.e.* producing, processing, trading and own them. Chain supporters are those services provider actors who never directly deal with the product, but whose services add value to the product.

The value chain influencers are like regulatory frameworks, policies, infrastructures and the like (Bammann, 2007).

Value chain analysis is assessment of the actors and factors influencing the performance of an industry, and relationships among participants to identify the driving constraints to increased efficiency, productivity and competitiveness of an industry and how these constraints can be overcome (Fries, 2007).Similarly Miller and Jones (2010) explained as an assessment of actors relationships, constraints and opportunities. The complete meaning of value chain analysis which was provided by Kaplinsky and Morris (2000) is explained as examining the full range of activities required to bring a product or service from its conception to its end use.

According to Webber and Labaste (2009) value chain analysis rests on a segmentation of the different activities and mapping of interactions that may generate costs or value in the production and sale of a product or service. Although it is also concerned with structure, conduct, and performance, it differs from traditional commodity system or industry analyses. Since the main focuses is on net value added instead of just overall revenue and gross physical output in some important ways.

2.2. Approaches of Value Chain Analysis (VCA)

There are different approaches in value chain analysis some of the main approaches is presented as follows.

Filière approach

The filière concept' was developed in the 1960s as an analytical tool for empirical agricultural research. The concept was used to gain a more structured understanding of economic processes within production and distribution systems for agricultural commodities. The 'filière' approach includes various schools of thought and research traditions. Initially, the approach was used to analyse the agricultural system of developing countries under the French colonial system. The analysis mainly served as a tool to study the ways in which the agricultural production systems were organised in the context of developing countries.

In this context, the filière framework paid special attention to how local production systems were linked to processing industry, trade, export and final consumption (Raikes *et al.*, 2000).

Porter's approach

Porter's concept introduced "value chain" as a new term. It put forward the notion of value addition in competitive markets as the core element in the production to consumption chain of activities. Porter has used the framework of value chains to assess how a firm should position itself in the market and in the relationship with suppliers, buyers and competitors. Porter distinguishes between primary activities, which directly contribute to add value to the production of the product or services and support activities, which have an indirect effect on the final value of the product. In Porter's framework the concept of value chain has a strict business application. Consequently, value chain analysis mainly aims at supporting management decision and executive strategies.However, Porter's concept deals essentially with firm-level strategy and not with broader economic development (M4P, 2008).

Global approach

It is approaches developed by Kaplinsky and Morris (2001) they observed that in the course of globalisation, there has been a perception that the gap in incomes within and between countries has increased. They argue that value chain analysis can help to explain this process, particularly in a dynamic perspective. Firstly, by mapping the range of activities along a chain, a value chain analysis breaks down total value chain earnings into the rewards that are achieved by different parties in the chain. A value chain analysis is the most accurate way of understanding the distribution of earnings. Other ways of viewing global distributional patterns provide only partial insights into these areas.

Second, a value chain analysis can show how firms, regions and countries are linked to the global economy. This will largely determine the distributional outcomes of global production systems and the capacity which individual producers have to upgrade their operations and thus to launch themselves on to a path of sustainable income growth. Generally, kaplinsky and Morris (2001) stress that there is no "correct" way to conduct a value-chain analysis rather, the approach taken fundamentally depends on the question that is being asked.

2.3. Importance of Value Chain Analysis

According to Kaplinsky and Morris (2001) there are three main sets of reasons why value chain analysis is important in this era of rapid globalization. Due to the growing division of labor and the global dispersion of the production of components, systemic competitiveness has become increasingly important, efficiency in production is only a necessary condition for successfully penetrating global markets and entry into global markets which allows for sustained income growth that is making the best of globalization requires an understanding of dynamic factors within the whole value chain.

The agricultural value chain approach is utilized by many development interventions that intend to engage smallholders either individually or collectively into the production of market oriented high value crops (Anandajayasekeram and Berhanu,2009).Since the focus of the approach is on identifying opportunities that actors along the value chain possess and critical constraints that limit their competitiveness, it has the potential of identifying market-based solutions to promote market competitiveness.

Value chain analysis is a useful analytical tool that helps understand overall trends of industrial reorganization and identify change agents and leverage points for policy and technical interventions. It is increasingly used by donors and development assistance agencies (UNIDO, 2009).

2.4. Mapping the Value Chain

Mapping the value chain is the first step of a value chain analysis. The main idea is initially to identify the actors and then to ‘map’ the traced product flows within the chain including input supply, production, processing, and marketing activities. The objective is to give an illustrative representation of the identified chain actors and the related product flows. A mapped value chain includes the actors, their relationships, and economic activities at each stage with the related physical and monetary flows (Faße *et al.*, 2009).

Chain mapping is the core of value chain analysis. 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. Mapping always starts by drawing a basic map providing an overview of the entire value chain. The overview map should present the major links (segments) of the value chain. It should visualize the sequence of production and marketing functions performed (in hollow white arrows) the value chain operators taking these functions (in yellow boxes) and vertical business links between the operators (GTZ, 2007). There are two different kinds of approaches used for mapping. These are functional and institutional analysis, and social network analysis.

Functional and Institutional Analysis

According to McCormick and Schmitz (2001) mapping a chain means giving a visual representation of the connections between actors in its simplest form it is merely a flow diagram. More sophisticated versions show that some actors (enterprises) differ in size and that some connections are more important than others; and they help to identify bottlenecks and leverage points. Mapping which starts with constructing a preliminary map of a particular chain to provide an overview of all chain actors (institutional analysis) and the type of interaction between them (functional analysis). The results can be presented either in a table or in a flow chart, which is called the preliminary map of the chain (FAO, 2005).The FAO methodology includes three essential aspects for developing a preliminary map. Once the activities and agents in the chain have been identified, it is useful to show their interaction in a functional analysis table which includes: Principal functions in the chain, *i.e.* the stages of processing and transport, as well as any activities associated with the supply of inputs which have been included as part of the chain; Agents, (or aspects of agents) carrying out these functions; Products concerned in the chain: i.e. the principal product of the chain, in the various forms into which it is transformed throughout the chain. Once the flow chart has been drawn, these flows are quantified, both in physical and monetary terms. The procedure allows assessing the relative importance of the different stages or segments of the chain, for this study this method of mapping chain was partially used.

Social Network Analysis

Another approach for mapping value chains is the social network analysis (SNA) originated in social sciences. Similar to the FAO concept, it serves as a tool for mapping and analyzing relationships and flows between people, groups, and organizations. The initial flow chart of the chain consists of various nodes and links arranged in the form of a matrix. The nodes represent the actors while the links describe the relationships and flows between the nodes. SNA is used when the value chain is more characterized by a network than a single vertical chain (Faße *et al.*, 2009).

Clottey *et al.* (2007) used SNA to map the small livestock production system in Northern Ghana for a value network analysis. The objective was to analyze the introduction of animal health care services in the region. Thus, the value-creating linkages were mapped, after that SNA was employed to determine the pathways of value exchanges and individual relationships among the small farmers and enterprises. As a result, the authors found out that the input supply is weakly linked with the upstream livestock chain activities.

In addition, the knowledge flow among farmers and actors from research and development needed to be improved to strengthen the entire livestock production chain. Kim and Shin (2002) also applied SNA to analyze the development of international and interregional trade flows between 1959 and 1996.The authors comes with conclusion that the world became increasingly globalized in the sense that the analyzed countries traded significantly more in 1996 than in 1959, both interregional and intraregional.

2.5. Value chain governance and upgrading

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, 2001).Value chains imply repetitiveness of linkage interactions. 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 and results in activities, roles and functions.

Governance is a description of the dynamic distribution of power, learning, and leadership in standards and strategy setting among a value chain's firms (Gereffi *et al.*, 2005). The author's concepts are related and refer to coordination and power relation between actors involved in certain value chain. We can distinguish different forms of governance, of which the most important are markets, modular value chains, captive relationships and vertical integration. While in a modular value chain an independent supplier makes products according to buyer specifications, captive relations describe a form of governance, in which small suppliers depend on a much larger lead company (GTZ, 2007).

Value chain upgrading

Increasing the competitiveness of the value chain by moving it into a new direction toward a new market, market segment, or customer; toward increased efficiency within the value chain or toward adding operations within the value chain (Webber and Labaste,2009).They classified upgrading into four :- Process upgrading: - Increasing the efficiency of internal processes such that these are significantly better than those of rivals, both within individual links in the chain and between the links in the chain. Product upgrading: Introducing new products or improving old products faster than rivals. This involves changing new product development processes both within individual links in the value chain and in the relationship between different chain links. Functional upgrading: Increasing value added by changing the mix of activities conducted within the firm or moving the locus of activities to different links in the value chain. Chain upgrading: moving to a new value chain.

2.6 Methods of Evaluating Market Performance

Market Performance is indication of the impact of structure and conduct on product price, costs and the volume and quality of output. If the market structure in an industry resembles monopoly rather than pure competition, then one expect poor market performance (Cramers and Jensen, 1982).

2.6.1. Marketing margins and marketing cost

Marketing margins

According to William and Robinson (1990) a marketing margin is defined alternatively as the difference between the price paid by consumers and that obtained by producers or the price of a collection of marketing services that is the outcome of the demand for and the supply of such services. Similarly, FAO (2007) explained marketing margin as the percentage of the final weighted average selling price taken by each stage of the marketing chain. 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 and buying prices (Mendoza, 1995).

The analysis of marketing costs and margins would reveal how efficient pricing in domestic markets is, and gives an indication of the importance of transaction costs facing traders, farmers and intermediaries (middlemen) and help in identifying and solving bottleneck thus assist in reducing marketing costs. Understanding the concept of market costs and margins requires a priori understanding of the marketing chains or channels under question and a prescription of how long is it (FAO, 2011).Looking at margins and changes in margins cannot tell us that there is a problem. It can only suggest that there may be a problem which requires further investigation by studying the marketing costs.

Marketing costs

According to FAO (2007) marketing costs refers to those costs, which are incurred by actors to perform various marketing activities in movements of products from producers to consumers. Marketing cost includes: handling cost (packing and unpacking, loading and unloading and etc) transport cost, product loss (predominantly for perishable fruits and vegetable), storage costs, processing cost, capital cost, market fees, commission and other payments. Moreover, marketing cost varies from commodity to commodity and changes overtime and space.

2.7. Marketable and Marketed Surplus

Marketable surplus is the quantity of produce left out after meeting farmer's consumption and utilization requirements for kind payments and other obligations (gifts, donation, charity, etc). Marketed surplus shows quantity actually sold after accounting for losses and retention by farmers, if any and adding previous stock left out for sales. Thus, marketed surplus may be equal to marketable surplus, it may be less if the entire marketable surplus is not sold out and farmers retain some stock and if losses are incurred at the farm or during transit (Thakur *et al.,* 1997*).*The importance of marketed and marketable surplus has greatly increased owing to recent changes in agricultural technology as well as social pattern. In order to maintain balance between demand for and supply of agricultural commodities with rapid increase in demand, accurate knowledge on marketed/marketable surplus is essential in the process of proper planning for procurement, distribution, export and import of agricultural products (Malik *et al*., 1993).

2.8. Overview of Potato Production and Marketing in Ethiopia

Potato is an important food and cash crop in the highlands and in urban areas mainly due to the growing number of fast food industries and hotels. Potato is among the most efficient commodities for converting natural resources, labor and capital into a high quality food. Because of its short duration, it is very strategic for mitigating food crisis in disaster situations (Alemu, 2012).

The altitude between 1,800 to 2,500m is suitable for seed and table potato growing and 70% of the Ethiopian agriculture land is located at that altitude (Bezabih and Mengistu, 2011). Potato is produced in two growing seasons: the *Belg* season (a short rain season: March to June), during which the bulk of production takes place, and the *Meher* season (a long rain season: July to November). Given the diversity in Ethiopia there are no certified or universally recognized varieties being used but all varieties are generally low yielding (8 ton/ha) and susceptible to disease and pests. Out of total potato producers in Ethiopia only about 3% have access to improved or uncontaminated seed mainly as a result of the lack of access to quality seed potatoes of disease resistant varieties. Uses of improved potato varieties

and inorganic fertilizers were influenced by wealth, education and technology adoption of individual households. Poor, non-adopter and uneducated households were constrained by inadequate access to improved varieties and inorganic fertilizers, and by shortage of cash (Teagasc, 2015).

The suboptimal agronomic techniques practiced by potato growers in Ethiopia are undoubtedly one of the contributing factors to the existing low average yield. Agronomic studies have been undertaken by different research centers to develop a package of optimum management practices together with improved cultivars planting time varies from place to place and from variety to variety influences tuber yield and late blight incidence. Late blight is the most devastating disease of potato in countries like Ethiopia where subsistence farmers are not in a position to properly know and control the disease. It occurs throughout the major potato production areas (ELBP, 2004).

For maximum yield, potato should be planted when favorable conditions prevail for better growth and development. Farmers in northwest Ethiopia plant potato earlier in the season to escape late bright infection. Potato is naturally a heavy feeder crop, fertilizer rate varies with soil type, fertility status, moisture amount, other climatic variables, variety, crop rotation, and crop management practices (EIAR and ARARI, 2013).

According to Bezabih and Mengistu, (2011) Potato sole cropping is the most popularly practiced production system, more than 90% of producers practice sole cropping in Tigray and SNNP. In the absence of storage technologies for ware and seed potato, farmers keep potato harvest in the ground for a long period, this reduces tuber yield significantly. The main production constraints are related to the narrow genetic basis of the varieties and the poor seed quality.

Around high land part of the country potato is intercropped with barley and linseed, where potato for those regions is an interesting cash crop but also provides a staple with relatively good nutrition value, making it a crucial crop for food security for the highlands (Haverkort.*et al.,* 2012).

Even during the Dergue regime, when the Ethiopian government was more actively involved in agricultural production and distribution of crops, potato marketing remained an essentially free market activity, but one in which farmers were challenged was lack of transportation facilities and accurate market information (Gebremedhin *et al.,* 2001).Mostly ware potatoes are sold at harvest and large supply leads to low price. Farmers often sell their potatoes without having market information; hence middlemen take the advantage of their close contacts with farmers and wholesalers (Haverkort *et al.,* 2012).

According to Bezabih and Mengistu (2011) marketing problems farmers faced were high seed potato price, brokers interference ,low price ,lack of grading and standards for the commodity. The study also reported that one of the major problems in potato production and marketing in Ethiopia was high post harvest loss.

According to Kassa (2014) demand for improved varieties is increasing from time to time since producers need to grow improved varieties and sell it for seed with relatively better price but the supply is very limited.

2.9. Review of Empirical Studies

2.9.1. Value chain analysis

Numerous studies have employed the value chain analyses to look into the whole system of agricultural commodities among that related to potato are presented below.

Value chain study conducted on vegetables by USAID (2011) in Nepal indicated that the subsector faces challenges such as unavailability of quality planting materials, lack of knowledge among the producers on proper usage of fertilizers and pesticides as well as poor soil fertility management, lack of irrigation facilities, labor shortage, postharvest loss due the perishable nature of vegetables, limited access to reliable market information, unorganized market center, limited collection centers, and lack of proper packaging and transportation facilities. The study recommended short-term and long term infrastructural and institutional innovation to reduce the above challenges.

Mebrat (2014) conducted value chain analysis of tomato in the central rift valley of Ethiopia. She identified actors involved in tomato value chain and major constraints facing value chain actors, these were seasonality, prevalence of tomato diseases and pest, lack of finance, higher fertilizer price and untimely delivery, poor transportation facility, non-existence of value addition through processing, high perish ability, poor market information and dissemination, poor marketing skill and intervention of brokers.

Abraham (2013) used value chain analyses to identify constraints hindering the development of vegetable value chain; the constraints were found in all the stages of the chain. At the farm-level, vegetable producers are faced with lack of modern input and high postharvest losses. On marketing side, limited access to market, low price of product, lack of storage, lack of transportation facility , low quality of product and illegal trade.

Kassa (2014) applied value chain analysis for potato and identified the following major problems;- inadequate input supply, high input price, inappropriate delivery system, poor harvesting technology, limited awareness of post-harvest handling, lack of support for producers and traders (technical, business or financial),poor infrastructure facilities, lack of market information, and poor integration among actors.

Bezabih and Mengistu (2011) used value chain analysis tools to identify constraints in potato value chain impurity of potato seed, lack of improved potato variety, absence of formal potato seed supply and use of small size potato for seed, poor road to access rural potato growing areas, inadequate ware and seed potato storage facility, in adequate agronomic practice, diseases and pests were the major constraints in the chain. Getachew (2015) conducted value chain analysis for potato seed tuber and suggested the major problems faced by producers.
The identified constraints were; absence of road infrastructure, low product price and lack of product market information, delay of modern input supply, diseases and pests, chemical ineffectiveness and continuous increment of input price.

Bezabih (2008) conducted value chain analysis for horticultural crops and identified ample constraints, from that some of were pests, drought, shortage of fertilizer, high fuel price for

irrigation purposes , poor market information, inadequate communication, storage and perish ability of the products.

Addisu (2016) applied value chain analysis to identify key constraints which hinder the development of vegetable value chain in different level. At farm level, the major production constraints were shortage of good quality seed, high cost of inputs, lack of availability of adequate pesticides/herbicides, reduction of irrigation water, low irrigation facility, limited knowledge on the proper plantation, harvesting and post- harvest handling activities, diseases and pest attacks, lack of storage, and inadequate credit service. At marketing/trading stage, poor road and transport facility, price setting problem, poor market information, presence of unlicensed traders, lack of product standard, price fluctuation and perish ability of the product.

Almaz *et al.* (2014) have undertaken a value chain analysis for vegetable (onion and tomato) in Ethiopia and identified constraints impeding the improvement of onion and tomato value chain at different stages of the chain. The commodity was complicated by substantial problems including; low yield, lack of production and marketing skill, lack of capital, adulteration (poor quality of seed), lack of market information, brokers interferences in marketing, inadequate vegetable marketing policy, problem of rural road access, storage problem, improper shading and lack of demand.

2.9.2. Determinants of marketed surplus

Many study identified the determinants of agricultural commodity marketed surplus from which some that relate with potato are presented below.

Adugna (2009) applied cobb douglass logarithmic model for fruit and vegetable. The identified factors that influence marketable supply were age, sex, active labor force, distance from production to main road, total land holding, quantity produced of each crop, access to market information, number of oxen owned, family size and education level.

Abraham (2013) employed multiple regression model to identify factors that affect the marketable surplus of vegetable and the result shows that marketable supply of tomato was affected by access to market information and quantity of tomato produced. Marketable supply of potato was affected by access to extension service, access to market information, vegetable farming experience and quantity of potato produced and marketable supply of cabbage was affected by non/off farm income, distance to the nearest market and quantity of cabbage produced.

Meron (2015) employed Heckman two stage selection model to identify factors that affects the market supply of vegetables, the results of second stage of Heckman showed that family size, frequency of irrigation and frequency of extension contact was the significant determinants of the quantity of vegetables supplied.

Abay (2007) applied Heckman two-stage selection model to analyze the determinants of vegetable market supply and the study found that marketed supply of vegetables were significantly affected by family size, distance from main road, number of oxen owned and extension service.

Yeshitila (2012) applied Heckman two stage selection model and identified factors affecting supply of vegetable to the market. The results of the Heckman two stages indicate that extension contact, access to irrigation, education level, land holding and fertilizer application significantly affects vegetable market supply.

Abitew *et al.* (2015) employed a linear regression model to identify factors that affect market supply of potato in Eastern Hararghe zone and found that gender of house hold, farm experience, livestock holding, access to market information, access to credit and quantity of potato produced were significantly influenced market supply.

Mebrat (2014) employed a multiple regression model to examine factors affecting tomato marketed surplus and found that current price, farm size, access to market information and distance to market were influenced marketed surplus of tomato.

Almaz (2013) employed multiple linear regressions to study determinants of market supply of vegetables a case of Akaki-Kality sub-city, Ethiopia. The result of the study revealed that education, sex of the household head, access to market information, family size, distance from the nearest market centre and quantity of leafy vegetables produced was found to influence market supply of leafy vegetables. Likewise sex of household head, quantity of potato produced and distance from the nearest market centre affected market supply of potato.

2.10 Conceptual Framework of the Study

Agriculture value chain analysis begins at stage of input supply, then passes through production, processing and marketing and ends with the consumption of a certain product. Since value chain includes direct actors who are commercially involved in the chain and supporters that makes better environment for primary actors involved in that commodity chain. Moreover, examining the existence of market imperfection and identifying determinants of potato marketed surplus and also identify major constraints and opportunities along the chain to assists actors involved in potato value chain in general and potato producers in particular, having this ground the conceptual framework for this value chain investigation is presented below.

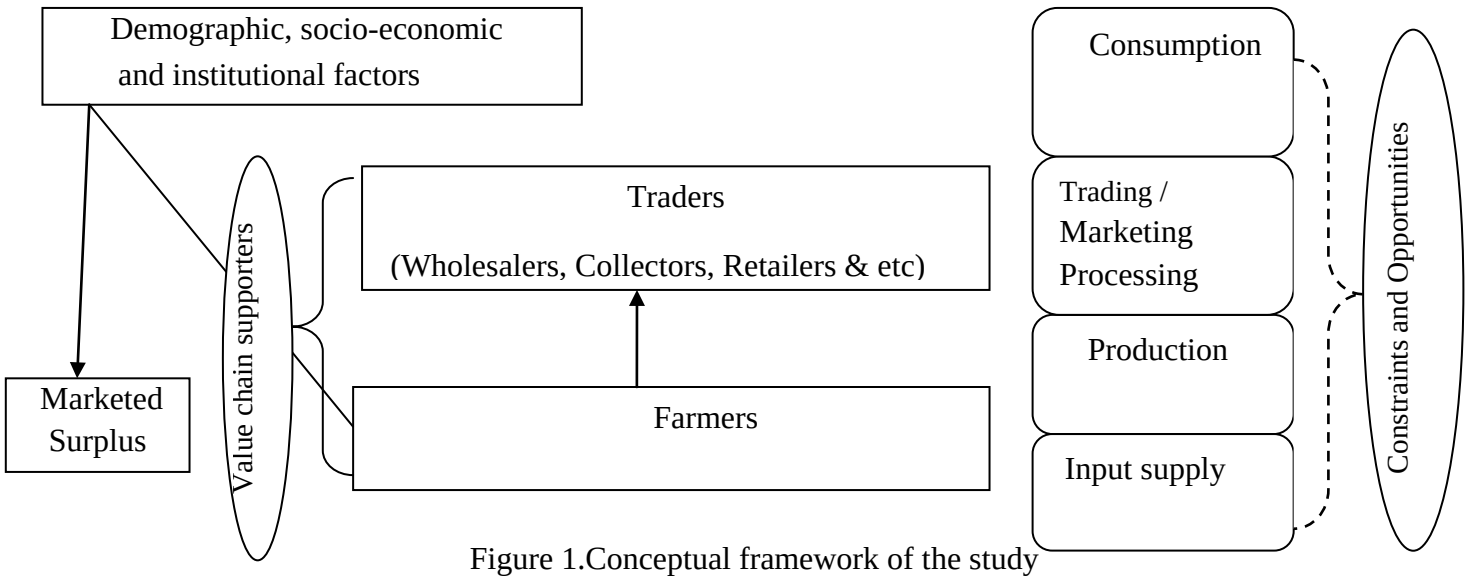

Figure 1.Conceptual framework of the study

Source: adapted from Kaplinsky and Morris (2001).

3. METHODOLOGY

In this chapter, description about the study area, data types and sources, sampling procedure, methods of data collection and data analysis, and explanation on hypothesized variables are discussed.

3.1 Description of the Study Area

The study was undertaken in Dedo district which is one of 18 districts of Jimma zone, Southwest Ethiopia. Located at a distance of 377 km from Addis Ababa, it is bordered with Kersa district in the north, Omo Nada district in east, SNNP regional state district in the south and Seka Chokersa district in west. It is situated in the south extreme of the zone. It has a total surface area of 1509Km^2 that accounted for 7.7% of the total area of Jimma zone. 49.1% of the district land is under cultivation while, 23.9%, 13.9% and 13.1% is occupied by forest, woodland and grassland respectively. *Teff*, maize and vegetables are important cash crops. The district has 53 rural *kebeles* with agro-climatic condition, consists of highland (47%), midland (35%) and lowland (18%) with altitude that ranges between 800-3000 masl.The dominant soil categories in the district are Orthic Acrisols (80%) and Orthic Vertisols (20%).The area receives an average annual rainfall ranging from 1600-2600mm with average minimum and maximum daily temperatures of 20 and 28C^o, respectively (DoANR,2016).The total population projection of about 360,745 out of which 179,390 &181,355 are male and female respectively in year 2016 (CSA, 2013).

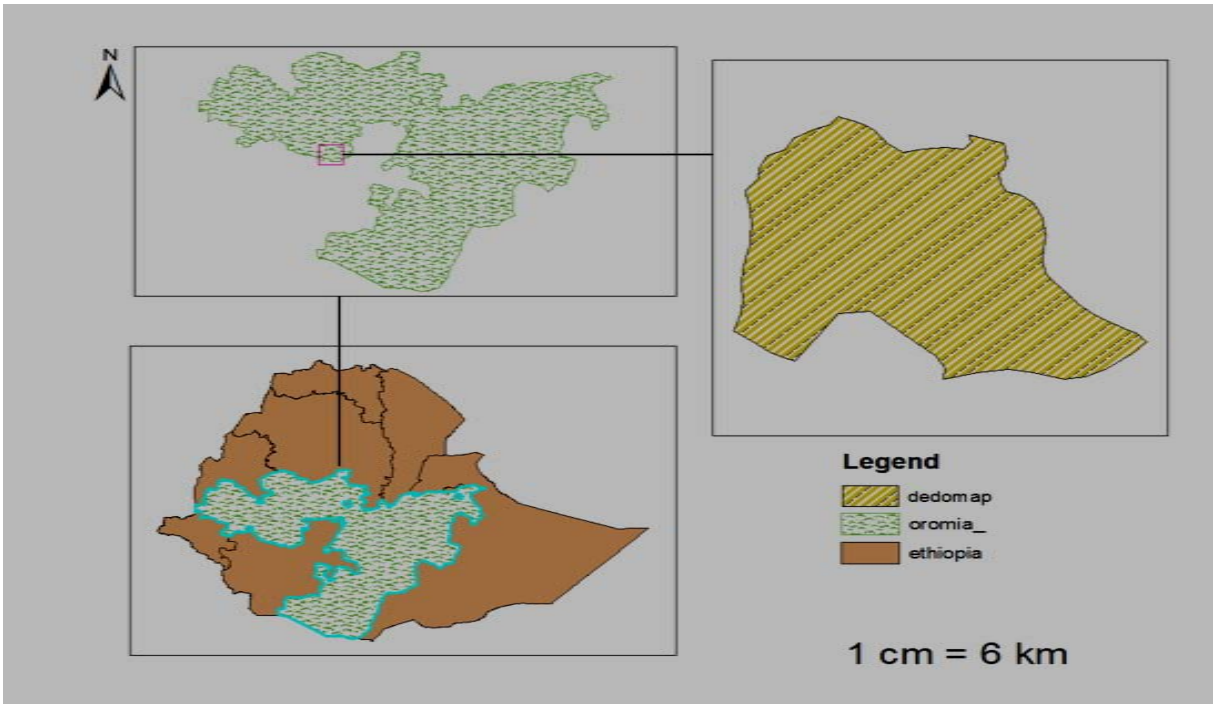

Figure 2. Map of the Study area

3.2 Data Types, Sources and Methods of Data Collection

For this study both quantitative and qualitative data types were collected, sources of primary data were potato producer (farmers), traders and small scale processors. Besides the primary data, secondary data on total land size, population, number of licensed traders and related issues were obtained from the central statistical authority (CSA), office of agriculture and natural resources (DoANR),irrigation authority office(DoIA), office of trade and market development, and other sources. Primary data was collected from potato producer (farmers), traders and processors through interview schedule containing close ended and open ended question. Checklist was used to collect primary data from value chain supporter concerning support they provide to other actors. Informal surveys such as key informant interviews and focus group discussion were held. Key informant interview with experts of agriculture and natural resource office, irrigation authority office, cooperative promotion office and trade and market development office was conducted to collect primary data used for identification of constraints and opportunities in potato value chain. Focus group discussion consists of male and female, literate and illiterate were held at sample *kebeles.*

3.3 Sampling Procedure and Sample Size Determination

3.3.1 Farmers sampling

Out of the 53 rural *kebeles* in Dedo district 20 *kebeles* were producers of potato. Out of the 20 potato producing *kebeles*, 4 of them were randomly selected. Then, 136 sample farmers were selected randomly based on proportional to the population size of the selected *kebeles* (Table 1).

Yamane (1967) sample size determination formula was used to calculate sample size.

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

Where: - n –the sample size N – Potato producers e - the acceptable sampling error

$$N = 1070, n \approx 136 \ \& \ e = 8\%$$

Table 1. Number of households selected from sample *kebeles*

Name of *Kebeles*	Number of producer	Number of sample household
Geshe	220	28
Garima Gudda	267	34
Sito	283	36
Ilala	300	38
Total	1070	136

Sources: Own design based on secondary data from DoANR (2016)

3.3.2 Traders sampling

Sample size of traders included in the study were obtained in different ways, wholesalers included in the study based on information obtained from Dedo district office of trade and market development, there were 5 joint vegetables wholesalers in the district and all of them were included as they all participated in wholesale business of potato. According to district trade and market development office collectors, retailers and small scale processors in the area is not licensed, because of this, information about number of collectors was obtained

from wholesalers. Based on these eight collectors were included in the study. Likewise 12 retailers out of 24 and 6 small scale processors were interviewed.

Table 2: Sample wholesalers, collectors, retailers and small scale processors

Actors	Total	Sample
Wholesalers	5	5
Collectors	8	8
Retailers	24	12
Small scale Processors	6	6
Total	43	31

Source: obtained from secondary data and personal information, 2016

3.4 Method of Data Analysis

In this study, both descriptive and econometric methods were employed in analyzing data from the survey.

3.4.1 Descriptive analysis

Descriptive statistics were used to describe different characteristics of the sample households.

3.4.1.1. Value chain mapping

Value chain mapping was used to identify the chain actors and their supply linkage mapping a value chain facilitates a clear understanding of the sequence of activities and identifying the key actors and relationships involved in the value chain. 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. According to GTZ (2007) mapping value chain contains a functional map combined with a map of value chain actors.

3.4.1.2. Margin analysis

Estimates of the marketing margins are the best tools to analyze performance of market. Marketing margin is calculated by taking the difference between producers and retail prices. A marketing margin is the percentage of the final weighted average selling price taken by each stage of the marketing chain. The total marketing margin is the difference between what the consumer pays and what the producer/farmer receives for his product (William and Robinson, 1990; FAO, 2005).

$$\text{Gross Margin} = \text{Sales price (SP)} - \text{Purchase price (PP)} \quad \ldots\ldots 2$$

$$\text{Marketing profit (MP)} = \text{Gross margin (GM)} - \text{Marketing cost (MC)} \quad \ldots\ldots 3$$

$$\text{TGM} = \frac{\text{Consumer price} - \text{Producer price}}{\text{Consumer price}} * 100 \quad \ldots\ldots 4$$

The producer's margin is calculated as:-

$$\text{GM}_P = \frac{\text{Consumer price} - \text{TGM}}{\text{Consumer price}} * 100 \quad \ldots\ldots 5$$

$$\text{NMM} = \frac{\text{Gross margin} - \text{Marketing cost}}{\text{Consumer price}} * 100 \quad \ldots\ldots 6$$

Where:-TGM is total gross marketing margin, GM_P is gross marketing margin of the producer and NMM is net marketing margin.

3.4.2 Econometric analysis

Econometric analysis was used to estimate the relationship between the dependent variable and the independent variables. Tobit model was employed to analyze determinants of potato marketed surplus.

3.4.2.1 Determinants of marketed surplus of potato

To identify determinants of marketed surplus of potato by house hold head, the multiple linear regression model can be used, but in this study, all households were not participated in potato marketing. Tobit model maximum likelihood estimation was used to identify determinants of marketed surplus of potato. Tobit is an important kind of limited dependent variable model which is roughly continuous over strictly positive values but it is zero for a nontrivial fraction of the population (Wooldridge, 1999). In this study about 12.5% of sample household didn't participate in supplying potato, from the total of 136 sample households, data are censored, and Tobit estimation is appropriate.

Specification of the Tobit model for potato marketed surplus

Tobit model is used when the dependent variable is bounded but continuous within the bounds.

$$Y_i^* = \beta_o + \sum_{i=1}^{n} \beta_i \mathrm{X_i} + \epsilon_\mathrm{i} \quad ---------- 7$$

$$Y_i = \begin{cases} Y_i^* = \beta_0 + \sum_{i=1}^{n} \beta_i \mathrm{X_i} + \epsilon_\mathrm{i}, \text{if } Y_i^* > 0 \\ 0 \quad if Y_i^* \leq 0 \end{cases} \quad ---------- 8$$

$\epsilon \sim N(0, \sigma^2)$

Where Y_i the quantity of potato supplied to the market (dependent variable); Y_i^* is latent variable which is not observable, β_0 is the intercept, β_i is the coefficient of i^{th} independent variable, $\mathrm{X_i}$ is the vector of independent variable determining quantity supplied and i is $1,2,3 \ldots n$ and ϵ_i is error term. Tobit model output is not directly interpreted as that of OLS, since the estimated coefficients of Tobit is interpreted as the effect of the regressors on the latent variable. A change in explanatory variables has two effects; it affects the conditional mean of Y_i^* the positive part of the distribution and it affects the probability that the observation will fall in that part of the distribution.

(1) The marginal effect of an explanatory variable on the expected value of the dependent variable is:

$$\frac{\partial E(Y_i)}{\partial X_i} = F(z)\beta_i \quad ---------- 4$$

Where, z represents $\frac{\beta_i X_i}{\sigma}$ (Maddala, 1997)

(2) The change in intensity of market participation with respect to a change in an explanatory variable among potato sellers /participant group

$$\frac{\partial \mathrm{E}(\mathrm{Y_i}/\mathrm{Y}^* > 0)}{\partial \mathrm{Xi}} = \beta_i \left[1 - \quad Z\ \frac{f(z)}{F(z)} - \left(\frac{f(z)}{F(z)}\right)^2\right] ---------- 5$$

Where, F (z) is the cumulative normal distribution of z, f (z) is the value of the derivative of the normal curve at a given point (i.e., unit normal density), z is the Z score for the area under normal curve, β_i is a vector of Tobit maximum likelihood estimates and σ is the standard error of the error term.

(3) The change in the probability of market participation as independent variable X_i changes is

$$\frac{\partial F(z)}{\partial Xi} = \ f(z)\frac{\beta_i}{\sigma} ---------- 6$$

3.5 Definition and Hypothesis of Variables

Dependent variables:-

Quantity of potato marketed (MS): It is a continuous variable which represents the actual amount of potato supplied to the market by the farm household in the survey year.

Independent variables; Different variables were expected to determine the amount of supply. A number of studies suggested that farmer's marketed surplus of agricultural commodity can be determined by a number of factors. Explanatory variables that were expected to affect the dependent variables in the context of the area are presented as follow.

Age of the household head (AGEHHH): Age is continuous variable measured in years. As farmers' stays long, he will have better knowledge, develop skills, and have better experience to supply more. Aged households have wider experience which helps them produce large and sell more (Alemayehu, 2012). Therefore, age of the household head was hypothesized to have positive relation with marketed surplus of potato.

Sex of the household head (SEXHHH): This is a dummy variable that takes value 1 if male headed and 0 other wise. As male household better control over resource and have ability to supply more than female headed households. Habtamu (2015) indicated that a male headed household has higher level of market participation than female headed households. Therefore, this variable was hypothesized to have positive relationship with marketed surplus of potato.

Active family labor (ACVELAB): This refers to family members of the household who have the ability to work on the farm which is measured in adult equivalent. The larger the number of active labors in the family, the more the labor force available for production which enhances quantity of potato marketed. Availability of labor force enables *kocho* producers to supply large quantity (Nuri, 2016). Therefore, this variable was hypothesized to influence potato marketed surplus positively.

Education (SHYRSHH): It is a continuous variable and refers to years of schooling a household head attended. Educated farmers tend to be more innovative and more likely to adopt improved agricultural technologies and its marketing systems. Formal education enhances the information acquisition and adjustment abilities of the farmer, thereby improving the quality of decision making (Fakoya *et al*., 2007). Similarly Astewel (2010) found that as producer gets educated the amount of paddy rice supplied to the market increases. Education enables farmers to have better skills and better access to information to supply more amounts of vegetable (Addisu, 2016). Therefore, this variable was hypothesized to influence marketed surplus of potato positively.

Number of extension contact (EXTFREHH): This is a continuous variable, which is measured in number of day the extension agent or development agent visit the potato farmer

within a year. Development agents assist farmers in dissemination of new technologies and providing advisory service. Farmers who had frequent extension contact are assumed to have more awareness about production which improves their market supply. Ayelech (2011) found that if fruit producer gets extension, the amount of fruits supplied to the market increases. Therefore, this variable was hypothesized to have positive relationship with marketed surplus of potato.

Distance from district market (DMktHHH): It is a continuous variable measured in kilometer that potato farmers travels to supply his product to market. As farmer's gets far from the market the more distance needed to travel to reach a market place, the lesser possibility to participate in production and marketed surplus of the commodity. Makhura (2001) explained that those households located closer to market centers will experience lower costs since they can get information more easily. Similarly Mebrat (2014) indicates that as distance from farm to market increases the quantity of tomato supplied to the market decreases. Ayelech (2011) also indicated that distance to market caused marketable surplus of avocado to decline. Therefore, this variable was hypothesized to have negative influence on marketed surplus of potato.

Perception on lagged potato price (LAGPHHH): It is a dummy variable that take value 1, if the perception of the farmer on the lagged price is good, 0 otherwise. Since potato is a short season crop lagged prices can stimulate production as result the marketed surplus of potato increases for the next year. Myint (2003) suggested that if prices in one year are bad, farmers will often respond by planting less in the next year this will lead to lower production and higher prices, so encouraging more plantings in the following year and a consequent fall in prices. Therefore, this variable was hypothesized to have positive relationship with marketed surplus of potato.

Farm size allocated for potato (LNDFRPOT): It is continuous variable and measured in hectares. Refers to the size of land allocated for potato production by a house hold. Land allocation has an effect on quantity supply since, the larger land size households allocated for potato production the more will be the quantity supplied to the market.

An increase in farm size naturally implies an increase in output which leads to increase marketed surplus of vegetables (Addisu, 2016). Tura (2015) also indicated that the cultivated land for wheat production has positive relation with marketed surplus of wheat. Therefore, this variable was expected to influence marketed surplus of potato positively.

Access to improved seed (ACCAGRIN): This is a dummy variable that takes a value of 1 if a farmer has access to improved potato seed, 0 otherwise. Since improved seed has correlation with high productivity and better capacity to resist diseases, which leads producers to produce large quantity of the commodity. Kindie (2007) having access to improved agricultural input increases marketed surplus of sesame. Therefore, this variable was expected to influence marketed surplus of potato positively.

Number of Oxen owned (NOXNHHH): It is a continuous variable measured in head count of Ox a house hold owned. Since oxen is used for plowing, as a house hold own more Ox the more probably the house hold expand his cultivation thereby producers supply large quantity of potato. Abay (2007) indicated that number of oxen owned influence the volume of tomato supplied to the market. Therefore, this variable was expected to influence marketed surplus of potato positively. `

Access to irrigation (ACCIRRIG): This is a dummy variable that takes a value 1 if a farmer has an access to irrigation for potato production and 0 other wise. As farmer uses irrigation the more products it produces may market oriented. Yeshitila (2012) indicated that farmers who have access to irrigation can sale vegetable at least twice a year which increases their market supply. Therefore, irrigation was expected to have positive effect on marketed surplus of potato.

Access to market information (ACMIF**):** This is a dummy variable taking a value of 1 if the farmer has access to market information on his product and 0 otherwise. Since farmers marketing decisions are based on market price information and demand. Farmers who have better access of market information supply more quantity of their product. Mebrat (2014) indicated that producers who had access to market information were greater than those who did not in terms of marketed surplus of tomato.

Takele (2015) also indicated that access to market information by mango producer increases the likelihood and intensity of market participation. Therefore, this variable was hypothesized to influence potato marketed surplus positively.

Access to credit (CREDITACC): This is a dummy variable that takes 1 if a farmer takes loan for potato production or 0 otherwise. Access to credit would enhance the financial capacity of the farmer to purchase the necessary inputs for potato production. Mahlet *et al.* (2015) explained that those households with better access to loan have better chance to increase their potato market supply. Marshal (2011) also indicated that access to credit has a positive effect on marketable supply of sugarcane. Therefore, it was hypothesized that access to credit would influence potato marketed surplus of households positively.

Non-farm income (NFINCHHH): It is a continuous variable measured in birr in the survey year that obtained by the household head from non-farming activities. A household head with better income from non farming activity is assumed to have low volume of potato marketed. A study by Iddo *et al.* (2006) confirmed that non-farm income has negative impact on the decision of farmers to sell their farm output. Likewise Rehima (2006) indicated in her study that non-farm income of the household head has negative influence on quantity supplied. Therefore, this variable was hypothesized to have negative influence on marketed surplus of potato.

Table 3: Definition, type, measurement and hypothesis of variables

Variables	Variable type	Measurement	Impact on Market supply
Age of the HH	Continuous	Year	+
Sex of the HH	Dummy	1=if male; 0=otherwise	+
Non- farm income	Continuous	Birr	-
Active family labor force	Continuous	Man equivalent	+
Educational level of HH	Continuous	Years of schooling	+
Number of extension contact	Continuous	Days of contact	+
Distance from district market	Continuous	Kilometer	-
Farm size allocated for potato	Continuous	Hectare	+
Access to improved seed	Dummy	1=if access; 0=otherwise	+
Number of oxen owned	Continuous	Number of oxen	+
Perception on lagged price	Dummy	1=if good ; 0=otherwise	+
Access to Irrigation	Dummy	1=if access; 0=otherwise	+
Access to market information	Dummy	1=if access; 0=otherwise	+
Access to credit	Dummy	1=if take loan; 0=otherwise	+

4. RESULTS AND DISCUSSION

This chapter deals with the socioeconomic and demographic characteristics of potato value chain actors, their core functions and linkage are discussed in detail. The chapter also deals with the analysis of marketing margin of actors, and major constraints and opportunities in potato value chain. Moreover, the results of econometric analysis of potato marketed surplus based on data from sample potato producers in the study area are presented.

4.1 Characteristics of Sample Farmers'

4.1.1 Demographic and socio-economic characteristics of the sample Producers

Since potato producers are the primary unit of analysis, there is a need to understand the basic characteristics of the sample producers.

Table: 4. Demographic characteristics of the sample households

Dummy variables	Mean/%	Std. Dev.	Min	Max
Sex				
Male	91.18	-	-	-
Female	8.82	-	-	-
Marital status		-	-	-
Married	91.91	-	-	-
Divorced	1.47	-	-	-
Widowed	6.62	-	-	-
Religion				
Muslim	91.18	-	-	-
Orthodox	5.88	-	-	-
Protestant	2.94	-	-	-
Age	48.38	10.69	30	74
Education	3.10	3.57	0	12
Experience	19.96	10.05	2	50
Active labor	3.71	1.64	1.75	8.75
Family size	7.73	1.69	4	12

Source: Own computation of survey data (2016)

The descriptive result revealed that both male and female headed households participated in potato production (Table 4). Out of the total interviewed potato producers 91.18% were male headed and the remaining 8.82 % were female headed. Regarding religion of house hold 91.18%, 5.88%, 2.94 % of the sample households are followers of Islam, Orthodox Christianity and Protestant respectively. The study shows that average age of sample potato producers was 48.38 years.

The mean farming experience of farmers was 19.96 with maximum of 50 years. The result shows that mean of schooling years of potato producers were 3.10 years /grade and with maximum of 12 Grade complete. The average family size per sample house hold head was 7.73 and with maximum of 12.

4.1.2 Socio -economic characteristics of farmers

Table 5. Socio –economic characteristics of sample producers

Factors	Mean/%	S.D	Min	Max
Livelihood activity				
Agriculture	91.91	-	-	-
Agriculture &non-farm activities	8.09	-	-	-
Non-Farm income ‘’000’’	2.22	9.43	0	59.73
Land allocated for potato	0.39	0.33	0.024	1.65
Number of oxen owned	1.96	0.95	0	4
Total livestock excluding oxen	6.80	3.23	0	18.84
Income from other crop sale	8373.816	5857.75	1804.5	34652.25
Income from livestock sale	8079.003	6479.474	326.67	38237.25
Income from sale of potato	7263.253	7965.155	0	43396.5
Annual income from farm	23716.07	19578.28	2554.17	116286

Source: Own computation of survey data (2016).

The average amount of non-farm income earned by sample farmers was birr 2220.Oxen are the main source of farm power for plowing, the average number of oxen owned by sample house hold was 1.96 oxen. It is obvious that land is one of the most important physical inputs of agricultural production and land size allocated for the crop of interest shows how farmers intended to produce the commodity. The mean of land allocated for potato production in the year 2015/16 was 0.39 hectare. The study showed that the average number of livestock in TLU for sample respondent was 6.79, often the number of livestock owned by a household is considered as a measure of wealth in rural area. In a mixed farming system the contribution of livestock to crop production cannot be undermined. They are an important source of income, food and draft power for smallholder farmer. In addition to these, they serve as providing manure for potato and crops production and as means of transportation of farm products from place to place. The annual income of sample respondents was birr 23716.07.

4.1.3 Institutional factors

Table 6. Institutional factors and access to services

Variables	Mean/%	Std. Dev.	Min	Max
Access to improved seed	38%	-	-	-
Access to irrigation	26%	-	-	-
Access to credit	35%	-	-	-
Distance from district market	11.16	8.76	0.25	32
Access to market information	38%	-	-	-
Number of extension contact	4.51	4.31	0.00	14.00
Perception on lagged price	49%	-	-	-

Source: Own computation of survey data (2016).

Since, improved seed help to increase productivity and thereby increase production, about 38% of sample producers has access to improved potato seed.

It is obvious that irrigation leads to an increase in yield per unit area and subsequent increases in income, consumption and food security. Irrigation enables smallholders to diversify cropping patterns, and to switch from low-value subsistence production to high value market oriented production. Irrigation can benefit the poor specifically through higher yields per unit of lands, lower risks of crop failure, and higher and year round farm employment. The result of the study revealed that about 26% of potato producers have access to irrigation.

The availability of credit service to farmers has its own contribution in enhancing production and productivity of agricultural product. Credit is an imperative source for financing the agricultural activities of smallholder farmers. The result of the study indicates that about 35% of sample respondent was used credit for potato production.

Regarding the distance taken to travel from home to the market place where they sold their product in determining market participation, the average distance that most of the households used to travel to sell their product to the market was about 11.16 kilometers. It is clear that market information is a necessary tool for farmers. Price obtained by producer depends on the reliability, source and channels of market information.

Moreover, farmers marketing decisions are based on market price information, and poorly integrated markets may convey inaccurate price information, leading to inefficient product movement. The study result revealed that about 38% of sample producers were exposed to information about market price of potato in the survey year.

Having access to agricultural extension service and frequent contact initiate farmers to produce and supply their product. The average number of contact farmers has with extension workers at their farm or get advice throughout the production process of potato the average number of extension contact for sample house hold was 4.51 days. 49 % of sample house hold perceived that last year potato price was good.

4.2 Results of Value Chain Analysis

4.2.1 Map of potato value chain

Value chain can be mapped and analyzed using value chain analysis (VCA). The first step of a value chain analysis is mapping. A mapped value chain includes the actors, their relationships, and economic activities at each stage with the related physical and monetary flows (Faße *et al.*, 2009).

Mapping value chain helps to identify the different actors involved in the potato value chain, and to understand their roles and linkages. The value chain map of potato is described on figure 3.The figure shows actors involved and activities performed in stages of the value chain. The actors identified in potato value chain in study area were input suppliers, producers, wholesalers, retailers, processors and consumers. These are actors engaging directly in input provision, production, trading, processing and consumption. They take title of product and/or own product, each of these actors adds value in the process of changing product title. The main supporting actors identified were DoANR, DoIA, DoTMD, micro finance institutions (*i.e* OCSI &ESHET), cooperatives promotion office, NGOs and Bank.

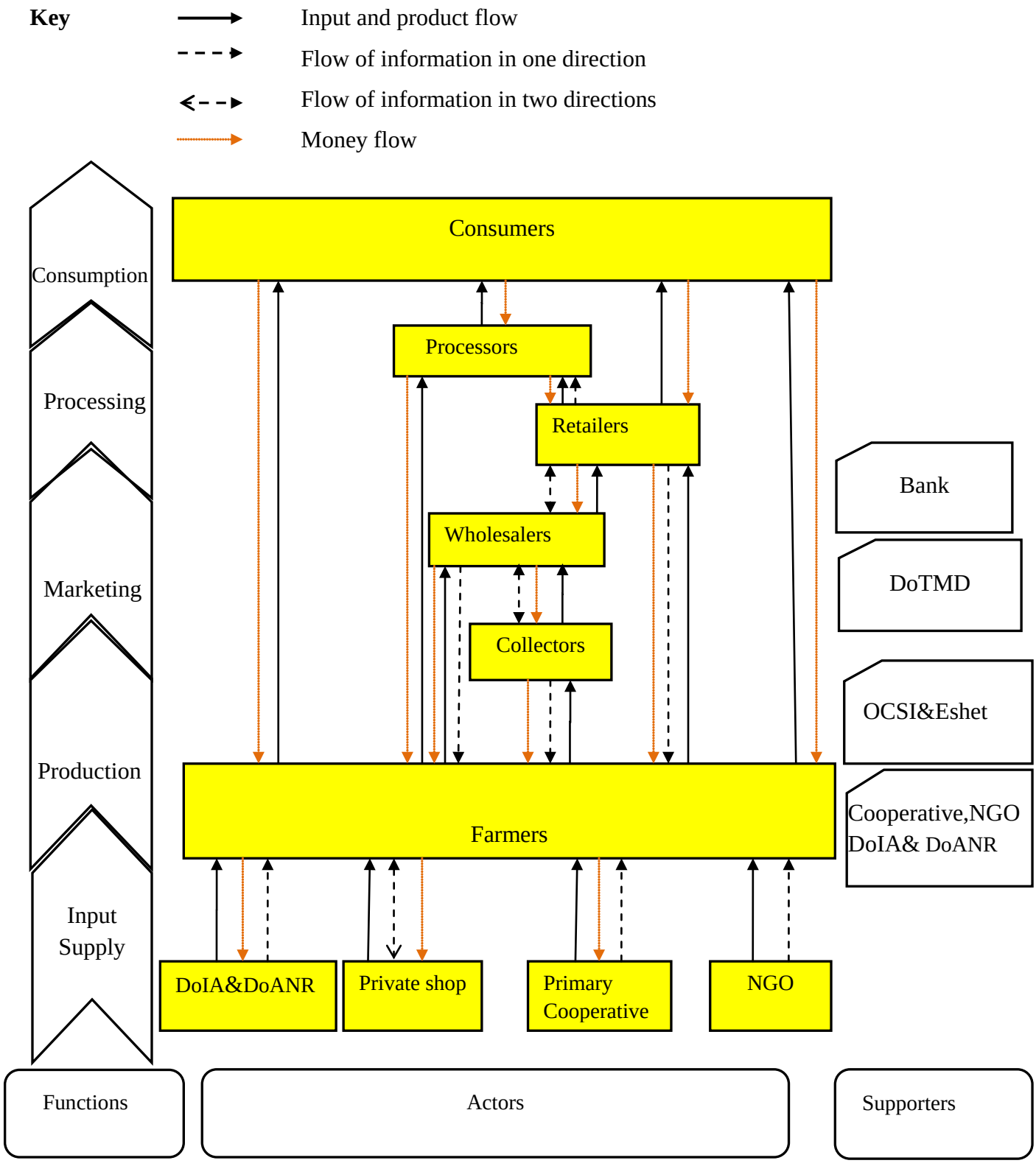

Figure: 3. Potato value chain map

Source: Own sketch from survey result, 2016.

4.2.2 Actors, their core functions and linkage in potato value chain

4.2.2.1 Primary actors in potato value chain

The primary activities focus on taking the inputs, converting it into outputs and delivering the output to the customer (Porter, 1985). These are the firms and individuals who assume different functions in the potato value chain, engaging directly in production, processing, trading and marketing. They usually become the owner of the product and/or take active market position often certain actors can have more than one function.

Table 7: Factors of potato production and its sources

Factors of production	Frequency	Percentages
In organic fertilizer (yes)	69	50.74
Sources of fertilizer		
Agricultural office	6	8.96
Primary cooperative	56	83.58
Market	4	5.97
NGO' s	1	1.49
Access to improved seed (Yes)	46	33.82
Agriculture office	23	16.91
NGO	2	1.47
Market	101	74.26
Other farmer	5	3.68
Research center	4	2.94
Own source	1	0.74
Chemical fertilizer (Yes)	86	63.24
Agricultural office	15	17.44
Private shop	71	82.56
Sources of labor		
Family source	94	69.12
Labor exchange	3	2.21
Cooperation	3	2.21
Family source and labor exchange	22	16.18
Family source and cooperation	14	10.29
Customized cropping system		
Sole/mono cropping	120	88.24
Intercropping with other Vegetables	3	2.21
Intercropping with cereal crops	13	9.56

Source: Own computation of survey data (2016).

Input suppliers: This segment of the value chain consists of the actors in the value chain that provides inputs like seed/tuber, fertilizer, herbicide and pesticide. DoANR, DoIA, primary cooperatives, private shops and NGO are the main actors responsible for the supply of such inputs in the study area.

Regarding sources of seed for production of potato farmers in study area obtain inputs from different sources;- the majority (74.26%)of the sample producers were used potato tuber/seed from market the rest obtain seed from different source (Table 7).

Some farmers use only organic fertilizer (mostly animal dung) while some farmers use both inorganic and organic fertilizers. Regarding sources of in organic fertilizers cooperative (83.58%) takes the lions share to provide fertilizer for potato producers followed by agriculture office (8.96 %) and market source which account about 5.97 %, as cited by district agricultural experts the market source is not encouraged because it is from unknown sources. The mean quantity of fertilizers used by sample producer was very low (0.38 Quintal), commonly used fertilizer in the study area were DAP, UREA and the recently introduced which is called NPS. Chemical inputs (herbicides, pesticides, fungicides and etc) in the study area was mainly supplied by private shops (82.56%) followed by agriculture office (17.44%). Labor is an essential input for agriculture, the labor engaged in potato production from start up of farming activity to the final collection of yield was from different source. As described above on table 7, about 69.12 % , 2.21 %, 2.21 % , 16.18 % ,10.29 % of the respondents used family labor, labor exchange, cooperation ,family and labor exchange, family and by cooperation respectively.

Producers: These are smallholder farmers that grow potatoes and sell to collectors, wholesalers, retailers, small scale processors and consumers. The major activities that executed by potato producers were land preparation, planting and applying fertilizer (in-organic and organic), weeding, disease and pest control, harvesting and transporting. The production system customized by smallholder farmers (producers) were sole cropping, intercropping with cereals and other vegetables which accounts about 88.24%, 9.56%, 2.2 % respectively (table; 7).Post harvest activities, such as sorting, packing, transporting, loading and unloading is done by the house hold head and some time by active member of the family

(if any) this was due to bulk nature of the commodity. According to the survey result among producers that supply potato to market 15.96 % were supply their produce to the wholesalers that found in district market and about 33.6% were sold their potato to collectors/assemblers and 15.12 % sold their product directly to retailers and 7.56 % sold to consumers, 3.36 % of potato market participant sold to processor (chips and boiled potato). Likewise the producers in the study area were sold potato to more than one trader, 15.12 %, 5.04 % and 4.20 % were sold to collectors and wholesalers, retailers and wholesalers, and collectors and retailers respectively. Moreover, retailers and collectors in the area were not licensed only the wholesalers that found in district has joint vegetable trading license. Regarding transportation, animal and head/backload are used to move potato from the producers to the market.

Table 8: Demographic and socio economic characteristics of sample traders

Variables	Mean /percentage			
	Collectors	Wholesalers	Retailers	Small scale processor
Sex (Male)	87.50	80	40	0
Age	33.25	44.6	41.6	31.67
Educational level	3.125	6	2.46	0.834
Trading experience	3.375	7.8	6.26	2.17
Family size	1.68	7.81	5	2.96
Initial Capital	1300	8010	730	-
Current Capital	7562.5	74000	4753.4	-

Source: Own computation of survey data (2016).

Collectors: These are traders that collect potato from producers. The roles/ functions of this actor are mostly collecting potato from producers and supply to wholesalers in the district market. These actors mostly purchase potato at village and at main road to the market of the district. The study result shows that large number of potato producer (33.6%) sells their product to this actor from sample potato producers.

Regarding collector's characteristics the average age of collectors was 33.25 years and 87.50% of the collectors were male. The average years of schooling of collectors was 3.125 years and with the average family size of 1.68 which is lowest family size of all actors involved in potato value chain (table 8).The mean trading experience of sample collector's was 3.375 years. Moreover, the average initial capital (start up) was 1300 birr and with the average current capital of birr 7562.5.

Brokers: These market agents serve as mediators between buyers and sellers in the potato market. They are usually expected to link buyers with sellers and some work of facilitation. In the study area they don't hold product they simply stand at main road from village to the district market and negotiate the producers and fix price, then brought the producers to the wholesalers. In most of the cases, brokers intentionally create a communication gap between buyers and sellers (producers), and arbitrate them in the way they like. The brokers are serious problem for sellers who do not have much experience of such markets. Therefore, as producers is not getting fair price that much their efforts. So, the problem requests serious attention from concerning government bodies.

Wholesalers: These are actors that deal with larger volume of potato than collectors, retailers and small scale processors that purchase potato in large volume and also have better financial status and information access relative to others, furthermore, they have license of trade but their license was joint vegetable license. They acquire potato from farmers, collectors and through brokers that brought producers to them. As described on table 8.The average age of the wholesalers was 44.6 years and 80% of the total respondent was male. This implies that females were few in number from the total respondent engaged in potato wholesale business in study area**.** The mean years of education of wholesaler was 6 years this show that years of education of wholesalers was greater than other actors involved in potato value chain.

The average trading experience of sample potato wholesalers was 7.8 years and the average family size of wholesaler's was 7.81 and the mean initial capital (start up of potato wholesale business) was 8010 birr and the average current capital of wholesaler's was74, 000birr.

Retailers: retailers in study area mostly purchase Potato from producers and wholesalers. This is one of the final relations or links in the chain that delivers potato to consumers or end users. They were many as compared to others and their main function was to sell potato according to amount needed by consumers. As depicted on table 8 the average age of retailers of potato was 41.6 years and about 60% of total sample retailer's was female this implies that the numbers of female was highest as compared to the male in potato retail business. The average schooling years of retailers was 2.46 in years. The average family size of sample retailers was 5 and the average retail business experience was 6.26 years. Moreover the average start up (initial capital) of respondent was 730 birr with current average capital of 4753.4birr.

Small scale processors:-These actors are individuals involved in the transformation of raw potato into chips and cooked potato. Processing work is done at road side, bus station and near cafeterias. Most chips and boiled potato processors sourced their potatoes from producers and retailers. The processing capacity of processors was few kilograms per day. Availability in the market and price are the most important attributes that chips and cooked potato processors consider when buying potatoes, though shape, not-green, not bruised and size were an important aspect as well.

Consumers:-Are actors those purchasing potato for consumption, mostly individual households. Potato value chain ended at consumers who buy the potato for the ultimate consumption. Most of consumers buy unprocessed potato for preparing sauce at their home.

Support service providers: Support activities assist the primary activities in helping the organizations achieve its competitive advantage (Porter, 1985). Value chain supporters or enablers provide support services and represent the common interests of the value chain operators. The roles that value chain enablers provide, include training and advisory, information and financial. The key supporters of potato value chain in the study area were district agriculture and natural resources office, district irrigation authority office, trade and market development office, cooperative promotion office, micro finance institutions (Oromia credit and saving institution and Eshet) NGOs and banks.

DoANR and DoIA ,provides extension services through DAs hired at *kebele* level to improve production, market linkages and build the capacities of farmers through training about agricultural technologies. They also provides services regarding crop management and disease control in addition, sample respondent specified that they are getting information mainly on availability and price of input (*i.e.* fertilizer).Nevertheless this supporters were not working much on providing information on accessing of improved seed that much farmers demand.

Oromia credit and saving institution, Eshet and other private lenders were identified as finance sources for smallholder farmers. Farmers require finance to buy inputs for production purpose. Likewise traders need finance to buy the product in large volume, since micro finance institution is a main source of financial services for farmers and small businesses lacking access to banks and related services. OCSI and Eshet provides loan for actors in potato value chain, but it needs being in group and some saving as criteria to get credit. Bank (Commercial bank of Ethiopia), mostly perform money transfer activity especially for wholesalers in the study area.

In the study area, NGOs like LIVES/ILRI, agricultural gross program (AGP) plays important role in supporting actors in potato value chain. This NGO's were working for the improvement of agronomic and water management including use of new varieties, good land preparation, improved pest/disease and soil fertility management. They also provide training for DAs and supervisors on vegetables that enables them to support small holders at farm level.

Cooperatives promotion office as service provider, broadly speaking cooperative is economic enterprises and self help organizations that expected to play a meaningful role in up-lifting the socio economic conditions of their members and their local communities nevertheless, the function of cooperative promotion office found in the study area in guiding primary cooperatives main goal is not encouraging rather it was only limited to facilitating supplying of in-organic fertilizer by primary cooperatives to members and community. Occasionally provide fertilizers price information in collaborating with DoANR.

4.3 Results of Margin Analysis

A market research study include marketing channels and margins, begins with the knowledge of the origin of the product, to the final destination (Mendoza, 1991).The analysis of potato market channel was intended to understand the flow of the commodity from their origin to the final destination.

4.3.1 Potato marketing channels

According to the survey result eight alternative channels are identified in potato marketing in the study area. The identified channels started with the producers (farmers) ended with the consumers. In the survey year about 1400.58 quintals of potato were marketed by sample producers. The major receivers of potato were collectors and wholesalers with percentage shares of 51.7% and 29%, respectively. The identified channels were as follow:

Channel I: Producers → Consumers (74.7Qts)
Channel II: Producers → Processors → Consumers (5.28Qts)
Channel III: Producers → Collectors → Wholesalers → Retailers → Consumers (703.11Qts)

Channel IV: Producers → Collectors → Wholesalers → Retailers → Processors → Consumers (21.12Qts)
Channel V: Producers → Retailers → Consumers (184.5Qts)
Channel VI: Producers → Retailers → Processors → Consumers (5.71Qts)

Channel VII: Producers → Wholesalers → Retailers → Processors → Consumers (12.18Qts)

Channel VIII: Producers → Wholesalers → Retailers → Consumers (393.984Qts)

Among identified channels, channel I is the shortest channel that producers directly sell to consumers without any intermediate. It accounts about 5.33% of the total potato marketed with amount of 74.7quintals of potato.

According to the survey the longest channel identified was channel IV which includes all actors that participated in trading and processing of potato with the volume of 21.12quintals

nevertheless, the volume passes through this channel was very small as compared to other channels. This indicates that potato mostly reaches the consumers as raw or unprocessed. The channel that contains highest volume of potato was channel III with about 703.11 quintals passes through it.

4.3.2 Marketing Margin analysis

The marketing margin is the difference between the price paid by the ultimate consumer and the price received by the producer. The number of intermediates involved in various channels of the marketing has a strong effect on the marketing margin.

Table 9: Average production and marketing costs of potato for different actors (Birr/Qt)

Cost items	Cost incurred per quintal by actors				
	Producers	Collectors	Wholesalers	Retailers	Processors
Cost of seed/tuber	68.65	-	-	-	-
Cost of fertilizer	26.21	-	-	-	-
Cost of chemicals	6.76	-	-	-	-
Packing cost	14.5	13.2	13.2	35	167
Labor cost	35.44	3.37	4.20	3.933	5
Transport	10	15.50	13.6	6.06	6.83
Storage cost	-	-	2.1	-	-
Product loss	23.3	9.12	17.80	13.10	5.66
Tax /Charge	-	-	3	-	-
Brokerage	-	-	2.40	-	-
Processing cost	-	-	-	-	300
Other Expense	11.28	12.87	5.66	6.67	6.66
Total cost	196.14	54.06	61.96	64.76	491.16

Source: Own computation of survey data (2016).

The major production costs incurred by potato producer were seed/tuber, fertilizer, chemicals and labor cost Table: 9.The highest cost items incurred by producers was the cost of seed for potato production with an average of birr 68.65 for producing a quintal of potato in study

area. The cost incurred by processors was 491.16birr/quintal which was the highest marketing cost this is due to skyrocketing price of oil and other necessary ingredients for processing potato into cooked and chips. Marketing costs are estimated to compute the share of profit gained by different actors in the marketing chain.

Table: 10. Potato marketing margin for different channels

Marketing Margins (%)	Channels							
	I	II	III	IV	V	VI	VII	VIII
GMM_P	100	25.51	49.3	17.05	60.58	20.96	17.72	51.23
GMM_C			14.86	5.14				
NMM_C			5.85	2.02				
GMM_W			18.66	6.45			10.93	31.6
NMM_W			8.34	2.89			7.36	21.27
GMM_R			17.16	5.94	39.41	13.63	5.94	17.16
NMM_R			6.37	2.2	28.62	9.9	2.2	6.37
GMM_{PR}		74.48		65.4		65.39	65.39	
NMM_{PR}		46.13		37.07		37.07	37.07	
TGMM	0	74.48	50.74	82.94	39.4	79.03	82.27	48.76

Source: Own Computation from actors survey data (2016)

As depicted above on Table 10 the marketing margins in different marketing channels in which actors involved. The total gross marketing margin is highest in channel IV (82.94%), it is channel in which all actors involved and the next largest TGMM which is 82.27% that occurs at channel VII, the reason behind being highest of TGMM in this channel is existence of a lot of intermediary and large consumers prices received by processors and lowest in channel V (39.4%) followed by channel VIII (48.76%). The gross marketing margin of Producer's (GMMp) is highest in channel I which shares 100% from the total consumer's price due to direct sell to consumers without any interference of other actors and lowest in channel IV which is17.05%.This difference support theory that states as number of marketing actors increases the producers share decreases. The result also illustrated that the extreme gross marketing margin from traders and processors was taken by processors, which accounts

about 74.48 %, of the consumer's price in channel II. The lowest gross marketing margin (5.14%) is taken by collectors at channel IV.

The highest net marketing margins is highest at channel II which is about 46.13% that is captured by small scale processors and the next highest is also obtained by processors itself which is 37.07% occurred at channels (IV, VI& VII).

Table: 11 Analysis of margin distribution along potato value chain

	Actors along potato value chain					
Cost/quintal	Producers	Collectors	Wholesalers	Retailers	Processors	Horizontal summation
Production cost	137.06	-	-	-	-	137.06
Purchase price	-	295.80	346.20	430.25	560.63	1632.88
Marketing cost	59.08	54.06	61.96	64.76	491.16	731.02
Selling price	358.93	385.00	497.00	600.00	1734.00	3574.93
Marketing margin	221.87	89.20	150.80	169.75	1173.38	1804.99
%Share of margins	12.29	4.94	8.35	9.40	65.01	99.99
Profit margins	162.79	35.14	88.84	104.99	682.22	1073.97
%Share of profit	15.16	3.27	8.27	9.78	63.52	100

Source: Own Computation from Actors survey data (2016)

According to the result of margin analysis for actors involved in potato value chain specify that around 65.01% and 63.52 % of market margin and profit margin respectively, was captured by small scale potato processors. Next to processors about 12.29% and 15.16 % of marketing margin and profit margin respectively, obtained by farmers. The rest actors (retailers, wholesalers and collectors) gets marketing margin of 9.40 % ,8.35% &4.94% and profit margins of 9.78 %, 8.27 % &3.27% respectively in the potato value chain.

4.4 Governance of potato value chain

Governance in a value chain refers to the structure of relationships and coordination mechanisms that exist between actors in the value chain (Gereffi *et al.*, 2005).

The leading value chain actors play facilitation role, they determine the flow of products and prices. Even though the largest share of margin (65.01%**)** was captured by small scale processors their governing capacity is negligible due to their low volume product handing. The study result shows that wholesalers supported by the collectors and brokers are the key value chain governors. The major source of market information for producers was collectors who purchase his product, this information was not that much realistic.

Table 12: Producer's response on price setting of potato

How price is set for potato? (Yes, %)	Frequency	Percentage
By the will of producers	1	0.84
By the will of traders	75	63.03
By supply and demand	26	21.85
By traders and existing market	17	14.29
Total	119	100

Source: Own computation from survey data 2016.

As described on table 12, around 63.03 % of producers that supplied potato mentioned that price of potato was set by traders this is due to market information asymmetry and minimal bargaining power, farmers were obligated to sell their product at the price offered by traders, and otherwise the commodity could deteriorate. The farmers are not organized and are not governing the value chain they are simply price takers and have no power in price setting. The governance structure in the study area was characterized by low coordination among the value chain actors in terms of information exchange and trust.

4.5 Constraints and Opportunities in Potato Value Chain

There are factors that hinder potato value chain in study area. Descriptive statistics (frequency and percentages) were used for analyzing smallholder farmer's response. The issues rose on focus group discussion and key informants interview was summarized on 14.

Table: 13. Constraints and opportunities raised by producers

Constraints	Frequency	%
In adequate extension service	49	36
Shortage and high price of improved seed	132	97.1
Prevalence of disease and pests	121	89.0
Higher fertilizer price	117	86.0
Low storage facilities	124	91.2
Capital shortage	73	53.7
Parish ability of the product	119	87.5
Poor market information and skills	102	75.0
Interferences of brokers	125	91.9
Low demand	52	38.2
Poor infrastructure	126	92.6
Poor linkages with other actors in the chain	121	89.0
Opportunities		**%**
Suitable agro-ecology	108	79.4
Low cost of production	71	52.2
Government organization support	97	71.3
Availability of irrigation water	35	25.7
Availability of buyers	86	63.2
High price	43	31.6
Proximity to urban center	12	8.8
Adequate value chain linkage	13	9.6

Source: Computed from survey data, (2016).

As described on table 13 there were constraints raised by sample potato producers. About 97.1% of farmers raised that there was shortage and high price of improved seed, likewise, 92.6% of farmers mentioned that poor infrastructure in the area. About 91.9% of farmers cited interferences of brokers was high and ,91.2%,89%,89% and 87.5% of sample producers raised that low storage facilities, poor linkages with other actors in the chain, prevalence of disease and pests and parish ability of the product respectively. Opportunities identified were;- suitable agro-ecology (79.43%), government organization support (71%) and availability of buyers (63.2%). From table 13 we understand that producers in study area are constrained with a lot of things that is affecting their performance in the value chain of potato.

The major constraints which hold back the development of the potato value chain and opportunities along potato value chain were identified through focus group discussion and key informant interview were summarized as follows.

Table 14: Summary of constraints and opportunities in potato value chain

V. Chain stages	Constraints	Opportunities
Input supply	Limited access to improved potato seed	Demand for improved seed
	High cost of inputs (*i.e* fertilizer ,pesticides and herbicides)	Some support from GO and NGO's
	In adequate supply of pesticides and fungicide	
Production	In adequate agronomic practices by farmers	Favorable agro-ecology
	Prevalence of diseases and pests	Availability of irrigable land
	Poor storage facility	Availability of labor
	High post-harvest loss	
	Weak traditions of irrigation use	
Trading/marketing	Low price of potato at harvest	Raising demand for potato
	Price fluctuation	
	Brokers interference in price setting	
	Poor storage facility and infrastructure	
Processing	Lack of processing facility	Low price of potato
	High cost of ingredient	Profitability of potato processing
	Conventional way of potato processing	Availability of potato
Consumption	Traditional ways of potato preparation at home	Availability of potato on market
	Income shortage	
	High price of product (when intermediates number is large)	
	Poor storage facility	

Source: Own summary from Focus group discussion and Key informant interview (2016).

4.6 Determinants of Potato Marketed Surplus

The econometric analysis was applied to investigate factors affecting actual amount of potato supplied by small holder farmers. In this study Tobit model was employed to identify these factors. Heteroscedasticity detection test were performed using IM-test in STATA 13 to check for heteroscedasticity (Appendix Table1).The fitness of the model was checked and the assumption of null hypothesis that all predictors in regression model are jointly equal to zero is rejected at 1% level of significance. Out of 13 important explanatory variables included in the Tobit model, about 7 variables were found to be statistically significant ;- age of house hold head, non-farm income, active family labor, land allocated for potato , access to improved seed, access to credit and number of extension contact, were influenced potato marketed surplus by producers (Table 15).

Table 15: Maximum likelihood estimates of Tobit model for potato marketed surplus

Explanatory Variables	Coefficients	Standard Error	Marginal effect [1]	Marginal effect[2]	Change in Probability
Age of house hold head	-0.130**	0.053	-0.125**	-0.110**	-0.002
Sex of house hold head	2.453	1.821	2.362	2.067	0.038
Educational level (years)	0.201	0.164	0.194	0.170	0.003
Non- farm income ‘’000’’	-0.251*	0.132	-0.242*	-0.212*	-0.004
Active family labor	0.922***	0.321	0.888***	0.777***	0.014
Land allocated for potato	21.655***	1.858	20.852***	18.247***	0.336
Number of Oxen owned	0.491	0.566	0.472	0.413	0.008
Access to improved seed	2.016*	1.086	1.941*	1.699*	0.031
Access to irrigation	0.738	1.314	0.710	0.622	0.011
Access to credit	2.913**	1.255	2.805**	2.455**	0.045
Number of extension contact	0.580***	0.132	0.559***	0.489***	0.009
Perception on lagged price	0.603	1.174	0.581	0.509	0.009
Access to market information	1.120	1.234	1.079	0.944	0.017
Constant	-4.741	2.981			
Sigma	5.228***	0.338			

Log likelihood = -372.330 Number of observation =136

LR chi2 (13) = 226.90 Left-censored observations=17

Prob > chi2 = 0.0000 Uncensored observations=119

Pseudo R^2 = 23.35% Right -censored observations = 0

***, **and * represents level of significance at 1%, 5% and 10% respectively.

Source: Own computation from the survey, 2016

[1] The effects of change in the explanatory variables on the expected value of the dependent variable among the whole sample

[2] The change in intensity of market participation with respect to a change in explanatory variable among potato sellers

Age of the household head: The expected influence of age assumed was positive but survey result showed that age negatively influenced the marketed surplus of potato at 5% level of significance, keeping other factors constant a one year increase in age results a decrease in marketed surplus of potato by 0.125 quintal among the whole sample and by 0.110 among potato seller. As age of house hold increases the probability of participation in potato market would also decrease by 0.2%.The negative influence of age indicates that as the household head gets older it is difficult to engage in production and marketing of potato due to bulky nature of the commodity. The result is in line with finding of adugna (2009) who indicated that as age of the household head increases the elasticity of marketable supply of onion decreases and also with Nuri (2016) who indicated the increase in age causes the marketed surplus of *kocho* to decrease.

Non-farm income: As hypothesized the influence of non-farm income on marketed surplus of potato was negative. The result of the study showed that one thousand birr increase in non-farm income decreases the marketed surplus of potato by 0.242 quintal among the whole sample and by 0.212 among potato sellers. As non-farm income of house hold increases the probability of participation in potato market would also decrease by 0.4%, at 10 % level of significance. This implies farmers who engaged in non-farm income give less attention to the production and marketing of potato. The result is contrary with Abraham (2013) who suggested that non-farm income influences volume of cabbage supply significantly and positively. The result is in line with Rehima (2006) who suggested that non-farm income of the household heads negatively affected quantity of pepper supplied.

Active family labor: As hypothesized active family labor influenced marketed surplus of potato positively at 1% significant level. A one man equivalent increases in active labor in the family of household result in an increase in marketed surplus of potato by 0.888 quintal among the whole sample and by 0.777 quintal among potato seller and also increases the probability of participation in potato market by 1.4 %.Larger number of active labor in the family helps to carryout production and marketing activity which enhance supply of potato. The result is in line with Nuri (2016) who explained a household with more number of labor produce more *kocho* and supply large volume of it to the market.

Farm size (land) allocated for potato: as hypothesized the size of land allocated for potato production by producer influenced marketed surplus of potato positively and significantly at 1% probability level. A one hectare increase of land allocation for potato production increases marketed surplus of potato by 20.852 quintals among whole sample and 18.247 quintals among potato sellers and also increases the probability of participation in potato market by 33.6 %.The result of the study is in line with Tura (2015) who indicated that cultivated land for wheat production had positive influence on marketed surplus of wheat and also with Alemayehu (2012) who explained that as farmers allocate more area of land for ginger, the marketable amount of ginger increases.

Access to improved seed: As hypothesized access to improved seed has positive impact on marketed surplus of potato at 10 % significant level. The result revealed that those who have got access to improved seed would increase the marketed surplus of potato by 1.941 quintals among the whole sample and by 1.699 among potato sellers. Access to improved seed increases the probability of potato market participation by 3.1 %. Farmer who has access to improved potato seed supply more, since improved seed technology has correlation with high productivity level and better ability to resist diseases. The finding is in line with Kindie (2007) who suggested access to improved agricultural inputs increases the market supply of sesame.

Access to credit: As hypothesized the influence of credit access on marketed surplus of potato was positive and significant at 5%. The result revealed that those who have got credit access would increase the marketed surplus of potato by 2.805 quintal among the whole sample and by 2.455 quintal among potato seller and increases the likelihood to participate in potato market by 4.5 %. This implies that credit access strengths marketed surplus of potato. The result is in line with Alemayehu (2012) who suggested access to credit increases the amount of ginger supplied to market and also with Yeshitila (2012) who explained that farmers who have access to credit are able to diversify their income sources and thus decide to engage in potato marketing.

Number of extension contact: As expected the influence of number of extension contact on marketed surplus of potato was positive and significant at 1% level. The result revealed that a unit(a day) increase in contact of development agent results in 0.559 quintal increment in marketed surplus of potato among the whole sample and 0.489 quintal increase among potato market participant and also increases the probability of participation in potato market by 0.9 %. In view of the fact that extension contact supports production and marketing of potato through new agricultural technologies dissemination and capacity building. The result is contrary with Abraham (2013) who suggested extension service given to the farmers reduces potato quantity produced and this in turn reduces potato supplied to the market and is in line with Alemayehu (2012) who indicated the increase in number of extension contact increased the amount of ginger supplied to market.

5. SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary and Conclusion

This study aimed at conducting value chain analysis of potato in Dedo district of Jimma zone southwest Ethiopia. With specific objectives of mapping potato value chain, identify actors and their function, analyze marketing margins of actors in potato value chain, identifying major constraints and opportunities of potato value chain, and analyzing the determinants of potato marketed surplus by small holder farmers.

For this study both quantitative and qualitative data types were collected, sources of primary data were potato producers, collectors, wholesalers and retailers , in addition to the primary data, secondary data on total land size, number of population, number of licensed traders and related issues was obtained from the central statistical authority (CSA), office of agriculture and natural resources (DoANR),irrigation authority office(DoIA), and office of trade and market development.

Out of 53 rural administrative *kebeles* in Dedo district, potato produced in 20 *kebeles*, out of these 4 *kebeles* were selected randomly, then 136 potato producers were selected randomly. Regarding traders sampling 5wholesalers, 8collectors, 12 retailers and 6 small scale processors were selected purposively. In this study descriptive and econometric methods of data analysis were used to analyze data from producer's survey.

The analysis of descriptive statistics revealed that, out of the total sample potato producer 91.18% were male and 8.82 % were female headed. 91.18%, 5.88%, 2.94 % of the sample households were follower of Islam, Orthodox and Protestant Christianity respectively. The average age of sample house hold head was 48.38 years and the family size was 7.73 with average labor force of 3.71 in adult equivalent.

Agriculture and related activity was main source of farmer's livelihood, about 91.91% of the respondents indicated farming as their only source of livelihood and 8.09% participate in non-farm income activities in addition to farming.

The major actors identified in potato value chain in study area were input suppliers, producers, wholesalers, retailers, small scale processors and consumers. Key supporters of potato value chain in the study area were district office of agriculture and natural resources, irrigation authority office, trade and market development office, cooperative promotion office, Oromia credit and saving institution, Eshet microfinance, NGO's and bank. Different actors involved in potato value chain in study area, however there is a weak link among actors in potato value chain.

Eight alternative channels were identified in potato marketing and about 1400.58 quintals of potato were marketed by sample producers. Major receivers of potato were collectors and wholesalers with percentage shares of 51.7% and 29%, respectively. This implies the potato marketing is dominated by collectors and other intermediary. Production costs incurred by potato producer were seed/tuber, fertilizer, chemicals and labor cost, the highest cost items incurred by producers was the cost of seed purchase with an average cost of birr 68.65 for producing a quintal of potato. High cost of seed potato results from non-existence of potato storage facility. The cost incurred by processors was 491.16birr/quintal which was the highest marketing cost this is due to high cost of necessary ingredients.

The result of margin analysis for actors involved in potato value chain indicates about 65.01% and 63.52 % of market margin and profit margin respectively, was captured by potato processors. Next to processors about 12.29% and 15.16 % of marketing margin and profit margin respectively, is obtained by farmers. Retailers, wholesalers and collectors obtained marketing margin of 9.40 %, 8.35% and 4.94%, and profit margins of 9.78 %, 8.27 % and 3.27% respectively. The study result shows that small scale processor in study area seems actors generating high profit as compared with other actors however, their product handing and processing is very few, due to limited processing capacity of processors. The results also indicated that farmers those directly sold to consumers obtained highest marketing margin, this is due to absence of intermediary.

The major constraints identified were high price of improved seed ,poor infrastructure(*i.e* road and telecommunication) interferences of brokers, low storage facilities , poor linkages with other actors in the chain, prevalence of disease and pests and parish ability of the

product. From this we deduct that producers in study area is facing with huge production and marketing problem.

The identified opportunities were suitable agro-ecology, low cost of production, government organization support and availability of buyers.

Tobit Model was employed to identify the determinants of marketed surplus of potato. Out of thirteen explanatory variables included in the analysis, about 7 variables were found to be statistically significant. The results of econometric analysis indicates active family labor, land allocated for potato, access to improved seed, access to credit and number of extension contact influenced marketed surplus of potato significantly and positively and non-farm income and age of house hold head affects marketed surplus of potato negatively. The result indicate active labor has positive impact on marketed surplus of potato so, initiating active labor engagement in potato production and marketing helps to boost marketed surplus of potato. Improving land allocations of small holder farmers favor marketed surplus of potato. The result also shows access to credit and number extension of contact increases marketed surplus of potato.

5.2 Recommendations

Based on the findings of the study, the following recommendation is forwarded.

1. Strengthening the linkage/interaction among value chain actors helps for better performance of potato value chain in the study area. Therefore, the government and other concerned bodies should enhance the linkage between actors involved in potato value chain.

2. Capacitating small scale processors through providing them with processing equipment. Therefore, government and other concerned bodies should work to improve processing capacity of processors.

3. Provide training on seed potato storage construction, disease and pest control and vegetable crops management helps to solve seed problem, therefore district agriculture and natural resources and irrigation authority office should give due attention to improve storage facility.

4. Encouraging legal potato traders and create awareness for illegal traders to collect them into formal potato trade system. Hence, the district trade and market development should provide market information and take corrective measures on unlicensed traders and brokers.
5. Improve bargaining power of potato producers through establishing potato producer's cooperatives. Therefore, cooperative promotion office should work on establishing potato cooperative.

6. Improving infrastructures (road and telecommunications) of rural village by constructing all weather road and enlarge network coverage to enhance market access of producers. Therefore, the district administration office, road authority and other concerning body should work to improve road and telecommunications service of the area.

7. Enhance farmers land allocation for potato and increase productivity through better land management practices, thereby increase sale volume of potato. Therefore district agriculture and natural resources and irrigation authority office should promote land allocation and increase productivity per unit area.

8. Initiate active family labor engagement in potato production and marketing activities to increase household's marketed surplus of potato. Therefore district agriculture and natural resources and irrigation authority office should work to increase active labor participation in potato production and marketing.

9. Strengthen the financial capability of potato farmers by providing sufficient loan. Therefore, micro finance institutions should provide adequate credit service for potato producers according to their need.

10. Strengthen extension service provisions through speeding up the frequency of potato farm visit. Therefore, district agriculture and natural resources and irrigation authority office should work to increase frequency contact of potato farmers by DAs.

11. Strengthen the input supply system especially improved potato seed and timely delivery with reasonable price. Therefore, district agriculture and natural resources and irrigation authority office should provide farmers with improved seed and closely work with agricultural research organizations that releases improved potato varieties.

12. Creating awareness on utilization of non-farm income for production purpose so that farmers can generate income from supplying potato. Therefore district agriculture and natural resources, and irrigation authority office should work on awareness creation for household that engaged in non-farm income activity.

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7. APPENDIX

Appendix I. Tables

Appendix Table 1. Heteroskedasticity test result of STATA imtest Cameron& Trivedi's decomposition of IM-test

Source	chi2	Df	P
Heteroskedasticity	126.78	120	0.3183
Skewness	16.38	15	0.3573
Kurtosis	1.42	1	0.2337
Total	144.58	136	0.2912

Appendix Table 2. Conversion factors used to compute tropical livestock units (TLU)

Livestock Category	Conversion factor
Calf	0.25
Oxen / Cow	1.00
Bull	0.75
Heifer	0.75
Horse /mules	1.10
Donkey adult	0.70
Donkey young	0.35
Goats /sheep adult	0.13
Goat /Sheep young	0.06
Poultry birds	0.013
Weaned calf	0.34

Source: Storck *et al*., 1991

Appendix Table 3 .Conversion factor used to compute adult equivalent

Age Category in year	Sex	
	Male	Female
<10	0.6	0.6
10-13	0.9	0.8
14-16	1	0.75
17-50	1	0.75
>50	1	0.75

Source: Storck *et al*., 1991

Appendix Table 4 Potato marketing margin for actors in different channels

Actors	Cost& margin	Channels							
		I	II	III	IV	V	VI	VII	VIII
Producers	Production cost	137.06	137.06	137.06	137.06	137.06	137.06	137.06	137.06
	Marketing cost	75.95	75.95	49.08	49.08	75.95	75.95	75.95	75.95
	Selling price	495.5	442.5	295.8	295.8	363.5	363.5	307.4	307.4
	Market profit	282.49	229.9	109.66	109.66	150.49	150.49	94.39	94.39
	GMM_P (%)	100	25.51	49.3	17.05	60.58	20.96	17.72	51.23
Collectors	Purchase price			295.8	295.8				
	Marketing cost			54.06	54.06				
	Selling price			385	385				
	Market profit			35.14	35.14				
	GMM_C (%)			14.86	5.14				
	NMM_C (%)			5.85	2.02				
Wholesalers	Purchase price			385	385			307.4	307.4
	Marketing cost			61.96	61.96			61.96	61.96
	Selling price			497	497			497	497
	Market profit			50.4	50.4			127.64	127.64
	GMM_W (%)			18.66	6.45			10.93	31.6
	NMM_W (%)			8.34	2.885			7.36	21.27
Retailers	Purchase price			497	497	363.5	363.5	497	497
	Marketing cost			64.76	64.76	64.76	64.76	64.76	64.76
	Selling price			600	600	600	600	600	600
	Market profit			38.24	38.24	171.74	171.74	38.24	38.24
	GMM_R (%)			17.16	5.94	39.41	13.63	5.94	17.16
	NMM_R (%)			6.37	2.2	28.62	9.9	2.2	6.37
Processors	Purchase price		442.5		600		600	600	
	Marketing cost		491.16		491.16		491.16	491.16	
	Selling price		1734		1734		1734	1734	
	Market profit		800		642.84		642.84	642.84	
	GMM_{PR} (%)		74.48		65.4		65.39	65.39	
	NMM_{PR} (%)		46.13		37.07		37.07	37.07	
TGMM		0	74.48	50.74	82.94	39.4	79.03	82.27	48.76

Source: Own computation from survey results, 2016

Appendix Table 5 Results of Multiple regression model for marketed surplus of potato

Variables	Coefficients	Std. Err.	t	P>t
Age	-0.0766037	.0473684	-1.62	0.108
Sex	1.664477	1.771876	0.94	0.349
Educational level (years)	0.1807586	.1556678	1.16	0.248
Non- farm income ‘’000’’	-0.0100509	.0516206	-0.19	0.846
Active family labor (A.EQ)	0.774658**	.3097237	2.50	0.014
Land allocated for potato	21.67921***	1.835781	11.81	0
Number of Oxen owned	0.1022804	.5319536	0.19	0.848
Access to improved seed	1.948406*	1.062788	1.83	0.069
Access to irrigation	0.8188612	1.292179	0.63	0.527
Access to credit	2.246237*	1.209717	1.86	0.066
Number of extension contact	0.5835869***	.1311143	4.45	0
Access to market information	0.1005467	1.138778	0.09	0.93
Perception on lagged price	0.6225748	1.213727	0.51	0.609
Constant	-4.157177	2.815177	-1.48	0.142

Source	SS	df	MS	Number of obs	=	136
				F(13, 122)	=	38.91
Model	13858.4137	13	1066.03182	Prob > F	=	0
Residual	3342.74645	122	27.399561	R-squared	=	0.8057
				Adj R-squared	=	0.785
Total	17201.1601	135	127.416001	Root MSE	=	5.2345

Appendix II: Interview Schedule

Jimma University College of Agriculture and Veterinary Medicine Department of Agricultural Economics and Extension

M.Sc Program: -Agribusiness and Value Chain Management.

This interview schedule is prepared to collect data from potato value chain actors for the Purpose of undergoing study on **"Value Chain Analysis of Potato in Dedo District of Jimma Zone, Southwest Ethiopia".**

Date of interview _____

Name of the interviewer _____

I. Producers/Farmers / Interview Schedules

♣ **Instructions for Enumerators:**

Make brief introduction before starting any question,

- ✓ Introduce yourself to the farmers, greet them in local Language and make clarification on the objective of the study.
- ✓ Please fill the interview schedule according to the farmers reply (do not put your own feeling/idea).
- ✓ Please ask each question clearly and patiently until the farmer gets your points.
- ✓ Please do not use technical terms and do not forget local units.
- ✓ Please write answers on the space provided.
- ✓ Make sure that all the questions are asked and the interview schedule page is completed.

I. Household Heads Basic Information

1. Name of the household head_____
2. Age of the household head_____ years
3. Sex of household head []1=Male []0= Female
4. Kebele _____
5. Ethnicity _____
6. Marital status []1=Single [] 2=Married[] 3=Divorced [] 4=Widowed
7. Religion of the household head: []1=Muslim[] 2= Orthodox [] 3= Protestant 4.Other (Specify)_____
8. Have you attended any formal education? (√) [ ] 1= Yes [ ] 0= No
9. Years of schooling of the household head: _____
10. Years of schooling of the spouse: _____
11. What is your main source of income? [ ] 1= Agriculture [] 2= Agriculture and trade [] 3= Salary [ ] 4=other sources of income
12. Farming experience of household head:_____ _____ years

II. Household characteristics and Resource Data

13. Family Size (in number of years):

Age group in year	Male	Female	Total
<10			
10-13			
14-16			
17-50			
>50			

14. Number of children in school: [ ] Male_____ [ ] Female_____ [ ] Total_____
15. Number of Dependents (< 14 and >64 ages): [ ] 1= Male -------[ ] 2= Female --------- [ ] Total_____
16. Did you own arable land? (√) [ ] 1= Yes [ ] 0= No
17. Total crop land: _____ ha.
18. Total grazing land: -------- ha.
19. Total irrigable area: ____ ha.
20. What is the size of land used twice in a year? _____ ha.
21. Did you have livestock? (√) [ ] 1= Yes [ ] 0= No
22. If yes, please specify livestock holdings of you during the survey year

Species of livestock	Number owned	Number sold during the year	Income from sale	income used for the purpose of potato production
Oxen				
Cows				
Calf				
Weaned calf				
Bull				
Heifer				
Goat adult				
Goat young				
sheep adult				
Sheep young				
Donkey adult				
Donkey young				
Horses				
Mules				
Chickens				
Bee hives				
Others				

III. Production

23. Farm size allocated for potato _____hectares
24. Experience in potato production in years:_____ years
25. Production of potato, grain and other cash crops in the survey year 2008

Type of crop	Area in hectare	Qty produced Quintal	Qty lost in Quintal	Family Consumptions in Quintal	Qty sold In quintal)	Income from sale of each crop
Potato						
Wheat						
Teff						
Maize						
Sorghum						
Barley						
Been						
Khat						

26. How many times do you produce potato in last production Season?

_____

27. Did you use chemical fertilizer for the production of potato? (√) [ ]1= Yes [ ]0= No
28. Did you use organic fertilizer (*i.e* Compost, animal dung and crop residue) for the production of potato? (√) [ ]1= Yes [ ]0= No

29. If your answer for Q28 is yes

Type of fertilizer	No. of round applied in one production period	Amount applied per one round	Total amount applied

30. Source of chemical fertilizer? 1= Agricultural office [ ] 2= Cooperative [ ] 3= Input Traders [ ] 4 = on market [ ] 5= NGO, s
31. Did you use improved potato seed (√) [ ]1= Yes [ ]0= No
32. Did you get improved potato seed/tuber easily [ ]1= Yes [ ]0= No
33. If your answer for Q.32 is No, what was the main reason behind? _____
34. If your answer for Q.32 is yes what are your sources of potato tuber/seed? [ ] 1= Agricultural office [ ] 2= Input Traders [ ] 3 = other farmers [ ] 4= NGO, s [ ] 5= Research Centers.
35. What type of seeds of potato do you use? 1. [ ] local varieties 2. [ ] Improved varieties 3. [ ] Both
36. If you have ever encountered problems with the use of improved potato tuber and local varieties, what type? (√) (Multiple responses are possible). [ ] 1= Germination problem [ ] 2= Low quality [ ] 3= High price 4. Others (specify) _____
37. Inputs of potato crop production during last season? (Labor requirement includes for plowing, planting, weeding, harvesting, transporting, etc).

Types of inputs used	Cost incurred for input
UREA (qt)	
DAP(qt)	
Seed (kg/Qt)	
Pesticide (ltr or kg)	
Compost M3	
Animal dung M3	
Labor (man day)	

38. Did you used chemicals (pesticide and herbicide) for potato production [ ] 1= yes [ ] 0=No
39. If yes from what Sources you use? [ ] 1= Agricultural office [ ] 2= Private shop [ ] 3 = both
40. What type of potato production system did you adopt or customized cropping systems ? [ ]1= Sole cropping [ ] 2=
    Mixing different vegetable crops [ ] 3= Mixing with other cereal crops [ ] 4=Others_____
41. Do irrigation facility available for potato production (traditional and modern irrigation facilities)? [ ] 1= yes [ ] 0=No
42. If yes did you have access to use?
    [ ] 1= yes [ ] 0=No
43. If yes from what Sources you use?

[ ] 1= Pond [ ] 2= River/spring [ ] 3= Borehole 4 other specify

44. What is the source of labor used for potato production? (√) (Multiple response is possible) [ ] 1= Family labor [ ] 2= Labor exchange [ ] 3= Hired labor [ ] 4= Cooperation
45. The source of oxen power (√): [ ] 1 = Own [ ] 2= Rent 3. Other (specify)
46. Why did you engaged in farming potato (more than one answer is possible)? [ ] 1= High demand [ ] 2= Low cost of production [ ] 3= Resource suitability [ ] 4= for immediate cash requirement [ ] 5= Availability of irrigation water [ ] 6= Having water pump.
47. Would you like to expand potato production? (√) [ ] 1.=Yes [ ] 2= No
48. If the answer for Q**.** No 48 is NO what is the Reason

_____

49. Did you borrow money for your potato production? [ ] 1= Yes [ ] 0= No
50. If your answer for question48 is NO what is the reason _____
51. If your answer for question No 49 is yes, which source you use? [ ] 1= Micro finance [ ] 2= Credit and saving associations [ ] 3= Banks [ ] 4=from rich people
52. What is the amount of loan you received in Birr_____
53. Did you face any problem in accessing credit? [ ] 1= Yes [ ] 0= No
54. If your answer for Q. 54 is yes, what was the problem? (Multiple response is possible) [ ]1= Limited supply of credit[ ] 2=Limited access to transport [ ]3=Huge bureaucracy [ ]4.= un availability of interest free loan 5. Others (specify) -

_____

55. What are the major constraints of potato production in this area? (multiple answers is possible) [ ] 1=inadequate extension service [ ] 2= shortage and high price of improved seed [ ] 3= prevalence of disease and pests [ ] 4= high fertilizer price [ ] 5= low storage facilities [ ] 6= Capital Shortage 7. Others specify

_____

56. What are the opportunities of potato production in the area? (multiple answers) [ ] 1= suitable agro-ecology [ ] 2= adequate infrastructure [ ] 3= Government organization support [ ] 4= adequate irrigation facility [ ] 5= Low cost of production with endogenous seed 6. Others specify_____
57. Who provides the advisory service for you in the process of potato production? (√) (Multiple response is possible)

    [ ] 1= Development agents [ ] 2= NGOs [ ] 3= Research centers (specify) [ ] 4= District office of agriculture &natural resources, & Irrigation development Authority experts [ ] 5= Neighbors and friends 6. Others 7. Specify
58. In what way you get the advisory service? (√) (Multiple response is possible) [ ] 1= Farm to farm visit by the development agent [ ] 2= experience sharing tour [ ] 3= Visit to demonstration/ model farmers' site [ ] 4= Training 5. Others (specify)

_____

59. How frequent were you visited by development agents last year?[ ]1= Once per month [ ] 2= Twice per month [ ] 3=Three times per month [ ] 4.= Four times per month [ ]5= Others, specify _____
60. What is the average number of days the Development Agents visit you/your farm_____ days/year.

III Marketing and Information access

61. Did you participate in potato marketing? In year 2008 [ ] 1= Yes [ ] 0= No

62. How much did you supplied to the market (quintal)in the survey year 2008 _____

63. How many hours it will take for you to reach the nearest market for your potato sale?_____ KM _____hours
64. Did you have your own transportation facilities? (√) [ ] 1= Yes [ ] 0= No
65. If your answer for 65 is yes, what type? (√) [ ] 1= Vehicle [ ] 2= Transport animals[ ] 3= Cart [ ] 4= other
66. Did you have access to market (potential buyers) for your produce? [ ] 1= Yes [ ] 0= No
67. What is the selling price per Kg/Quintal? In the survey year(2008) _____ETB
68. How many times you visit the market to sale your potato per week during peak season? [ ] 1= Once per week [ ] 2= Twice per week [ ] 3= Three times per week [ ] 4= More than 3 times per week.
69. How many year you practiced potato marketing _____years
70. Are you a member of any cooperative? [ ] 1=Yes [ ] 0= No
71. If yes, what is the name of the cooperative _____?
72. How did you see last year price [ ]1= Low [ ] 2=Medium [ ] 3= High
73. What is the average price of potato per Quintal/kg in the last 3years _____,_____,_____birr/Quintals

74. What are marketing costs you incur when you take your produce to the market?

Items	Cost incurred per quintal
Packing material	
Loading and un loading	
Transportation cost	
Loss of product	
Other expense (if any)	

75. What problem you faced by brokers [ ] 1 = took to limited traders [ ] 2= unfair scaling (weighing) [ ] 3= high brokerage charge [ ] 4= unreliable price 5 Others
76. How is price set for potato [ ] 1= by the will of the producers [ ] 2= by the will of buyers [ ] 3= by the existing Market (Supply and Demand)
77. Did you frequently contact with traders that buy your potato [ ]1 = yes;[ ]0 = no
78. If yes did they provide you with market information before you sell your potato? [ ]1 = yes;[ ]0 = no
79. Through which source you mainly obtain market information?
    [ ] 1.= potato traders [ ] 2= Radio [ ] 3=Telephone [ ] 4=Coop's [ ] 5=Personal

observation [ ] 6.= Broker [ ] 7= Newspaper[ ] 8=TV [ ] 9.= Other farmers [ ] 10= others sources

80. What type of information did you get? [ ] 1 = Price information [ ] 2= Market place information [ ] 3= Buyers information [ ] 4. Quality required [ ] 5. Demand Other (specify) _____
81. At what time interval do you get the information? [ ] 1= Daily [ ] 2=Weekly [ ] 3= Monthly 4. Other (specify) ___
82. Was the information you get is valuable? [ ] 1= Yes[ ] 2= No
83. Did you face difficulty in finding buyers when you wanted to sell potato? [ ] 1.= Yes 0=No
84. If your answer for Q. 84 is Yes, due to: [ ] 1= Inaccessibility of market [ ] 2= Lack of market information [ ] 3= Low price offered 4. Others_____
85. How is the trend of price per unit of sales of potato products during the last 3 years? [ ] 1= Increasing [ ] 2= Decreasing [ ] 3= fluctuating [ ] 4=the same
86. If increasing, why? ----------
87. If decreasing, why? ----------
88. What are the major constraints of potato output marketing? [ ] 1= perish ability of the product [ ] 2= poor market information and skills [ ] 3=Interferences of brokers [ ] 4= Low demand [ ] 5= low price offered [ ] 6= Poor linkages with other actors in the chain [ ] 7= low quality of product 8. [ ] 9= poor infrastructure (*i.e* telecommunication and road for transport) [ ] 10. Low storage facility 11. Others specify_____
89. What are the major opportunities in potato marketing [ ]1= availability of buyers

[ ] 2 =high price [ ] 3 =proximity to urban center [ ] 4= adequate value chain linkage.

90. Would you like to improve your volume of selling?[ ] 1= Yes [ ] 2.=No
91. What Value addition you carry out for potato before you sell

[ ] 1= Sorting [ ] 2= Cleaning [ ] 3=Grading [] 4=Packing 5. Other (specify)

92. To whom did you sold more of your potato product?

[ ] 1=Wholesalers [ ] 2= Retailers [ ] 3=Consumers [ ] 4=Potato Cooperatives (if any)

93. Why you preferred the mentioned buyers/markets to sale your production? [ ] 1= Gives better prices [ ] 2= under contract [ ] 3= Consistent & for immediate cash [ ] 4=Only for proximity 5. Others (Specify) _____
94. Where did you get them? [ ] 1=at farm gate [ ] 2= At village market [ ] 3= At main road to market [ ] 4= At district market
95. Distance to nearest district town: [_____] km OR [_____] hrs walk
96. How much you sold for
    - [ ] 1=Wholesalers _____ quintals or kg
    - [ ] 2= Local Collectors _____ quintals or kg
    - [ ] 3 =Retailers _____ quintals or kg
    - [ ] 4= Consumers _____ quintals or kg
    - [ ] 5= others specify _____
97. How many km you need to travel to get the following markets (on foot).
    1. Wholesalers _____ km

2. Local market _____km
3. The district market _____ km
4. Retailers _____km
5. Local assembler _____km

98. How did you transport potato from farm to market? [ ] 1= Head/back loading [ ] 2=Animal's cart [ ] 3=Pack animal [ ] 4=Vehicle 5.others (specify)_____

IV Non-farm Activities

99. Do you also purchase and sell potato? [ ] 1.= Yes [ ] 0= No
100. If yes Do you practice trading activities other than trading of potato?[ ] 1=Yes [ ] =No.
101. Did you perform other income generating activities other than Agriculture? (√) [ ] 1= Yes [ ] 0= No
102. How much did you earn from such activity this year? _____

II. Traders Interview Schedule

I. General Information

1. Name of trader: _____
2. Age of trader: _____
3. Sex of trader: (√)[ ] 1=male [ ] 0= Female
4. Type of trade: (√)[ ] 1=Retailer [ ] 2=Wholesalers [ ] 3= Collectors [ ] 4= Others
5. Marital status (√) [ ] 1=Single [ ] 2=Married [ ] 3=Divorced [ ] 4= widowed
6. Family Size of traders (in number of years):

Age group in year	Male	Female	Total
<10			
10-13			
14-16			
17-50			
>50			

7. Have you attended any formal education? (√) [ ] 1= Yes [ ] 0= No
8. If yes, what level _____
9. Position of respondent in the business (√): [ ] 1= Owner- manager [ ] 2=Employed manager [ ] 3= Daughter of the owner [ ] 4= Son of the owner [ ] 5= Relative to the owner [ ] 6= other (specify)
10. How long have you been operating the business? _____ Years
11. Did you trade alone or in partnership? (√); [ ] 1=Alone [ ] 2= Partnership 3. other (specify) _____
12. If partnership, how many are you in the joint venture? _____ Persons.
13. Total number of peoples employed in your business:_____

	Male	Female	Total
Family member			

Non family member			
Total			

14. What is your main business? /Put in order of importance and business proportions/

Activity performed	Business rank
Wholesaling	
Retailing	
Assembling	
Brokerage	
Processer	
Other specify	

15. Do you participate in potato trading year round? (√); [ ] 1= Yes [ ] 0= No
16. If your answer to Q.15 is No, at what period of the year do you participate? (√)[ ] 1= When purchase price becomes low [ ] 2= During high supply 3.[ ] Other(specify)
17. Do you practice trading other than potato /vegetables? (√) [ ] 1= Yes [ ] 0=No
18. If your answer to Q.17 is yes, what? _____
19. Number of market days in a week? _____
20. What was the amount of your initial working capital when you start this potato Trade business? _____ birr.
21. What is the amount of your current working capital? _____ Birr.
22. What is your source of working capital? (√);[ ] 1= Own [ ] 2= Loan [ ] 3= Gift [ ] 4= Share [ ] 5= others (specify) _____
23. If it was loan, from whom did you borrow? (√) [ ] 1= Relative/family [ ] 2= Private money lenders. [ ] 3= NGO (specify) [ ] 4= Friend [ ] 5= Other traders [ ] 6.=Micro finance institution [ ] 7= Bank [ ] 8= Others
24. How much was the rate of interest? _____Birr for formal, _____ birr for informal.
25. What is the reason you take the loan? (√)[ ] 1= to extend potato trading. [ ] 2= to purchase potato transporting vehicles/animals. [ ] 3= Others
26. How was the repayment schedule? (√) [ ] 1=Monthly [ ] 2= Quarterly [ ] 3= Annually [ ] 4= When you get money [ ] 5= others (specify) _____
27. Is there change in accessing finance for potato trade these days? (√) [ ] 1=Improved [ ] 2= Deteriorated [ ] 3= No change
28. What mode of transportation did you use? [ ] 1= Man power [ ] 2= Animal transport [ ] 3. = Vehicle 4. [ ] Cart [ ] 5=others (specify) _____
29. Do you carry out any physical treatment to maintain product quality? (√) [ ] 1=Yes [ ]0= No
30. Are there entry barriers in potato trading? (√) [ ] 1=Yes [ ] 0= No

31. If your answer to Q.30 is yes, what are the reasons? (√)[ ] 1. Capital [ ]2= Information collusion [ ] 3= Administrative problems[ ] 4= Stiff competition with unlicensed traders [ ] 5=High monopoly with prior control of farmers [ ] 6=Other (specify)
_____

32. Linkage with commercial value chain actors: (√) (Multiple response is possible)
[ ] 1= Farmers/producers [ ] 2= Retailers [ ] 3= Whole sellers [ ] 4=Consumers
[ ] 5= Local collectors [ ] 6= Brokers 7. Others (specify)

II. Purchase practice

33. From which market and supplier did you buy potato? (Multiple market area is Possible)

Actor	From which value chain actor you buy							
	Producers		Collector		Whole seller		Retailer	
	Amount purchased	Price /kg/qt	Amount purchased	Price /kg/qt	Amount purchased	Price /kg/qt	Amount purchased	Price /kg/qt

34. From which market do you prefer to buy most of the time?
[ ] 1= Farmers/producers [ ] 2= Retailers [ ] 3= Whole sellers [ ] 4= Local collectors
[ ] 5= Brokers [ ] 6= Others(specify) _____
35. Why do you prefer this market? (√) [ ] 1= Better quality [ ] 2= High supply
[ ] 3= Shortest distance [ ] 4= others (specify)
36. Are all your purchasing centers accessible to vehicles? [ ] 1=Yes [ ] 2=No
37. If your answer to Q. 36 is No, what proportions are accessible? ____ % .
38. How do you measure your purchase? (√)[ ] 1= By sack [ ] 2= By basket [ ] 3.= By weighing (kg) [ ] 4= by *'feresula'* [ ] 5= others (specify) _____
39. Who sets the purchase price? (√)[ ] 1= Myself [ ] 2= Set by demand and supply
[ ] 3= Sellers [ ] 4= other (specify) _____
40. Who purchase potatoes for you? (√)[ ] 1= Myself [ ] 2.=Broker [ ]3= Commission agent [ ] 4= Family members [ ] 5=Friends [ ] 6= Others (specify)
_____
41. How do you attract suppliers? (√) [ ] 1= Giving better price [ ] 2.= By visiting them
[ ] 3= Fair scaling /weighing [ ] 4= Extending credit [ ] 5=Using brokers
[ ] 6 = Advertizing using influential peoples [ ] 7= Other (specify)
_____
42. Do you consider quality requirement of your customers in purchasing activities?
[ ] 1=Yes [ ] 0=No
43. If your answer to Q.42 is yes, what quality requirement do you consider for Potato _____
44. What was your source of information about quality requirement of your customers?
_____
45. Which are the months of the year when prices are lowest? and highest? _____, _____ respectively
46. Is your purchasing price higher than your competitors? (√)[ ] 1=Yes [ ] 0= No

47. If your answer to Q.46 is yes, what was the reason? (√) (Multiple answers is possible);[ ] 1= To attract suppliers [ ] 2=to buy more quantity [ ] 3= to kick Competitors [ ] 4= to get better quality [] 5= Others (specify)
48. How many regular suppliers do you have? Producer's _____, Collectors _____ , Processors _____, Wholesalers _____, Retailers _____, others_____
49. Have you ever stopped purchasing due to lack of fund? (√) [ ] 1=Yes [ ] 0= No
50. If your answer to Q.49 is Yes, for how long_____
51. Have you ever stopped purchasing due to lack of supply? (√) (√)[ ] 1=Yes [ ] 0= No
52. Is obtaining sufficient volume is a problem? (√)[ ] 1=Yes [ ] 0= No
53. If your answer to Q.52 is Yes, for how long_____

III. Selling Practices

54. To whom did you sell potato. (Multiple answer is Possible) .

Actor	To which value chain actor you sale							
	Producers		Collector		Whole seller		Retailer	
	Amount sold	Price / qt	Amount sold	Price / qt	Amount sold	Price / qt	Amount sold	Price / qt

55. How did you sell your produce? (√) [ ] 1= Direct to the purchaser [ ] 2= Through Broker [ ] 3. Other (specify) _____
56. When did you get the money after sale? (√)[ ] 1=As soon as you sold [ ] 2=After Some hours [ ] 3=On the other day after sale [ ] 4= Other _____
57. What do you do, if the product is not sold on time? (√) [ ] 1=Took back home [ ] 2= Took to another market [ ] 3= Sold it at lower price [ ] 4= Sold on other market day
58. How did you attract your buyers? (√)[ ] 1= By giving better price relative to others [ ] 2= By visiting them [ ] 3= By using brokers [ ] 4= By fair scaling [ ] 5= Advertizing [ ] 6= Others (specify)
59. How many regular buyers do you have? Wholesalers_____, Consumers_____, Processors _____, collector _____, Retailers _____, others
60. What is your packaging material? (√) [ ] 1=Sisal sack [ ] 2=Plastic sack [ ] 3= Basket [ ] 4= Others _____
61. Do you know the market prices in different markets (on farm, village market and other areas) before you sold your potato? (√) [ ] 1= Yes [ ] 0=No
62. What is your source of market information?
    [ ] 1.= Other potato traders [ ] 2= Radio [ ] 3=Telephone [ ] 4=Coop's [ ] 5=Personal observation [ ] 6.= Broker [ ] 7= Newspaper[ ] 8=TV [ ] 9.= others sources
63. What percent of the produce is sold on local/*district* market? _____ %,
64. Do you have other branch shops/ shades to sell your potato? (√)[ ] 1= Yes [ ]0= No
65. Who sets selling price? (√)[ ] 1= Myself [ ] 2= Set by demand and supply [ ] 3= Buyers [ ] 4. Other (specify)
66. Are there charges (taxes) imposed by government or community officials at the Market? (√) [ ] 1= Yes [ ] 0= No
67. Do you want to expand potato trading? (√)[ ] 1= Yes [ ] 0= No
68. If your answer to Q.14 is yes, why? _____

69. If your answer to Q.14 is No, why? _____

70. Indicate your average cost incurred per quintal in the trading process of potato.

Cost items	Cost incurred in birr/qt
Purchase price	
Labor for packing	
Loading/unloading	
Transportation fee	
Storage cost	
Loss in transport and storage	
Processing cost	
Telephone cost	
Brokers cost	
Warding	
Other personal expenses	
License and taxes	
Other cost (specify)	
Total cost	
Selling price	
Revenue	

71. Are there problems on potato marketing? (√)[ ] 1= Yes [ ] 0= No

72. If your answer to Q.71 is yes, what are the problems? [ ] 1=Credit [ ] 2= Price setting [ ] 3=Supply shortage [ ] 4= Storage problem[ ] 5= Lack of demand [ ] 6=Information flow [ ] 7=Quality problem [ ] 8=Government policy [ ] 9= Lack of government support to improve marketing

73. What do you think are the causes of the problems? _____

V. Marketing Services

74. Is potato trading in your locality needs a trading license? (√)[ ] 1= Yes [ ] 0= No

75. If your answer to Q.74 is yes, how do you see the procedure to get the license? (√) [ ] 1= Complicated [ ] 2= Easy

76. Did you have potato trade license? (√)[ ] 1= Yes [ ] 0= No

77. If you do not have specific trading license what is your joint trading license? (√)[ ] 1=Grain [ ] 2= General [ ] 3= Consumers supply license [ ] 4=Other

78. How much did you pay for trade license for the beginning? and yearly renewal payment? _____birr, _____birr

79. Are you restricted by District or administrative boundary to operate? (√) [ ] 1= Yes [ ] 0= No

80. Are there restrictions imposed on unlicensed traders? (√) [ ] 1= Yes [ ] 0= No

81. Did you store potato before you sold? (√) [ ] 1= Yes [ ] 0= No

82. If your answer to Q.81 is yes, for how long did you store potato in the store? _____

III. Consumers Interview Schedule

I. General Information

1. Name of Respondent: _____
2. Age of the respondent: [_____] years
3. Sex of the respondent (√): 1. [ ] Male 2. [ ] Female
4. Have you attended any formal education? (√) [ ] 1= Yes [ ] 0= No
5. If yes, what level _____
6. Marital status (√): [ ] 1=Married [ ] 2= Unmarried [ ] 3=Divorce [ ] 4= Widowed

7. Family Size of consumers (in age group measured number of years):

Age group in year	Male	Female	Total
<10			
10-13			
14-16			
17-50			
>50			

8. Distance to nearest town: [_____] km OR [_____] hrs walk
9. What is your major means of income generation? [ ] 1=Farming [ ] 2=Trade [ ] 3= Employment 4. Others _____
10. How much do you earn per year (estimate based on weekly, monthly income):_____Birr
11. Is potato consumed in your family? [ ] 1= Yes [ ] 0=No
12. If no consumption of potato product, why? _____
13. Experience in potato products consumption? _____ years
14. Do you produce and consume or purchase? [ ] 1= Purchase [ ] 2=Produce
15. If you purchase how much Kg of potato you purchase per month? _____
16. If you purchase, what is the proportion of your income used for purchase of potato product?
17. What is the maximum and minimum price you pay per Kg of potato _____, _____
18. Do you consider any quality requirements to purchase potato? [ ] 1= Yes [ ] 0= No
19. What are the constraints hindering consumption of potato? [ ] 1= Supply Shortage [ ] 2=Income shortage [ ] 3= Lack of storage at home [ ] 4=High price of product [ ] 5= Poor product handling [ ]6= Lack of market information [ ] 7= Perish abilty Others (specify)_____
20. Do you know the benefits of consuming potato product? [ ] 1=Yes [ ] 0= No
21. Do you think there is problem with consumption of potato product? [ ] 1=Yes [ ] 0=No
22. What should be done to increase potato product consumption

IV. Processors Interview Schedule

1. Name of processors :_____;
2. Age of the respondent: [_____] years
3. Sex of the respondent (√): [ ] 1= Male [ ] 2= Female
4. Have you attended any formal education? (√) [ ] 1= Yes [ ] 0= No
5. Level of Education of the respondent: [ ] 1= Illiterate [ ] 2= Primary school completed [ ] 3= Secondary school completed [ ] 4= Certificate [ ] 5= Diploma 6. Above
6. Marital status (√): [ ] 1=Married [ ] 2= Unmarried [ ] 3=Divorce [ ] 4= Widowed
7. Family Size of processors (in number of years):

Age group in year	Male	Female	Total
<10			
10-13			
14-16			
17-50			
>50			

8. How long since you have started potato processing? _____ years
9. From whom do you buy potato? (√): [ ] 1 = Farmers [ ] 2= Retailers [] 3= Wholesalers [] 4.Collectors. others
   specify_____
10. To whom do you sell potato?
    [ ] 1 = Cafes [ ] 2= supper market [ ] 3= consumers [ ] 4= others specify_____

11. What is your average cost incurred per Kg for processing potato.

Cost items	Cost incurred in birr/kg
Purchase price	
Packing cost	
Loading and unloading	
Transportation cost	
Storage cost	
Loss in transport and storage	
Processing cost	
License and taxes (if any)	
Telephone cost	
Personal expenses	
Other cost (specify)	
Total cost	
Selling price	
Revenue	

12. How much cost do you incur to process a kg of potato to chips and other _____ birr/Kg

13. What is the average birr consumers paid you for a kg of chips and other _____ birr/K
14. What is the average processing capacity of potato you process per day in kg/quintal _____

15. What are the major constraints of potato processing?
    _____
    _____
    _____
    _____
16. What are the major opportunities of potato processing? _____
    _____
    _____
    _____
17. _____

Checklist for Key Informants Interview

1. Name of the organization: _____
2. Role of the interviewee in the organization: _____
3. Location and contact information: _____
4. Type of the organization: public. _____
5. Organizational mission, vision and objectives
6. What is the role of your organization in potato value chain in the study area?
   _____
   _____
   _____
7. What are the constraints and opportunities you faced in undertaking those roles assigned to your organization?
   _____
   _____
   _____
8. What are constraints and opportunities at inputs supply level, at farm level, marketing processing and consumption stage?
   _____
   _____
   _____
   _____

9. Linkage /interaction/ partnership/ coordination between actors

   _____
   _____
   _____

Checklist for Focus Group Discussion Interview

1. What are constraints and opportunities related to inputs suppliers (Availability accessibility, on time delivery, quality, cost of inputs and etc)?
2. _____

3. What are major constraints and opportunities at potato production stage (land preparation, crop management practice and, disease and pests control &etc)?

   _____

4. What you suggest to solve these hindrances?

   _____

5. What are the major constraints and opportunities at in marketing stage of potato (sales price setting ,brokers interferences &etc ?

   _____

   _____

   _____

6. What are the major constraints and opportunities at processing stage of potato?

   _____

   _____

   _____

   _____

7. What are the major constraints and opportunities at consumption stage

   _____

   _____

   _____

   _____

8. Linkage /interaction/ partnership/ coordination between potato value chain actors ?

   _____

   _____

   _____

   _____

Thank you very much for responding to the questions.