VALUE CHAIN ANALYSES OF RICE: THE CASE OF SHEBE SOMBO WOREDA, JIMMA ZONE, SOUTH WEST ETHIOPIA

M.Sc. Thesis

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VALUE CHAIN ANALYSES OF RICE: THE CASE OF SHEBE SOMBO WOREDA, JIMMA ZONE, SOUTH WEST ETHIOPIA.

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<u>Thesis Submission Request Form (F-05)</u>

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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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Decision/suggestion of Department Graduate Council (DGC)

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_____   _____   _____

DEDICATION

This thesis manuscript is dedicated to my father **Aliyi Abawaji** who put me in desolation before I complete this thesis. His commitment for my success in the world of academics is unforgettable throughout my life and I believe that may Allah put his soul in paradise.

STATEMENT OF AUTHOR

First, I declare that this thesis is my own work and that all sources of materials used for this thesis have been duly acknowledged. This thesis has been submitted in partial fulfillment of the requirements for M.Sc. degree at Jimma University and is deposited at the University Library to be available to borrowers under rules of the library. I solemnly declare that this thesis is not submitted to any other institution anywhere for the award of any academic degree, diploma, or certificate.

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BIOGRAPHICAL SKETCH

The author was born in October 1986 in Limmu Sapa Kebele of Gomma district, Ethiopia. He attended his primary education (1-6 grade) in Balto Elementary School and (7-8 grade) in Limmu Shayi Elementary School. The author attended his secondary and preparatory education (9-12 grade) at Aggaro secondary and preparatory School which found in Aggaro town. After passing Ethiopian Higher Education Entrance Qualification Examination, he joined Jimma University, in September, 2007 and graduated with BSc degree in Agricultural Economics in June 10, 2010.

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ACKNOWLEGEMENTS

LIST OF ABBREVIATIONS AND ACRONYMS

AAFC	Agriculture and Agri-Food Canada
AfDB	African Development Bank
ARDO	Agricultural and Rural Development Office
CC	Contingency Coefficients
CSA	Central Statistical Agency
DH	Double Hurdle
EUCOR	European Cooperative for Rural Development
FAO	Food and Agriculture Organization
GDP	Gross Domestic Product
GMM	Gross Marketing Margin
GMMP	Gross Marketing Margin of Producers
GTZ	German Agency for Technical Cooperation
IPMS	Improving Productivity and Marketing Success
MoA	Ministry of Agriculture
NMM	Net Marketing Margin
NRRDS	National Rice Research and Development Strategy
SCP	Structure Conduct Performance
TLU	Tropical Livestock Unit
TMDO	Trade and Market Development Office
TVA	Total Value Addition
UNIDO	United Nations Industrial Development Organization
VIF	Variance Inflation Factor

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VALUE CHAIN ANALYSES OF RICE: THE CASE OF SHEBE SOMBO WOREDA, JIMMA ZONE, SOUTH WEST ETHIOPIA

ABSTRACT

This research attempts to analyze rice value chain in Shebe Sombo district of Jimma zone, Ethiopia. The study aimed at identifying rice value chain actors and their respective functions, assessing the distribution of rice value addition at different stages of themarketing

chain,analyzing market performance of rice value chain, identifying factors affecting market participation and intensity of marketed surplus. Data were collected from primary sources through astructured questionnaire, checklists, focus group discussion and key informant interviews. In addition, secondary datawere gathered through reviewing andexamination of reports as well as records of published and unpublished documents. Two-stage random sampling technique were employed; and a total of 148 farmers from four kebeles were randomly and proportionately sampled. Other than farmer, 32 traders were also selected using

purposive sampling techniques based on their volume of trade.Descriptive statistics and econometric methods of data analysis were used to analyze the data. Value chain tools were used to identify rice value chain actors and share of value added by each value chain participant. Besides,S-C-P model was used to analyze market performance of rice value chain. Tobit model was used to identify factors affecting market participation and the extent of marketed surplus of rice.The results of the descriptive statisticsshowed that out of the sampled rice producing households 80% were rice market participants and about 36.4% of the total rice produced was supplied to the market. Value chain analyses revealed that the major actors in rice value chain were input suppliers, producers, collectors, processors, wholesalers, retailers and consumers. Each of these actors adds value as the product was transferred from one actor to another. Rice producers added 41% of the total value, processors, wholesalers, retailers and Collectors respectively contributed to further value addition of20%,18%,13% and 8%. Based on the market concentration ratio (62.3%) we conclude that the rice market in the study area can be classified asoligopolistic form of market structure. The result of Tobit model shows that market participation and intensity of marketed surplus are influenced significantly and positively by availability of labor, amount of credit used, membership in cooperative, land allocated for rice, education of household head, rice farming experience, number of oxen and market information while family size, livestock holding, distance to nearest market, non-farm income negatively affect market participation and intensity of marketed surplus.Based on the findings of the study, we suggest that the government and concerned stakeholders should focus on Strengthening the linkage among rice value chain actors and supportive institutions, improving road infrastructures, providing adequate credit and building knowledge of farmers on credit use, strengthen the adult education system, strengthening institutions that convey reliable and timely market information and promoting farmers' cooperatives.

1. INTRODUCTIN

1.1.Background

More than 60 percent of the world's population dependson rice for its major daily source of food energyandprotein and thus the importance of rice in relation tofood security and socio-economic stability is self-evident (FAO, 2013). In the world, the largest volume of rice production is concentrated in countries China, India and Indonesia. Rice yields recorded worldwide include 5.8 MT/ha in Japan, 5.6 MT/ha in China and 4.3 MT/ha Indonesia (ECFRD, 2012). Comparing these yields with the world average of about 3.5 MT/ha, it is evident that there is great potential to improve rice yields elsewhere. The development of rice therefore presents an opportunity to reduce the number of food-insecure people that presently stand at 860 million, by half by 2015, and to achieve MDG 1 (i.e., to eradicate poverty and hunger) (ECFRD, 2012).

Rice is an important staple food crop in Africa with a growing demand that poses an economic challenge for the African continent. Annual rice production in Sub-Saharan Africa (SSA) is estimated at 14.5 million metric tonnes (MT), comprising 15 percent of the region's cereal production. Most of this rice is produced by smallholder farmers. In contrast, Africa's rice consumption is about 21 million MT creating a deficit of about 6.5 million MT per year valued at US$ 1.7 billion that is imported annually. Overall, imported rice accounts for roughly 40 percent of SSA local rice consumption (AATF, 2013). The Food and Agriculture Organization of the United Nations (FAO, 2013), forecasts that the world's largest proportionate increase in rice consumption over the next 10 years will occur in Africa. The insufficient rice production affects the well-being of over 20 million smallholder farmers who depend upon rice as their main food.

Rice is proven to be one of the potentialstrategiccommodity crops that can assure food security andpoverty reduction in Ethiopia (Zenna*etal.,* 2008).Among the target commodities which have received due attention in promotion of agricultural production, rice is the one considered as the "millennium crop" expected to contribute to ensuring food security in the country. Although rice is introduced to the country very recently, rice has proven to be a crop

that can assure food security in Ethiopia (MoARD, 2010). The importance of rice as a food security crop, source of income and employment opportunity due to its relative high productivity as compared to other cereals is recognized by farmers as well as private investors. Rice importance is being well recognized in the country as the area coverage of 18,000 ha in 2006 has increased in 2009 to 155,000 ha.Rice production has brought a significant change in the livelihood of farmers and created job opportunities for a number of citizens in different areas of the country (MoARD, 2010).Moreover, the country has vast suitable ecologies for rice production along with the possibility of growing it where other food crops do not do well (Teshome and Dawit, 2011). It is reported that the potential rice production area in Ethiopia is estimated to be about thirty million hectares (MoA, 2011).

According to MoA (2011), the government of Ethiopia given due attention for promotion of rice development and marketing including value addition. Currently, there is an unmet growing demand for rice consumption in the low and middle-income markets. Rice is relatively inexpensive, as compared to alternative cereals. The vision of the national rice researcher and development strategy (NRRDS) is to see the existing limited area and subsistence dominated rice subsector transformed progressively in to commercially profitable and viable production system. This will contribute to the development of a viable agricultural sector through establishment of a competitive and sustainable rice production and marketing system. Overall, the production level is projected to increase from 498,332 tons in 2009 to about 1.8 million in 2014 about 4.0 million tons in 2019 (MoA 2011).

However, rice marketing chain is poorly organized in Ethiopia, the farmers sell their rice product at nearby local markets to collectors, to rice processors as paddy (unhulled rice) or sell to traders coming at farm gate. There is no any systematically developed marketing system and market linkage except the traditional system, which runs by individuals. In most cases the traders control the price of rice. Hence, there is no system to check the quality of rice, nor to design a price incentive system for good quality rice (Halos-Kim, 2014). Without well-functioning agricultural markets, productivity gains on the farm lead to temporary production surges and price collapses. Improved market access proves necessary for maintaining production incentives, permitting household specialization and enabling

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movement to high-value products and to value-added activities. As a result, sustained agricultural growth typically occurs where productivity-enhancing agricultural technology and favorable market incentives converge.Most poverty reduction strategies in developing countries are predicated on improving agricultural production and promoting market access and integration of smallholder producers in formal market exchange(Steven *et al*.,2012).

Furthermore, under the current situation of the rice sector in Ethiopia, research and development gaps were identified in different producing regions of the country. According to NRRDSE (2010) rice could suitably grow in South Western Highlands of Oromia Region (Illuababora, East and West Wellega and Jimma Zone). Shebe Sombo Woreda is one of the Woredas in Jimma Zone in which rice production is carried out. Rice is becoming a strategic crop for the livelihood of many farmers in the study area. Due to the availability of favorable land and climatic condition for rice production, thedemand for the product is increasing over time in the area.According to the Woreda Agricultural Rural Development Offices (2015/16), The area of production of rice in the district has been increasing over the past few years. Thus, improving and strengthening the rice value chain in the study area has the potential to generate significant benefits for small-scale producers. The benefits can be derived largely through productivity increases and improvements in marketing.

Therefore, the purpose of this study was to analyze rice value chain in Shebe Sombo district ofJimma zone, Southwest Ethiopia. The study was undertaken with the aim of identifying rice value chain actors and their respective functions, evaluating thedistribution of rice value addition at different stages of the marketing chain,analyzing market performance of rice value chain, identifying factors affecting market participation and intensity of marketed surplus in the study area.

1.2. Statement of the problem

Although rice has just been recently introduced to Ethiopia, recognizing its importance as a food security crop and a source of income and employment opportunities, the government of Ethiopia has named it the "millennium crop," and has ranked it among the priority commodities of the country (Mohapatra, 2012).Even though the contribution of rice to food

security, income and in alleviating poverty is substantial, limited attention has been given to rice research and development. It lacks a comprehensive study to understand the whole rice value chain. So far, many organizations that are working on rice development mainly focus on adaptation trials, release of locally adapted varieties and improving productivity. They give little attention to the other activities across the rice value chain (Gebremeskel, 2010).

Value chain development has become a key approach in both research and policy fields, with an increasing number of bilateral and multilateral aid organizations adopting it to guide their development interventions(Henriksen et al, 2010). Value chains provide a valuable visual framework for understanding the structural connective tissue linking small farmers with input suppliers, processors, traders and final consumers. The value chain perspective provides an important means to understand business-to-business relationships that connect the chain, mechanisms for increasing efficiency, and ways to enable businesses to increase productivity and add value. It can contribute to pro-poor initiatives and better linking of small businesses with the market (Steven *et al*.,2012).

Value chains provide an analytical and diagnostic tool for identifying viable, remunerative income-earning opportunities for poor households. In highly competitive and increasingly global agribusiness markets, poor households must find niches in which they can compete effectively in the rapidly growing urban and rural markets (Reardon and Timmer 2005). However, income generating capacity of rice value chain actors through collaborative work has not been exploited in Ethiopia. Primary reason among others seems to be poor collaboration among and between value chain actors. There is also inadequate knowledge among and between value chain actors on how rice market is organized, how the various key actors are performing in terms of distribution of gains along the chain (Endelkachew, 2014). Collaboration, cooperation and partnership of agricultural products value chain actors is needed to transform smallholder farmers from subsistence to better position in production and marketing (Berhanu,2012). Therefore, these calls to employ a value chain approach to fully understand and resolve the problem of rice development at all levels for improving the performance of the chain via improving the marketing services and limiting the number of participating middlemen.

In spite of potential for production and growing demand for rice, the supply is constrained by different factors in the country. A number of factors such as poor marketing infrastructure, use of traditional technologies, lack of group marketing options (coop/unions), excessive intermediaries, limited number of buyers, lack of marketing support services, market information and limited credit services have contributed to under exploitation of ricepotential (Tareke ,2003).Small-scale producers often struggle to gain market access because they lack knowledge of market requirements or the skills to meet them. Furthermore, inadequate information flow and other obstacles in value chains prevent them from entering into new markets, or reduce the benefits they obtained from entry, reducing poverty among small-scale producers, are often designed to overcome some of these obstacles (Henriksen et al, 2010). The question of smallholder participation and level of participation in Agricultural Value Chains (AVCs) is of great importance to policymakers seeking to stimulate rural economic growth and poverty reduction (Barrett, 2008). Therefore, understanding the value chain actors and level of their participation and the variables affecting it can be of great importance in the rice value chain development.

Despite the significance of rice in the livelihood of many farmers and income generating crop in the study area, however, contribution of rice production to farm income was not as much expected, the performance of smallholder farmers has remained unsatisfactory, they obtained low benefit from rice production. Even though, the importance of marketed surplus for better income generation, smallholder farmers in the area continue to face numbers of challenges related to marketing, these are, limited access to market facilities, less exposure to market information, infrastructural problem (poor road), inadequate support services and problem in transportation services are some of the problems resulting in low participation of smallholder farmers in selling their products (ARDO, 2016). In order to make correct estimates of supply for marketing, the scientific estimation of marketed surplus factors is the highest importance.Hence, it was important to identify determinants of marketed surplus of rice and point out potential factors policy should focus in the area.

Few studies have been done on rice production in Ethiopia by Takele (2010), Gebremeskel (2010), Tilahun *et al*.(2012) and Meron (2016). Besides, most of these studies have focused on production, challenges and opportunities and marketing aspects. They did not thoroughly address the entire rice value chain, factors affecting household market participation, distribution of value addition of rice at different stages of the marketing chain.Therefore, avalue chain analysis forrice hasbeen initiated to fill information gap on the subject and to better understand critical bottle necks for reorienting value chain system for the benefit of value chain actors. To this effect, the present study focused on providing an in depth analysis of the value chain of rice.

1.3. Basic Research Questions

The study attempted to answer the following key research questions.

1. Who are the major actors involved in the rice value chain? What is their role?
2. How much value do the actors add in the rice value chain? Who benefits most or least from the value chain?
3. How is the rice marketing system organized along the value chain?
4. What are the factors influencing the market participation and intensity of marketed surplus?

1.4. Objectives of the study

The overall objective of the study was to analyzerice value chain in Shebe Sombo Woreda, South West Ethiopia. The specific objectives of the study were:

1. To identify rice value chain actors and their respective functions in the study area;
2. To assess value addition of rice at different stages of the marketing chain;
3. To analyze marketperformance of rice value chain;
4. To identify factors influencing market participation and intensity of marketed surplus.

1.5. Significance of the Study

The study was generated valuable information on rice value chain that would assist policymakers in designing appropriate policies for intervention in the study area. Furthermore,

understanding the behavior of market participation and intensity of participation and the variables affecting it can be of great importance in the development of sound policies with respect to agricultural marketing, in addition analysis of value addition at different market channel among actors in rice value chain is quite important for the decision making in agricultural marketing and policy analysis which has not been addressed in sufficient manner for different parts of rice producing areas in Ethiopia.It will also narrow the information gap on the subject and will contribute to better design on improved strategies for reorienting marketing system for the benefit of smallholder farmers and traders, extension workers, government ministries and agencies and cooperatives, nongovernmental organizations will use the findings of the study for intervention purposes and/or references. The study adds new empirical results to the scanty literature on rice value chain analysis in the region.

1.6. Scope and Limitations of the Study

As the study is the first in the region, it lacks many detailed literature, which could be reinforcing understanding of the whole system especially in relation to demand side and consumption preference studies. As Ethiopia has wide range of diverse agro ecologies, institutional capacities, organizations and environmental conditions, the result of the study may have limitations to make generalizations and make them applicable to a country level. Thus, it may be useful for areas with similar context as the study area. Besides, the accuracy of the results depends on authenticity and willingness of farmers, traders and other participants to share actual information during the course of data collection. Yet, maximum efforts have been made to minimize the limitations associated with the Value chain analysis, and hence the information herein is valuable.

1.7. Organization of the Thesis

The thesis is organized into five chapters. The rest of chapters are organized as follows. Chapter Two deals with the review of related theoretical and empirical literature, in order to identify the research gap and give directions for this study. Chapter Three deal with the description of the study area and the methodology used in the study. Chapter Four presents and discusses the results of the study in relation to past studies. Finally, Chapter Five gives summary, conclusions and recommendations based on the findings of the study.

2. LITRATURE REVIEW

This chapter presents review of literature on theories and Basic Concepts of value Chain Analysis, theoretical perspectives of value chain analysis, and value chain analysis in the agricultural sector, dimensions in value chain, and framework for evaluation of marketing system. It also reviews empirical studies on value chain analysis (VCA), factors affecting rice market participation and marketed surplus, so that theoretical views and empirical evidences of the reviews enables better understanding of the subject. Finally, it presents the conceptual framework of the study.

2.1. Theories and Basic Concepts

In the seminal value chain handbook by Kaplinsky and Morris (2001), a value chain is defined as: 'the full range of activities which are required to bring a product or service from conception, through the different phases of production (involving a combination of physical transformation and the input of various producer services), to delivery to final consumers, and final disposal after use'. As such, value chains include all of the vertically linked, interdependent processes that generate value for the consumer, as well as horizontal linkages to other value chains that provide intermediate goods and services. Value chains focus on value creation, typically via innovation in products or processes, as well as marketing, and also on the allocation of the incremental value (Kaplinsky and Morris, 2001).

Value chain analysis examines the full range of activities required to bring a product or service from its conception to its end use, actors that perform those activities in a vertical chain and final consumers for the product or service. It is used to identify how poor people, small enterprises or other target groups can play a larger and more active role in a particular value chain and how a value chains structure or characteristics can be changed to enable it to grow in pro-poor ways. It is increasingly used to help develop a competitive strategy for a product. It enables the poor to engage more productively in markets, the thinking goes and poverty be reduced through market engagement. Making markets work for the poor emphasizes the need to unblock access to profitable market opportunities. It is an original methodological tool that enables design teams in the product definition phase to

comprehensively identify pertinent actors, their relationships with each other and their role in the products life cycle (Donaldson *et al*., 2006).

Supply chain: It is an integrated process where a number of various business entities (i.e. suppliers, manufactures, distributors, and retailers) work together in an effort to acquire raw materials, convert these materials into specified final products, and deliver these final products to retailers. The chain is traditionally characterized by a forward flow of materials (Beamon, 1998). It is a set of linkages between actors where there is no binding or sought-after formal or informal relationships, except when the goods, services and financial agreements are actually transacted (KIT *et al*., 2006).

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

Marketed surplus: Marketed surplus refers to quantity actually sold after accounting for losses and retention by farmers, if any and adding previous stock left out for sales. Marketable surplus is the quantity of produce left out after meeting farmers consumption and utilization requirements for kind payments and other obligations (gifts, donation, charity, etc.). 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 principal difference between marketable surplus and marketed surplus, is time perspective: marketable surplus is the produce that a farmer currently has on hand to take to market to earn a profit, while marketed surplus is what he has already taken to the market to earn a profit (Kumar 2007). The importance of marketed 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 surplus is essential in the process of proper planning for procurement, distribution, export and import of agricultural products (Malik *et al*., 1993).

2.2. Theoretical Perspectives of Value Chain Analysis

2.2.1. The filiere approach

The scientific discussion about vertical integration of production and distribution processes started in the 1960s. The filiere concept describes the flow of physical inputs and services in the production of a final product. The scholars analyzed the vertical integration and contract manufacturing in French agriculture with the filiere concept during the 1960s. As the filiere concept is static model with non-changing actors and national boundaries it is less functional to analyze the global world economy. A filiere tended to be viewed as having a static character, reflecting relations at a certain point in time. It does not indicate growing or shrinking flows either of commodity or knowledge, nor the rise and fall of actors. In general, filiere analyses has been applied to the domestic value chain, thus stopping at national boundaries (Kaplinsky and Morris, 2001).

2.2.2. The Porter approach

The value chain approach was developed by Michaela Porter in the 1980s, and described in his book competitive advantage: creating and sustaining superior performance (Porter, 1985). The concept of value added in the form of a value chain has been used to build up an industry's sustainable competitive advantage in the business field. The entire industry is formed of activities that link together to develop the value of the business, and together these activities form the industry's value chain. Such activities included product manufacturing, and activities of purchasing, distribution and marketing of the company's products. Since the value chain framework is used as a powerful analytical tool for the strategic planning of an organization, it aims to maximize value creation while minimizing costs.

According to Porter (1990), the value chain framework constitutes an interdependent system or network of activities, connected by linkages, showing how the value chain activities are tied together to eventually create value for the consumer. As a result, the linkages become a veritable source of competitive advantage in cases where the system can be carefully managed. Lynch (2003) postulates that value chain analysis entails the linkages of two areas:

linking the value of industry's activities with its main functional parts and assessing the contribution of each part in the overall value added to the business.

In the 1990s, Gereffi and Korniewicz (1994) developed the global commodity chain (GCC), originally derived from Wallerstein's commodity chain. They established four core elements: (a) input-output structure, (b) territorial (international) structure, (c) institutional framework, and (d) governance structure. The focus was set on governance structure referring to institutional mechanisms and inter-firm relationships. The main attention was paid to balance the power embedded in the coordination of globally fragmented but interlinked production systems. Gereffi and Korniewicz (1994) concluded that many chains are characterized by some dominant actors, who determine the overall character of the chain. These actors become responsible for upgrading possibilities, knowledge transfer, and interaction coordination within the value chain.

2.2.3. Global value chain approach

Based on global commodity chain, Messner (2002) developed the world economic triangle. Messner's concept is based on the assumption that actors, governance and regulation systems determine the scope of action in the global commodity chains. This approach focuses on upgrading entire regions or clusters through their integration into chains. Hence, the horizontal (cluster development) and vertical approaches (value chain) are linked (Kaplinsky and Morris, 2001).

2.2.4. Value Chain Analysis in the Agricultural Sector

Value chain is useful as a poverty-reduction tool if it leads to increase farm and off farm rural employment and income. Increased agricultural productivity alone is not a sufficient route out of poverty within a context of globalization and increasing natural resource degradation. A focus on post-harvest activities, differentiated value added products and increasing links with access to markets for goods produced by low-income producers would appear to be the strategy open to smallholders (Lundy *et al*., 2004).

Traditionally, little attention has been paid to the value chains by which agricultural products reach final consumers and to the intrinsic potential of such chains to generate value added and employment opportunities. While high-income countries add nearly US$185 of value by processing one tone of agricultural products, developing countries add approximately US$40. Furthermore, while 98 percent of agricultural production in high-income countries undergoes industrial processing, barely 38 percent is processed in developing countries. These indicate that well developed agro-value chains can utilize the full potential of the agricultural sector (UNIDO, 2009).

In the process of preparing an agro-industrial master plan for Ethiopia, a prioritization process was conducted for several commodities to identify those offering the highest prospects for growth (UNIDO and FAO, 2009). Group 1: Commodities that are highly important to the economy due to the large population involved in their production and to their contribution to national food security. This group includes: (i) cereals (wheat, maize, teff, rice andbarley); (ii) oilseeds (sesame, Niger seed, linseed and rapeseed); (iii) coffee; and (iv) sugar. Group 2: Commodities that are of importance to the economy, due to the number of people involved in production, processing and marketing as well as to their contribution to food security. This group includes: (i) dairy products; (ii) meat; (iii) tea; and (iv)fruit and vegetables. Group 3: Commodities that entail a competitive advantage for Ethiopia. This group includes: (i) honey; (ii) pulses; (iii) spices; and (iv) grapes/wine.

The application of value chain analysis in agriculture is growing due to market failure and no competitive setting of small scale agricultural production. Value chain and innovations are also interlinked. Improvement in productivity and competitiveness of the value chain is the litmus test for value chain innovation (Anandajayasekeram and Gebremedhin, 2009). The concept of value chains has been extended to the analysis of globalization (Kaplinsky and Morris, 2001).

2.2.5.Methodology used inValue-chain analysis

The value chain approach is mainly a descriptive tool to look at the interactions between different actors. As a descriptive tool, it has various advantages in so far it forces the analyst

at considering both the micro and macro aspects involved in the production and exchange activities. Kaplinsky and Morris (2001) stress that there is no "correct" way to conduct a value-chain analysis rather, the approach taken fundamentally rests upon the research question that is being answered. Nonetheless, four aspects of value-chain analysis as applied to agriculture are particularly noteworthy.

Firstly, at its most basic level, a value chain analysis systematically maps the actors participating in the production, distribution, marketing, and sales of a particular product (or products). This mapping assesses the characteristics of actors, profit and cost structures, and flows of goods throughout the chain, employment characteristics, and the destination and volumes of domestic and foreign sales (Kaplinsky and Morris, 2001).

Second, value chain analysis can play a key role in identifying the distribution of benefits of actors in the chain. That is, through the analysis of margins and profits within the chain, one can determine who benefits from participation in the chain and which actors could benefit from increased support or organization. This is particularly important in the context of developing countries (and agriculture in particular), given concerns that the poor in particular are vulnerable to the process of globalization (Kaplinsky and Morris, 2001).

Third, value chain analysis can be used to examine the role of upgrading within the chain. Upgrading can involve improvements in quality and product design that enable producers to gain higher-value or through diversification in the product lines served. An analysis of the upgrading process includes an assessment of the profitability of actors within the chain as well as information on constraints that are currently present.Governance issues play a key role in defining how such upgrading occurs. In addition, the structure of regulations, entry barriers, trade restrictions, and standards can further shape and influence the environment in which upgrading can take place (Kaplinsky and Morris, 2001).

Finally, value chain analysis can highlight the role of governance in the value-chain. Governance in a value-chain refers the structure of relationships and coordination mechanisms that exist between actors in the value-chain. Governance is important from a policy perspective by identifying the institutional arrangements that may need to be targeted

to improve capabilities in the value-chain, remedy distributional distortions, and increase value-added in the sector (Kaplinsky and Morris, 2001). Figure 1 illustrates the methodology used in value-chain analysis. At the heart of the analysis is the mapping of sectors and key linkages. The value-added of the value-chain approach, however, comes from assessing these intra- and inter-actor linkages through the lens of issues of governance, upgrading, and distributional considerations. By systematically understanding these linkages within a network, one can better prescribe policy recommendations and, moreover, further understand their reverberations throughout the chain.
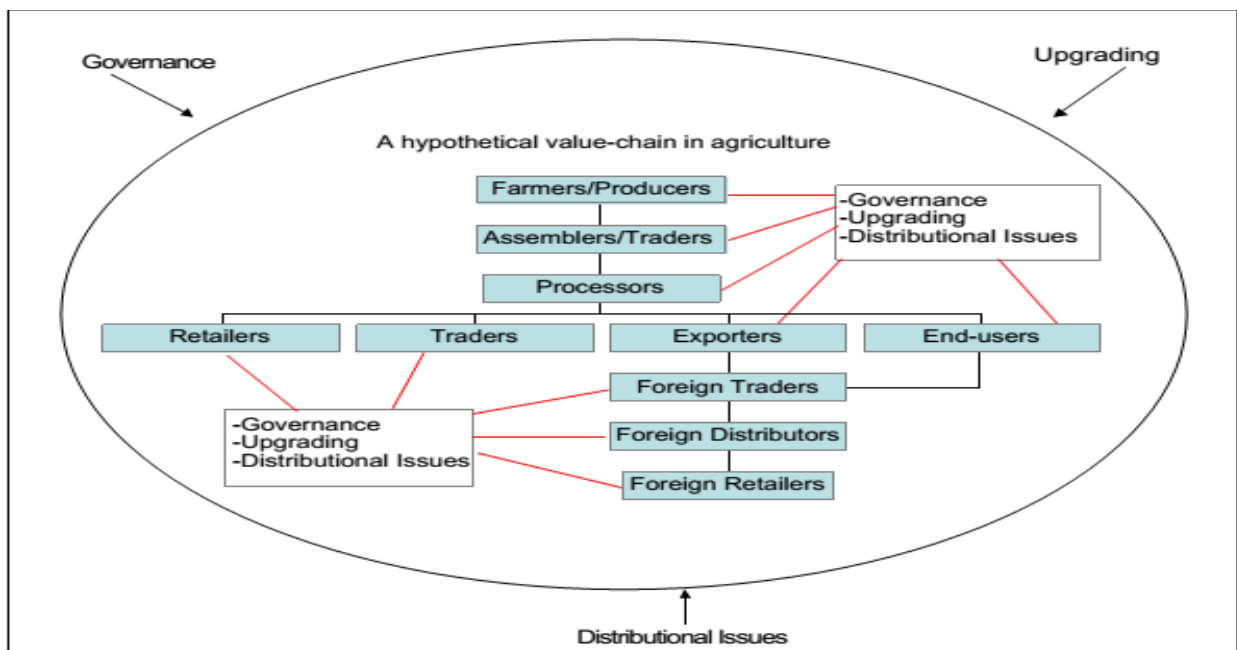
Figure 1: A Schematic of a Value-Chain Analysis
Source: (Rich 2004)

Value Chain Mapping: According to (Hellin *et al*., 2010),the value chain map is a conceptual and practical tool that helps us identify policy issues that may hinder or enhance the functioning of a value chain and also the institutions and organizations providing the services (such as market information and quality standards) that the different value chain actors need in order to make better informed decisions. The value chain map is made up of three inter-linked components. These are value chain actors, enabling environment (infrastructure, policies, institutions, and processes that shape the market environment),

service providers (the business or extension services that support the value chains' operations).

Value chain actors: They are those involved in supplying inputs, producing, processing, marketing, and consuming agricultural products (Kaplinisky and Morris, 2001). They can be those that are directly involved in the value chain (farmers, collectors, wholesalers, retailers and consumers) or indirect actors who provide financial or non-financial support services, such as credit agencies, business service and government, researchers and extension agents. According to KIT *et al.* (2006), the direct actors are those involved in commercial activities in the chain (input suppliers, producers, traders, consumers) and indirect actors are those that provide financial or non-financial support services, such as credit agencies, business service providers, government, NGOs, cooperatives, researchers and extension agents. According to CTA (2014) there are two categories of actors in the value chain. These areMain actors,those who buy and sell the product as it moves along the chain and Supporting actors, those who provide services to facilitate the movement of the product along the chain.VC actor: This term summarizes all individuals, enterprises and public agencies related to a valuechain, in particular the VC operators (farmers, small and medium enterprises, industrial companies, exporters, wholesalers and retailers)and the providers of support services. In a wider sense, certain government agencies at the macro level can also be seen as VC actors if they perform crucial functions in the business environment of the value chain in question. VC operators are the owners of the product at one stage in the VC, whereas, Value chain supporters provide VC support services and represent the common interests of the VC actors (GTZ, 2007).

Enabling environment and service providers: The enabling environment consists of the critical factors and trends that are shaping the value chain environment and operating conditions, but that may be amenable to change. These "enabling environment" factors are generated by structures (national and local authorities, research agencies, etc.) and institutions (policies, regulations, and practices) that are beyond the direct control of economic actors in the value chain. The purpose of charting this enabling environment is not simply to map the status quo, but to understand the trends that are affecting the entire value chain and to examine the powers and interests that are driving change. This knowledge can help determine

avenues and opportunities for realistic action, lobbying, and policy entrepreneurship (Hellin *et al*., 2010).

2.2.6. Framework for Evaluation of Marketing System

Due to the effects of globalization, liberalization and increasing competition in agricultural markets, it is apparent that strategies aiming to reduce rural poverty in developing countries need to move beyond a focus on productivity to include the many other aspects involved in being part of a competitive marketing chain. Service providers implementing agricultural support projects therefore need to incorporate themes such as demand, market opportunities, profitability and competitiveness into their working agenda. Farmers today therefore need to learn not only how to produce but first how to identify profitable market opportunities, how to adapt and improve their produce and to work with others in a market chain to meet the increasing demands of the ever more globalized consumer. Understanding profitability, competitiveness and being attuned to changing market signals helps in making business decisions (CIAT, 2004).

In the realm of economic growth, markets may provide the incentives to profit maximizing participants to develop new technologies, products, resources of supply, new markets and methods to exploiting them. Markets also have an influence on income distribution, food security, and other important development objectives. Despite its importance, as indicated above, marketing is given little attention or credence in the developing countries, including ours (Kindie, 2007). Efficiency factors can be evaluated by examining marketing enterprises for structure, conduct and performance (Abbott and Makeham, 1981). S-C-P model is one of the most common and pragmatic methods for analyzing marketing system. The framework distinguishes between three related levels; the structure of the market, the conduct of the market, and the performance of the market.

Market structure: Market structure refers to the number and relative size of distribution of buyers/sellers in the market. It is generally believed that higher market concentration implies a noncompetitive behavior and thus inefficiency. But, studies also warn against the interpretation of such relationships in isolation (Scott, 1995). The organizational features of a

market should be evaluated in terms of the degree of seller concentration, entry barriers (licensing procedure, lack of capital, know-how, and policy barriers), degree of transparency and degree of product differentiation that condition or influence the conduct and strategies of competitors (Wolday, 1994).

Market conduct: The structure and the conduct of market participants have a direct implication for the nature of production price relationships between different marketing levels and the direction of causality. Conduct of the market refers to the strategies that firms pursue with regard to price, product and promotions, and the linkages/relationships between and among firms. The market behavior of firms will determine whether or not they compete and whether they are acting innovatively to improve market efficiency. Informal association between even a small numbers of firms (collusion) can cause price distortions, and seemingly independent firms can have joint ownership (subsidiaries) (Muhammed, 2011). According to Abbott and Makeham (1981) conduct refers to the market behavior of all firms. In what way do they compete? Are they looking for new techniques and do they apply them as practicable? Are they looking for new investment opportunities, or are they disinvesting and transferring funds elsewhere? Market conduct deals with the behavior of firms that are price-searchers are expected to act differently than those in a price-taker type of industry (Cramers and Jensen, 1982).

Market performance: Market performance can be evaluated by analysis of costs and margins of marketing agents in different channels. A commonly used measure of system performance is the marketing margin or price spread (Getachew, 2002). Performance of the market is reflection of the impact of structure and conduct on product price, costs and the volume and quality of output (Cramers and Jensen, 1982). Market performance can be evaluated by analyzing costs and margins of marketing agents in different channels. A commonly used measure of system performance is the marketing margin or price spread. Margin or spread can be useful descriptive statistics if it used to show how the consumer's price is divided among participants at different levels of marketing system.

Marketing cost: It refers to those costs which are incurred to perform various marketing activities in the transportation of goods from producer to consumers. Marketing costs includes

handling cost (packing and unpacking), costs of searching for a partner with whom to exchange, screening potential trading partners to ascertain their trustworthiness, bargaining with potential trading partners (officials) to reach an agreement, transferring the product, monitoring the agreement to see that its conditions are fulfilled, and enforcing the exchange agreement (Holloway and Ehui, 2002).Marketing costs refers to those costs, which are incurred to perform various marketing activities in the shipment of goods from producers to consumers. Marketing cost includes: Handling cost (packing and unpacking, loading and unloading putting inshore and taken out again), transport cost, product loss (particularly for perishable fruits and vegetable), storage costs, processing cost and capital cost (interest on loan), market fees, commission and unofficial payments (Heltberg and Tarp, 2001).

Marketing margin: 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. In other words, it is the difference between retail price and farm price (Cramers and Jensen, 1982). The marketing margin in an imperfect market is likely to be higher than that in a competitive market because of the expected abnormal profit. But marketing margins can also be high, even in competitive market due to high real market cost (Wolday, 1994). Marketing margin is a commonly used measure of the performance of a marketing system (Abbott and Makeham, 1981). Market participation is both a cause and a consequence of economic development (Reardon and Timmer, 2005). It enhances the links between the input and output sides of agricultural markets (Gebremedhin *et al*., 2010). Farmers with low market participation have low agricultural productivity and they are also the poorest (Mathenge *et al*., 2010). Higher market participation can drive productivity by providing incentives, information, and cash for purchasing inputs. Higher productivity could drive market participation because farmers with high productivity have surplus to participate in the market, *ceteris paribus* (Barrett, 2008; Rios *et al*., 2008)

2.3. Dimensions in Value Chain

Value chain analysis forms an important tool to examine structural change. Altogether, it comprises of five dimensions which include the technical structure, the actors in a chain, the

territorial, the input output and the governance structure (Gereffi, 1994). The analysis of these structures answers a set of questions such as, how does the production process take place? Who participates at which stage? Where do the different stages take place? How are they linked? Who has which benefits? etc. Answers are required to find the pertinent points of intervention for a successful integration of poor population sections (Kodigehalli, 2011).

According to Baker (2006), the value chain concept explained as it traces product flows.It shows value additions at different stages; identifies key actors and their relationships in the chain; identifies enterprises that contribute to production, services and required institutional support; identifies bottlenecks preventing progress; provides a framework for sector-specific action; identifies strategies to help local enterprises to compete and to improve earning opportunities; identifies relevant stakeholders for program planning (also in distant markets); for good policies and programs, we need to understand how local enterprises fit into the global economy. Value chain is characterizing by its network structure, its governance form and the way value is added.

Network structure

From supply chain management and network theory, we draw the network structure of the value chain, including the market outlet (local, regional, international). Supply chain management focuses on vertical connections between economic actors aiming to jointly produce for a market. Network theory combines horizontal and vertical relationships between actors (Trienekens, 2011). The performance of an agricultural value chain depends on how well the actors in the value chain are organized and coordinated, and on how well the chain is supported by business development services (BDS). Verticality in value chains implies that conditions at one stage in the value chain are likely to be strongly influenced by conditions in other stages in the vertical chain, in direct and indirect ways, and in expected and unexpected ways. It should be noted that intra-chain linkages are mostly of a two-way nature. A particular stage in a value chain may affect and be affected by the stage before or after it (Anandajayasekeram and Berhanu, 2009).

Value addition

One of the central points or concepts in value chain analysis is the one of value added. In a broad sense, applicable not only to value chain analysis, but to any analytical work in the sphere of economic growth and development, the value added refers to the creation of wealth, the contribution of the particular production process, or particular chain, to the growth of the economy (FAO, 2006). Value addition is created at different stages and by different actors throughout the market chain. The addition of value may be related to quality of the product, costs of the product, delivery times, delivery flexibility, innovativeness, etc. of the chain members. The size of value addition is determined by the willingness of the end user to pay for the delivered products. The opportunities to add value by the company is depend on a number of factors, such as market characteristics (size and diversity of markets) and technological capabilities of the actors (Kaplinsky and Morris, 2000).

Value addition can be broadly stated as the process of economically adding values to products (raw commodities) that possess intrinsic value in their original state by changing their current place, time, and form characteristics to improve their economic value and preferred by consumers in the market place (Coltrain *et al.,* 2000). According to these authors, value addition can be achieved in two ways; innovation and coordination. Value addition through innovation focuses on improving the existing processes, procedures, products, and services or creating new ones, while value addition through coordination involves arranging partnership among the value chain actors that produce and market farm products, changing the distribution of value in the chain which in turn through direct marketing, vertical integration, producer alliances, and cooperative efforts.

Value addition is simply the act of adding value to a product, whether you have grown the initial product or not. It involves taking any product from one level to the next (Fleming, 2005). It is creation of value for products at different stages and by different actors throughout the value chain. Value added related to quality, costs, delivery times, delivery flexibility, innovativeness, etc. The size of value added is decided by the end-customer's willingness to pay. Opportunities for a company to add value depend on a number of factors, such as market characteristics (size and diversity of markets) and technological capabilities of the actors (Kaplinsky and Morris, 2001). As a given commodity flows through the different segments

along the chain, value is created. Value added is the difference between revenue and the cost of externally sourced material and service inputs is a node's value added (Klemperer, 1996; Tallec and Bockel, 2005). It differs from net profit by wage costs, depreciation and corporate overhead including marketing expense, interest, and taxes. As presented in Tallec and Bockel (2005), value added is not only an element of income but also represents the distribution of that income among the fundamental agents of the national economy, including households (the recipients of the return to labor), financial institutions (interest charges), government administration (taxes), and enterprises (gross or net profit).

Value addition refers to the act of adding value(s) to a product to create a form, place, and time utility which increase the customer value offered by a product or service. It is an innovation that enhances or improves an existing product or introduces new products or new product uses (Fleming, 2005).Through value addition, farmers can create new markets, or differentiate a product from others and thus gain an advantage over competitors. In so doing, the farmer can ask a higher premium (price) or gain increased market share or access. Adding value does not necessarily involve altering a product; it can be the adoption of new production or handling methods that increase a farmer's capacity and reliability in meeting market demand. Value-addition can be almost anything that enhances the dimensions of a business. The key point is that the value adding activity must increase or stabilize profit margins, and the output must appeal to the consumer (AAFC, 2004).

Governance structure

Governance is a central concept to value chain analysis. Governance can be defined as nonmarket coordination of economic activity. The starting point for interest in global value chains is the fact that some firms directly or indirectly influence the organization of global production, logistics and marketing systems. Through the governance structures they create, they take decisions that have important consequences for the access of developing country firms to international markets and the range of activities these firms can undertake (Gereffi *et al*., 2001).Governance is defined as how control is exercised within the value chain actors and plays a major role in how production capabilities are upgraded; determine the sustainability of

the value chain and distribution of an equal benefit among the value chain actors (Marshal and Schreckenberg, 2006).

2.4. Empirical Reviews

2.4.1.Empirical reviewson Value chain analysis

Value chain research related to rice is scanty. Most literature and research in the past has focused on rice production, challenge and opportunity and some on marketing aspect. But there are a number of studies that have employed the value chain approach to other agricultural commodities from which some of them are reviewed below.

In Ethiopia, Metemadistrict, rice value chain was evaluated using the functional, flow and economic analysis methods. Moreover, the study utilized SWOT analysis to identify the challenges and opportunities. The study identified the various actors in the value chain strengthen, weakens and opportunities of each actor. Currently, the different agents or stakeholders in the chain include farmers, commission agents, extension agents, researchers, millers, exporters and urban retailers. The rice production is largely subsistence farming and not directly linked with the market. As to the linkage, weak and informal linkage between chain actors characterizes the rice value chain. Lack of post-harvest processing technology (rice polisher), limited access to and supply of inputs, severe termite attack, non-availability of well-developed rice market, high labor demand for crop management, absence of responsible body who works on actor's interaction were some of the challenges identified for innovation at various stages of rice value chain. Absence of rice polisher machine was the most critical problem that affects the whole value chain. On the contrary, increased farmer's awareness about and availability of improved rice varieties, existence of favorable land and climatic condition, presence of high consumer demand, and increased institutional support from different governments and NGOs were mentioned as opportunities for innovation (Kassa, 2010).

Rice value chain development study was also conducted in Fogera district by Improving Productivity and Market Success (IPMS) project and it was developed based on the experience of the project. The results indicated that farmers used rice seeds up to 200 kg/ha

(X-Jigina) which is more than 250 % (80 kg/ha) of the recommended seed rate. Since 2008, the number of farmers using inorganic fertilizers decrease. This due to that farmers were asked to pay 100% cash unlike the previous years which allowed credit. (Tilahun, *et.al*, 2012). The existing rice varieties were long maturing type and when rains stop early in the uplands, supplementary irrigation to complete the growth cycle was needed. Quality related problem due to machinery used as well as machine operation, and marketing of NERICA as a grain was still in its early stages, were some of the challenges observed in the value chain. On the other hand, the dramatic increase in area coverage and production of rice, farmer positive response to the introduction of rice in the uplands, farmer to farmer seed exchange system for X-Jigina and introduction of parboiling technology were also mentioned as opportunities for innovation in the value chain. (Tilahun, *et.al,* 2012).

The same study was conducted in Fogera district, the main objective of the study was to examine the contribution of the rice value chain development to the livelihood of farmers and assess the challenge/constraints faced by farmers. The result of the study revealed that rice value chain in the study wascontributed positively on the livelihood of farmers. Allocation of rice land for cultivation increases and the productivity of rice also increase from year to year. In addition, farmers were able to get better market for rice compared to other crops. Rice was the main source of income and food (consumption) of households Fogera district. The study further identifies the challenge and opportunities in value chain development. Accordingly, there was shortage of improved input supplies in the market; therefore, farmers were forced to use the local varieties. In addition, the market actors were not offering better price for better product and this would distort the farmers would not be encouraged to produce a better product. Farmers also face problem in relation to weeding and storage, appropriate and cost effective technologies needs to be introduced to minimize the time spent on weeding and the harvest that damages due to poor storage method as well. Opportunities in rice production and marketing in Fogera district were identified, natural resources availability, conducive weather condition, high productivity of the crop, good market of the rice product, availability of supportive institutions, increase consumers demand from time to time, government gives more emphasis to the sector and the crop less susceptible to insect and pest(Meron,2016).

Bart *et al*. (2013) used value chain analysis to identify the rural–urban value chain of teff in Ethiopia. Prices were carefully collected at each stage of the value chain for each quality at the time of the survey. Relying on unique large-scale surveys at different levels in this value chain, they found, in contrast to conventional wisdom, that value chains are relatively short and that average farmers obtain a high share, of about 80 percent, of the final consumer price in the major terminal market, Addis Ababa. Stock release by farmers is smooth over the year and the importance of distress sales after harvest is lower than commonly assumed. According to Minten *et.al* (2013) teffvalue chain had divided in to upstream and downstream.The use of modern input such as herbicide, pesticide, improved seed varieties, chemical fertilizer increased productivity in upstream of teffvalue chain, however, broadcasting is common method used for teff sowing. The share of red teff in production declined from 36% of total production to 20 percent. The reasons for the decline of red teff produce over time. First, the prices for red teff are significantly low. Second, red teff traditionally used to have higher productivity than white teff; this is now changing as high-performing white varieties have recently become available. Thirdly, only very few improved red varieties are currently available.

2.4.2.Empirical reviews ondeterminants of intensity of market participation

Mujawamariya *et al*. (2016) analyzed determinants of market participation by rice farmers from selected rice growing regions in Tanzania using double-hurdle model. Results of the double-hurdle model analysis showed that in the first hurdle, the decision to participate in the market is affected by the cropped area, yield, distance to the market and type of variety grown. In the second hurdle; besides these factors, the quantity marketed is affected by the existence of a market within the village. Pilile (2015) used double-hurdle model to examine the key factors influencing market participation decisions among maize-producing households in the former homelands of South Africa. The results of the double-hurdle regression point specifically to five key factors that were found to have a positive statistical effect on rural smallholders' market participation decisions, and on the conditional quantity of maize they traded (viz. household size, land size, access to credit and government transfers for the first stage, which was estimated using the Probit model, and age, education and employment status of the household head, use of tractor when cultivating, government transfers, quantity

produced, market price, and own transport to the market for the second stage which was estimated using truncated normal regression).

Yallew (2016) analyzed determinants of level of farmers' participation in maize output market and determinants of farmers' participation in maize output market in Guangua district of Amhara National Regional State using double-hurdle model. Results of the double-hurdle model analysis showed that in the first hurdle, educational status of the household head, price perception and land holding size played positive and significant role in households' decision to participate in maize output sales; whereas, distance from extension office was found to affect participation in maize sales negatively and significantly. In the second hurdle; gender of the household head, household size and land holding size have positive and significant role in the volume of maize sold; while distance to the market was found to have negative significant role. Land holding was found to affect both households' decisions to participate and intensity of participation in maize sales.

Adetola *et al*. (2014) identified determinants of market participation among maize producers in Oyo State, Nigeria by using censored Tobit regression. The study has revealed that market price, member of a producer group, farm size, educational and total maize produced, road condition, primary occupation and transaction costs significantly affect farmers' market participation. Tewodros (2014) used Tobit model to identify determinants of smallholder pulse producers' market orientation in Southern Ethiopia and indicated that household head education level, access to credit and land per capita positively influenced chickpea market orientation while being male head of a household and accesses to credit increased the predicted value of haricot bean market orientation. Adenegan *et al*. (2012) identified determinants of market participation of maize farmers in rural Osun State of Nigeria by using Tobit model and indicated that quantity of maize produced, age, household size, farming experience, ownership of farming equipment, access to non-farm income, farmers' association, means of information and transportation cost determined market participation significantly.Edward *et al*. (2012) also used Tobit model to identify factors influencing the intensity of commercialization by farm households in Ghana and indicated that output price,

farm size, access to extension service, distance to the nearest market and market information determine household commercialization.

Mussema (2006) identified that the key factors that affecting marketable supply of red pepper at Alaba and Siltie districts of SNNPRS using cross-sectional data with both dummy and continuous independent variables. In her study, she employed Tobit model and came up with the finding that distance to the market, frequency of contacts with extension agents, quantity of

pepper produced and access to market information influenced marketable supply of pepper positively at the district. Recent studies are commonly using regression models to estimate the supply function. Aman *et al*. (2013) A double hurdle model was applied to analyze the determinants of the commercialization decision and level of commercialization in horticultural crops in Gemechis district, West Hararghe zone, Ethiopia. In first hurdle, the result of Probit Regression Model revealed that, gender, distance to the nearest market, and cultivated land played a significant role in smallholder commercialization decision. In the second hurdle, the result of Truncated Regression Model revealed that, household education, household size, access to irrigation, cultivated land, livestock, and distance to the nearest market were the key determinants of the level of commercialization. Synthesis of double hurdle model result showed that farm size and distance to the nearest market were cross-cutting determinants of crops commercialization.

2.5. Conceptual framework

The focus of value chain framework is in developing an effective way of coordinating the hierarchical stages in the value chain to meet consumer demand in an efficient manner. The value chain framework also enables us to think about development from a systems perspective (Anandajayasekeram and Berhanu, 2009). Value chains can be viewed as a network of different functions or stages from production to consumption, including all ancillary support services. The main possible actors of rice value chain in the study areas are input suppliers, producers, Wholesalers, Collectors, Processors, Retailers and consumers of the final product, supporting service providers.

The main focus of this study is to put some starting dots on the value chain analysis of rice for the future better work by the interested scholars on rice and other economically important agricultural commodities which still exposed to loss and wastage because of poor integration for value chain management for a given commodity among the actors who participate from production via final consumption at different stages. This can be shown by mapping the rice value chain actors and their functions and also support service providers, identifying the rice value chain actors, value addition activities and value share of each actor along the chain, what factors affect the farmers' decision to participate in rice market and sales volume, identifying who governs the rice value chain more as compared to their contribution and share.Therefore, in order to reduce unfair market and benefit share in the value chain, there is a need to identify major factors affecting the rice market participation and quantity supply, to help small scale producers in order to improve productivity and competitiveness of the value chain. The outcomes of this study are to help the policy makers to look into and improve the livelihood of the rural poor by enhancing the participation in rice production, processing and marketing. With this ground, the schematic representation of the conceptual framework applied for this study is represented here after.
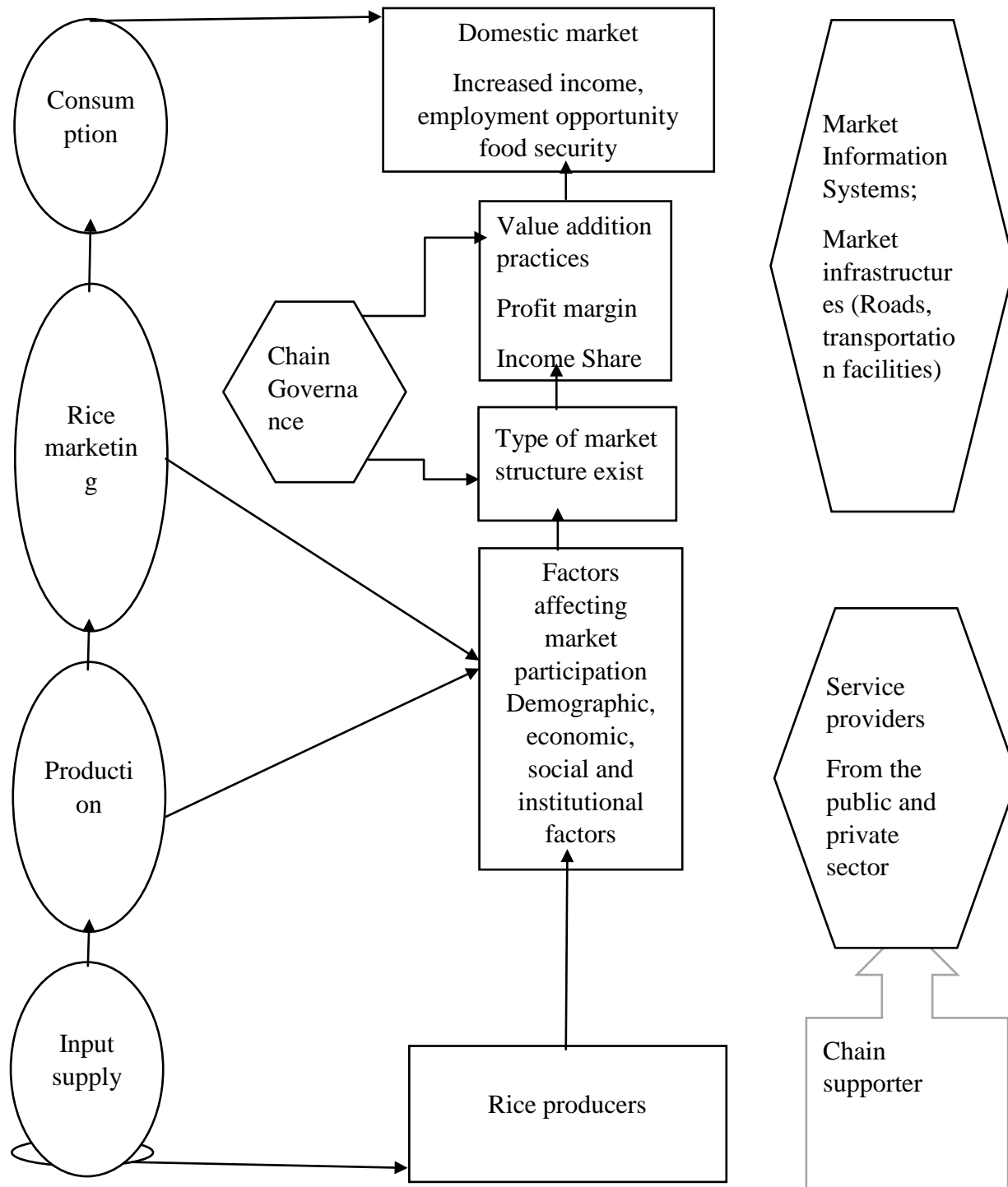
Figure 2: Conceptual framework of the study

Sources: Own sketch based on literature review (2016)

3. METHODLOGY OF THE STUDY

This chapter of the thesis provides research methodology organized in the study in order to address the objectives of the study. The chapter presents brief description of the study area, data types and sources, sampling procedure and sample size determination, methods of data collection, methods of data analysis, specification of econometric model and estimation strategies.

3.1. Description of the Study Area

The study was conducted in Shebe Sombo districts of Jimma zone,Southwest of Ethiopia. The district islocated about 395Km Southwest of Addis Ababa and 50km South of Jimma town.The relative location of the Woreda is Seka Woreda at North, SNNPR at South, Gera Woreda at East and again Seka Woreda at West. The Woreda is divided into 20 rural Peasant Associations (PAs) and 2 urban Kebeles and it is one of the 18s Districts' in Jimma Zone.According to CSA (2013) population projection, the estimation ofthe total population of the Woreda in the year 2016 is 141,037from which male and female account 71,150and 69,887, respectively, with an area of 1191km^2.The area has potential cultivable land of 29,668 ha and 16,805ha of uncultivable land. There is, 17,346 ha of Coffee land, 22,509.9 ha of forestland and 596 ha of grassland. Besides, there is 2798 ha of waterlogged areas are found in the Woreda (ARDO, 2016).

The altitude of the Woreda reneges from 1000 to 2240 m asl while the minimum annual temperature ranged between 16C^o and 30C^o. Mean annual rainfall for the area ranges from about 1420 to around 2200 mm. The main rainy season in the Woreda is from February to end of August. The Woreda has diverse agro-ecological zones, from the total area,highland (15%), midland (49%), and lowland (36%). The Woreda is characterized by subsistence mixed farming system in which production of both crops and livestock is common economic activity. Commonly produced crops in the area include maize, teff, sorghum, rice, wheat, barley, field peas and various types of oil seeds, are cultivated in the area. Moreover, livestock such as cattle, sheep, goats, pack animals, and poultry, are important sources of livelihoods in the area.Agricultural production system is relying on traditional method in which tame

animals such as oxen supply drought power. There is tendency of making the system modernized in terms of technological input adoption such as, improved varieties, fertilizer, chemicals, etc. Livelihood system of the area is mainly based on agriculture, Small scale trade, off-farm and non-farm activities are also serving as the way of sustaining life and meeting basic needs for the certain portion of population in the area.

Trends of rice production in the study area

Based on the secondary data obtained from ARDO and TMDO (2016)total land used for rice production, total yield, yield/ha, total quantity marketed, Average price and farmers engaged in rice production over the period of 2009/10 to 2015/16 was increased (Table 1).

Farmers are able to increase their volume of production though out the years and the factors that help them to increase their production are;availability of land with favorable soil characteristics for rice production and climatic condition, the importance of rice as a food security crop and source of income, the price and the demand for rice production increase over time,relatively rice has high productive as compared to other cereals (ARDO,2016).

Table1: Trends of rice production in the study area from (2009/10-2015/16)

Year	Total land for rice (ha)	yield/ha	Total production (qt)	Farmers	Marketed (qt)	Averageprice/qt
2009/10	630	31	19530	2520	976.5	395
2010/11	1143	33	37719	3657	2263.1	475
2011/12	2265	33	74745	5530	5262.2	550
2012/13	2536	36	91296	5897	8216.6	605
2013/14	2815	38	106970	5985	11766	685
2014/15	2987	42	125454	6095	17563	705
2015/16	3071	45	138195	6142	28198.5	721

ARDO and TMDO (2016)

The woreda has7 village marketsand 2 town markets(Shebe and Angechamarket) are the main market center.Out of 20 Peasant Kebele administrations, only 7 Peasant Kebele administrationshas local markets, the rest are supposed to sell their output to neighbor's market or to the village collectors.Some producers market over long distances through

intermediaries, while some farmers are located closer to markets. Post-harvest handling, processing, storage, transportation and sales are mostly carried out by family members (ARDO, 2016).
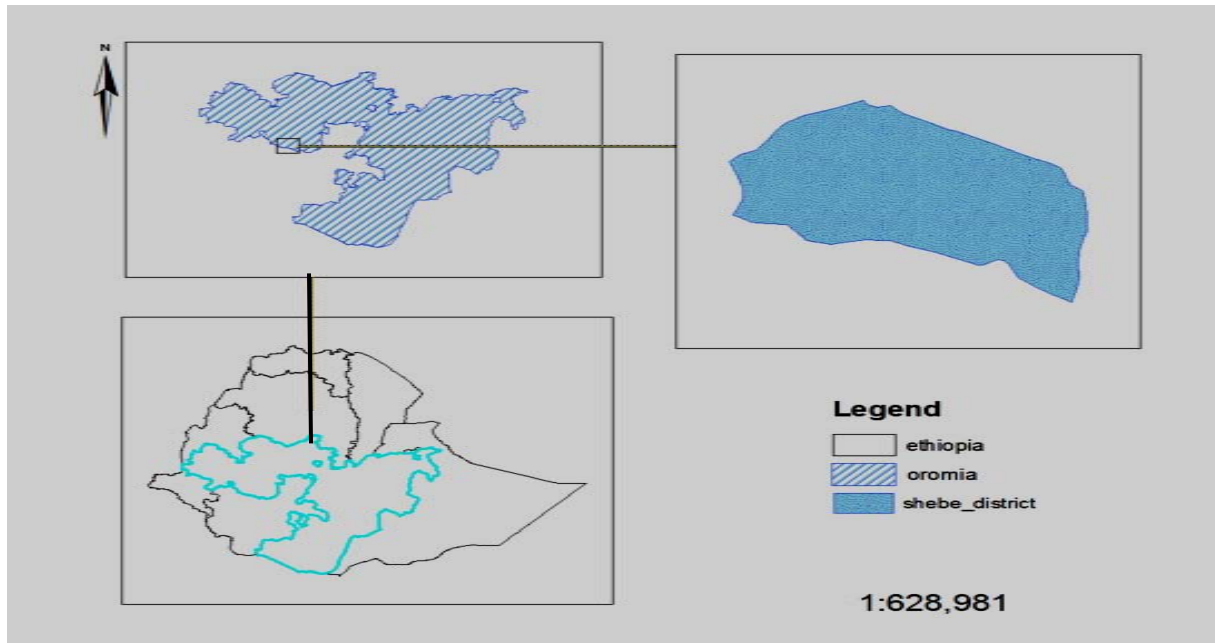
Figure 3: Map of the study area

3.2. Types, Sources and Methods of Data Collection

Data types and Sources

To conduct this study, both qualitative and quantitative types of data were collected from both primary and secondary sources of data that are consistent, available, adequate and reliable for the objectives intended to be addressed. The primary data type was collected from sample rice producers, traders (Collector, whole sellers, retailers and processors), Woredaagricultural offices,Cooperative agency and district trade office. Besides, discussion was held with relevant experts and other officials to seek additional information and/or crosscheck the data. Secondary data on population size of the study area, lists of Kebeles, lists of rice producing households, list of licensed rice traders', amounts of production in the district, journals, books, Central Statistics agency (CSA), national policies, Woredareports, different relevant published and unpublished reports, bulletins and websites were consulted to generate relevant secondary data on rice products and market participation.

Method of data collection

To capture adequate data for the study, both close ended and open ended (semi- structured) questionnaire was prepared. The questionnaire was pre-tested on eight farmers and four traders to evaluate the appropriateness of the design, clarity and interpretation of the questions, relevance of the questions and time taken for an interview. Hence, appropriate modifications and corrections were made on the questionnaire based on the feedback received during pre-test. The enumerators who have college diploma and working as development agents, were selected and trained on data collection procedures and interview techniques in order to simplify the complexity of data collection. On top of conducting individual interviews, Participatory Rural Appraisal (PRA) tools such as focus group discussion and key informant interview were held with farmers, traders, consumers, district agriculture and trade offices manager, DAs and representatives of kebelefarmersusingchecklists.Data were collected under continuous supervision of the researcher.Document review was made to take secondary data related with the study.

3.3. Sampling Procedure and Sample Size Determination

3.3.1. Producers sampling

In the first stage,stratified random sampling technique was used to select sample kebeles. In the selection process both Woreda agricultural office manager and experts were consulted. From among different factors,actual rice production of kebeleswas assumed to be important criteria to stratify kebelesfor deriving representative sample kebeles.12 kebeles are producing rice,out of 20 rural kebeles. First, by using actual production of each kebeles recorded in district of Agricultural office in the year 2015/16, each 12 kebeles were stratified into two groups based on the actual mean production of the district. Less production statuskebeles (those kebeles producing below the actual mean production of the district) and high production statuskebeles (those kebeles producing above the actual mean production of the district). According to this stratification, six kebeleswere categorized as high production status kebeles, and the left six kebeleswere categorized as less production statuskebeles. Four kebele administrations were randomly and proportionally selected from the two strata.Two kebele

administration (*Gasara and Kishe*) was randomly and proportionally chosen from the high production statuskebeles and two kebele administration (*Machi and Angecha*) was randomly and proportionally chosen from the less production statuskebeles.

In the second stage, systematic random sampling technique was employed to select target smallholder farmers. To consider the target populations, only list of rice producing farmers from sample kebeles were considered. Then, based on the number of rice producing farmers available in each sample kebeles, proportional size of sample rice producing farmers was selected from each sample kebelesusing systematic random sampling technique. Based on the established sample frame for the selected kebeles, sample size of farmers for the survey was determined.Since adequate size of sample is needed for the purpose of econometric analysis, unlike descriptive analysis, employing sample size determination formula is important (Israel, 1992). Simplified formula provided by (Yamane, 1967)was used to calculate the sample size of rice producers. Accordingly, the required sample size at 95% confidence level with degree of variability of 5% and level of precision equal to 8% were used to obtain a sample size required, which represent a true population (Table 2).

$$n = \frac{N}{1+N(e)^2} = \frac{2729}{1+2729(0.08)^2} = 147.788 \approx 148 \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots(1)$$

Where, n = sample size, N= population size (sampling frame) and e =the desired level of precision (in this case 8%considered).

Table 2: Sample size determination of rice producers

Kebeles	Number of households	Proportion	Sample households
Machi	568	0.208	31
Gasara	823	0.302	45
Kishe	906	0.33	49
Angecha	432	0.16	23
Total	2729	1	148

Source: Agricultural offices of Shebe Sombo Woreda (2016)

3.3.2. Traders sampling

In this study, information fromintermediary value chain actors involved in rice marketing such as wholesalers, collectors, retailers and processors were also needed mainly for the purpose of mapping the rice value chain, calculating value share of actors and to capture the actual practice and behavior of the traders. The lists of licensedwholesalers, processors and retailers were obtained from the district Trade and IndustryOffice. Accordingly,9 wholesalers, 7 processors and 30 retailersare licensedin the district. They are all 9 and 7 of wholesalers and processors in number, respectively, and all were considered. Similarly based on the list of sample frame 10 retailers were selected purposively out of 30 retailers based on their volume of trade. However, there was no recorded data for Collectors in the trade and industry office of the Woreda. Consulting other traders, information was gathered (counting) and size of collectors was determined by developinga sample frame (24 collectors were identified). Hence, 6 collectors were selected purposivelyout of 24collectorson their volume of trade. Random sampling is not relevant for analyzing market structure, because the largest firms could have been missed if traders are sampled randomly. Therefore, they must be selected by their order of size purposively.

Table 3: Traders sampling

Traders	Number of Traders (N)	Sample size (n)
Wholesalers	9	9
Processors	7	7
Retailers	30	10
Collectors	24	6
Total	70	32

Source:District Trade and Industry Office (2016)

3.4. Method of Data Analysis

Two types of data analyses, namely descriptive statistics and econometric analysis were used for analyzing the data collected from rice producers and traders and processors in the study area.

3.4.1. Descriptive analysis

Descriptive and inferential statistical tools such as mean, frequency, percentages and standard deviations were used in the process of examining and describing socioeconomic and demographic characteristics of rice farmers and traders. Moreover, t-test and chi-square test were used to make comparisons between different groups of households with respect to the characteristics under consideration. In addition to this, value chain map is used to identify and categorize the value chain actors, their roles, and relationships in the rice value chain of the study area.

Rice value chain analysis

The following three steps of value chain analysis were applied for this study:

1. Mapping the value chain to understand the characteristics of the chain actors and the relationships among them, including the study of all actors in the chain, of the flow of rice through the chain, of employment features, and of the destination and volumes of domestic sales. This information was obtained by conducting surveys and interviews as well as by collected secondary data from various sources(Kaplinsky and Morris, 2001)..

2. Identifying the distribution of actors' benefits in the chain. This involves analyzing the margins and profits within the chain and therefore determines who benefits from participating in the chain and who would need support to improve performance and gains. In the prevailed context of market liberalization, this step is particularly important, since the poor involved in value chain promotion were the most vulnerable (Kaplinsky and Morris, 2001).

3. Emphasizing the governance role. Within the concept of value chain, governance defines the structure of relationships and coordination mechanisms that exist among chain actors. By focusing on governance, the analysis identified actors that may require support to improve capabilities in the value chain, increase value added in the sector and correct

distributional distortions. Thus, governance constituted a key factor in defining how the upgrading objectives could be achieved (Kaplinsky and Morris, 2001).

Analysis of rice Value Addition

The difference between the final retail price and farmer's price represents the value added by the different market actors. The value added by a given actor is the difference of the selling price and purchasing cots or production cost. The value addition contribution of actors was computed in a relative term as the ratio of actors' value added and total value added by all actors. After all, production costs are the single most important factor determining competitiveness. Assessing the cost structure allows identifying critical points that need to be addressed. Hence, the value added for each step of the chain as well as the overall value added of the entire chain are calculated and interpreted as the creation of economic wealth by one or more productive activities (GTZ, 2007). The calculation of the value-added (VA) is defined as:

$$VA_{ij} = Y_{ij} - II_{ij} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (2)$$

The value of the intermediate inputs (denoted as II) used in the productive activities has to be subtracted from the value of the output of a product i (denoted as Y). The difference represents the value-added from an individual agent j. Thus, to calculate the value added, all costs and sales for the relevant stages have to be measured.

The overall value added is the following:

$$TVA_{chain} = Y_{chain} - II_{chain} = \sum VA_{agents} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (3)$$

Now it is possible to identify which stage contributes to the highest share of the value added, which stage to the lowest, and if there is an overall positive value added. This is especially interesting for policy makers, who want the households to get a fair share in the profit.

Analyze market performance of rice value chain.

Structure conduct and performance (S-C-P) model was applied. The model examines the causal relationships between market structure, conduct, and performance, and is usually referred to as the structure conduct and performance (S-C-P) model. In agricultural economics, the most frequently used model for evaluating market performance is based on the industrial organization model. Wolday (1994) also used this model to evaluate food grain market in Alaba Siraro district. Rehima (2006) and Kindie (2007) used this model to analyze the market performance of pepper and sesame. Thus, this study used S-C-P to analyze market performance of rice value chain.

Market Concentration

Market concentration is defined as a number and size distribution of sellers and buyers in the market (Scherer, 1980). The concentration ratio is a way of measuring the concentration of market share held by particular suppliers in a market. "It is the percentage of total market sales accounted for by agiven number of leading firms". Thus a four-firm concentration ratio is the total market share of the four firms with the largest market shares. The greater degree of concentration is the greater the possibility of non-competitive behavior existing in the market. For an efficient market, there should be sufficient number of firms (buyers and sellers). Kohls and Uhl (2002) suggest that, as a rule of thumb, a four enterprise concentration ratios of 50 percent or more is indicative of strongly oligopolistic industry, 33-50 percent a weak oligopoly, and less than that, an un-concentrated industry. The usual measures of market concentration as:

$$C = \sum_{i=1}^{r} S_i \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots. (4)$$

Where C = concentration ratio handle, S_i =Percentage share of i[th]firm, r =number of largest firm for which the ratio is going to be calculated.

Market conduct

Market conduct refers to the behavior of firms or the strategies used by the firms, for example, in their pricing, buying, selling, etc.The behavior of firms in setting their prices plays a vital role in the S-C-P paradigm. Conditions that are believed to express the exploitative relationship between producers and buyers was analyzed based on a) Pricing

behavior analysis. Who sets prices? How are prices determined? (e.g. one buyer or many buyers, factors considered in price setting and b) Buying and selling practices analysis (e.g. source of product, distribution channels used), was used for the study (Scot, 1995).

Marketing margin

Marketing margin analysis deals with comparison of price at different levels of marketing chain over the same period of time. It measures the share of the final selling price that is captured by a particular agent in the marketing chain and always related to the final price or the price paid by the end consumer, expressed in percentage (Mendoza, 1995). Estimates of the marketing margins are the best tools to analyze performance of market. Marketing margins were calculated by taking the difference between producers and retail prices. The producers' share is the commonly employed ratio calculated mathematically as, the ratio of producers' price to consumers' price. Mathematically, producers' share can be expressed as:

$$P_S = \frac{P_P}{C_P} = 1 - \frac{MM}{C_P} \ \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \ (5)$$

Where: Ps = Producer's share Pp = Producer's price Cp = Consumer price MM = marketing margin

The above equation tells us that a higher marketing margin, diminishes producers share and vice versa. It also provides an indication of welfare distribution among production and marketing agents.

Computing the Total Gross Marketing Margin (TGMM) is always related to the final price paid by the end buyer and is expressed as a percentage (Mendoza, 1995):

$$TGMM = \frac{Consumer \ \ price \ -Producer \ \ price}{Consumer \ \ Price} * 100 \ \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \ (6)$$

Where, TGMM = Total gross marketing margin.

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

$$\text{GMMP} = \frac{\text{Price Paid by the Consumer} - \text{marketing grossmargin}}{\text{Price Paid by the Consumer}} * 100 \dots\dots\dots\dots\dots (7)$$

Where, GMMp = Producers' participation (farmers' portion)

Net Marketing Margin (NMM) is the percentage over the final price earned by the intermediary as his net income once his marketing costs are deducted.

$$\text{NMM} = \frac{\text{Gross margin} - \text{marketing cost}}{\text{Consumer Price}} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (8)$$

From this measure, it is possible to see the allocative efficiency of markets. Higher NMM or profit of the marketing intermediaries reflects reduced downward and unfair income distribution, which depresses market participation of smallholders. An efficient marketing system is where the net margin is near to reasonable profit.

3.4.2. Econometric analysis

3.4.2.1.Specification of the Tobit model for Intensity of Market participation

Majority of the rice producers in the study area practiced rice production both for food and as a source of income. A large proportion of the rice producers therefore participated in rice marketing; however, the degree of participation varies among households. The data have a censored sample as dependent variable, 20% of household didn't supply rice even if they produce rice from the total of 148 samples. This situation disqualified two step procedures like Heckman or Double Hurdle model in analysis of the data because of a fewer number of non-participants in rice market. Because of the predetermined selection of households based on production and marketing of mango in the study area, the data collected did not allow use of selectivity models. The model assumes that the decision to sell and the actual sales level were simultaneously determined by the same variables such that the variables that increased the probability of selling also increase the total amount of output sold. Tobit interprets all the zero observations as corner solutions where the household is assumed to be a mango seller with zero sales. The aim of the study was to look at factors that increase the level of farmers'

participation in the rice market. Ideally, the Ordinary Least Square (OLS) model is applicable when all households participate in the market but in this study not all households participate in the rice market. Some households may not prefer to participate in a particular market in favor of another, while others may be excluded by market conditions.

Therefore, it was interesting to identify factors that influence both the probability and intensity of market participation leading to a need for a model that is a hybrid between the logit/probit and MLR. The appropriate model for such is Tobit model that uses Maximum Likelihood estimation (MLE) (Tobin, 1958). A Tobit model answers both the factors that affect the probability of market participation and intensity of participation simultaneously. The results obtained from the Tobit procedure were the MLE or as well as the marginal effects.The marginal effects indicate the amount of rice sold to the market resulting from a unit change in the explanatory variables among the whole sample or the participant group. The change in probability on the other hand indicates the likelihood for the farmers to participate in the rice market. Using Tobit, with left-censoring at zero, to identify factors affecting intensity of market participation while controlling other factors, the econometric model is specified as:

$$y_i^* = \beta o + \sum_{i=1}^{m} \quad \beta xi + \varepsilon_I \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots.(9)$$

$$yi = \begin{cases} y^* = \beta o + \sum_{i=1}^{m} \quad Bxi + \epsilon i, \ if \ y^* > 0 \\ 0 \qquad\qquad\qquad\qquad\quad if \ y^* \ \leq 0 \end{cases} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots. (10)$$

Where:

y_i is intensity of participation (dependent variable); yi^* is the latent variable which is not observable; βo is an intercept; β_i is coefficient of the ith independent variable; x_i is vector of independent variables determining intensity of participation; and i is 1, 2, 3…….., m; and ε_i is the error/disturbance term that are independently and normally distributed with mean zero and a common variance σ^2.

Interpreting the coefficients of a Tobit model is not in the same way as one interprets coefficients in an uncensored linear model (Johnston and Dinardo, 1997). Hence, it was sensible to compute the derivatives of the estimated Tobit model to predict the marginal effects of changes in the explanatory variables. A change in explanatory variables has two

effects. It affects the conditional mean of Yi^{*} in 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:

$$\frac{\partial E(yi)}{\partial xi} = F(z)\beta_I \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots(11)$$

Where, z represents $\frac{\beta i \ xi}{\sigma}$ (Maddala, 1997)

2) The change in intensity of market participation with respect to a change in an explanatory variable among participants of market is:

$$\frac{\partial E(yi/Yi>0)}{\partial xi} = \beta_i[1 - z\frac{f(z)}{F(z)} - \left(\frac{f(z)}{F(z)}\right)^2]\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots(12)$$

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 (that is, unit normal density), Z is the z-score for the area under normal curve, β is a vector of Tobit maximum likelihood estimates and σ is the standard error of the error term.

3.5. Definition of variables and hypothesis

In the course of identifying factors influencing rice market participation decision and marketed surplus, the main task is to analyze which factors influence the participation and marketed surplus of rice. Therefore, potential variables, which are hypothesized to influence the rice market participation and marketed surplus, are presented below.

Dependent variables

Market participation decisionand intensity of participation among market participants are the dependent variables. For the sample households who do not participate in rice market it takes a value of 0, and for those who participated in rice market it takes the amount of rice actually supplied to the market and sold by the household in 2015/16.

Independent Variables

Rice farming experience (RFE): It is a continuous variable and measured in years. It is a proxy for farming experience of household head. Experienced households are believed to be intelligent in resource use, and it is expected to have a positive effect on market participation and marketed surplus.Farmers with longer farming experience are expected to be more knowledgeable and skillful (Ayelech, 2011).Toyiba *et al*. (2014) found that experience in papaya production had a positive and significant effect on papaya volume marketed. Therefore, it is expected that farm experience affects positively rice market participation and marketed surplus.

Family size ofHousehold (FSH): It is continuous variable measured in number of headcount, which affects farmer's market participation decision and intensity ofmarket participation. Families with more household members tend to have more labour. Production in general and marketed surplus in particular is a function of labour. Though household size is expected to have positive impact on volume of sales, beside this larger family requires larger amount for consumption which reduces intensity of participation. Therefore, it is hypothesized that it would have both negative and positive impacts on the intensity of participation. The household size explains the family labor supply for production and household consumption levels (Alene *etal*., 2008). Positive sign imply that a larger household provides cheaper labor and produce more output in absolute terms such that the proportion sold remains higher than the proportion consumed. A negative sign on the other hand means that a larger household is likely to consume more output, leaving smaller and decreasing proportion for sale.

Education of household head (EDU): It is continuous variable and is measured in years of formal schooling of the household head attended. Education increases farmers' ability to get and use information. Since households who have better knowledge are assumed to adopt better production practices, this variable is assumed to have positive relation with market participation decision and farm level marketed surplus of rice. Aman *et al*. (2014) found that education increases the ability of farmers to get and analyze relevant market information

which would improve the managerial ability of the farmers in terms of better formulation and execution of farm plans, and acquiring better information to improve their marketing performance. Also Enete and Igbokwe (2009) argued that education will endow the household with better production and managerial skills which could lead to increased participation in the market.

Income from non-farm activities(NFI): It is a continuous variable and measured in birr, which represents amount of income gained from different sources other than farming and can be obtained by household head, spouse and other household members. Through improving production process, this income makes the household to expand production. Rehima (2006) found that the amount of pepper supplied to the market decreases as pepper producer have engaged on non-farm income.However,for this study,income from the non-farming sources is hypothesized to affect market participation decision and intensity of participation.

Livestock holding (TLU): This is a continuous variable, measured in tropical livestock unit,which excludes oxen.It is assumed that household with larger livestock have better economic strength and financial position to purchase sufficient amount of input (Kinde, 2007). Another study conducted by Makhura (2001) on maize market participation suggested that an increase in the value of livestock owned leads to an increase in maize sale. However, for this study livestock holding is expected to have positive relationships with market participation and on the intensity of participation.

Land allocated for rice (LS): This variable is continuous variable measured in hectare. Producers who own large area holding can produce more than producers who own less area and thus supply more to the market. The increase of area of land covered by the rice can directly increase the marketed surplus of rice. Therefore, this variable is assumed to have a positive relation with the dependent variable.Kindie (2007) found that land allocated to sesame production influenced marketable supply of sesame positively.

Amount of credit used (CRU): Itis a continuous variable and measured in birr, which indicates amount of credit received for rice production and marketing.Thismight be due to use

of credit eases liquidity constraints of households that contribute tomarket oriented production. Likewise, use of credit provide for the farm households apower to spend in input market like purchase of fertilizer, improved seeds and othersthat boost yields and thereby leading to more marketed surplus. Yaynabeba and Tewodros (2013) and Musah *et al.* (2014) argued that credit has a positive relationship with maize and haricot bean market participation decision respectively.Therefore, in this study, use of credit is hypothesized to affect market participation decision and intensity of marketed surplus positively.

Membership in cooperative (MCOOP): This variable is measured as a dummy variable which can take the value of 1 if the farmer is a membership in cooperative and 0 otherwise.It assumed that membership in cooperative could have better access of market information, inputs, extension services and/or technical advice, and credit facilities important to production and marketing decisions.Agwu *et al.* (2012) and Adeoti *et al.* (2014) found that being a member of producer group motivates farmers to participate in the market through networking and provision of up-to-date information to members. As a result, the likelihood of farm households who involved in farmers' cooperative was more likely to be a participant than to be non-participant.This variable is expected to affect market participation decision and on the intensity of participation positively.

Distance to nearest market (DMRKT): It is a continuous variable measured in kilometer that a farmer travels to sell the product to the market. If the farmer is located in a village far away from the market, he/she has limited access to the market and vice versa. Therefore, it is hypothesized that this variable is negatively related to market participation and marketed surplus. The assumption here is that the closer a household is to the market, the more the household is motivated to produce rice product and supply it to the market. Therefore, this variable is expected to have an inverse relation with market participation decision and farm level marketed surplus of rice. In particular, rural communities in remote areas suffer from lack of transportation facilities. This happens due mainly to absence of adequate means of transformation and due to poor infrastructural conditions like roads (Rashid *et al.,* 2010).

Access to market information (MINFO): Access to market information was captured as a dummy variable whether the household had information about prices, market demand and supply, product quality, time and place of sale before selling rice product. Taking a value of 1 if rice producing farmer has access to market information and 0 otherwise.The distribution of market information refers to the availability of relevant market information to farmers, about price of sale, market demand and supply,product quality, time and place of sale and market risk.Here, market information is hypothesized to affect market participation decision and marketed surplus positively. Jari (2009) stated that availability of market information boosts confidence of household who are willing to participate in the market. The expected outcome of access to market information over market participation and intensity of participation is positive.

Perception on current prices(PCPRICE): It is a dummy variable that can affect the household market participation decision and marketed surplus of rice. It takes a value of 1 if current price of ricerelatively attractive and 0 if otherwise. If the farmer considers that the price of rice is attractive, there would be an increase in market participation and quantity of marketed surplus; and if farmers had a view that the price was not attractive, he/she would be forced to decreases or even stops to supply rice to the market and might choose alternative options like hording/storing. Sarkar and Roy (2013) and Adesiyan *et al.* (2012) found that an average price of paddy received by farmers affects marketed surplus of the crop positively.

Availability of labor(ALBR): It is measured as a dummy variable taking a value of 1 if rice producing farmer has access to labour and 0 otherwise. Since labor is the main input for rice production,the availability of labor in the ricefarm household increases farmer's riceproduction. Also, production, processing (value adding activities) and other marketing activities are the function of labour. Availability of labour was assumed to have positive relation with both market participation and marketed surplus. The study by Berhanu *et al.* (2011) revealed that availability of family labour affected the level of milk value addition by the smallholder farmers positively at 1% significance level. Thus in this study, availability of

labor was hypothesized to have positive impact on both market participation and quantity of rice marketed.

Number of oxen owned(NOX): This is a continuous variable that refers to the number of oxen the households owned.This is expected that the number of oxen available to the household positively enhances the market participation and marketed surplus. Since ox is a critical production asset in smallholder farm households having a direct effect on the production of rice and thereby marketed surplus with a significant amount. Shewaye (2016) found that number of oxen owned available to the household positively enhances the probability of being participation in the market.

Table 4: Hypothesized variables with expected sign

Variables	Representation	Measurement	Expected effect
Family size	HFS	Number of person	±
Education of household head	EDU	Years of schooling	+
Rice farming experience	RFE	Number of years	+
Non-Farm income	NFI	ETB birr	+
Livestock holding	TLU	Tropical unit	+
Land allocated to rice	LSIZE	Hectare	+
Availability of labor	ALBR	1=yes,0=otherwise	+
Amount of credit used	CRU	ETB birr	+
Membership in cooperative	MCOOP	1=Yes,0=otherwise	+
Distance to nearest market	DMRKT	Kilometer	-
Access to market information	MINFO	1=Yes,0=otherwise	+
Perception on current prices	PCPRICE	1= attractive, 0=otherwise	+
Number of oxen owned	NOX	Number of ox	+

4. RESULTS AND DISCUSSION

This chapter deals with results and discussion of the findings from descriptive and econometric analyses. It has four main sections. The first section deals with descriptive analysis to describe the general characteristics of sampled farm households and traders. The second section presents value chain analysis of rice which includes value chain map, actors and their roles,and value addition of rice at different stages of the marketing chain. The third section presents structure conduct performance of rice market. The fourth section presents resultof the econometric model analysis which investigatedfactors influencing market participation and marketed surplus.

4.1 Characteristics of Sample Producers and Traders

4.1.1 Farmers' characteristics bymarket participation

Market participants are those respondents who participate in rice market (those farmers selling rice products)and non-participants are those respondents who did not participate in rice market (those farmers who did not sell rice products)in the year 2015/16.

The demographic and socio-economic characteristics of rice market participants and non-participants involved in different activities were described in Table 5. Among 148 sample respondents 80% of them were rice market participants whereas the rest 20% respondents were non-participants. The study showed that, among the sample households, 90.5% of them were male headed whereas the rest 9.5% of them were female headed households. The statistical analysis showed that there is no significant difference in percentage of sex ofhouseholds in rice market participation and those who did not participate.

The average age of the sample households was 45.5 years, and it was 44.8 and 48.4 yearsfor rice market participants and non-participants,respectively. There isa statistically significant difference between age of household who participated in rice market and those who did not participate at 10% level of significance. The average yearsof rice farming experience of sample households was 15.89 years, and it was 16.27 and 14.34 years for rice market

participants and non-participants, respectively.The t-test result indicated that there is a significant mean difference between rice market participants and non-participants at 5% significant level.

Table 5: Demographic and Socio-economic characteristics of farmers across marketparticipation

Continuous variables	Non-participant (n=29) Mean	Participant (n=119) Mean	Overall (n=148) Mean	t/$\chi 2$ -$_{Value}$
Age of the household	48.4	44.8	45.5	1.8*
Educationof the household	0.1	2.27	1.84	3.27***
Family size	12.31	10.22	10.5	-3.98***
Rice farming experience	14.34	16.27	15.89	2.42**
Non-farm income (000)'	6.111	2.305	3.051	-3.9***
Livestock holding (TLU)	11.9	6.6	7.6	-5.4***
Total land holding	1.2	2.4	2.15	5.06***
Land allocated to rice	0.5	1.1	0.95	4.3***
Amount of credit used (000)'	0.095	1.885	1.533	3.06***
Distance to nearest market	11.5	7.2	8.1	-6.7***
Number of oxen owned	1.66	1.78	1.76	0.64
Rice production(quintal)	15.6	40.14	35.3	4.7***
Dummy Variables (yes, %)	(%)	(%)	(%)	t/$\chi 2$ -$_{Value}$
Sex(male)	93.3	89.9	90.5	0.23
Access to market information (yes, %)	24.1	54.6	48.6	8.67***
Perception on current prices (Attractive, %)	34.5	68.1	61.5	11.12***
Membership in cooperative (yes, %)	20.7	42.9	38.5	4.84**
Availability of labor (yes, %)	34.5	62.2	56.8	7.3***

***, ** and *represents significance at 1% and 5% and 10% probability levels, respectively
Source: Own Computation of Survey data (2016).

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Family size is a distinguishing characteristic in rural communities of many developing countries such as Ethiopia (Mamo, 2009). The case is similar in the study area; the average family size for the sample households was found to be 10.5 persons. The average family size for rice market participants and non-participants was found to be 10.22and 12.31 persons, respectively.In terms of family size, the independent sample t-test revealed that there is a significant difference between market participant and non-participant at 1% level ofsignificance.Family size affects rice production and marketing, as the family size increase, the labor increases, this responsible for the increment of rice marketed surplus and the inverse is that consumption may increase which decrease marketed surplus of rice produces.

To assess the livestock holding of each household, the Tropical livestock unit TLU per household was calculated, which excludes oxen. The average livestock holding of the total sample households was 7.6TLU. From this the participants and non-participant average livestock holding was6.6 and 11.9 TLU, respectively. The analysis of independent t-test revealed that there is significant difference in livestock holding at 1% significance level between rice market participant and non-participants.

Education enhances access to information processing for technology uptake and higher farm productivity (Aman *et al*., 2014). On average, the education level of the sample household by schooling years was 1.84, and it was 2.27 and 0.1 ofschooling years for rice market participants and non-participants, respectively. The independent sample t-test indicates that there is a significant difference between rice market participants and non-participants at 1% significance level in their education.

According to the survey result (Table 5), the average total land holding size by sample respondents was 2.15 hectares per household. The participants and non-participant average total land holding size was 2.4 and 1.2 ha, respectively. The average land allocated for rice production in the year 2015/16 by sample respondents was0.95 ha per household. The participants and non-participant average land allocated for rice production was 1.1 and 0.5 hectare, respectively.The analysis of independent t-test revealed that there is significant difference in total land holding size and land allocation for rice production at 1% significance level between market participants and non-participants in the study area.

Theresult of the survey shows that, on average,the amount of credit received by sample household was 1533 birr. The participants and non-participant average amount of credit received was 1885and 91.3birr, respectively. Based on the independent t-test there is statistically significant difference between market participant and nonparticipant in terms of credit received at 1%significance level. This implies that market participant farmers had more credit than non-participantfarmers. The average income from non-farm activities of the sample households was 3,051birr per year and it was 2,305 and 6,111 birrfor participants and non-participants, respectively. Non-participant households had higher non-farm income level than market participating households. The t-test result indicated that there is a significant mean difference between rice market participants and non-participants at 1% significant level.

As depicted in table 5, on average, the mean production of rice by sample household was 35.3 quintal and it was 40.14and 15.6 quintals for participants and non-participants, respectively. Households with larger quantity of rice produced had higher marketed surplus than households with small quantity of rice produced. The analysis of independent t-test revealed that there was significant difference in total production of rice at 1% significance level between market participants and non-participants.

Results presented in Table 5 also showed that, on average, the distance to nearest market by sample household was 8.1kilometer andit was 7.2 and 11.5 kilometer for market participants and non-participants respectively. This is indicated non-participant farmers were far away from the market which is difficult to access buyers who offer better payment.The t-test result also indicated that, there is a significance mean differences between market participants and non-participants at 1%significance level in terms of distance to nearest market.

The study result revealed that on average about 48.6% of the sample households obtained market information prior on prices, market demand and supply, product quality, time and place of sale before selling rice products.Access to market information was 54.6% and 24.1 % for rice market participants and non-participants respectively.The analysis of chi-square test indicates that there is a significant difference between rice market participants and non-participants at 1 % probability level. This indicated, market participants had better access to

market information than non-market participants.The survey result showed that from the total sample households about 38.5% of them were membershipin cooperative, and it was 42.9 % and 20.7 % for rice market participants and non-participants, respectively. The result of chi-square test indicated that membership in cooperative showed significance difference among those who participate in rice market and those who did not at 5% significance level.

The survey result alsoshowedthat from the total sample households 61.5 % of them replied that the current price of rice was attractivewhile 38.5% of them replied it was not attractive. Among the participants 68% and non-participants 34.5% of them thought that the current price of rice wasattractive.Hence,when the price of the rice product is promising, farmers are motivated to sell their product to the market. The statistical analysis showed thatthere is a significant percentage difference between participantsand non-participants in rice market in terms of perception of price on rice at 1 % significance level.

Availability of labor is the major factor in rice production in the study area. Since, rice farming is more labor intensive relative to other cereal crops. The survey result indicated that about 56.8% of sample farmers have availability of labor during rice production and harvesting time, whereas about 43.2%of them had shortage of labor duringriceproduction and harvesting time. Availability of laborfor rice market participants and non-participants was 62.2% and 34.5%, respectively. The result of chi-square test indicated that availability of laborshowed significance difference among those who participate in rice market and those who didn'tat 5% significance level.

4.1.1.1. Major income sources of sampled rice producers

Households' income is determined by household's production activities andchanges in factors influencing production activities.Sources of income is the only cash of income obtained from sales of crops, livestock and income from non-farm activitiesthatthe farmer or any of the household members earnedduring 2015/16.The average annual income of rice producers disaggregated is presented in Table 6.

Table 6: Income Sources of rice producers

Sources of income(ETB)	Non-participant Mean	Participant Mean	Overall Mean	$t/\chi2_{-Value}$
Income from sales of another crop	7,904	5280	5,794	1.63**
Income from sales of livestock	5,877	4894	5,086	0.73
Income from sales of rice	-	11,392	9,159	-
Income from non-farm activities	6,111	2,305	3,051	3.9***
Total average annual income	19,892	23,871	23,090	-1.7*

***, ** and * represents significance at 1%, 5% and 10% significant levels, respectively
Source: Own Computation of Survey data, 2016

The survey result indicated in Table 6, showed that, in general, rice production is the first income source forsample rice producers households (39.7%) followed by crop production (25.1%), livestock rearing (22%) and non-farm income (13%).Theaverage annual income from sales of rice for market participate was 11,392 birr per year and it was contributing about 47.7% of income to the total annual income for rice market participants.The average annual income from sales of another crop of sample respondents was 5,794 birr/year and it was5,280and 7,904 birr for participants and non-participants, respectively. The major sources of cash income were from the sales of maize, teff, sorghum, wheat, barley, etc. The analysis of independent t-test revealed that there is significant difference between rice market participant and non-participants in terms of income from sales of another crop at 5% significant level. The result showed that average annual income from sales of another crop for non-participant is greater than that of participants.

In general, the survey result showedthat, the average total annual income of the sample respondents was found to be 23,090 birr/year. The average annual income for rice marketparticipants and non-participants was23,871 and 19,892 birr/year, respectively.The t-test showed that there is significant difference in total annual average income between households those who are participating in rice market and non- participants at 10% significant

level.The explanation for this result is that, the mean total annual income of rice market participant was higher than non- participants.

4.1.2. Characteristics of sample Traders

Factors affectingthe rice trading in the study area such as sex, age, family size, trading experience, Education, access to credit, access to storage facility, access to information, access to transportation facility and initial working capital are depicted in table 7.

Age is one of the factors of rice trading that is useful to describe traders experience and networking. The age of sample traders ranged from 33 to 65 years. The average age of all sample traders was 48 years and its standard deviation was 7.48 years. The family size of sample traders ranged from 5 to 12 person. The average family size of the total sample respondents of traders was found to be 8.3 person and its standard deviation was 1.89 person. Educational level of sample traders, on average was 4.3 schooling years and its standard deviation was 3.6 years. Experience plays an important role in improving trading activities and marketing efficiency. The trading experience of sample traders ranges from 2 to 19 years. The average trading experience of sample traders' respondents was 15.56 years and the standard deviation was 3.39 years.

Table 7: Socio-economic characteristics of the sample traders

Variables	Traders				
	All sample Mean	Collectors (mean)	Processors (mean)	Wholesalers (mean)	Retailers (Mean)
Age(year)	48	45.4	51.4	49.67	47
Experience(year)	15.56	16.3	16.86	15	14.7
Education (school year)	4.3	3.4	6	5	2.9
Family size(year)	8.3	9.4	8.7	7.5	7.6
Initial capital in (ETB)	33,798	7,950	19,500	17,500	10,454
Net capital now in (ETB)	67,498	29,208	95,160	97,055	48,569
Dummy variables	(%)	(%)	(%)	(%)	(%)
Sex(male)	81.8	66.7	100	100	72.7
Access to storage facility (yes)	30.3	22.2	42.9	33.3	27.3
Access to credit (yes)	57.6	22.2	71.4	83.3	63.6
Access to information(yes)	45.5	33.3	42.9	66.7	45.5
Transportation facility (yes)	66.7	22.2	57.1	66.7	72.7

Source: Own computation from survey result, 2016

The survey result further indicated that 81.8% of the sample traders were males while only 18.2% of them were females. This implies that both male's and female's participation in rice trading, but male's participation was high relatively. The survey result also indicated that about 57.6% of the sample rice traders had access to credit but the majority of them (63.6%) did not take credit on cash to use as working capital and for others purposes. On average, about 66.7%, 45.5% and 30.6% of sample traders had access to transport facilities, access to information andstorage facility in rice trading market, respectively.

4.2. Results of rice Value Chain Analysis

Value chain approach is mainly a descriptive tool to look at the interactions between different actors. Value chain analysis concerned with the contribution of value adding functions of each and every actor along the commodity chain. This is to mean that value chain analysis highlights the actors and their respective function/role along the commodity chain which in turn contributes to the addition of value in the chain for the satisfaction of the final user. It also helps to estimate the distribution of benefits among actors in the commodity chain.

4.2.1. Rice value chainMapping

The value chain analysis starts with the process of mapping out the value chain. According to McCormick and Schmitz (2001), value chain mapping enables to visualize the flow of the product from conception to end consumer through various actors.It also helps to identify the different actors involved in the rice value chain, and to understand their roles and linkages. Consequently, the current value chain map of rice is depicted in Figure 4. Based on this function, potential value chain actors and their roleswere identified; value adding processes, marketing and relationship were sorted out.
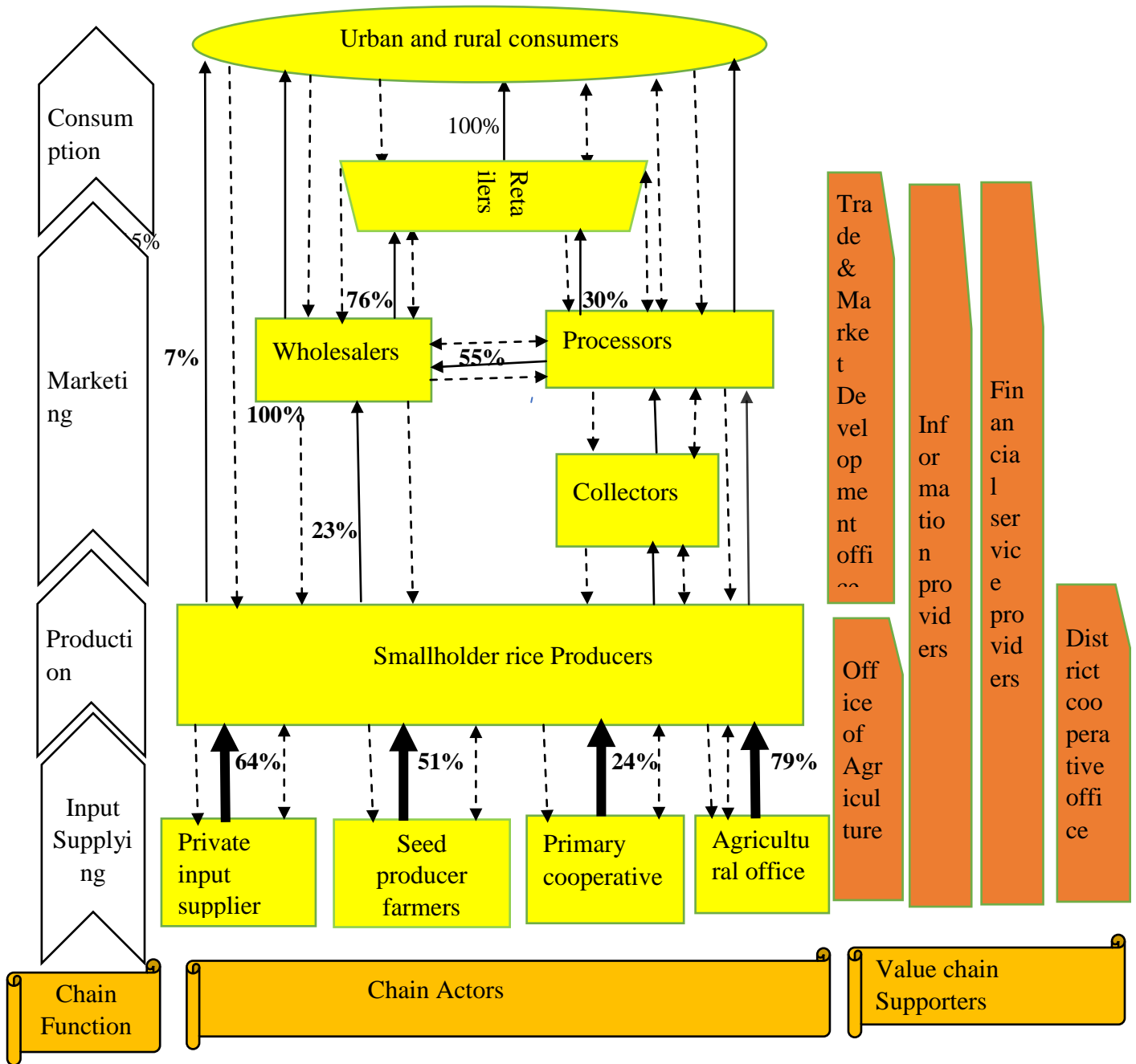
Figure 4: Rice Value chain map of the study area

Source:Own sketch from survey result (2016)

——————▶ Represents physical flow of inputs

————▶ Represents physical flow product

- - - - - -▶ Represents One-way flow of money

◀- - - - - -▶ Represents two-way flow of information

4.2.2. Rice value chain actors and their functions

This section presents the actors and the role they play in the rice value chain in the study area. There are main actors and supporting actors involved along the rice value chain, upstream' towards production, and 'downstream' towards consumption, playing different roles. These are; input suppliers, producers, traders and supporting (indirect) actors. Each of these actors adds value in the process of changing product title. Some functions or roles are performed by more than one actor, and some actors perform more than one role. The main actors involved in the rice value chain, their roles and inter relationships are discussed below.

Input suppliers

There are many actors who are involved directly or indirectly in agricultural input supply in the study area. Currently private vendors, primary cooperatives and office of Agriculture are the main source of input supply. Basically, there were also smallholder farmers who even participated at this stage in supplying important agricultural inputs for other farmers. All such actors supply agricultural inputs like improved seed varieties, fertilizers, herbicides, pesticide and farm implements which are essential inputs at the production stage.

Table8: Type and Sources of input use by rice production

Type of input	Sources				
	Cooperative	ARDO	private vendors	Own production	Seed producer farmers
Chemical fertilizer	24.3%	-	-	-	-
Organic fertilizer	-	-	-	4.7%	-
Local seed	-	-		48.6%	51.4%
Improved seed	-	9.5%	-	-	-
Herbicide	-	40.5%	50.7%	-	-
Pesticide	-	29.7%	13.5%	-	-

Source: Own Computation from Survey result, 2016

The survey result showed that, Primary cooperatives are the main sources and suppliers of chemical fertilizer (DAP and Urea). About 24.3% of rice producing sample households

bought DAP and Urea from Cooperative Associations. Out of the total sample respondent, only 4.7% of respondents used Organic fertilizer from their own source. About 51.4% of sample farmers used rice seed from Seed producer farmers, and the remaining 48.6% of rice producing sample respondents used seeds obtained from their own source. However, only 9.5% of the sample farmers get improved rice seed from ARDO. But, the survey has further indicated that, the reason for not using improved seed from known source were unavailability of improved seed, shortage of supply and its high price. In addition to this, there are no private input suppliers who have been engaged in provision of improved varieties and chemical enterprises in the area.

Table 8 also indicated that, office of agriculture andPrivate supplier are the main sources and suppliers of agro-chemicals (herbicide and pesticide). About 40.5% and 29.7% of rice producing sample households bought herbicide and pesticide from office of agriculture, respectively. Although about 50.7% and 13.5% of rice producing sample households bought herbicide and pesticide from Private supplier, respectively. As per farmer's expression, due to problem of seasonal labor shortage and high wage rate especially at times of weeding, they have been using herbicides namely; 2-4-D. This helped them to reduce weed infestation and cost of labor both for land clearing and weeding.

Table 9: Agricultural input uses by Market participation

Type of input uses	Nan-participant Mean	Participant Mean	Overall mean	t/$\chi 2$ – Value
Chemical fertilizer (Yes, %)	10.3	27.7	24.3	3.83**
Organic fertilizer (Yes, %)	6.9	4.2	4.7	0.376
Herbicide (Yes, %)	65.5	95	89.2	20.96***
Pesticide (Yes, %)	10.3	51.3	43.2	15.91***
DAP used in kg/ha	6.4	10.5	9.67	-0.996
UREA used in kg/ha	6.4	11.85	10.78	-1.183
Herbicide used in liter/ha	1.99	4.02	3.6	-3.37***
Pesticide used in liter/ha	0.1	0.63	0.52	-3.27***

*** and **represents significance at 1% and 5% significant levels, respectively

Respondents were also asked whether they used inputs such as chemical fertilizers, organic fertilizer, pesticides and herbicides and the amount they used per hectare. It is evident that chemical fertilizer could boost both production and productivity. Despite this fact, rice producer in the district used very small amount of fertilizer on their rice field. The reason is that due to the perception of the farmers their soil fertility is high and expensive of the fertilizer; they were not commonly used fertilizer for rice production in the district. As shown in Table 9, only 24.3% of the sampled households used chemical fertilizer (DAP and UREA) and 4.7% used organic fertilizer for rice production. The chi-square test indicates that there is a significant difference between rice market participants and non-participants at 5 % significance level in terms of chemical fertilizer used. Thus, applying of chemical fertilizer for production of rice would increase the extent of production surplus and thereby farmers participating in the rice market.

The average application rate of DAP fertilizer by rice producers was 10.5Kg and 6.4 Kg per hectare for market participation and non- participation, respectively. And also, on average, the application rate of UREA fertilizer by rice producers was 11.85 Kg and 6.4 Kg per hectare for market participation and non- participation, respectively. This amount indicated that both DAP and UREA used per hectare of land was much below the recommended rate. Furthermore, proper application of the recommended fertilizer rate is important to obtain the required production and marketed surplus of rice.

Agro chemical application such as herbicides and pesticide is the most important agricultural practices that used by rice growers in the study area.In the District, the level of weed infestation is very high. During the focus group discussion farmers reported weed as a serious problem for rice production in the area. The key informant also identified weed problem as one of the major factors that affect the amount of land allocated for rice production. Accordingly, the demand for herbicides is very high. This is because use of herbicide helps them to reduce both labor and production costs and amount of time spent for weeding. The survey result indicated that, out of the sampled households 89.2% of them used herbicides and 43.2% used pesticides for rice production. The chi-square test showed that, there is a

significant difference in utilization of herbicides and insecticides at 1% level of significant between market participant and non-participants. This implies that, for rice grower's farmers the availability and use of herbicides and pesticide contribute for enhancing the productivity of rice production in the area.

Production stage

Producers are the major actors who perform most of the value chain functions right from farm inputs preparation on their farms or procurement of the inputs from other sources to post harvest handling and marketing. Rice production in the study area is currently dominated by smallholders. They produce rice for home consumption and selling purposes. The major value chain functions that rice growers perform include ploughing, planting, fertilization, weeding, pest/disease controlling, harvesting and post-harvest handling. Post-harvest handling, which includes different activities like harvesting, bulking, threshing, winnowing, drying, packaging, labeling, storing, transportation, loading and unloading and marketing is done by the farmers themselves. Most of the farmers used sacks, store house (*Gotera)* and warehouse as a store in the district.

Marketing stage

Regarding rice market, in the study area, there is no well-developed rice marketing system rather it is informal. The marketing actors are few in number. Currently, producer farmer themselves, collectors, Processors, wholesalers, and retailers are identified as the major market actors.

Table 10: Average amount of rice produced, consumed and sold at a household level.

Crop	Amount produced (Qt) Mean	Amount used for consumption(Qt) Mean	%	Amount sold (Qt) Mean	%
Rice	35.3	8.76	24.8	12.83	36.35

Source: Own computation survey data (2016)

The result of the survey depicted in table 10, showed that the total average amount of rice produced at a household level was 35.3 qt.Among the produced rice by the sample farm households on average 36.4% of it was sold on market while the rest utilized at home as food

and seed sources. Musah *et al*., (2014) categorize smallholders as low commercial farmers if they sell only up to 25% of their product, medium commercial farmers if the farm households sell 26-50% of their product and considered as high commercial farmers if the farm households sell 50% and more of their product. Based on this categorization the degree of commercialization of rice product in the area is under the category of medium commercialization level.Farmers are able to sell their product for different actors at different market place. Farm gate, village market and town markets are type of markets used by household heads. The means of transportation varies among farmers but predominately producers transport the commodities to village or town markets either carrying sack or use pack animals or vehicles.

Collectors

These are the main actors in rice value chain who collects paddy rice from farmers in village markets or at the farm gate for the purpose of reselling it to process. They use their financial resources and their local knowledge to bulk rice products from the surrounding area. They play important role and they do know areas of surplus well. Most rice producer farmers sold their rice in the form of paddy rice to collectors. Collectors not involved in processing paddy rice in the study area. However, they sold in the form of paddy rice to processors. Collectors are responsible for the trading of 29.3% of paddy rice from farmers in village markets or at the farm gate and selling it to processors. The activities performed by collectors include buying and assembling, cleaning, repacking, transporting and selling to processors.

Processors

Rice processors in the study area are usually provide milling services to farmers as well as buying paddy rice from farmers andcollectors. According to District Trade and market development Officeprocessors were licensed for both milling machine and rice trading. Processors, who is the owner of milling machine, have double participation in rice value chain, firstly they have involved in milling/processing the paddy rice, secondly, they participate in rice trading, they bought paddy rice from farmer and collector, after processing they sell milled rice to wholesaler, retailers and consumers. Processors mainly sell milled rice directly to wholesaler. Producers and collectors were the main rice supplier to processors. The supplied level of the rice by producers and collectors was 40.5% and 29.3% respectively to

processors. And also, processors supplied 55%, 30% and 15% of rice to wholesalers, retailers and consumers, respectively.

Wholesalers

Wholesalers are also the main actors in rice value chain and are involved in buyingmilled ricedirectly from farmers andprocessors in large volume than any other actors and mainly sale them to retailers andconsumers.Producers and processors were the main rice supplier to wholesalers. The supplied level of the rice by producers and processors was 22.78% and 55% respectively to wholesalers. In addition, wholesalers supplied 76% and 24% of rice to retailers and consumers,respectively. Survey result indicated that wholesale markets are the main assembly centers for rice in their respective surrounding areas. They have better storage to store, sort and packing of milled rice, transport and communication access than other traders. Almost all wholesalers have a warehouse in a market either self-owned or on rental basis. They do not trade only rice but all other cereal crops that grown around the study area. The market destinations of the products are mainly Gojob, Bonga, Jimma, Addis Ababa, Wolega and to urban retailers and consumers.

Retailers

These traders are licensed to sell different products to consumers. They are not specialized to sell rice only but used milled rice along with other grain products. This is one of the final links in the chain that delivers rice to consumers. Retailers involvement in the chain includes buying of rice, transporting to retail shops, grading, displaying and selling to consumers. They mostly buy ricefrom processors and wholesalers and sell them to consumers. Consumers usually buy rice from retailers as they offer according to the requirement and purchasing power of buyers. Wholesalers andprocessors were the main suppliers of retailers. The supplied level of the rice by wholesalers and processors was 76% and 30%, respectively to retailers.

Rice Consumers

Consumers are the final and the most important actors in the value chains. Consumers are final purchasers of rice produce mostly from retailers, wholesalers and processors for consumption purpose. Occasionally they could also directly buy from the producers. Rice consumers are individual households (rural and urban dwellers). According to key informant, local rice is used as table food and making of injera (mixed with teff to make injera), for this purpose ricepreferred by consumers due to it gives white color for the injera and increase the number of injera as compared with teff alone.

Support service providers/Value chain enablers

Support service providers are essential for value chain development andtheyprovided supportive services as training and advisory services, extension services, information services, financial services, research and technology transfer services. The main supporters of the rice value chain in the study area are: District Agriculture Office, District Trade and Market Development Office, District Cooperatives office and Financial service providers. Supporting actors are outsiders to the regular business process and restrict themselves to temporarily facilitating a chain upgrading strategy. Typical facilitation tasks include creating awareness, facilitating joint strategy building and action and the coordination of support activities.

Agricultural Development Office: Agricultural Development Office provide agricultural extension services to producers through experts and development agents. The office provides advisory services, facilitate access to inputs and provide technical support in improved seed preparation, fertilizer application, crop protection and post-harvest handling. The major form of extension services given to farmers were training, technical advisory services, and experience sharing visit to model farmers site. The key informant's interview points out that the producers get extension service on general agriculture and it is not sufficient to improve the technical skill of the riceproducers. The survey result revealed that 53.4% of the sample households obtained extension service on rice production, the rest did not get the relevant extension services. However, they need extension service on production, post-harvest handling and marketing. The most important extension service they need was82.4% and 80.4% on post-harvest handling and marketing, respectively, which were not given widely and adequately.

Table 11: Extension service required by respondents

Extension service required	Frequency	Percent
Method and date of planting	55	37.2
Seed rate	94	63.5
Type, rate and date of fertilizer application	111	75
Pest and disease and their control method	99	69.9
Field management after plantation	67	45.3
Post-harvest treatments	122	82.4
Marketing	119	80.4

Source: Own survey result, 2016

District cooperative office: It played a major role in the supply of input for primary cooperatives and farmers. Based on input demand from primary cooperatives and farmers it undertakes input purchase following an auction process. They are playing facilitation role in collecting farmers input requirement/demand and it also distributed the purchased fertilizer directly to farmers or primary cooperatives again to distribute to farmers.

Woreda Marketing Office: This is also governmental organization which provides marketing services in the certain stages of rice value chain in the study area. This organization provides services like quality control, licensing, and market place for wholesalers, collectors and retailers and certifies licensed rice traders to secure their freely involvement in rice transactions.At the same time, the organization prohibits direct entry of unlicensed rice traders in order to uphold the rights of traders who have been licensed.By performing all this responsibilities, the organization enables rice marketing environment for the traders and sets rules and regulations guiding traders in the study area. But, the study has further indicated that

some rice traders like collector's act illegally by collecting rice from farmers and enter into the business without receiving trade license from the woreda marketing office.

Information providers: District level agricultural experts/DAs, cooperatives and District trade and market development office, Traders, fellow/other farmers in the neighbor traders, provides information about the price of rice, market demand and supply, quality of product etc. In addition, mobile/telephone, personal market observation and brokers were also the main information sources for farmers about price and timing of marketing. The study results revealed that 48.6% of the sample households obtained market information before selling rice.

Financial service providers: Rice production requires money for different production activity (for input/fertilizer and weed control). Farmers in the study area received credit used to purchase fertilizer, and herbicides and pesticides, payment to rent additional land for rice cultivation, purchase of donkey for transportation and for payment of hired labor and to run non-farm business activities. During the survey, farmersreported that their sources of credit are Oromia credit and saving institution (OCSI), private lenders, relatives/friends were identified as the potential and available credit sources forthem. The survey result showed that 38.5 % of sample respondents took credit from different sources of credit services.

Table 12: Access to services by sample respondents

Variables	Frequency	Percent
Market information (Yes, %)	72	48.6
Credit service (Yes, %)	57	38.5
Extension service (Yes, %)	79	53.4

Source: Own survey result, 2016

4.2.3. Rice marketing channels

Producers sell rice through different channels. In this study, ten marketing channels were identified for ricemarketing.The rice market channel drawn based on the data collected from different sources. The main marketing channels identified from the point of production until the product reaches the final consumer.

The total quantity supplied to the market was about 1898.84 quintals of rice by the sample farmers in the study area. Regarding the product flow, from the total volume of rice sold by sample producers the largest share 15.79% (299.85quintal), 13.98%(265.58 quintal), 11.17% (212 quintal), passes through ChannelI, IV and VI, respectively. The least volume of rice 4.32 %(82quintals) passes through ChannelIII. On the other hand, 8% (152.71quintal) of the total rice was sold to consumer's market directly.

Channel I. Producers →Collectors → Processors →Wholesalers→ Retailers→ Consumers (299.85qt)

Channel II.Producers→Collectors → Processors →Retailers →Consumers (182.11qt)

Channel III. Producers →Collectors →processors →Wholesalers →Consumers (82.06qt)

Channel IV. Producers → Processors → Wholesalers → Retailers→ Consumers (265.58qt)

Channel V. Producers → Processors → Wholesalers → Consumers (114.55qt)

Channel VI. Producers → Processors →Retailers → Consumers (212.05qt)

Channel VII.Producers → Processors→Consumers (196.59 qt)

Channel VIII.Producers → Wholesalers →Retailers→ Consumers (192.76 qt)

Channel IX. Producers → Wholesalers → Consumers (200.58qt)

Channel X.Producers→ Consumers (152.71 qt)

4.2.4.Value addition of rice at different stages of the marketing chain

The analysis of value addition at different market channels was intended to provide a systematic knowledge of the flow of rice from its origin of production to final destination. Each of the rice value chain actors adds value to the product as the product passes from one actor to another. In a way, the actors change the form of the product through improving the grade by sorting, milling/processing, cleaning or create space and time utility. The value added by a given actor is the difference of the selling price and purchasing cots or production costs. The potential for farmers to add value to their produce lies in their ability to keep intermediate input costs as low as possible (GTZ, 2007).

Production and marketing costs of rice

The major categories of costs along the chain are production, purchase and marketing costs. Production cost involves mainly those payments by farmers associated with laborers and/or inputs for production of rice. Rice production needs costs for land preparation, purchase of inputs (Fertilizer and seed), cost for cultivation and weeding and managements of rice production, cost for harvesting, threshing and winnowing (table 13). Marketing costs include expenses incurred to perform various value adding activities or services from bringing produce from a given actor until reached the other next customer. The major marketing costs include handling cost (clearing, packing, loading and unloading), transport cost, storage cost, milling/ processing cost, and capital cost (table 14).

Production costs of rice

Table 13 gives expenditure per quintal on various inputs used in the production of rice. The table reveals that the total cost per quintal was 468 birr on samples households. Cost of weeding was the item taking maximum share in total cost (27.56%), followed by Costs of land preparation (19.87%), Costs of input used (18.3%) and Costs of harvesting and collecting of rice from the farm (11%).

Table 13: Average costs of rice production per quintal

Type of cost	Cost(birr/qt)	% Share
Costs of rented land	0.6	0.13
Costs of rented Oxen	0.8	0.17
Costs of land preparation	93	19.87
Costs of input used (Seed, fertilizer, chemicals)	85.8	18.33
Cost of weeding	129	27.56
Costs of harvesting	51.4	11
Costs of threshing & winnowing	33	7
Costs of transporting from farm to home	15	3.2
Other cost (tax, constructing storage &costs of bags)	24.2	5.17
Opportunity costs of land	35.5	7.6
Total cost	468	100

Source: Own computation from survey results, 2016

Marketing cost of rice among major value chain actors

Table 14 showed the average marketing costs incurred by each actor during transaction. The arrangement of marketing cost revealed that transportation cost is the highest cost for each marketing agents followed by cost of loss and labor cost. Milling cost is the highest cost for producers who sold milled rice and for processors. The highest average marketing cost was incurred by the processors (105.43birr/qt) followed by producers (78.32birr/qt).

Table 14: Average rice marketing cost among value chain actors

Items(birr/qt)	Value chain actors				
	Producers	Collectors	Processors	Wholesalers	Retailers
Costs of packaging	3.4	5.2	5.2	3.96	4
Load & unload cost	2.8	8.5	5.4	4.8	5.2
Transportation cost	15.1	17	9.5	14.7	10.8
Storage cost	-		5	5	9.6
Costs of loss	3.1	3.1	4.3	2	9.35
Costs of license & Tax			1.1	1.45	1.2
Watching & warding cost	-		2.1	2.14	2.8
Capital costs of interest rate			1.7	2	0.4
Depreciation cost of machine			2.4	1.97	
Wear & tear (maintenance cost)			2.57		
Labor (machine operator)			4.84		
Brokerage cost	-		3.6	3	
Sorting/milling cost	50		50		
Other cost	3.92	15	7.72	8.48	13.7
Average Total marketing cost	78.32	64.2	105.43	49.5	57

Source: Own computation from survey results, 2016

However, before proceeding to the calculation of value addition and benefit share of actors, we need to consider the transformation of paddy rice into milled rice (the conversation rate). For example, a one kilogram of paddy rice purchased from the farmer cannot be compared with one kilogram of processed/milled rice sold to the consumer. According to Shepherd and Andrew (1995) the conversion rate for paddy into milled rice (conversion at 65-70 percent). In this study based on processors and farmers respond 70% was taken as the conversion factor for paddy into milled rice. To calculate the value added by each actor of rice value chain all marketing chains were considered and the average price of rice for that particular channel was taken.

Table 15: Distribution of value addition per quintal of rice among major value chain actors

Actors	Items(birr/qt)	M.ch									
		I	II	III	IV	V	VI	VII	VIII	IX	X
Produ Cers	Sales price	555	555	555	715	715	715	775	940	940	1050
	Prod. Cost	468	468	468	468	468	468	468	468	468	468
	Marketing cost	25.4	25.4	25.4	74	74	74	86	130	130	139
	VA_P	61.6	61.6	61.6	173	173	173	221	342	342	443
	VA_P (%)	11.9	11.4	14.4	32.5	37.5	31.6	47.5	60.1	68.5	100
Colle Ctors	Purchase price	555	555	555	-	-	-	-	-	-	-
	Marketing cost	64.2	64.2	64.2	-	-	-	-	-	-	-
	Sales price	760	760	760	-	-	-	-	-	-	-
	VA_C	141	141	141	-	-	-	-	-	-	-
	VA_C (%)	27.3	26	32.9	-	-	-	-	-	-	-
Proce Ssors	Purchase price	760	760	760	715	715	715	775	-	-	-
	Market cost	93.2	93.2	111	93.2	93.2	93.2	161	-	-	-
	Sales price	950	970	950	950	950	970	1180	-	-	-
	VA_{Pr}	96.8	117	79	142	142	162	244	-	-	-
	VA_{Pr} (%)	18.8	21.5	18.4	26.6	30.7	29.7	52.5	-	-	-
Whole Salers	Purchase price	950	-	950	950	950	-	-	940	940	-
	Market cost	46	-	53	46	53	-	-	46	53	-
	Sales price	1140	-	1150	1140	1150	-	-	1140	1150	-
	VA_W	144	-	147	144	147	-	-	154	157	-
	VA_W (%)	28	-	34.3	27	31.8	-	-	27.1	31.5	-
Retai Lers	Purchase price	1140	970	-	1140	-	970	-	1140	-	-
	Market cost	47	67	-	47	-	67	-	47	-	-
	Sales price	1260	1260	-	1260	-	1260	-	1260	-	-
	VA_R	73	223	-	73	-	223	-	73	-	-
	VA_R (%)	14	41	-	13.7	-	40.7	-	12.8	-	-
	TVA	516	542.6	429	532	462	558	465	569	499	443

Source: Computed based on survey data (2016)

Where: VA_P = Value addition for producers, VA_C = Value addition for collectors, VA_W = Value addition for wholesaler, VA_R = Value addition for retailers, VA_{Pr} = Value addition for processors and TVA = Total value addition respectively.

The result in table 15, showed that rice producers added value from 61.6 to 443 birr per quintal of the total value of rice at different market channels. Collectors, processors, wholesalers and retailers also added value up to 141,244,157 and 223 birr per quintal, respectively at different market channels. Producers have got the highest value addition in channel Xwhen they direct sell to consumers which accounts, 443 birr/qt,whereas producers have got the lowest value addition in channel I, II and III which accounts, 61.6birr/qt, however, collectors have got the highest value addition in channels I, II and III when they direct purchase from producers and sell to processors which accounts, 141 birr/qt. Processors have got the highest value addition in channels VII which accounts, 244birr/qt. Wholesalers have got the highest value addition in channels IX, which accounts,157 birr/qt.Retailers have got the highest value addition in channelII and VIwhich accounts,223 birr/qt, in both channels.

Without considering channel X (producers selling directly to consumers) producers' share of VA is the highest (68.5%) from the total value addition in channel IXand the lowest in channel I (11%), channel II (11.9%) and channel III (16.2%) because of the involvement of local collectors in this channel that purchase the paddy rice relatively at lower price from producers in their locality. Processors'share of VA is the highest in channelVII,which accounts 52.5%from the total value addition,retailers'share of VA is the highest in channelVI,which accounts40.7% from the total value addition,wholesalers' share of VA is the highest in channelIII,which accounts34.3% from the total value addition and Collectors' share ofVA is the highestin channelIII,which accounts32.9% from the total value addition.

In general, compared to farmers, traders' (collectors, wholesalers, retailers and processors) operating expense is less than half (50%) but their profit margin is more than that of farmers. That means by simply buying from the farmers and selling to consumers, traders took 59% of the total profit margin. While farmers, doing all the work of producing rice and bearing the associated risks, took only 41% of the total profit margin. Whereasprocessors, wholesalers, retailers and Collectors, are responsible for 20 %, 18 %, 13% and 8%, of the total profit margin, respectively.

4.2.5.Value chain governance

Governance of rice value chain actors was assessed by volume of commodities flow, price setting strategy and level of competition. Volume of rice flow carried out varies on the basis of actors purchasing, and transaction and storage ability. Price setting strategies are different throughout the actors. Based on the data from sample farmer and traders in rice value chain, about 79.1% (table 21) of sample farmer respondents said that, market price was set by buyers. Among traders, about 48.5% (table 22) of the sample traders responded that, traders set purchase price themselves. This indicated that the rice traders had substantial role in price setting.

Moreover, the study also revealed that the governance structure exercised was favorable to wholesalers and processors, and leaves smallholders and consumers in a weak position with other value chain actors. Wholesalers have sufficient information about the supply of rice and which direction it flows along the marketing channels and markets in different parts of the country. It appears that the producers in the study areas have limited bargaining power. This is due to the lack of a proper market information system, lack of producers' organizations, and minimal bargaining power, smallholders' farmers are highly dependent on intermediaries. In general, the governance structure in the study area was characterized by low coordination among the value chain actors, information exchange and knowledge transfer and low involvement in changing the rules and regulations that was exercised in the study area.

4.2.6. Constraints of Actors along rice Value chain

One of the facts of value chain analysis is that it helps to clearly identify bottlenecks to the development of the chain right from input supply up until the consumption level in intense way. Accordingly, a number of constraints are explained by different actors through focus group discussion and questionnaire. From results, major constraints which are currently hindering the development of the rice value chain can be categorized according to the two basic stages: Production and marketing constraints of rice producer, and marketing constraints of rice traders.

4.2.6.1. Production and marketing constraints of rice producers

Production and marketing related constrains of rice producers identified through focus group discussion and questionnaire was mentioned at pre-harvest and post-harvest levels. Those, which are considered as major ones, are discussed below.

Input Supply problem: The most important physical inputs for rice production are improved seeds, fertilizers, Pesticide and herbicides. Regarding the input supply problem (improved seed, access and use of pesticide and herbicides, high input price) were responded by the farmers. Farmers who participated both in interview schedule and focus group discussion identified limited supply of improved seeds as a major input related problem in their area. Among the total sample of respondents, about 126 (85.1%) of sample respondents replied Problem of input supply (improved seeds, fertilizers, Pesticide and herbicides), especially they replied limited access and supply of improved seed as their major production problem (table 16). This caused mainly due to absence of responsible rice seed multiplying and distributing agency.The dominant rice variety (X-Jigina) used for long time may be lost its viability before replaced by other varieties. According to the survey results, currently white rice is relatively widely used type of improved rice seed followed by Superica-1.

Table 16: Production and marketing constraints of rice producers by market participation

Production constrain	Non-participant	Participant	Total	χ^2-Value
Problem of input supply (yes, %)	93.1	83.2	85.1	1.8
Pest and disease problem (yes, %)	55.2	63	61.5	0.607
Limited access to extension services (yes, %)	44.8	47.1	46.6	0.047
Weed and weed control method (yes, %)	72.4	63.9	65.5	0.754
Market constraint				
Lack of marketing cooperatives (yes, %)	93.1	95.8	95.3	0.376
Accessibility of markets (yes, %)	65.5	34.5	40.5	9.3***
Poor information flow (yes, %)	58.6	47.1	49.3	1.247

Absence of milling machine (yes, %)	82.8	63.9	67.6	3.8**

*** and **represents significance at 1% and 5% probability levels, respectively
Source: Own Computation of Survey data, 2016

Pest and disease problem: Like other commodities rice production is constrained by many environmental factors like insects and pests. According ARDO (2015/16), the common types of insects and pests in rice include stalked eyed flies, termite, stick bug, rice mealy bug, and weevil.The common diseases in rice includes rice blast, rice yellow mottle virus, brown spot, sheath blight, leaf scaled, and grain root. About 61.5 % of the households responded that pests and disease are the major biological challenges in the area.

Limited access to extension services: Training is an important entry point to acquire skills of rural communities and it contributes for achievement of sustain development. About 46.6% of the respondents reported that they never attend any training on recommended agronomic practice and post-harvest handling. However, during data collection, it is observed that, in two sample PAs (*Machi and Gasara)* there were no DAs with plant science profession. The extension service related to rice was delivered by other DAs without any prior knowledge about rice. This is also the main challenge faced in provision of quality extension service. In line with the above statement, during the focus group discussion the farmers explained that extension agents and Woreda experts sometimes give some service on production aspects, but the farmers carry out marketing of agricultural products without significant support from any institutions. The farmers reported that they want a supporting institution for linking them with useful organizations for selling their rice product and other agricultural products.

Weed and weed control method: About 65.5 % of sampled rice producers' household, replied the problem of weed and weed control method. Weeding practice of rice in the study area is the hardest works which practiced by whole family and hired labor. It practices three to four times weeding frequency throughout the planting period of rice production. Most of the respondents practiced hand weeding and some of the respondents used weeding tool like sickle to remove the weeds from the ground. Herbicides application mostly used to eradicate weed that grows on constructed bunds. Based on the survey result, the majority of the farmers are still using traditional way of weeding technology following traditional weeding tool usage.

Lack of marketing cooperatives: During the interview and focus group discussions, the farmers pointed out that lack of marketing cooperatives/ farmer's organization who are working on rice as major market constraint. Out of the total sampled households,95.3% of sampled rice producer responded that, lack of marketing cooperatives as one of major market problem.It is obvious that Cooperatives are assumed to play important role in improving the bargaining position of the producers and creating lowering transaction costs, reducing the level of oligopolistic market type by creating competitive market.

Availability of markets: Due to the poor conditions of roads and the lack of access to means of transportation, it was costly and time-consuming for farmers to market their produce. About 40.5% sample respondents stated that market distance was a major market problem. Since the existing markets in the Woreda are in the towns, farmers have to walk long distances to sell their rice. Availability of market as a major market constraint for market participant and non-participant was 34.5% and 65.5%, respectively.The survey result showed that in terms of availability of market, there was significant difference between market participants and non-participants at 1%probability level. It implies that availability of market in rice production will contributes to participate in rice market.

Poor information flow: Poor contact or communication was also one of the problems of farmers. Information on market price, demand and supply is also mentioned as a problem by sample households. It is assumed that producers who have market information can decide how much to produce and market. The study results revealed that there are underdeveloped market information and lack of knowledge/understanding on the incentive for improving productive capacity and quality of the households. About 49.3% of the households responded that market information is a constraint and the remaining did not.

Lack of milling machine: Problems of threshing machine or polishers were responded by 67.6 % of the sampled farmers. This has an effect on the quality of rice for marketing. During focus group discussion with farmers, farmers believed that they had developed the food habit for rice. In addition, the productivity was also very high and the market value was good enough to encourage production. However, the absence of rice polisher hinders the production and utilization of rice by farmers as well as urban consumers. In terms of milling machine there was significant difference between market participants and non-participants at

5%probability level. Thus, it implies that availability of milling machine in rice production will contributes to participate in rice market.

4.2.6.2. Marketing constraints of traders

The major marketing constraints that hinder rice traders were limited credit access, poor transport facility, absence of storage facility, information flow problem, insufficient working capital, low product quality, poor linkage among value chain actors and absence of government support.Those, which are considered as major ones, are discussed below.

Table 17: Market problem of traders

Variables						$\chi 2-$
	Collectors	Processors	Wholesalers	Retailers	Total	Value
Limited credit access (yes, %)	77.8	28.6	16.7	36.4	42.4	6.95*
Poor transport facility (yes, %)	88.9	42.9	33.3	27.3	48.5	8.5**
Absence of storage facility (yes, %)	88.9	71.4	66.7	72.7	75.6	1.24
Information flow problem (yes, %)	66.7	57.1	33.3	54.5	51.5	1.3
Insufficient working capital (yes, %)	77.8	14.3	33.3	45.5	45.5	6.89*
Low product quality (yes, %)	33.3	42.9	83.3	63.6	54.5	4.39
Poor linkage among actors (yes, %)	77.8	71.4	66.7	63.6	69.7	0.5
Absence of government support (yes, %)	55.6	57.1	66.7	54.4	57.1	0.26

*** and *represents significance at 5% and 10% probability levels, respectively

Source: Own Computation of Survey data, 2016

Out of the total sample traders 48.5 % of traders reported that there was a problem of transport facility. The chi-square value showed that, there is statistical difference between traders in terms of problem on transport facility at 1% significant level. problem of transport facility is high in case of Collectors, about 88.9% collectors responded that transportation as a major constraint.Due to the poor conditions of roads and the lack of access to means of transportation, it was costly and time-consuming for collectors to market the rice production. Out of the total sample traders 75.6 %, of traders reported that there was a problem of storage facility,51.5% of traders reported that there was information flow problem, about 54.5% and

69.7% of traders reported that there was a problem of low product quality and poor linkage among value chain actors, respectively. About 45.5% and 42.5% of traders reported that there was a problem of shortage of capital and credit access respectively, there was significant difference between traders in terms of credit and shortage of capital at 10% significant level respectively. Credit access and capital shortage was the problem that more encountered collectors relative to others, about 77.8% of collectors responded that capital shortage and credit access as a major constraint in rice market.

4.3. Measuring Market performance of Rice value chain

4.3.1. Rice market structure

The structure of the rice marketing system should be evaluated in terms of the degree of market concentration, barrier to entry (licensing procedure, lack of capital and know how, and policy barriers), and the degree of transparency (Pender et. al 2004). In this study the structure of the rice market is characterized using the following indicators:

Market concentration, the degree of transparency (market information) and entry conditions (licensing procedure, lack of capital and know how).

4.3.1.1. Degree of market concentration

The concentration ratio of traders in the study area is used as an indicator of the relative size of traders in relation to the market as a whole. It is calculated as the sum of the percent market share of the top four traders. One commonly used concentration ratios are the four-trader concentration ratio, or C4, consists of the market share of the four largest traders as a percentage of the total volume of goods or services mobilized in the total market. Market shares are estimated based on the amount of product handled by each unit, as a percentage of total volume handled in a market. The higher the concentration ratio, the greater the market power of the leading traders. Four firms (C4) concentration ratio is the most typical concentration ratio for judging the market structure (Kohls and Uhl, 1985). A C4 of over 50% is generally considered as strong oligopoly; C4 between 33% and 50% is generally considered a weak oligopoly and a C4 of less than 33% is un concentrated market.

Concentration ratio was estimated by taking annual volume of rice purchased in 2015/16 from sample traders 'survey at area level.The information forall the other rice traders and the total volume of rice traded in the markets was obtained from the district trade and market development office. The degree of market concentration was estimated for the licensed rice traders in the study area.

Table 18: Market concentration of rice traders' in Shebe market in 2015/16

Traders	Market volume(qt)	Market share (%)
Trader 1	3012.5	10.68
Trader 2	4656	16.51
Trader 3	6075	21.54
Trader 4	1301.25	4.61
Trader 5	3806.25	13.50
Trader 6	867.75	3.08
All other traders	8479.5	30.07
Total	28198.5	100

Source: computation from survey result, 2016

Taking the four largest traders from the survey the concentration ratio was computed. As stated in the table 18 above, the levels of market concentrations (C4) indicated as

$C_4 = S_1 + S_2 + S_3 + S_4$

$= 10.68 + 16.51 + 21.54 + 13.5 = 62.3\%$

The survey result revealed that the concentration ratios in Shebe market indicate a high degree of concentration. In the market four Traders control 62.3% of the total rice sold in the market. These indicate a high degree of concentration which was dominated by few traders. Based on the rule thumb of market structure criteria suggested by Kohls and Uhl (1985) the rice market in the study area displayed an oligopolistic market, indicating the existence of market imperfection.

4.3.1.2. Degree of transparency (market information)

The degree of market transparency refers to the adequacy, timeliness and reliability of market information that the traders have for their marketing decision. It is widely accepted that; accurate and timely market information enhances market performance by improving the knowledge of buyers and sellers concerning supply and demand. However, even though information plays such a crucial role in improving the marketing system, there was no organized system to provide reliable market information to all market participants in the study area.

Table 19: Market information and its source for traders

Variables	Traders					
	All sample (%)	Collect ors (%)	Proce ssors (%)	Whole salers (%)	Retail ers (%)	X^2/t-value
Market information (Yes, %)	54.5	33.3	57.1	66.7	63.6	2.375
Sources of information						
Other Traders	81.1	75	71.4	85.7	90.9	1.44
Telephone	87.9	87.5	85.5	85.5	91	0.157
Personal observation	54.5	37.5	85.7	85.7	27.5	9.7**
Newspapers	12.5	12.5	14.3	28.6	9.1	1.34
Brokers	24.2	33.3	28.6	16.7	18.2	0.884

**is statistically significant at 5% significance Level
Source: Own computation from survey result, 2016

Survey result indicated that 54.5% of the sample traders got price information through the combination of telephone (87.9%), personal observation (54.5%), other traders (81.1%), newspaper (12.5%) and brokers (24.2%).There is a significant difference in sources of information between the traders at 5% significance level in terms of personal observation. Whereas there is no significant difference in theother sources of information between the traders.

4.3.1.3. Barrier to entry

Trade barriers have often laid the groundwork for market imperfection. Whether by intent or not, many regulatory actions by state or local units have the result of restricting freedom to entry and the free flow of goods and services (Kohls and Uhl, 1985). The major barriers to entry in to rice trade in the study area included lack of working capital, licensing and know how.

Table 20: Barriers to rice market entry

Barriers	Traders					
	All sample	Collectors	Processors	Wholesalers	Retailers	X^2/t-value
Lack of Capital (Yes, %)	81.8	88.9	71.4	83.3	81.8	4.3
Trading licenses (Yes, %)	18.2	18.2	0	0	0	19.6***
Information collusion (Yes, %)	30.3	44.4	28.6	16.7	27.3	1.44
Competition with unlicensed traders (Yes)	21.2	22.2	14.3	16.7	27.3	0.522

Source: Own computation from survey result, 2016

Capital: Lack of capital is not only the major problem in rice trading; it's the major problem for the whole grain marketing. Lack of working capital was reported to be an important barrier to entry thereby resulting in imperfection of food grain, pepper and rice markets in Southern and North East Ethiopia (Wolday, 1994; Rehima, 2006; Wolelaw 2005).

In the survey about 81.8% of the sample traders respond that major problem to run their business was lack of capital. Although working capital required was reported to vary depending upon the price level and quantity of rice to be purchased, high amount of initial working capital was required to compute with wholesalers, collectors, processors and retailers. To enter in to the market more capital is needed because they have to purchase more rice and they have to pay cash on hand at the time of purchase. In addition, high capital is required for store construction and for appropriate and adequate storage facilities. In these cases, capital requirement discourage entry into rice trading.

Licensing: According to the information obtained from Trade and Industry Office, there were 46 traders licensed on the bases of the amount of initial capital they possessed. There are two types of licenses in the study area; those who have an initial capital of 10,000 Birr classified as wholesalers. They can purchase rice in regional markets and transport it to the deficit terminal markets. Those who received a license with initial capital of 1000 Birr are licensed as retailer and can purchase and sell grain within the regional markets only.

However, from the sampled respondent about 82% of rice traders (all traders residing in the town) have rice-trade license whereas the remaining 18.2% of the sample traders had no rice-trade license. According to the survey result, all traders having rice-trade license reported that it is very simple to get rice/grain trade license, so long as they fulfill the required initial capital verified by the office. Although, theoretically it is compulsory to have license to enter in to the rice market, the simplicity to have rice/grain license and absence of strong restriction to enter into the rice/grain market with respect to licensing made rice marketing relatively free to enter. Thus, entry in to rice trading is easy.

Lack of trading experience: As discussed in description part under characteristics of sample traders, trading experience of traders ranges from 2 to 19years with an average experience of 15.56years. There appears relatively high variation within a trading experience that it is from 2 to 19 years of experience. This may explain that there is no barrier to entry in rice trade with respect to years of experience. Likewise, educational level of sample traders, on average, was 3.5 schooling years and ranges from 0 to 12 schooling years. About 60.6% of sample traders had received formal education, and the rest 39.4 % did not have formal education.This may explain that there is no barrier to entry in rice trade with respect to education.

4.3.2. Rice market conduct

In this section conduct of the rice market is analyzed in terms of producer and trader's price setting, purchasing and selling strategies.

4.3.2.1.Price Setting Strategy

Producer's price setting strategy

According to the survey result, about 79.1% of sample farmer respondents said that, market price was set by buyers and 8.1% respondents said that, price was set by the supply and demand. The remaining 8.1% and 4.7% of farmer respondents said that selling price of rice was set by negotiation and themselves respectively.

The survey further confirmed that, about 65.5% of sample respondents face problem of low price after they took the product in to the market. Sample respondent farmers reported different Solution to the problem when they face low price, about 54.1% of sample respondent farmers reported that they took their product back to home and waited till next market day. The other 38.5% of sample respondents sold their product with the existing price. The remaining 7.4% put their produce in homes of their relatives on market place to be sold some other day other than the market day. The majority of farmers identified that price was the major determining factor that affect their decision as to whom and which market to sell their produce. Hence, there existed absence of competitive pricing system, indicating the deviation of market from the competitive market norms.

Table 21: Producer price setting strategy

Strategies	Percent
Price setter	
Buyer	79.1
Supply and demand	8.1
Negotiation	8.1
Farmers themselves	4.7
Face problem of low price at market	65.5
Solution to the problem when face low price	
Took to back home	53.4
Sold with existing price	37.2
Took to another market	2
Store at market	7.4

Source: Own computation from survey result, 2016

Traders purchasing and selling strategy

Based on the data from sample trader's survey, about 48.5% of the sampled traders set purchase price themselves, about 21.2% of respondents reported that buying price was set by the market and discussion with other traders respectively. The rest 9.1% of sample traders

reported that market price was set by negotiation with suppliers. This indicates that the traders had significant role in price setting.

The survey result showed that, traders use a variety of criteria to attract their suppliers, 60.6% of respondent said that, they attract their suppliers by fair scale weighing and social relation, 12.1% by giving better price relate to others, 12.1 % by giving credit, and the rest 18.2% by visiting them. This suggests that, while profits are important for traders' marketing behavior, social networks play an important role in these decisions as well. Traders also use a variety of criteria to attract their buyers, about 21.2% of respondent said that, by supplying quality rice to our buyer, 12.1 % by giving lower price relate to others, 54.5 % by fair scale weighing and social relation and 12.1% by selling on credit. When the purchasing and selling, strategy was checked across different traders, there was no significant difference between the them.

Table 22: Traders purchasing and selling strategy

Variables	Traders					
	All sample (%)	Collect ors (%)	Proce ssors (%)	Whole salers (%)	Retail ers (%)	X^2/t-value
Price setter						
Market (supply& demand)	21.2	11.1	28.6	33.3	18.2	2.44
Discussion with other traders	21.2	22.2	14.3	16.7	27.3	
Negotiate with suppliers	9.1	11.1	14.3	-	9.1	
Traders themselves	48.5	55.6	42.9	50	45.5	
How do you attract Supplier						
Better price	12.1	-	28	16.7	9.1	13.7
Fair scale	60.6	44.4	57.1	66.7	72.7	
Visiting them	18.2	55.6	14.3	-	-	
Giving credit	12.1	-	14.3	16.7	18.2	
How do you attract buyer						
Low price	12.1	11.1	14.3	16.7	9.1	
Fair scale	54.5	44.4	57.1	50	63.6	1.7
Better Quality	21.2	33.3	14.3	16.7	18.2	
Giving credit	12.1	11.1	14.3	16.7	9.1	

Source: Own computation from survey result, 2016

4.3.3. Rice market performance

Market performance can be evaluated by analyzing costs and margins of marketing agents in different channels. The performance of rice market was evaluated by considering the associated costs, returns and marketing margins. Marketing performance of rice were analyzed by taking into consideration the associated marketing costs and taking average price at each channel for major rice value chain actors.

4.3.3.1.Marketing margins of actors at different channels

Marketing margin used to measure the share of the final selling price that is captured by a particular agent in the value chain. It is the percentage of the final weighted average selling price taken at 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/her product. A wide margin usually means high prices to consumers and low prices to producers. A systematically recording of prices at different levels of marketing chain during a two to three-week period is sufficient to calculate quite accurately the relevant marketing margins (Pomeroy and Trinidad, 1995).

Table 23 showed that marketing margin among different actors at different channels. The highest and the lowest total gross marketing margin (TGMM) were found to be 56% and 0% in channels (I, II) and channelX, respectively.The result showed that the marketing margin increases as the product moves away from the production center. This implies that producers have less power in managing the value chain and as a result consumers were paying higher prices to consume the product. Producer's share (GMM$_P$) was highest in channel X which account 100% from the total consumers'price, this is because of the direct sale of rice to the consumers with a good price and lack of intermediaries in the channel. Correspondingly,producers net marketing margin (NMM) is highest in channel X and channel IX which accounts for 42.2% and 29.7% of the consumer price. However,farmers' gross marketing margin and net marketing margin (NMM) is lowest in the channel I and II, this is because of the involvement of intermediary's in the channel which pays relatively low price

for rice producers. The reason being, the higher number of middlemen in the commodity market, the more profit they retain for their services whether they add value to the item or not.

Table 23: Rice marketing margins for actors along different marketing channels

Agents	Marketing margins	M.Ch									
		I	II	III	IV	V	VI	VII	VIII	IX	X
Producers	GMM$_P$ (%)	44	44	48.3	56.7	62.2	56.7	65.7	74.6	82	100
	NMM$_P$ (%)	4.2	4.9	5.4	13.3	15	13.7	18.7	27	29.7	42.2
Collectors	GMM$_C$ (%)	16.3	16.3	17.8	-	-	-	-	-	-	-
	NMM$_C$ (%)	11.2	11.2	12.2	-	-	-	-	-	-	-
Processors	GMM$_{Pr}$ (%)	15	16.7	16.5	18.65	20.4	20.2	34.3	-	-	-
	NMM$_{Pr}$ (%)	7.7	7.93	8.4	12.25	12.3	11.4	20.7	-	-	-
Wholesalers	GMM$_W$ (%)	15	-	17.4	15	17.4	-	-	15.9	17.5	-
	NMM$_W$ (%)	11.4	-	12.8	11.4	12.8	-	-	12.2	13.5	-
Retailers	GMM$_R$ (%)	9.5	23	-	9.5	-	23	-	9.5	-	-
	NMM$_R$ (%)	5.7	17.7	-	5.7	-	17.7	-	5.8	-	-
	TGMM (%)	56	56	51.7	43.3	37.8	43.3	34.3	25.4	18.3	0

Source: Computed based on survey data (2016)

As depicted in the Table 23 above,Gross Marketing Margin(GMM) of processors, retailers, collectors and wholesalers is the highest inchannel VII, VI, III and IX,which account34.3%, 23%,17.8% and17.5%of the consumer price, respectively.The highest Net Marketing Margin (NMM) of the processors,retailers, wholesalers and collectors is 20.7%,17.5%,13.5% and 12.2% in channel VII,VI,IX and III,respectively.This implies share of market intermediaries in the consumer's price was significant and there was a need to reduce market intermediaries to minimize the marketing margins and thereby enhance the producers' income.

4.4. Econometric Results

4.4.1. Factors affecting intensity of participation in rice market

As proposed in the methodology part, 13 explanatory variables were regressed with Tobit model.The overall goodness of fit Tobit model, parameter estimates is assessed based on the likelihood ratio test. The null hypothesis for the likelihood ratio test revealed that all the

coefficients are jointly zero. The model chi-square test applying appropriate degrees of freedom indicate that the overall goodness of fit for the model is statistically significant at a probability of less than 1%. This implied that jointly the independent variables included in the model explain the intensity of participation. The result showed that 12 variables were found significantly and statistically affect intensity of participation in rice market(Table 24).

Education of the household head: As hypothesized, the result showed that there was positive and significant relationship between education and intensity of rice market participation at 1% significance level. The marginal effect for this variable revealed that, all other factors beingunchanged, a one year increase in education of the householdleads to an increase the intensity of participation in rice market by 0.428 quintal among the whole sample and by 0.425 quintal among the participant group. As education of the household increased by one year, the probability to participate in rice market would increase significantly by 0.03%.This may be due to educated household head having better market networking and bargaining power and good managerial skill of enterprises. It is also evident that educated farmers tendency to accept different agricultural technologies is high, so that they can produce more surplus for market. The result is in conformity with the findings of Aman *et al*. (2014) that states education increasesintensity of market participation by improving farmers marketing performance. But this result contradiction with the work of Musah *et al*. (2014) who argued that the number of years spent in school by the household head is negatively related to the probability of selling maize in upper west region of Ghana.

Table 24: Maximum likelihood estimates of Tobit model

MS	Coefficient.	Std. Err.	marginal effect[1]	marginal effect[2]	Change in probability
Education (year)	0.4284605***	0.1197997	0.428	0.425	0.0003
Family size	-0.883385***	0.1864471	-0.883	-0.876	-0.0006
Rice farming experience	0.2563311***	0.0948431	0.256	0.254	0.0002
Non-Farm income	-0.1782289***	0.0680083	-0.178	-0.177	-0.0001
Livestock holding (TLU)	-0.260245***	0.0874365	-0.260	-0.258	-0.0002
Land allocated for rice	3.829615***	0.4874883	3.827	3.799	0.0027
Availability of labor	1.408743*	0.7308688	1.408	1.398	0.0010
Number of Oxen Owned	2.208898***	0.7196628	2.207	2.191	0.0015
Amount of credit used	0.5368767***	0.129593	0.536	0.533	0.0004
Membership in cooperative	1.492264*	0.8687397	1.491	1.480	0.0010
Distance to nearest market	-1.060153***	0.1450325	-1.059	-1.052	-0.0007
Market information	1.680907**	0.7082252	1.680	1.667	0.0012
perception on Current price	1.361713	0.9732286	1.361	1.351	0.0010
_cons	14.22313***	3.420349			
/sigma	3.80479	0.251192			

Log likelihood = -346.47828   Number of observations =   148

LR chi2(13)   =   323.50   Left censored observations= 29

 Prob > chi2   =   0.0000   Uncensored observations = 119

Pseudo R2   =   31.8%   Right-censored observations = 0

***, **, and * represents level of significance at 1%, 5%, and 10% respectively.
Source: Own computation from survey, 2016

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

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

Family size: The econometric result showed that household size affects intensity of market participation negatively and significantly at 1% significance level. Other factors being constant, an average an increase in the household size by one person decreasesintensity of market participation by 0.883 quintal among the whole sample and by 0.876 quintal among the participant group. An increase in the household size by one person decreases likelihood of market participation by 0.06%. This implies that households with larger family sizes were less likely to participate in the rice market as sellers; they sell small rice when they participate. These results are consistent with the finding of Yallew (2016) that Household size is negatively associated with the intensity of market participation in the case of northwestern Ethiopia. It was also in conformity with Musah *et al*. (2014) that households with large family sizes need to feed their family first and take the remaining small portion surplus to the market especially if the crop is consumable at home.

Rice farming experience: As expected rice farming experience was affect the intensity of market participation decision positively. The result shows that, this variable affected the intensity of market participation significantly and positively at 1% level. It implied that as farmers stay longer in rice farming, it is expected to increase value of rice sold to market. It was revealed that, a one-year increase in rice farming experience, leads to an increase the intensity of rice market participation by 0.256 quintal among the whole sample and by 0.254 quintal among the sellers.As experience increased by a year the probability to participate in rice market would increase significantly by 0.02%. This result is consistent with the results of Agwu *et al*. (2012) who found that farming experience was significant and positive sign with the level of commercialization among small holder farmers in Nigeria.

Non-farm income: Contrary to hypotheses, the result of the study showed that, non-farm income influences volume of rice sold in the market significantly and negatively at 1% significance level. The marginal effects for this variable revealed that, on average, a one percent increase in non- farm income would result in decrease the intensity of rice market participation by 0.178 quintal among the whole sample and by 0.177 quintal among the sellers. Each additional percent increase in non- farm income would significantly decrease the probability to engage in rice market by 0.01%. This implies that earning better income from

non-farm activities like trading discourages farmers' intensity of participation in rice market because of the diversion of attention to better income generating activities.The finding in line with that of Fengying *et al*. (2014) who found that negative relationship between non-farm income and extent of rice market participation in Tanzania. The finding also, concurs with that of Rehima (2006), who found that non-farm income has negative relationship with the quantity of pepper supply.

Livestock holding: Contrary to the prior expectation, livestock holding (TLU) is found to be negatively and significantly influence the intensity of market participation at 1% significance level. The marginal effect shows that as the number of livestock increased by one tropical unit, will result in decreasethe intensity of market participation by 0.260 quintalamong the whole sample and by 0.258 quintal among the sellers. As the number of livestock increased by one tropical unit, the probability of market participationwould significantlydecreaseby 0.02%. This is mainly due to the fact that farmers with more TLU tend to specialize in livestock production reducing the importance of rice production as means of cash generation and hence it has negative impacts on intensity of market participation. This is in line with that of Rehima (2006) that total tropical livestock unit has a negatively and significantly affected quantity of pepper sales.

Land allocated for rice: As hypothesized, the result depicted that there was positive and significant relationship between farm size and intensity of rice market participation at 1% significance level. As the land allocated for rice production increases by one hectare the intensity of rice market participation increases by 3.827 quintalamong the whole sample and by 3.799 quintal among the sellers. As the land allocated for rice production increases by one hectare, the probability of market participationwould significantlyincrease by 0.27%. This indicates that the farmers with relatively the larger the farm size has more space to produce more volume of rice both as food and cash crop. The finding is concurring with that of Fengying *et al*. (2014) who found that the size of land cultivated by the household have a positive significant effect on rice sales in Tanzania. It also argued with that of Yallew (2016)

that showed land holding size significantly determines the intensity of maize output market participation.

Availability of labor: As it was hypothesized, availability of labor affected intensity of rice market participation positively and the effect is statistically significant at 10% significance level.The marginal effect also confirms that availability of labor increases the intensity of market participation in the rice market by 1.408 quintalamong the whole sample and by 1.398 quintal among the sellers, all other factors held constant. Availability of labor increasesthe probability of market participation in the rice market by 0.1%. Since, rice production is labor intensive, a household with more availability of labor during production and harvesting time, produce more rice and participate in market. This result was in confirmation with the study of Nuri (2016) who revealed that availability of labour affected market participation decision positively at 1% significance level.

Number of Oxen Owned: As hypothesized number of oxen has a positive and significant relationship with marketed volume of rice at 1% significant level. The result shows that an increase in number of oxen resulted an increases the intensity of market participation in the rice market by 2.207 quintalamong the whole sample and by 2.191 quintal among the sellers, all other factors held constant.As the number of oxen increases by one the probability of market participation would increase by 0.15%. Since ox is a critical production asset in smallholder farm households having a direct effect on the production of rice and thereby marketed surplus with a significant amount. The finding is consistent with the results of Dagmawit (2016) who found that the existence of positive relationship between number of oxen and the quantity of maize sold.

Amount of credit used: As expected, it was positively related to intensity of market participation at 1% significant level. The marginal effects for this variable revealed that, on average, a one percent increase in amount of credit usedwould result anincreasein the intensity of rice market participation by 0.536 quintal among the whole sample and by 0.533 quintal among the sellers, all other factors being constant. Each extra percent increase in amount of credit utilization would significantly increasethe probability ofparticipation in rice

market by 0.04%. From this result, it can be stated that those farmers who have used more credit, are more probable to supply rice than those who have not used credit/ used less amount of credit. The result is in line with that of Shewaye *et al*. (2016) who found that use of credit was significantly and positively associated with the level of market participation. The result also consistent with that of Lizzen (2015) who found that there is positive relationship between credit and extent of rice market participation in Zambia.

Membership in cooperative: Membership in cooperative determines intensity of market participation positively and statistically significant at 10% significance level. Being a membership in cooperative increases the intensity of market participation by 1.491 quintal among the whole sample and by 1.480 quintal among the sellers, all other factors being constant. Membership in cooperative increases the likelihood to participate in rice market by 0.1%. The implication is that membership in cooperative could have better access of market information, inputs, extension services and credit facilities is important to production and marketing decisions. The result is in line with the findings of Shewaye *et al*. (2016) and Adeoti *et al*. (2014) found that being a member of cooperative motivate farmers to participate in the market through networking and provision of up-to-date information to members.

Distance to nearest market: As expected, distance to the nearest market negatively and significantly influences the intensity of marketed surplus at 1% significant level. When the household is located extra onekilometeraway from the market, the intensity of rice market participationwould decrease by 1.059quintal among the whole sample and by 1.052 quintal among the sellers, all other factors being constant. As the household is located extra onekilometeraway from the market, the probability of market participation would significantly decrease by 0.07%. This implies that farmer households located far from market facing high transportation costs and thereby leading to decide not to participate. The finding agrees with that of Mujawamariya *et al*. (2016) found that distance to the market have a negative and significant effect on both the farmer's decision to participate and the extent of farmer participation in the market. Also, it is consistent with Gebremedhin and Jaleta (2010) found that distance to the market negatively influences both the decision to participate in the market and the proportion of output that is sold.

Market information: As expected prior, market information significantly and positively influences intensity of market participation at 5% significant level. The result shows that household who had access to market information sold 1.680 quintal among the whole sample and by 1.667 quintal among the sellers, all other factors being unchanged. Access to market information increases the probability of rice market participate by 0.12%. Market information is a vital instrument during marketing because it informs the farmers about marketing conditions. The finding is consistent with the results of Musah *et al.* (2014) who found that the existence of positive relationship between market information and the quantity of maize sold. The finding also consistent with that of Lizzen (2015) and Ohen *et al.* (2013) who found that access to information prior to selling was positively significant among rice farmers in Zambia and Nigeria, respectively.

5. SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1. Summary and conclusion

The study was undertaken with the objective of rice value chain analysis in Shebe Sombo district of Jimma zone, Southwest Ethiopia, with the aim of identifying rice value chain actors and their respective functions, evaluating distribution of value addition of rice at different stages of the marketing chain,analyzing market performance of rice value chain, identifying factors affecting market participation and intensity of marketed surplus in the study area. To address the objectives of the study, both quantitative and qualitative type of data were used. The data were generated from both primary and secondary sources. The primary data were collected through personal interviews form 148 producers and 32 traders using both close ended and open ended (semi- structured) questionnaire. All the sampled households were rice producers. Qualitative data were also collected through focus group discussions and key informant interviews.

The analysis was made using descriptive statistics and econometric models using versions 13 STATA software. Value chain actors, distribution of value addition among actors, market performance, market participation decision and volume of sales are found to be important elements in the study of the rice value chain. Therefore, Tobitmodel was employed to determine factors of the market participation and intensity of marketed surplus of rice. The main findings of this thesis are summarized as follows.

Out of 148 total household's heads interviewed 90.5% of them were male headed whereas the rest 9.5% of them were female headed households. Among sample respondent 80% of them were rice market participants whereas the rest 20% respondents were non-participants.Significant differences were recorded among rice market participants and non-participants in terms of education, family size, farming experience, age of the household, non-

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farm income, livestock holding, total land holding, land allocated for rice, amount of credit used, distance to nearest market, rice production, number of oxenowned, market information, price perception of farmers, availability of labor and membership in cooperative.

In line with the objective of the study, value chain analysis indicated that there are direct and indirect actors who can take their part in each and every stages of the rice value chain in the study area. The direct actors of rice value chain are input suppliers, producers, collectors, processors, wholesalers and retailers. Each of these actors adds value in the process of changing product title. In addition to this, major value adding activities performed by the rice value chain actors include provision of inputs, production, processing, grading, drying, and transporting and distributing which in further adds form, time spatial value of the product. The main supporters of the rice value chain in the study areaDistrict Agriculture Office, District Trade and Market Development Office, Cooperatives promotion office, Oromia credit and saving institutions, Private transporters. These actors play a central role in creating awareness, facilitating joint strategy building and action and the coordination of support activities.

The survey result revealed that 53.4% of the sample households obtained extension service on rice production; the rest did not get the relevant extension services. However, farmers need extension service on production, post-harvest handling and marketing,which were not given widely and adequately. Farmers get information about the price of rice, market demand, supply and quality of product from different sources. The study result showed that 48.6% of the sample households obtained market information before selling rice, the rest did not get the market information before selling rice.Rice farmers in the study area received credit for different purposes from different sources of credit services. The survey result showed that 38.5 % of sample respondents took credit,the rest did not received credit.

The results revealed that, total average amount of rice produced at a household level was 35.3 qt, and 36.4% of rice produced was supplied to the market. The total quantity supplied to the market was about 1898.84 quintals of rice by the sample farmers in the study area. Ten different rice market channels have been identified with each channels having different marketing margin. Regarding the product flow, the main receivers from producers were

processors, collectors, wholesalers and consumers with an estimated percentage share of 40.5%, 29.3%, 22.78% and 7.39%, respectively. Channel comparison was made based on quantity of rice thatpassed through each channel. Accordingly, the Channel I. Producers →Collectors →Millers →Wholesalers→ Retailers→ Consumers accounted for the largest share for rice (15.79 %) marketed than other channels.

Results of rice value chain analysis revealed that there are many actors involved in rice value chain all playing different roles.Each of the rice value chain actors added value to the product as the product was transferred from one actor to another. The results revealed that, rice producers added value from 61.6 birr to 443 birr per quintal of the total value of rice at different market channels. Collectors, processors, wholesalers and retailers also added value up to 141,244,157 and 223 birr per quintal, respectively at different market channels.

Compared to farmers, traders' operating expense is less than half, but their profit margin is more than that of farmers. Rice producers added 41% of the total value of rice in the district. Processors, wholesalers, retailers and Collectors, are responsible for 20 %, 18 %, 13% and 8%,
of the total profit margin, respectively. Producers shared unfair profit distribution comparing with other actors. The linkages among value chain actors were to some extent weak and informal. Unfortunately, there was no responsible body who is working for effective and efficient linkage between value chain actors.

The major production and marketing constraints that encounter farmers were input Supply problem (improved seed, pesticide and herbicides, high input price), pest and disease problem, limited access to extension services, weed and weed control method, lack of marketing cooperatives, availability of markets, Poor information flow and lack of milling machine. The major marketing constraints that hinder rice traders were limited credit access, poor transport facility, absence of storage facility, information flow problem, insufficient working capital, low product quality, poor linkage among value chain actors and absence of government support.

The degree of market concentration was estimated for the licensed rice traders in Shebe market using the four firm concentration ratios. The results revealed that four Traders control 62.3% of the total rice sold in the market. Based on the result the rice market in the study area displayed an oligopolistic market, indicating the existence of market imperfection. Survey result indicated that 54.5% of the sample traders got price information through the combination of telephone, personal observation, other traders, newspaper and brokers. There is no significant difference in terms of sources of information between the traders, except personal observational at 5% significance level. Among the major barriers to entry in to rice trade, lack of capital is found to be the major trade barriers in the study area.

About 79.1% of sample farmer respondents said that, market price was set by buyers and 8.1% respondents said that, price was set by the supply and demand. The remaining 8.1% and 4.7% of farmer respondents said that selling price of their produce was set by negotiation and themselves respectively. The survey further confirmed that, about 48.5% of the sampled traders reported that buying price was set by themselves, about 21.2% of respondents reported that buying price was set by the market and discussion with other traders respectively. The rest 9.1% of sample traders reported that market price was set by negotiation with suppliers. This indicates that the traders had significant role in price setting. Traders use a variety of criteria to attract their suppliers, 60.6% of respondent said that, they attract their suppliers by fair scale weighing and social relation, 12.1% by giving better price relate to others, 12.1 % by giving credit, and the rest 18.2% by visiting them.

Regarding the marketing margin of the chain actors, the highest and the lowest total gross marketing margin (TGMM) were found to be 56% and 0% in channels (I, II) and channelX, respectively.Producer's share (GMM$_P$) was highest in channel X which account 100% from the total consumers' price.Correspondingly,producers net marketing margin (NMM) is highest in channel X and channel IX which accounts for 42.2% and 29.7% of the consumer price. Gross Marketing Margin(GMM) of processors, retailers, collectors and wholesalers is the highest in VII, VI, III and IX,which account34.3%, 23%,17.8% and 17.5%of the consumer price, respectively. The highest Net Marketing Margin (NMM) of the processors, retailers, wholesalers and collectors is 20.7%,17.5%,13.5% and 12.2% in VII, VI, IX and

III,respectively.The result revealed that the wholesalers and processors are the main rice value chain governors, therefore, they had substantial role in price setting.

The resultof Tobitmodel shows that market participation and intensity of marketed surplusare influenced significantly and positively by availability of labor, amount of credit used, membership in cooperative,land allocated for rice, education of household head, rice farming experience, number of oxen and market information while family size, livestock holding, distance to nearest market,non-farm income negatively affect market participation decision and intensity of marketed surplus.

5.2. Recommendations

From the results of the study, the following recommendations are drawn and forwarded for the rice value chain development. We suggest that the government and concerned stakeholders should focus on each of recommendation forwarded for the rice value chain development.

1. The linkages among rice value chain actors were to some extent weak and informal in the study area. Unfortunately, there was no responsible body who is working for effective and efficient linkage between value chain actors. To strength the linkage among value chain actors, there is a need to change the outlook of actors, by developing ground rules that will bind the relationship between producers and traders. Therefore, defining and integrating the existing concerns of the government and public institutions is required to promote the development of rice value chain.

2. Comparing with other actors, farmers capture a lower share of the marketing margin while they incur the highest operating costs. The enhancement of rice producers' bargaining power through farmers' organizations is the best measure that should target at reducing unfair profit distribution among actors. Therefore,care should be taken in order to create a co-ordination mechanism among the value chain actors and encouraged all actors in changing the rules and regulations that was exercised in the study area.

3. Office of agriculture in collaboration with other stakeholders, should address the issues of using improved seeds, proper application of fertilizer rate, in addition to hand weeding use of appropriate technology to reduce the weed infestation and improve the current practices of post-harvest handling that result in quality products.

4. The presence of rice diseases, created frequent yield reduction and hindered market supply. Therefore, development of high yielding and disease resistant varieties is a solution to the prevalence of rice disease. The role of research institutes and universities (more importantly Jimma University) are crucial in identifying high yielding and disease resistant varieties to improve production and productivity of rice and thereby increasing marketed surplus.

5. The econometric result concludedthat using credit increases rice market participation and marketed surplus. Hence, strengthen the financial capability of farmers by providing adequate size of credit is a strategy to increase farmer's participation and intensity of marketing. Therefore, Government and other stakeholders should strengthen rural financial or microfinance system to address the credit needs of farmers for enhancing market participation.

6. Membership in cooperatives affected farmers by increasing market participation. Farmers should be encouraged to be members of cooperatives so that they can benefit from the support given by government via cooperatives and unions. Therefore, encouraging farmers to form cooperatives/farmers organization or join existing ones will be a step in the right direction, through which can take advantages of bargain power in the input and output market. In so doing cooperative should be the major channel for farmers to secure better income from rice sold in order to encourage farmers' production objective to be market based.

7. Education status is another significant variable that affect intensity of market participation positively. Therefore, building education capacity of rural farmers through arranging consecutive trainings and experience sharing sessions among smallholder farmers or arranging other formal way of education such as adult education should be designed to increase rice marketed surplus.

8. Access to market information prior to selling was positively related to intensity of market participation. Strengthen access to market information including prices, supply and demand, for all market actors by strengthening Media's contribution on production and marketing of agricultural product is required. Dissemination of relevant market information through the agricultural extension systemshould also be considered.

9. Distance to nearest market affected rice market participation and intensity of market participation negatively. Therefore, development of infrastructure should be improved; especially roads facilities should be established around the production centers.

10. Family size was one of significant factors affected rice market participationand intensity of market participation negatively. So government may need to strengthen the family planning program which is being given in the area; so that the families will have planned family size and will be able to produce more surpluses for market. On the other hand, provision of rural employment opportunities is essential to reduce high dependence by households on farm output.

11. Land allocated for rice was affects intensity of rice market participation positively. However, increasing the size of land cannot be an alternative for marketed surplus of rice due to the fact that land is a limited resource. Therefore, looking for productivity improving measures through proper management of land increases the production per unit area.This will enable the farmer to produce more from the same plot of land so that increased intensity of rice market participation will be achieved.

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7. APPENDIXS

Appendix A   Tables

Appendix table1:Conversion factors used to compute tropical livestock units (TLU)

Livestock Category	Conversion factor
Calf	0.25
Weaned calf	0.34
Heifer	0.75
Cow or ox	1.00
Horse/mule	1.10
Donkey (adult)	0.75
Donkey (young)	0.35
Camel	1.25
Sheep or goat (adult)	0.13
Sheep or goat (young)	0.06
Chicken	0.013
Bull	0.75

Source: Storck *et al*., 1991

Appendix Table2: Variance Inflation Factor for continuous independent variables

Variables	VIF	1/VIF
Family size	1.91	0.52
DISMRKET	1.82	0.55
Livestock holding	1.76	0.57
Land allocated for rice	1.67	0.60
Non-Farm income	1.58	0.63
Number of oxen owned	1.41	0.71
Education of household head	1.37	0.73
Amount of credit used	1.31	0.76
Rice farming experience	1.27	0.79
Mean VIF	1.57	

Source: Own computation from survey result, 201

Appendix table3: Contingency coefficients for dummy variables

	ALBR	MCOOP	MINFO	PCPRICE
ALBR	1.00			
MCOOP	-0.19	1.00		
MINFO	-0.01	0.08	1.00	
PCPRICE	-0.01	-0.3	0.2	1.00

Source: Own computation from survey result, 2016

Appendix B   Questionnaires

Questionnaires for Producers

Instructions for Enumerator:

- ➢ Make brief introduction before starting any question, introduce yourself to the farmers, greet them in local ways and make clear the objective of the study.
- ➢ Try to ask the respondent clearly and in understandable manner
- ➢ Try to write the response of the respondent clearly on the space provided
  - • Ask & write details where required,
  - • Encircle or tick the chosen answer;
- ➢ Please, don't write your own idea rather put what the respondent replies on each points
- ➢ 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.
- ➢ Be sure that you have asked all the questions listed accordingly
- ➢ At the end, leave farmers with words of thanks
- ➢ Thank you for keeping the instructions accordingly

I.   General Information

1. Name of the household head_____

2. Age of the household head_____ years

3. Sex of household head_____

4. Marital status 1. Single 2. Married 3. Divorced 4. Widowed

5. Religion of the household head:

    a. Muslim b. Orthodox c. Protestant d. Catholic e. Other (Specify) _____

II.   Household Characteristics:

1. Family size: Male_____   Female_____   Total_____

Age & Sex of Family members

Sex	Age in Years				
	<10	10 – 13	14 – 16	17- 50	> 50
Male					
Female					

2. Number of working persons (14-64 ages):   Male _____ Female ____ Total_____

3. Number of children in school: Male _____ Female ____ Total_____

4. Number of dependents (< 14 and >64 ages): Male _____ Female ____ Total_____

5. Years of schooling of the household head: _____

6. Farming experience in years: _____

7. Experience in riceproduction in years: _____

III. Resource ownership

1. Livestock ownership in 2015/16

No	Type of livestock	Number owned	No. of sold	Cash income from sold in (Birr)
1	Cows			
2	Oxen			
3	Calves			
4	Bulls			
5	Sheep or goat (young)			
6	Sheep or goat (adult)			
7	Donkey (adult)			
8	Donkey (young)			
9	Mules/Horses			
10	Chicken			
11	Heifer			
12	Other (specify			

2. Total farm size: _____hectares/timad 2015/16 (Note: 1 ha = 8 timad or 1 timad = 0.125 ha)

 1. Rented out_____ hectares/timad 2. rented in_____ hectares/timad 3. Own____ hectares/timad   4. Private pasture land _____ hectares/timad 5. Others (specify) ____ hectares/timad

3. Area cultivated for rice _____hectares/timad 2015/16

4. Did you involve share cropping in land for rice in 2015/16? 1 = Yes   2 = No

5. Do you have your own transportation facilities? (√) 1. [   ] Yes 2. [   ] No

6. If your answer for Q. 5 is yes, what type? 1. Vehicle 2. Transport animals 3. Cart, 4. Others_____

7.Source of Oxen Power. 1.Own 2. Rent   3. Other(specify)_____

 IV. Production

1. Production of rice and food grains during the last seasons in (2015/16).

	Type of crop	Cultivated area in(ha)	Productivity(q/ha)	Quantity produced (qt)	Quantity consumed (qt)	For seed (qt)	Quantity sold (qt)	Price/qt
1	Wheat							
2	Teff							
3	Maize							
4	Sorghum							
5	Barley							
6	Faba bean							
7	Field pea							
8	Groundnut							
9	Chick pea							
10	Pepper							
11	Rice= Produced on own land							
	Share out							
12	Groundnut							
Your cash crop relative to level of cash income 1=primary, 2=secondary and 3= tertiary)				1			
				2			
				3			

2. How is the trend of volume of rice production during the past 5 years? (√)

Crop	Trend of production		
	Increasing	Decreasing	Same
Rice			

3. If increasing for Q 3, why? _____

4. If decreasing for Q 3, why? _____

5. What are the opportunity for rice production in the area? (multiple answer is possible)

  1.High consumer Demand 2. Land suitability 3. Proximity of river 4. Low cost production

6. Would you like to expand Rice production? 1. Yes, 2. No

7.If yes Why? _____

8. If No Why? _____

9. Is there Availability of labor during production and Harvesting time?   1. Yes   2. No

10. If your ans. Q. No _9 is yes, what is the source of labor used during production and Harvesting time? (Multiple responses is Possible) 1. Family labor   2. Labor exchange 3. Hired labor   4. Cooperation 5. Others _____

11. Do you obtain Income from farming activities? 1. Yes 2. No

12. If your ans. Q.No. _11 is yes, what are these major source of income?

Sources	Total income Birr/Years
Sale of other crop	
Sale of rice	
Sale of livestock	
Sale of crop residues	
Others(specify)	

13. Do you obtain Income from non-farming activities? 1. Yes 2. No

14. If your ans. Q.No. _13 is. yes, what are these major source of income?

Source	How much Birr/Month	Total income Birr/Years
Income from trade		
Income from handcraft		
Salaries/wage		
House rent		
Income from milling		
Rented out land		
Rented out donkey or Oxen		
Other(specify)		

V. Production services

1. Have you ever used agricultural inputs (fertilizer, chemicals, improved seeds etc.) for the production of rice?   1. Yes   2. No

2.If your answer for Q.2 is No, what was the main reason behind? _____

3. If your answer for Q.2 is Yes, what was your input for production of rice & their sources in the last seasons (2015/16)? (Multiple responses is expected)

Type		1=Yes 2= No	Source (Code)	Amount use Kg	Value (Birr)	1=Cash 2= Credit
Fertilize	Urea					
	DAP					
	Organic					
Insecticide						
Herbicide						

Seed	Local seed					
	Improved seed					

From: 1. Market   4. Cooperatives   7. Other (specify)
      2. Agricultural office   5. Other fellow farmers
      3. Own production   6. NGOs

4. What type of rice varieties do you use? (Multiple responses is Possible)

1. X-Jigna   2. White rice   3. Gumara 4. NERICA-2   5. NERICA-3

   6. NERICA-4   7. Suparica-1

5. Have you encountered problems in accessing these inputs? (√) 1. [   ] Yes 2. [   ] No

6. If your answer for Q.5 is Yes, what are the problems? (Multiple responses is possible)

No	Types of inputs used	Problems (write codes)	
1	Improved seed		1. Unavailability
2	Fertilizer		2. Shortage of supply
3	Pesticides/herbicides		3. Costly
4	Farm implements		4.Remoteness of input selling site
5	Others (specify)		5. Others (specify)

VI. Costs and constraints of rice production

1. Costs of rice production per Hectare/timad (last production year): (Labor requirement includes for plowing, sawing, weeding, harvesting, threshing & winnowing, transporting, etc.)

Type of costs	Area in ha/timad used	Costs birr(ha/timad)
Costs of land preparation		
Costs of rented land (if you rented land)		
Costs of rented Oxen(if you rented oxen)		
Costs of fertilizer used(DAP & UREA)		
Costs of chemicals(herbicide & insecticide)		
Costs of seed used(Improved & local seed		
Cost of labor for weeding		
Cost of labor for harvesting		
Cost of labor for threshing & winnowing		
Costs of transporting from farm to home		
Other costs (e.g. tax, constructing storage ,costs of bags etc.)		

2. What are the major rice production constraints?

Production constraints	1=Yes 2= No	What is your suggestion to solve each problem?
Problem of input supply		
Pest and disease problem		
Limited access to extension services		
Weed and weed control method		
Access and use of pre-harvest equipment		
Access and use of post-harvest equipment		

VII. Access to credit and extension services

1. Did you borrow money for rice production last year? 1. Yes 2. No
2. If yes, how much money did you borrow? _____ Birr

3. If your answer for question No "1" is yes, from where did you collect the credit? (*Multiple responses are possible)

1. Micro finance 2. Credit and saving associations 3. Cooperatives/unions 4. Banks 5. Traders 6. Friends 7. Other (specify)

4. For what purpose did you take the credit? (*Multiple responses are possible)

1.Payment for hired labor 2. Purchase of fertilizer and seed 3. Purchase of farm implements 4. Payment for rented equipment 5. Purchase of transport animals 6. To rent in land to extend rice production 7. Others (specify)

5. If your answer for Q. 1 is yes, have you paid the loan? 1. Yes 2. No

6. If the answer for Q "1" is No, what is the reason? _____

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

8. If your answer for Q.14 is Yes, what was the problem? (*Multiple response is

possible) 1. Limited supply of credit 2. Limited access to transport 3. Huge bureaucracy 4. Limited knowledge of credit 5. Others (specify) ____

9. How did you solve these problems? _____

_____

VIII. Training

1. Have you ever participated in riceproduction system training in the last three years?

1. Yes 2. No

2.If your answer for Q.1 is No, why? --

3. If your answer for Q.1 is Yes, on which aspects, by whom and for how long you have got the training?

	Training type	By whom	How long (days)	Year
1	Land preparation			
2	Spacing			
3	Fertilizer applications			
4	Chemical applications			
5	Cultivation management			
	Post-harvest handling			
	Marketing			

4.Type of information/ services do you need in rice production?

No	Type of extension service is required	1=Yes 2= No	Who provides the advisory services you need in rice production?	Use the Code
1	Method and date of planting			1= Development agents
2	Seed rate			2= NGOs
3	Type, rate and date of fertilizer application			3=Research center
4	Pest and disease and their control methods			4= Woreda ARDO Expert
5	Field management after plantation			5.Universities
6	Post-harvest treatments and storage			
7	Marketing			
8	Knowledge of threshing and milling equipment			
9	Knowledge of harvesting tools			

5. Did you get advisory service on rice production practices last year 1. Yes   2. No

6. If your answer for Q.5 is No, why? (Multiple response is possible) 1. No service provider nearby 2. Possessed the required information 3. Availability of contact farmers 4. Do not have time to get the service 5. Others (specify)--

7. If your answer for Q.5 is Yes, for how many time do you contact with the service providers? _____years

9. How do 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) _____
10. 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
11. Are you a membership in cooperative? 1. Yes 2. No
12. If your answer for Q.12 is Yes, what is the role of cooperative in rice production and marketing? _____
13. Do you store your rice before selling? 1) Yes 2) No
14. If your answer for Q 13 is yes, where do you store your rice before selling? 1) Using own "Gotera" 2) Using sacks 3) Processors store 4) Cooperative store 5) using warehouse 6) other Specify_____
15. Do you encounter any constraints in rice storage? 1) Yes 2) No
16. If your answer for Q.15 is yes, what type of constraint? _____
17. Estimate post-harvest losses at different stages in rice production kg/quintal?

a) Harvesting_____ b) Threshing_____ c) Cleaning/winnowing____

     d) Drying_____ e) storage___ f) Transporting____ g) Packaging____

18. Do you have any value addition on your riceproducts? 1. Yes 2. No

19. If your answer for Q.18 is Yes, what are those value adding activities? (*Multiple response is possible)   1.Cleaning 2. Dried rice   3. Processing/Milling 4. Parboiling 5. Grading   6. Storage 7. transportation

IX. Marketing aspect

1. Have you sold your produce (rice) in 2015/16? 1. Yes 2. No.

2. If your answer for Q.1is No, why you did not sell? --

3. If your answer for Q.1is yes, how much and to whom did you sell your production? (*Write the codes and multiple result is possible)

Quantity sold (qt)		Total Sold	Price of paddy rice	Price of Milled rice	Distance to market (Km.)	To whom do you Sell?	Means of Transport	Terms of Sale
paddy sold (qt)	Milled rice sold(qt)							

Means of Transport	To whom do you sell?	Advantages	Terms of Sell	
1= On donkey 2= Vehicle 3=On foot (Being carried)	1.Wholesaler 2. Millers 3.Collectors 4. Retailer 6. Consumer	1.Lesser transport cost 2.Give high price 3.Scaling fair 4.Reduce transport cost	1= cash 2= credit 3= advance payment	

4. Average rice marketing cost for rice producers

	Cost items	Birr/qt
	Costs of packaging	
	Load & unload cost	
	Transportation cost	
	Storage cost	
	Costs of loss	
	Costs of license & Tax	
	Sorting/milling cost	
	Brokerage cost	
	Other cost	

6. Where did you get buyer to sell your rice products?

    1. At farm gate 2. At Village market 3. At main road to market

    4. At Woreda market   5. At farm gate and at Village market, 6. at Zone (Jimma) market

7. What about the perception of current year rice price? 1. Attractive   2. Unattractive

8. When did you sell your produce (rice) in 2015/16?

  1. October - December 2. January - March   3. April – June   4. July -September

10. What is the Average price of rice per quintal for Last 3 years. _____, _____, _____birr/qt

 11. How was the price of your produce (rice) in 2015/16 compared to the previous year(s)?

1. Increased 2. Decreased 3. No change

12. What is the trend of price for the last 5 years?

Crop	Trend of price (Tick √)		
	Increasing(1)	Decreasing(2)	The Same(3)
Rice			

13. If increasing for Q 12, why? _____

14. If decreasing for Q 12, why? _____

15. How many years you practice rice marketing _____years

16. Did you face difficulty in finding buyers when you wanted to sell? 1. Yes 2. No

17. If yes, in Q 16 is it due to:

1. Inaccessibility of market 2. Lack of information 3. Low price offer

4. Other (specify) _____

18. What did you do, when the rice you offered to the market was not sold?

1. Took to back home 2. Sold with existing price   3. Took to another market 4. Store at market

19. Who set your selling price?

1. Buyer   2. Supply and demand   3. Negotiation   4. Farmers themselves

20. When did you get the money after your sale?

1. As soon as you sold 2. Other days after sale 3. Other (specify)_____

21. How did you transport your rice from home to market?

1. Head/back loading 2 Pack animals. 3. Animal's cart 4. Vehicle. 5. Other (specify)

22. Did you know the nearby market price before you sold your rice? 1. Yes 2. No

23. If yes, did you sell your rice as what you expect? 1. Yes 2. No

24. How did you get information on supply, demand& price of rice in other markets?

	Use code	Source of information
Supply		1. Traders 2. Cooperative 3. Telephone 4. Personal
Dem and		observation 5. Radio 6. Newspaper 7. Brokers 8.
Price		Other farmers 9. Extension visits

25. How did you qualify your source of information? 1. It was reliable 2. It was timely 3. It was adequate 4. Other (specify)

26. Does your produce have preferred quality by buyers in 2015/16?   1 = Yes   2 = No

27. If no, what interventions are needed to attract better price 2015/16?

28. What are the Major problems of marketing in 2015/16?

Market constraints	1=Yes 2= No	What is your suggestion to solve each problem?
Lack of marketing cooperatives		
Accessibility of markets		
Poor information flow		
Absence of milling machine		
Excessive intermediaries		
Price seasonality		

29. What determines to sell the products to your customers?

    1. Price   2. Fair Scaling 3. Proximity   4. Others (specify)___

30. Do you negotiate on price in 2015/16?   1 = Yes   02= No

31. How did you sale your produce(rice) in 2015/16?

    1. Direct to the purchaser   3. Through commission man to the purchaser

    2. Through broker   4. Others (specify)___

32. Are there marketing cooperatives/ farmers organization who are working on rice?

    1. yes 2. No

33. If yes what services do they provide? _____

Traders' Interview Schedule

I. Socio-demographics

1. Name of trader_____ Sex_____ Age _____Years.

2. Educational level in schooling years_____

3. Marital status of trader?   1. Single   2. Married   3. Divorced   4. Widows

4. Total family size_____ Male_____ Female_____

5. Religion, 1. Muslim 2. Orthodox Christian, Protestant 4. Catholic

5. What different languages do you speak?

1. Oromic   2. Amharic   3. Tigrigna   4. Others (specify)

II. Area information

6. Woreda _____Name of Market_____

7. Distance from residence to the market____ Hrs./walking time

8. Main occupation

     1. Wholesaler   3. Processor5. Urban assembler

     2. Retailer   4. Farmer trader (village collector) 6. Others (specify) _

9. How long have you been in rice trading? _____ Years.

10. Do you participate in rice trading year round?   1 = Yes   0 = No

11. If no, at what period of the year do you not participate?

     1. Year round   3. During high supply

     2. When purchase price becomes low   4. Others (specify) ___

12. Do you practice trading other than rice?   1 = Yes   0 = No

13. Number of market days in a week? _____

14 Did you trade alone or in partnership? 1. Alone 2. Partnership 3. Others

15. What was the amount of your initial working capital when you start this trade business? _____(Birr).

16. What is the amount of your current working capital in 2015/16? ___ Birr.

17. Do you have access to credit   1. Yes   2. No

18. What is your source of working capital? _____

1. Own   2. Loan   3. Gift   4. Share   5. Others (specify)____

19. If it was loan, from whom did you borrow?

     1. Relative/family   3. Private money lenders.   5. OCSI.   7. Friends.

     2. Other traders   4. Micro finance institution.   6. Bank.   8. Others (specify) _

20. How much was the rate of interest? _____ Birr for formal, _____ Birr for informal.

21. What was the reason behind the loan?

     1. To extend rice trading. 2. To purchase rice transporting vehicles/animals.

     3. Others (specify) ___

22. How was the repayment schedule?

     1. Monthly   3. Semi-annually   5. Others (specify) ___

     2. Quarterly   4. When you get money

23. Who will buy rice from you in 2015/16?

     1. Wholesaler   3. Household consumers   6. Collectors

2. Retailers   4. Processors   5. Urban consumers

24. From where did you purchase rice in 2015/16?

     1. From village market, name of village (specify) ___

     2. From town market, name of market (specify) ____

25. For whom do you purchase rice?   1. For own   2. For others

26. How did you sale the product in 2015/16?

     1. Direct to the purchaser   2. Through broker   3. Others (specify) _

27. Who sets the price in 2015/16?

     1. Myself   2. Set by demand and supply   3. Buyers   4. Other (specify) __

28. When did you get the money after sale?

     1. As soon as you sold   3. On the other day after sale

     2. After some hours   4. Other (specify) __

29. Do you carry out any physical treatment to maintain product quality?

     1 = Yes   0 = No

30. Do you have access to transportation facility? 1 = Yes   2 = No

31. Do You have your own storage? 1 = Yes   2 = No

32. How do you attract suppliers?

     1. Giving better price   3. Fair scaling /weighing

     2. By visiting them   4. Others (specify) __

III. Purchase practice

1. From which market and supplier did you buy rice in 2015/16?

Purchased from Market,	Purchased from sellers, (use code)	Transportation to storage or selling Point(use code)	%age Share of Seller	Average quantity purchased per market in a week (qt)	How many Weeks did you operate In this market in 2015/16	average price per qt	Term of payment 1=cash 2= credit 3=advance payment

	Sup player: 1 Farmers 2. Wholesaler 3.Collecter/Assemblers 4.Urban Assemblers 5. processors 6. Retailer	Transport 1.Vehicle 2.Animal Cart 3.Pack Animal 4.Human labor 5.others

2. Who purchase rice for you in 2015/16?

    1. Myself   3. Commission agent   5. Friends

    2. Broker   4. Family members   6. Others (specify)____

3. How do you measure your purchase?

 1   By sack   2. By weighing (kg) 4. Others (specify) _

3. By 'feresula'

4. Is obtaining sufficient volume is a problem in 2015/16?   1 = Yes   0 = No

5. From which market (s) do you prefer to buy most of the time in 2015/16? _____.

6. Why have you preferred the above-mentioned supplier? 1=better quality, 2=high supply 3=shortest distance 4= other (specify) _____

7. Which are the months of the year when prices of rice are lowest?

    1.Jan-march   2. April-June   3. July-Sep   4. Oct-Dec

8. Which are the months of the year when prices of rice are highest?

   1.Jan-march   2. April-June   3. July-Sep   4. Oct-Dec

. Is your purchasing price higher than your competitors?   1 = Yes   0 = No

10. If yes, what was the reason?

    1. To attract suppliers   2. To buy more quantity   3. To kick competitors

    4. To get better quality   5. Others (specify) ____

IV. Selling practices

1. To which market and to whom did you sell rice in 2015/16

Where did you sale Market, Specify	To whom did you sell buyers , (use code)	Relations hip (use code)	%age Share of buyer	Average quantity sold per week in this market	How many Weeks did you operate in this market	average price per qt	Term of payment 1=cash 2= credit 3=advan ce Payment
			To buyer: **1.**Wholesaler 2.Collectors 3. Retailer 6.consumers **7.** Hospitals 8. University 9. Hotels 10. Restaurants 11.Enjera Bakers			Relationship: 1 The same religion 2 The same ethnic 3The same origin 4 Close relative 5Exclusive relation 6 Meet socially 7 Other (specify)

2. Who decided on your selling price 2015/16? 1. Myself 2. By the market 3. Purchaser 4. other traders 5. negotiation between me & the purchaser 6. Other (specify)

3. How did you attract your buyers?

   1. By giving better price relate to others   3. By visiting them

   2. By fair scaling (weighing)   4. Others (specify)____

4. How many regular buyers do you have 2015/16?

   1. Wholesalers_____   3. Consumers_____   5. Processors__

   2. Collectors_____   4. Retailers _____   6. Others (specify) ___

5. Do you know the market prices in different markets before you sold the rice in 2015/16?

   1 = Yes   0 = No

6. If **Q.**no. 5 is yes, what type of information did you get? 1=Price information 2= Market place information 3= Buyers' information 4= other (specify)

7. Are there entry barriers in rice trading? 1= Yes 2= No

8. If your answer to Q.7is yes, what are the reasons? 1=Capital 2= Information collusion 3= Trading licenses   4. Competition with unlicensed traders 5=other (specify)

9.Linkage with commercial value chain actors: (Multiple response is possible) 1=Farmers 2=Retailers 3=Whole sellers 4=Consumers 5=Local collectors 6= processor

10. What is your source of information? ____ 1. Traders 2. Cooperative 3. Telephone   4. Personal observation 5. Radio 6. Newspaper   7. Brokers

11. How do you qualify the reliability, timeliness and adequacy of the information you got?

    1. It was reliable   3. It was timely

     2. It was adequate   4. Others (specify) _____

12. Do you have availability of labor? 1= yes   2=No

13. What are the market opportunities for value addition? _____

1.Parboiled, 2. Branding, 3. quality milling 4. Other (Specify)

14. Are there problems on rice marketing?   1 = Yes   0 = No

15. If yes what are the problems, and your suggestion to overcome each Problem in 2015/16?

No	Problem faced	1 = yes 0 = No	What do you think are the Causes of this Problem?	What is your Suggestion to solve?
	Credit			
	Theft			
	Price setting			
	Scaling/ Weighing			
	Shortage of supply			
	Storage problem			
	Lack of demand			
	Information flow			
	Natural quality problem			
	Government policy			
	No government support to improve rice marketing	-		
	Others (specify)			

19. Are there restrictions imposed on unlicensed rice traders?   1 = Yes   0 = No

20. Indicate your average cost incurred per quintal in the trading process of rice in 2015/16

Cost of Marketing	Birr/qt.
Purchas price per kg.	
Labor employed to fill one qt and stitch/Packaging	
Load/ unload	
Brokerage	
Transportation: Vehicle	
Sorting	
License and Taxes	
Storage cost	
Storage loss	
Manufacture cost/processing cost	
Telephone expense	
Watching and warding	
Personal travel & other expense	
Others (specify)	
Total costs	
Selling price (per Kg)	

V. Marketing Services

1. Did you pay tax for the rice you purchased in 2015/16?

    1 = Yes   0 = No

2. Did you pay tax for the rice you sold in 2015/16?

1 = Yes   0 = No

3. What was the basis of tax for the rice you purchase/sale in 2015/16?

1. per sack_____ birr   3. Per basket ____ birr   5. Per kg ____ birr

    2. per quintal _____ birr   4. Fixed payment _____ birr   6. Others (specify)____

4. What is your opinion regarding the marketing fee paid in this market as compared to your business? transaction? 1. Low   2. High   3. Average 4. You don't know

5. Is rice trading in your locality needs a trading license?   1 = Yes   0 = No

6. If yes, how do you see the procedure to get the license? 1. Complicated   2. Easy

7. Did you have rice trade license?   1 = Yes   0 = No

8. How much did you pay for rice trade license for the beginning? _____Birr

9. How much is the yearly renewal payment? _____Birr

11. Did you store rice before you sold in 2015/16?   1 = Yes   0 = No

12. If yes in Q 11 for how long did you store rice in the store? Maximum for _____Hrs/days

III. Processors Interview Schedule

1.What was the amount of your initial working capital? _____(Birr).

2. What is the amount of your current working capital in 2015/16? ___ Birr.

10. Current number of employees: a) Male_____ Female _____Total _____

b) Managerial (M/F) _____Technical (M/F) _____ Laborer (M/F)____Total (M/F) _____

3. Where did you bought your rice Processing Equipment? 1) Local supplier 2) Local agent 3) Importing (specify):_____

4.Services Provided by rice processor to producer

a). De-hulling b). Polishing c) Parboiling d). Milling

5.Do you trade rice?   1) yes   0) No

6. If yes for above question, trading status a) Wholesale b) Retail C) Both

7.Do you have identified/ registered customers of rice farmers who supply paddy rice consistently? 1) Yes 2) No

8.Do you make any discount for these customers? 1) Yes 2) No

9. What is the peak processing season in your past experience?

1) Oct.-Dec 2) Jan-March 3) April-June 4) July-August

10. Do you feel breakage of rice as a problem in your processing activities of rice? 1) Yes 2) No

11. If yes for above question what do you think is the source of the problem?

_____

12.What is the source of finance for your business? 1) Equity 2) Credit 3) Both

13.If credit is taken what purpose is it used for? 1) Equipment and machinery 2) Store and processing shade constriction 3) Working capital 4) other (specify)

14. If credit is received what was your source? 1) Banks 2) MFI 3) Relatives and friars 4) Other (specify)

15. By-products of the rice processing? 1) Husk 2) Bran 3) Other (specify) --------------------

16. What do you do with the By-products of Husk?   1) for sale   2) Own use

17. If for sale current selling price Birr ----------- per Qt.

18. What do you do with the By-products of Bran?   1) for sale   2) Own use

19. If for sale current selling price Birr ----------- per Qt.

20. Indicate your average cost incurred per quintal in rice processing in 2015/16

Cost of Marketing	Birr/qt.
Labor employed to fill one qt and stitch/Packaging	
Load/ unload	
Wear and tear (maintenance cost)	
Labor (machine operator)	
Brokerage	
Transportation: Vehicle	
Sorting	
License and Taxes	
Storage cost	
Storage loss	
Cost of electricity/annul	
Telephone expense	
Watching and warding	
Personal travel & other expense	
Other cost (water, warehouse)	
Total costs	

IV. Interview Check List for Farmers' Focus Group Discussion

Actors involved and the role they played:

1. Producers

− When you did first introduce about rice production practices in your locality? _____Year

− From where these rice production practices came from/ who first introduced you about the

Rice producing practice?

− Production trend in the area (increasing, decreasing, etc.)

-Why you decide to produce rice in your area?

− What are the challenges you faced in implementing production practices; crop husbandry

practice (land preparation, sawing, weeding and harvesting), input utilization (fertilizer

and chemicals), pre and post-harvest handling, etc. How do you adapt the recommendation given by the extension or research organization?

Input supply

- ❖ Have you got the required agricultural inputs in Quality, adequacy, timeline and price?
- ❖ From where and how you get improved seeds (formal and informal sources), fertilizer,

    chemicals and farm implements?

- ❖ Which sources do you like to get improved seeds, fertilizer, chemicals and farm

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implements? And why?
- ❖ Where do you get the seeds from? (if multiple sources: why?) Where do you prefer to get your seeds from? Why?
- ❖ What information do you have about the seed? (variety name, source, production traits,

  consumption traits)

- ❖ Is there a problem in getting these inputs?
- ❖ What do you recommend/suggest to alleviate the problems and get the service required?

Credit

- ❖ From where you have got credit (formal and informal sources) and which source is good for you and why?
- ❖ What are the requirements/criteria to get credit from formal institutions?
   And what is your suggestion on the criteria?
- ❖ In what condition you obtained the loan (individual, group, collateral bases), which one   is good for you?
- ❖ Which credit institutions are implementing group lending system?
- ❖ What are the predetermined criteria for group formation?
- ❖ What is the interest rate? Is it good for you? If not, why? Is there any difference in interest rate levels of these institutions?
- ❖ When and how do you repay the loan you get (terms of repayment period)?
- ❖ What limitations/challenges you encountered to get credit? And what alternative solution do you suggest?

Marketing

- ❖ To whom do you typically sell your rice?
- ❖ From where do you get input and output market information?
- ❖ What are the challenges and opportunities you faced in input and output marketing?
- ❖ What alterative solutions do you suggest to alleviate the problems and use the available

  opportunities**?**

Consumption

- ❖ Do you have enough knowledge about the food preparation and consumption of rice? If yes from where do you get such information/knowledge?
- ❖ Have you ever used rice for household food consumption?
- ❖ what is the main problem on rice consumption?
- ❖ What suggestions do you have to avoid those problems and enable you to use rice for food consumptions? _____

- ❖ what quality requirement do you consider for; rice product?
- ❖ What do you think about the feeding quality of rice in your area?
- ❖ If you are using rice for household food consumption, how do you use it?
- ❖ What problems you encountered to use rice for house hold consumption (for sale and food)?
- ❖ What do you feel about availability/absence of rice polisher and thresher?
- ❖ Have you attempted to get rice polisher in group by taking credit? If no, why?
- ❖ What alternative solutions do you have to improve the development of rice in yourarea**?**

Checklist for Supportive Actors

Organizational profile

1. Name of the organization: _____

2. Role of the interviewee in the organization:

3. Location and contact information: Region/Zone/Woreda/ Kebele/ P.O. Box/telephone

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

5. Organizational mission, vision and objectives

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

7. What are the challenges and opportunities you faced in undertaking those roles assigned to your organization?

8. Linkage /interaction/ partnership/ coordination between actors

9. What are the threats for rice extension service and input supply?

10. What are the most important constraining infrastructures affecting rice marketing?

3. What are the possible solutions to correct these problems?

4. What is the role of FTCs on rice production and marketing? How?

Thank you very much for responding to the questions!!!