ANALYSIS OF RICE PROFITABILITY AND MARKETING CHAIN: THE CASE OF FOGERA WOREDA, SOUTH GONDAR ZONE, AMHARA NATIONAL REGIONAL STATE, ETHIOPIA

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ANALYSIS OF RICE PROFITABILITY AND MARKETING CHAIN: THE CASE OF FOGERA WOREDA, SOUTH GONDAR ZONE, AMHARA NATIONAL REGIONAL STATE, ETHIOPIA

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As members of the Examining Board of the Final M.Sc. thesis Open Defense, we certify that we have read and evaluated the thesis prepared by **Astewel Takele**, entitled **" Analysis of Rice Profitability and Marketing Chain: The Case of Fogera Woreda, South Gonder Zone, Amhara National Regional State, Ethiopia"** and recommend that it be accepted as fulfilling the thesis requirement for the degree of: Master of Science in Agriculture (Agricultural Economics).

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DEDICATION

I dedicate this thesis manuscript to my beloved Mother Alem Kassa, who had played major role in nursing and educating me, and my Brothers and Sisters that brought me to this success.

STATEMENT OF THE AUTHOR

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ACRONYMS AND ABBREVIATIONS

ACSI	Amhara Credit and Saving Institute
ANOVA	Analysis of Variance
ANRS	Amhara National Regional State
BOFED	Bureau of Finance and Economic Development
CC	Contingency Coefficient
CSA	Central Statistical Authority
GMM	Gross Marketing Margin
GO's	Government Organizations
IAR	Institute of Agricultural Research
ILRI	International Livestock Research Institute
IPMS	Improving Productivity and Marketing Success
LDC	Less Development Countries
MEDaC	Ministry of Economic Development and Co-operation
MoARD	Ministry of Agriculture and Rural Development
NERICA	New Rice varieties for Africa
NRRDS	National Rice Research and Development Strategy
OLS	Ordinary Least Squares
PAs	Peasant Administrations
RDBOA	Rural Development Bureau of Agriculture
S-C-P	Structure -Conduct and performance
TLU	Tropical Livestock Unit
VIF	Variance Inflation Factor

BIOGRAPHICAL SKETCH

The author was born to his father Ato Takele Dessie and his mother W/o Alem Kassa on 8 December 1973, in Bahir Dar of Amhara Regional State. He attended elementary school at Tserse and Fasilol from 1976-1982, and attended his secondary education at Tana Haik comprehensive high School from 1985-1988 at Bahir Dar. He then joined the then Alemaya University of Agriculture in September 1996 and graduated in B. Sc. Degree in Agricultural Economics in July 1999.

After graduation, he was employed at various governmental offices at different positions for eight years. He joined the School of Graduate Studies at Haramaya University for his postgraduate studies in the field of Agricultural Economics in 2006/7.

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ABSTRACT

This study examined the profitability and marketing chain of rice in Fogera Woreda, South Gondar zone of Amhara Regional State. From the woreda, 14 peasant associations (PAs) producing rice were selected purposively and it is stratified based on the existing rice production farming system (upland and lowland), from each farming system two PAs were selected randomly. Then samples of respondents were selected randomly proportional to its population size. A total of 165 sample farm households were selected from the four PAs for the interview. In addition, market related data were collected from 25 assemblers (20 rural and five urban marketers) and six wholesalers and 10 millers at Woreta market, 21 retailers and five urban distributors at Bahir Dar market and 29 retailers at Gondar market. Both econometrics and descriptive analyses consistency used in this study. Results from the descriptive analysis show that wholesalers and millers are the most important buyers of rice from producers, about 45% and 27%, respectively. Farmers travel, on average, 1.6hr to the woreda market to sell their rice produce. The market concentration ratio is 0.77, showing that the rice market is oligopsonsitic. High initial capital and prior control of farmers is a barrier to entry in rice trading. Results from the Heckman's two step selection model show that, market information access, quantity of paddy produced, total value of livestock unit and extension contact with farmers increase household's probability of selling rice. Household head's education level and total quantity rice produced were positively affecting the level of rice sale. However increase in family size decrease the volume of rice supply to the market per household. The Tobit result also revealed that quantity produced is jointly affected both the probability of market participation and volume of supply. The cost benefit analysis of rice production shows that rice production is a profitable business for farmers. The net income obtained from production per hectare of rice is Birr 5006.48. The cost margin indicate that producers obtain on average 35.97 Birr per qt, assemblers get 139 Birr per qt, millers a profit of 5.4 Birr per qt, wholesalers 9 Birr per qt, urban distributors birr 3.88 Birr per qt and

retailers around 19 Birr per qt respectively. Though, assemblers get more profit, they also incur more marketing cost. The possible recommendations forwarded are strengthening market information and extension system, intervention to increase production and productivities by using improved agricultural inputs, promoting education and trainings about rice production and marketing and finally promoting family planning are the recommended policy implications.

1. INTRODUCTION

1.1. Background

The economy of Ethiopia is largely dependent on agriculture. The sector contributes 43.2% of the country's Gross Domestic Product (GDP), and about 85% of the population is engaged in it (CSA, 2004). Ethiopia has a total land area of about 112.3 million hectares (CSA, 1998). Out of the total land area about, 16.4 million-hectares are suitable for the production of annual and perennial crops. According to Ministry of Economic Development and Cooperation (MEDaC), crop production is estimated to contribute on average about 60%, livestock accounts around 27% and forestry and other sub-sectors around 13% of the total agricultural value.

Rice belongs to the family "*Gramineae*" and the genus "*Oryza"*. There are about 25 species of *Oryza*. Of these only two species are cultivated, namely *Oryza sativa Linus* and *Oryza glaberrima Stead*. The former is originated from North Eastern India to Southern China but has spread to all parts of the world. The latter is still confined to its original home land, West Africa. Rice *(Oryza sativa Linu)* is one of the main staple foods for 70% of the population of the world. Africa produces an average of 14.6 million tonnes of rough rice in the years 1989-1996 on 7.3 million ha of land equivalent to 2.6 and 4.6 percent of the world total production and rice area respectively. Africa also consumes a total of 11.6 million tonnes of milled rice per year, of which 3.3 million tonnes (33.6%) is imported (FAO, 1996).

Rice is among the important cereal crops grown in different parts of Ethiopia as food crop. The country has immense potentials for growing the crop. It is reported that the potential rice production area in Ethiopia is estimated to be about 5.4 million hectares. According to National Rice research and document strategy (2009), the trend in the number of rice producing farmers, area allocated and production shows high increase rate especially since 2006. The number of farmers engaged in rice production has increased from about 53 thousand in 2006 to about 260 thousand in 2008. Similarly, the area allocated has increased from about 18 thousand in 2006 to about 90 thousand ha in 2008 along with production

increase from about 150 thousand tones in 2006 to about 286 thousand tones in 2008. As presented in Table 1, there is an increased trend in area allocation and production of rice in Ethiopia (NRRDS, 2009).

Table 1. Area covered, yield and productivity of rice in Ethiopia

Season	No farmers	Area(ha)	Production(ton)
2006/07	53,902	18,527	na
2007/08	149868	48,966	122,302
2008/09	260328	90,547	285,924

Note: na=data not available Source: NRRDS, 2009

Shahi (1985) also explains that Ethiopia does not grow rice at present, but around 250,000 ha in the near future and around 1 million ha in the distant future could come under rice cultivation. According to Tareke (2003), four rice ecosystems were identified in Ethiopia. These are: upland rice, rain fed lowland rice (Hydromorphic), irrigated lowland ecosystem, and paddy rice (with or without irrigation).

Out of the total national production of rice in 2008, 40% is produced in the Amhara regional state, 1.14% in Tigray region, 0.41% in Benshangul-Gumz, 7.23 % in Oromia, and 1.55 % in Gambella ,13.33% in Somalia, 27.18% Southern region (NRRDS, 2009).

Bull (1988) estimated that about 3.5 million hectares of vertisols is found in the Amhara region, which remains waterlogged for most of the year and possible to produce food crops in these soils through better water management (drainage) and use of water loving crops such as rice.

The discovery of wild rice in the Fogera plain in Ethiopia was the cause for rice production activity in the Amhara region. The pilot production was promising when Jigna and Shaga farmer cooperatives (eye-opener and risk-taker PAs) located in Dera and Fogera woredas started large-scale production of rice with the technical support of North Korean experts. However, some technical and marketing problems hindered the production and rice production was ceased when farmers' cooperatives were dismantled in 1990 (Getachew, 2000 unpublished).

Due to the demand for food and improving farmer's awareness, Fogera and Metema woreda of the Amhara region, the number of households involved in rice production and its area coverage is also increasing. According to report of NRRDS (2008), in the Amhara regional state the estimated area and production of rice was 52985 ha and 140,235 tonnes, respectively.

Attempts have been made to improve the rice varieties in the Fogera area. The popular upland rice variety in the Fogera plain was *X-Gigna (N. KOREA)* but now three rice varieties *Kokit (IRAT-209), Tigabe (IREM-194*) and *Gumara (IAC-164)*) were released for Fogera and similar areas. Other introduced varieties like New Rice for Africa *(NERICA)* are being tested for adaptation trial (Sewagegne, 2005).

According to IPMS (2005), rice is sold in too many regions in the country, including Dire Dawa, Somalia and Gambella. There is also a high potential for marketing this crop even beyond its current marketing area. However, there are problems associated with rice marketing. According to Tareke (2003), these marketing problems are related to knowledge of grading, market information, lack of group marketing options (coop/unions), use of storage as marketing strategy, excessive intermediaries, price seasonality, limited number of buyers, and lack of markets.

This shows that without convenient marketing systems, boosting up of production does not stimulate farmers to increase outputs at household level in particular and at national level in general. Under traditional market structure which is characterized by failure to reflect market signals, absence of quality, excesses intermediaries and imperfect competition, it calls for studying the market structure from production up to the end consumers. This study therefore helps to identify the determinants of rice supply for possible interventions and policy implications.

1.2. Statement of the Problem

Agricultural marketing is the main driving force for economic development and has a guiding and stimulating impact on production and distribution of agricultural produce. The increasing

proportion of the population living in urban centers and rising level of income require more organized channels for processing and distributing agricultural products.

The weak performance of agricultural markets (both input and output markets) in Ethiopia has been recognized in various studies as a major impediment to growth in the agricultural sector and the overall economy (Eleni *et al*., 2004, cited in Dawit, 2005). Wolday (1994) also explained that in Ethiopia the performance of agricultural marketing system is constrained by many factors such as: poor quality of agricultural produce, lack of market facilities, weak extension services which ignored marketing development and absence of marketing information.

Dawit (2005) also explained that the flow of agricultural produce from the producer to the consumer involves a long chain of intermediaries, who, without creating value-added, merely keep on stretching the chain. He further pointed out; the involvement of these superfluous intermediaries has constrained the development of the sector and deprived the farmers of equitable returns. Mohammed (2007) also clearly states that the knowledge gaps in the crop sector in Ethiopia were inefficiency of the market system (which includes inefficient marketing chain, improper transmissions of price to producers and the type of product produced by farmers i.e. whether it satisfy the consumers taste and preference).

Improving marketing facilities for agricultural crops in general and rice sector in particular enable farmers to plan their production more in line with market demand, to schedule their harvests at the most profitable times, to decide which markets to send their produce to and negotiate on a more even footing with traders. Besides, a proper rice marketing system is also enables, to increase production and market efficiency.

Under the current situation of the rice sector in Ethiopia, the research and development gaps were identified in different producing regions of the country. Fogera Woreda is one the main producers of rice which contributes 58% of the region and 28% of the national production of rice.

In the Woreda rice is one of the food crop produced by the majority of the farmers, after teff, maize and finger millet. Study conducted by Gebremedhin and Hoekstra (2007), indicated that 72% of the households are producers of rice and about 50% of the farmers sell rice in the area.

However, the nature of the product on the one hand and the lack of organized market system on the other have resulted in low producers' price. Besides, there are challenges associated with rice production and marketing mainly on Knowledge of grading, market information, excessive intermediaries, price seasonality, limited number of buyers, and lack of markets (Tareke , 2003).

Despite the significance of rice in the livelihood of many farmers and income generating crop in the study area, it has not been given due attention. It is only recently that few studies have been done on rice. However, most of these studies have focused on production and were limited to a specific area and marketing aspects. Systematic and adequate information on the process of market competition, on market structure, conduct, performance; not well identified. Further more, rice marketing channels and their characteristics have not yet been studied. Hence, this study attempts to fill in these gaps.

1.3. Objectives of the Study

The over all objective of this study is to analyse the rice marketing chains in Fogera woreda. The specific objectives are:

1. To examine the determinants of household's rice supply to markets
2. To analyze the structure of rice productions costs and determine profitability of rice production in the study area.
3. To analyze the structure, conduct and performance of rice market.
4. To examine the support services (like extension, input supply, credit, and marketing services) in rice production and marketing.
5. To identify major constraints and opportunities in rice production and supply to market.

1.4. Scope of the Study

The study is limited to Fogera Woreda, ANRS, with specific crop category, rice. The commodity approach to market study will be followed to analyze the marketing chains of rice. It emphasized on different market levels, roles of market players in the market channels, price setting, the cost benefit analysis of production of rice, cost-margin for producers and traders buying and selling strategies, storage, transport and market information will be the center of the study.

1.5. Significance of the Study

Marketing is the most important aspect in the development process. This is obviously due to the fact that development basically means larger size productive activities in the economy. But we can not have more of production unless the goods produced are actually sold out and selling depends on the proper marketing conditions (Prasad and Prasad, 1995).

The importance of this study is to producers and to all actors in the marketing system. The performance of marketing of rice has impact on the income of producers, processors, traders and consumers too. This information could help farmers, consumers, traders, investors, and others, who need the information for their respective purposes. Since Fogera woreda is one of the selected growth corridor woreda in the region, (or rice basket of the region), detailed information on how the rice market is currently functioning and identifying the pros and cons of the marketing system helps governmental and non-governmental organizations to design appropriate intervention measures. Besides, the document also would serve as a reference for researchers to embark upon similar or related work in other parts of the country. Since Adet Agricultural Research Center was currently assigned or nominated to coordinate the national rice research work in the country, this study will also partially fill the gap in this regard.

1.6. Limitations of the Study

Collection of the traders' data was the most difficult task during the survey. Most of the time traders are reluctant to give appropriate information as they link it with tax fees. Besides, they are busy and time specific during interview. Some traders also appointed some more days to fill the questionnaire. Despite being aware of the effect of quality on price, we are able to examine its impact because the intermediaries purchase and sell rice based on their own criteria (this might be a problem in most of the agricultural markets in Ethiopia).

1.7. Organization of the Study

With the above brief introduction, the remaining part of the thesis is organized as follows. Chapter 2 presents review of literature on marketing analysis from different sources. Subsequently, description of the study area and methodologies are presented in chapter 3. In chapter 4, both descriptive and econometric results are presented and discussed in detail. The last section, chapter 5, presents the summary, conclusion and policy implications of the findings of the study.

2. LITERATURE REVIEW

2.1. Definitions of Basic marketing Concepts

2.1.1. Market and marketing

The term market has got a variety of meanings. Abbott and Makeham (1979), defined market as an area in which exchange can take place. It also means the people living there who have the means and the desire to buy a product. Thus, there can be a “local" market, a "domestic" market, and a “world" market. The limits of this kind of market are set not by a physical boundary fence but by the ease of communication, transportation, political and monitory barriers to the free movement of goods and money.

Mendoza (1995) also defined marketing as a system because marketing usually comprises several interrelated structures along the production, distribution and consumption units underpinning the economic process. According to Casavant *et al.* (1999), marketing encompasses all of the business activities performed in directing the flow of goods and services from the producer to the consumer or final user. These activities are usually classified into six stages. These are: production, assembly, processing, wholesaling, retailing and consumption.

According to Kotler (2003), marketing is a social process by which individuals and groups obtain what they need and want through creating, offering, and freely exchanging products and services of value with others. For managerial definition, marketing has often been described as ‘the art of selling products’, but people are surprised when they hear that the most important part of marketing is not selling, i.e., selling is only the tip of the marketing iceberg.

2.1.2. Marketing channels

According to Giles (1973), the term 'channels of distribution' refers to the system of marketing institutions through which goods or services are transferred from the original producers to the ultimate users or consumers. Most frequently a physical product transfer is involved, but sometimes an intermediate marketing institution may take title to goods without actually handling them.

Kohls and Uhl (1990), cited in Duc Hai, (2003) define marketing channels as "alternative routes of product flows from producers to consumers". They focus on the marketing of agricultural products, as does this study. Their marketing channel starts at the farm-gate and ends at the consumer's front door. The marketing channel approach focuses on firm's selling strategies to satisfy consumer preferences.

Kotler (2003) also explains marketing channels as a set of interdependent organizations involved in the process of making a product or services available for use or consumption. Most producers do not sell their goods directly to the final users; between them stands a set of intermediaries performing a variety of functions. These intermediaries constitute a marketing channel also called a trader channel or distribution channel.

2.1.3. Market chain, supply chain and value chain analysis

According Harahap (2004), Undertaking a sub-sector or market chain analysis is a way of gaining insight into the (1) operations of specific market channels while focusing on their growth potential, (2) activities and efficiency of actors along the chain, (3) business support services involved, and (4) policy and regulatory frameworks. With the information from the analysis, opportunities and constraints can be identified within specific market chains, and ways can be seen to improve a defined client's capacity to compete more effectively.

Lundy *et al*. (2004) also clearly stated that a market chain is used to describe the numerous links that connect all the actors and transactions involved in the movement of agricultural

goods from the farm to the consumer, it means agricultural goods and products flow up the chain and money flows down the chain.

The term supply chain analysis is used to refer to the overall group of economic agents (a physical person such as a farmer, a trader or a consumer, as well as legal entities such as a business, an authority or a development organization) that contribute directly to the determination of a final product. Thus the chain encompasses the complete sequence of operations which, starting from the raw material, or an intermediate product, finishes downstream, after several stages of transformation or increases in value, at one or several final products at the level of the consumer (FAO, 2005).

On the other hand, a similar terminology with a market chain is value chain. The term value chain has been used for more than twenty years. It refers to the full ranges of activities needed to bring a product or a service from conception, through production and delivery to final consumers. A value chain can be the way in which a firm develops competitive advantages and creates shareholder value. It can also demonstrate the interrelation and dynamic between individual businesses. A narrow economic-based definition of value chains involves identifying the serious of value-generating activities performed by an organization. A broader system approach looks of activities implemented by various actors, from primary producers, harvesters, processors, traders, service providers, and upstream suppliers to the down stream customers.

Value chain analyses encompass issues such as organizational, coordination, power relationship between actors, linkages, and governance aspects. The value chain approach has been a very useful analytical tool for taking a more objective look at an organizations position in a market. It allows for examining the consequence of empowering one group (the producer) and identifying how to link them to importers and consumers. It enables analysis of the implication of who does what, at which stage in the chain, and what this means for risk, capital needed and margins. It can help to identify with whom to form partnership in the chain (Ingram, 2009).

2.1.4. Marketing efficiency

Market efficiency is defined as the movement of goods from producers to consumers at the lowest cost consistent with the provision of the service that consumers desire and are able to pay for. The efficiency of a market can be evaluated (one approach) through analyzing the existing channels according to price and service provided. The prevailing price should reflect cost plus a profit margin and the profit must be just sufficient to reward investment at the going rate of inters rate. The quality of service should be neither to high nor too low in relation to cost and consumers desire. Factors that count for efficiency can also be evaluated by examining marketing enterprises for structure, conduct and performance (Abbott and Makeham, 1981).

The marketing efficiency model is stated from shepherd's formula. Market efficiency of 100% is perfect efficiency. While above 100% is excess profit. Shepherds formula is given by (Oscar and Chukwuma, 2008).

$$E = \frac{V}{I} - 1 ,$$

Where E = market efficiency,
V = Value of marketed Rice (value added or profit),
I = Total marketing cost.

2.1.5. Marketable Surplus

According to Atteri *et al.* (2003), marketable surplus can be defined as the residual production of agricultural produce left with the producer after meeting his requirements of family consumption, farm needs (seed and feed), kind payments, etc. The importance of increasing marketable surplus for meeting the increasing demand for food, raw materials and other agricultural products by the non-farming population is well recognized. If the size of marketable surplus in an economy does not rise, it may well contribute a fundamental limiting factor on the tempo of development by reducing supplies available for urban consumption, for industries and exports.

2.2. Fundamental Approach to the Study of Marketing

Marketing economists have developed various approaches to study marketing that can be serving as the framework (Brason and Norvell, 1983; Mendoza, 1995). According to Mendoza (1995) marketing studies adopt different view points and approaches. For instance, the functional or marketing functions approach, the organizational or institutional approach covering all market participants, the commodity sub-system approach which combines the previous two approach; the post harvest approach which analyzes all harmful or loss-provoking elements and other causes in the transfer of products and mixed system approach.

According to Casavant *et al.* (1999), the roll of marketing and marketing firms will be explained based on functional, intuitional, commodity system, and structural-evaluation approaches. They explained that each of these approaches is quite traditional and has evolved over time under the writings of various authors

The functional approach is the study of activities performed in changing the product of the farmer into the product desired by the consumers. It involves the business activities performed by firms in the marketing system. The most common classification of the functions performed are exchange functions, physical and facilitating function. This approach allows easy identification of the utilities being created and serves to identify the activity being examined in the other approaches.

Institutional approach is the second very common approach to studying marketing which emphasizing on who is doing the market function. The institutional approach identifies the business organization and managers that add utility to the product. These are the people often considered “parasitic middlemen” by agricultural producers. This middlemen are classified as merchant middlemen (retailers, wholesalers), agent middlemen (broker and commission men), speculative middlemen (buy and sell on their own account but expect profit made from price movement), processors, manufacturers and facilitators.

Another approach receiving less emphasis in recent years is the commodity approach. This approach simply follows one product, such as cotton, and studies what is done to the commodity and who does it as it moves through the marketing system. This approach is quit simple and allows both functional and institutional approach to be combined. It is extremely useful to the person who is interested in only one product since it does allow in-depth analyses. However, this is also a disadvantage because it ignores between product and market alternative and also ignores multi-product firms. Indeed it is now rare to see a large, institutional, cultural marketing group handling only one commodity.

A more recent approach to emphasize the system of marketing, dwelling on the interaction of subsystems rather than on individual function or firms is the system approach. This behavioral system allows systems to be identified with the particular problem being addressed. Systems type include input-output, which identifies motives and means of affecting the input–output ratio. The obvious disadvantage of this method is that it is abstract in nature and the reliance on intimate knowledge of individual's firm characteristics and behavioral interactions. Such data and on intimate knowledge is seldom available.

The last approach is the structural-evaluation approach. This approach evaluates the ultimate performance of the marketing system by examining the level of competition existing in the industry. The industry structure, including the number and size of firms, is combined with firm conduct, the price behavior, advertising and product development to denote a performance that can be evaluated as good or bad. This approach is used extensively by government regulatory agencies to achieve the goods of competition and avoid the evil of monopoly power. However, the lack of precise norm against which to judge performance has caused a minimal use of this approach by economists studying marketing.

2.3. Review of Empirical Marketing Studies in Rice and Related Crops

Many studies conducted in analyzing the market participation and volume of sale in different crops. Abay (2005) and Rehima (2006) studied the market participation of vegetables and pepper marketing at Fogera and Siltie Zone, respectively. Their studies indicate that both

where used Heckman two step model to identifying the factors that affect the market participation and volume of sales. The results show that distance from main road, frequency of extension contact and number of oxen were found significant for onion while experience of the farmers and distance from road were significant for tomato. The identified variables found in pepper marketing study were pepper production, crop yield of the households and extension contacts. Similarly, Makhura (2001) determined the effect of transaction costs on market participation in the four commodities horticulture, livestock, maize and other field crops in South Africa. He estimated by following Heckman two-step procedure (heckit). The variables were household endowment, access to information, household characteristics and interaction factors. He also used Tobit model to answer the two questions by identifying the factors affecting the decision to participate and the level of participation at the same time.

In connection to the above studies Gebremedhin and Hoekstra (2007) identified determinants of household's market participation of three crops (teff, wheat and rice) from three districts of Ethiopia (Ada, Alaba and Fogera). For analysis, they used community level and household level data. At the household level, Probit model was used to analyse the determinants of household choice to produce these market oriented crops. Also Heckman two-steps estimation was applied for the two crops (due to data availability rice result was not given) and the result shows that distance to market place didn't have effect on market orientation, there was a U-shaped relation between age of household head and market orientation of household in the cereal crops, availability of cultivated land, traction power, and household labour supply, are important factor that induces households to be market oriented.

A survey by Tesfaye *et al*. (2005) identified the challenges of the rice production, utilization and marketing of rice at Fogera, Dera and Libokemke districts. The studies pointed out both production and market constraints and more recommendations were forwarded. On the same area, Wolelaw (2005) identifies the main determinants of rice supply at farm level. The study uses Cobb Douglas production function model to estimate the limiting factors. The result that identified were, the current price, one year lagged price, actual consumption in the household, total production of rice in the farm, distant to the market and weather variables were significant to influence the supply of rice. A similar study on production part, Moses and

Adebayo (2007), examined the factors determining rainfed rice production in Adamawa state (Nigeria). Production function analysis was used to analyze the factors. The result shows that two of the variables used (farm size and seed) were significantly affect the production. Also resource productivity analysis revealed that seed was over utilized, while land and herbicide were underutilized. Decreasing the quantity of seed use and increasing the size of land and quantity of herbicide respectively could increase efficiency.

Duc Hai (2003) also studies the organization of the Liberalized rice market in Vietnam. The result shows that the major rice market places were competitive. That is (1) no barriers to entry are detected that influence the formation of prices; (2) there is no concentration of market shares in the hands of private companies; (3) product differentiation is not a major issue in the market; (4) information is accessible for traders. However, in the case of large-scale millers/ polishers, important barriers to entry concern access to capital, an unstable output market and proper milling technology. The study by Harahep (2004), Rice chain study in farmers' community in North Sumatra/Indonesia, shows that paddy/rice distribution was one factor that determines rice supply in consumer level. Main actors in conventional rice chains were the capital owner both in village level (small rice chain owner, and paddy retailer) and in outside village level (whole seller and big rice mill owner). These owners controlling the chains implement strategies such as a) giving credit to peasant for production and even living cost, and (b) developing human relationship with peasant. Within these strategies, the owner of chain structurally, made peasant in a high dependency to them.

2.4. Rice Research in Ethiopia

The discovery of wild rice in the Fogera plain and Gambella areas in early 1970's has initiated different governmental and non-governmental organizations to start adaptation trials on cultivated rice in different parts of the country such as Fogera plain, Chefa, Gambella, , Melka Werer, Lante, Pawe (Getachew, 2002). The Americans, Japan Oversea Cooperation Volunteers' (JOCV), Institute of Agricultural Research (IAR), Agricultural Development Department (ADD) of the Ministry of Agriculture, Tana Beles Project (TBP), Ethiopian Water Construction Authority (EWCA) International Institute of Tropical Agriculture (IITA)

and the North Korean agricultural experts were involved in rice research up to late 1980's and they came up with encouraging results. On average, 6 tones per hectare grain yield was recorded under experimental station conditions (Getachew, 2002).

Some "improved varieties" had been released informally and extended in to the resettlement areas in Gambella and Pawe for demonstration and large scale production. In the Fogera plain of the Amhara Region also the Jigna and Shaga farmers' producers' cooperatives started large scale production of rice with the technical support of North Korean agricultural experts. The extension program of rice was very successful. However, due to the liquidation of farmers' producer's co-operatives and the evacuation of rice producers from the resettlement areas around 1990's, the rice research, extension and production activities were weakened.

In 1993, the Ministry of Agriculture proposed a new rice research and extension program and Fogera plain was selected for its implementation. The program was handled by the Bureau of Agriculture of the Amhara National Regional State. The Bureau was conducting the research activity using the introduced rice varieties from IITA. Rice variety demonstration was also conducted in different potential areas of the region using the variety called *X-Jigna*, which was introduced and informally released by North Korean agricultural experts

In the late 1990's rice was first cultivated by farmers in Fogera Plain and Pawe with the support of North Korean Project and Tana-Beles Italian Project, respectively. After the phase out of these projects rice production in Fogera Plain has been continuously and enormously expanded and now becomes the most economical crop of the area. Following the introduction of rice the Fogera Plain has been transformed from year-after-year grain shortage and food insecurity to surplus grain producing one.

There was initially one popular upland rice variety in the Fogera plain known as *X-Gigna* but now three rice varieties (*Kokit, Tigabe and Gumara*) were released by Adet Agricultural Research Center for Woreta and Metema areas in 1999/2000. New rice varieties *(NERICA*) were introduced in the region and were evaluated in the past and some of them are currently introduced in the farmer's field (Sewagegne, 2005; Taddese, 2005*)*.

2.5. Rice Ecosystem and Production Trend

Rice ecosystem*:* Rice is grown in the tropical and sub tropical regions of all continents. Because of its long history of cultivation and selection under diverse environments rice has acquired a broad range of adaptability and tolerance. Its cultivation extends over a wide range of climatic, soil and hydrological conditions. One of the main reasons for this wide range of climatic conditions is the genetic diversity of rice cultivars (Onwueme and Sinha, 1991).

Rice produced in Africa in the following five ecosystems: (1) Dry land (rain-fed upland), (2) hydromorphic (rain-fed lowland), (3) Mangrove swamp, (4) Inland swamp, and (5) Irrigated ecology. The various ecosystems face many constraints. Some of these constraints are specific to particular ecosystems while others are general and cut across ecosystems and regions.

Production trend: Due to the demand for food security and improving farmer's awareness, Fogera and Metema woreda of the Amhara region, the number of households involved in rice production and its area coverage is also increasing. According to Report of NRRDS (2009) in the Amhara regional state the estimated area and production of rice for farmers was 52985ha and 140135 tonnes respectively.

Table 2. Area and production of rice and participants of farmers, 2008

	Participant farmers	Area (ha)	%	Production (ton)	%
Amhara region	211440	52985	58.52	140135	49.01
Tigray region	3600	1271	1.40	3286	1.15
Benshangual Gumuz	1474	362	0.40	1181	0.41
Oromiya region	22036	5200	5.74	20676	7.23
Somali region	5154	9920	10.96	38120	13.33
Southern region	15741	18,721	21	77,723	27.18
Gambella region	657	1314	1.45	4,456	1.56
Total	260328	90,547	100	285,924	

Source**:** Report of NRRD, 2009

Rice is a unique food crop having several advantageous features: it grows under flooded and submerged conditions where other crops can not so, (2) because of its C_4 nature it has high

capacity of harvesting solar radiation, which is normally excess, and thereby it has high yield potential up to 50 quintals/ha under rain-fed and 100 quintals/ha under irrigation, (3) as contrast to many cereals rice is suitable for flood and furrow irrigation, (4) it is also one of the few crop plants that can grow on the same land year after year without serious soil problems, (5) it also grows under a wide range of altitude, temperature, soil acidity and alkalinity.

Due to its comparative advantage of productivity from other food crops farmers in the Fogera woreda producing rice mainly for consumption and for market. Its productivity is more attracting to allocate more land for rice production. In the Woreda now there are 14 PAs which are currently major rice producing area. Table 3 shows the number of PAs, participant farmers, production trend and productivity for the last 15 years.

Table 3. Rice production trends in Fogera Woreda of the Amhara region

Cropping year	Number of PAS	Participants	Total area(ha)	Production (qt)	Productivity (quintal/ha)
1993/1994	2[A]	30	6	160	20
1994/1995	5	256	65	1625	25
1995/1996	5	494	130	1640	13
1996/1997	5	1374	487	14510	30
1997/1998	5	2957	1113	16127	15
1998/1999	11	4445	1670.5	41908	35
1999/2000	13	6158	1968	60411	35
2000/2001	14	9413	2907	66830	35
2001/2002	14	9796	3037	106295	35
2002/2003	14	11032	3346	117110	35
2003/2004	14	11583	4239	139300	35
2004/2005	14	12162	6378	288765	35
2005/2006	14	12770	6871	274860	45
2006/2007	14	12930	8014	344739	45
2007/2008	14	17300	9213	417735	45

Source: Fogera Woreda Agricultural and Rural Development Office, 2008

[A] - are Jigna and Shaga kebeles (cooperatives) which are an eye-opener and risk- taker PAs in the production of rice for the first time in the Fogera woreda.

2.6. Structure-Conduct-Performance Approach

Structure, conduct, and performance (SCP) analysis was developed by Bain (1968). This theory tells us that the market structure (the environment) determines market conduct (the behavior of economic agents within the environment) and thereby sets the level of market performance. It is an attempt to compromise between formal structures of economic theory and empirical observations of organizational experience in imperfect markets. It is a standard tool for market analysis (Duc Hai, 2003).

According to Kizito (2008), SCP is an analytical approach or framework used to study how the structure of the market and the behavior of sellers of different commodities and services affect the performance of marketing, and consequently the welfare of the country as a whole. The definition of structure, conduct and performance differs from one author to the other, depending on the sector and region being studied and the perception of the researcher.

A. Market structure:

Bain (1968) as cited in Duc Hai (2003) says market structure is defined as "the characteristics of the organization of a market which seem to influence strategically the nature of the competition and pricing within the market.

Abbott and Makeham (1979) define market structure as the market behavior of the firms. In what way they compute? Are they looking for new techniques and do they apply them as early as practicable? Are they looking for new investment opportunity or they disinvesting and transforming funds elsewhere?

In general, market structure can be studied in terms of the degree of seller and buyer concentration, the degree of product differentiation, the existence of entry and exit barriers, and the power distribution (Scott, 1995; Duc Hai, 2003).

Structural characteristics may be used as a base for classifying markets may be perfectly competitive, monopolistic or oligopolistic Perfect computation is an economic model of market possessing the following characteristics: each economic agent's acts as if price is given, i.e., each acts as a price taker; the product being sold is considered a homogenous good. Product differentiation does not exist. There is free mobility of and exit of firms. And all economic agents in the markets possess complete and perfect knowledge. Pure monopoly exists when there is only one seller (producer) in the market, barriers to entry to other potential competitors from selling in this market. Oligopoly is said to exist when more than one seller is in the market but when the number is not so large as to render negligible the contribution of each. A typical oligopoly exists when, for example, three firms control over 50% of all sales of a particular good in a particular market and certain barriers prevent potential competitors from entering the market (Tomek and Robinson, 1990).

B. Market concentration: refers to the number and relative sizes of buyers /sellers in a market many studies indicate that the existence of some degree of positive relation between market concentration and gross marketing margins. It is generally believed that higher market concentration implies non-competitive behavior and thus inefficiency. But studies warn against the interpretation of such relationships in isolation from other determinant factors, like barriers to entry and scale economics (Scott, 1995).

Kohls and Uhl (1985) suggest that as a rule-of-thumb, a four largest enterprises concentration ratio of 50% or more is an indication of a strongly oligopolistic industry, 33-50% shows weak oligopoly, and less than 33% shows un concentrated industry. The problem associated with this index is the arbitrary selection of r (the number of firms that are taken to calculate the ratio). The ratio does not indicate the size of distribution of the firm. In most LDC, where firms' records are usually not available publicly, it would be difficult to determine such ratios.

Koch (1980) lists two kinds of partial concentration indeces: The Gini Coefficient and Herfindahl Index (HHI). Both utilize market shares to determine the extent of market concentration. The Herfindahl Index is given as:

$$HHI = \sum_{i=1}^{r} S_i^2, i = 1,2,3....n$$

Where S_i is the percentage market share of i^{th} firm and the total number of firms and n, the total number of firms.

The index takes into account all points on the concentration curve. It is also considers the number and size distribution of all firms. In addition, squaring the individual market share gives more weight to the shares of the larger firms which is an advantage over concentration ratio. Avery small index indicates the presence of many firms of comparable size whilst an index of one or near one suggests the number of firms is small and/or that they have very unequal share in the market. The method is limited in its application for it imposes burden in so far a more data must be collected (Admasu, 1998).

C. Market conduct: Refers to the patters of behavior that trader and others market participants adapt to affect or adjust to the markets in which they sell or buy. These include price setting behavior, and buying and selling practices (Kizito, 2008). On the definition market conduct is the condition which makes possible exploitive relationships between sellers and buyers this is done via unfair price setting practice.

D. Market performance: Kizito (2008) defines the market performance as the extent to which markets result in outcomes that are deemed good or preferred by society. Market performance refers to how well the market fulfils certain social and private objectives. These includes price levels and price stability in long and short term, profit levels, cost, efficiency and qualities and quantity of food commodities' other scholars defines market performance as to the impact of structure and conduct as measured interns of variables such as price , costs, and volume of output, by canalizing its level of marketing margin and their cost components, it is possible to evaluate the impact of structure and conduct characteristics on market performance (Bain, 1968; Bressler and King, 1970, cited in Pomery and Trinidad, 1995) .

The two major indicators of market performance are net returns and marketing margins. Estimating net returns and marketing margins provide indication of an exploitive nature when net returns of buyer are much higher than his fair amount. Net returns can be calculated by subtracting fixed and variable costs from gross returns**.** The mathematical formulation is $NR = \sum P_I V_I - (FC + VC)$, where, NR is Net Return, P_i is price, V_i, is amount, FC is fixed cost and VC is variable cost.

E. Marketing cost and margin

One way of defining costs is that they are all of the expenses incurred in organizing and carrying out marketing process. Another definition is the charge which should be made for any marketing activities. Assembling transport, storage, grading, processing, wholesaling and retailing, which can all be stages in the marketing chain, involves expenses. People are often ignorant of the true cost of marketing because many of these costs are hidden, and only come to light with the patient investigation of the whole marketing process. To calculate the true cost of marketing, estimates have to be made of all these implicit cost of items. We use the economist's concept of opportunity cost for this purpose. This is defined as the benefit foregone by not using a resource in its best alternative use (Smith, 1992).

According to Tomek and Robinson (1990), marketing margin is defined as a difference between price paid by consumers and that obtained by producers or the price of collection of marketing services. Menduoza (1995) also explained that marketing margin measures the share of the final selling price that is capturing by particular agent in the marketing chain. It includes costs and typically, though not necessarily, some additional income.

Many researchers applied the SCP method for conducting their study on agricultural markets in developing countries. However, the SCP method has been subject to criticism; the SCP model is too deterministic to understand the functioning of imperfect markets. As most agricultural markets are imperfect markets, there is a need to develop more dynamic models showing how structure, conduct and performance interact. It means that market structure and market conduct determines market performance. In turn, market performance will influence market structure and market conduct in the long run (Duc Hai, 2003; Admasu, 1998).

2.7. Market participation

According Reardon *et al.* (2005), also argue that market participation is both a cause and a consequence of economic development. Markets offer households the opportunity to specialize according to comparative advantage and thereby enjoy welfare gains from trade. Recognition of the potential of markets as engines of economic development and structural transformation gave rise to a market-led paradigm of agricultural development during the 1980s. He explained further as households' disposable income increases, so does demand for variety in goods and services, thereby inducing increased demand-side market participation, which further increases the demand for cash and thus supply-side market participation.

Similarly Christopher (2007), explain the answer for why smallholder market participation so important to economic growth and poverty reduction. He traces its origin to Adam Smith and David Ricardo. He explained that given a household's desire for a diverse consumption bundle, it can either undertake production of all such goods and services for auto consumption, or it can specialize in production of those goods in which it is relatively skilled i.e., holds comparative advantage–consuming some portion and trading the surplus for other goods and services it desires but for which it holds no comparative advantage in production.

Another scholar also explains that the poorest people in the world are farmers with low market participation and low agricultural productivity. Increasing either one could help to improve the other, and both could boost living standards: higher market participation could drive productivity by providing incentives, information and cash flow for working capital, while higher productivity could drive market participation since households with higher productivity are more likely to have crop surpluses above their immediate consumption needs (Ana *et al.*, 2008).

Ana *et al* (2008), defined market participation in terms of sales as a fraction of total output, for the sum of all agricultural crop production in the household; this includes annuals and perennials, locally-processed and industrial crops, fruits and agro-forestry. This "sales index" would be zero for a household that sells nothing, and could be greater than unity for

households that add value to their crop production via further processing and/or storage. The measure is intended to measure market orientation or commercialization in a scale-neutral manner, independently of the household's wealth or productivity. Its definition is

$$\text{Sale index}_i = \frac{\sum_{j=1}^{J} \text{crop sales}_{i,j}}{\sum_{j=1}^{J} \text{crop production}_{i,j}} = \begin{cases} = 0 \text{ non} - \text{seller} \\ > 0 \text{ seller} \end{cases}$$

Study by Bellmare *et al* (2005) about market participation in Kenya and Ethiopia on livestock indicated that rural households had made sequential decision making rather than simultaneous decision making in market participation. Iddo Kans (2006) also examined that endowments and resource allocation decisions determines farm out put and non-farm income, and these intern determine market participation.

Analysis was also conducted by Rios *et al* (2008) on the direction of causality between market participation and productivity on multi-county farm households. Result indicates that households with productivity tend to participate in agricultural markets regardless of market access factors. In contrast having better market access doesn't necessary lead to productivity. The finding suggests that investment in markets access, infrastructure provide minimal, if any, improvement in agricultural productivity; whereas programs targeted enhancements in farm structure and capital have the potential to increase both productivity and market participation.

Stanton *et al* (2000) on their study of the roll of agribusiness, explain that with increasing efforts to promote free markets, one must ask whether the impact on some agricultural producers may be less than desirable. They argue that small producers with limited access and competitive buyers may be unable to participate in new marketing opportunities. They recommended that development policy be enlarged to encompass agribusiness enterprises, however this may require, a different governmental roll, primarily in provision of basic infrastructure, transportation policies and emphasis on availability of capital and technology

3. RESEARCH METHODOLOGY

3.1. The Study Area

Based on the CSA (2007), Amhara Region has a population of 17,214,056 of which 8,636,875 were men and 8,577,181 were women. Urban inhabitants were 2,112,220 or 12.27% of the total population. With an estimated area of 159,173.66 square kilometers, this region has an estimated population density of 108.15 people per square kilometer. For the entire region 3,953,115 households were counted. This results to an average of 4.3 persons per household. The average family size in urban and rural area is 3.3 and 4.5 persons, respectively.

Fogera Wereda is one of the 106 Woredas of the Amhara Regional State and found in South Gondar Zone. It is situated at 11^0 58 N latitude and 37^0 41 E longitude. Woreta is the capital of the Woreda and is found 625 km from Addis Ababa and 55 km from the Regional capital, Bahir Dar.

The woreda is bordered by Libo Kemkem woreda in the North, Dera woreda in the South, Lake Tana in the West and Farta woreda in the East. The Woreda is divided into 29 rural Peasant Associations (PAs) and 5 urban Kebeles (RDBOA, 2007/8).

The total land area of the Woreda is 117,414 ha. The current land use pattern includes 44 percent cultivated land, 24 percent pasture land, 20 percent water bodies and the rest for others. The total population of the Woreda is 251,714. The rural population is estimated at 220,421. The proportion of male and female population is almost similar in both rural and urban areas. The number of agricultural households is 44,168.

The mean annual rainfall is 1216.3 mm, with Belg and Meher cropping seasons. Its altitude ranges from 1774 up to 2410 masl allowing a favorable opportunity for wider crop production and better livestock rearing (IPMS, 2005).

Most of the farm land was allocated for annual crops where cereals covered 51,472 hectares; pulses cover 9819.98 hectares; oil seeds 6137 hectares; root crops 1034.29 hectares; and vegetables 882.08 hectares (CSA, 2003). The major crops include teff, maize, finger millet and rice, in order of area coverage. According to IPMS (2005), average land holding was about 1.4 ha with minimum and maximum of 0.5 and 3.0 ha, respectively.

The study area is one of the surplus crop producing areas and has a good potential for rice production. The area gets much of the flood water that accumulates around Lake Tana and the two big rivers, i.e., Rib and Gumara. The rivers bring eroded soil from up hill and deposit on the low land plain. The soil seems relatively deep and fertile.

In the study area, rice is planted at lower slopes of an undulating landscape where the water table moves to the surface for substantial period during cropping season. In addition, rice is irrigated with water, which is diverted from the streams at the upper part of a drainage system. However, the irrigated water is usually not substantial. In Fogera and the nearby woredas water supply to rice plants is principally provided by rainfall, run-off water, and under-ground water. Bunds are usually used for rain fed rice production. The bunds serve to retain flood water, as well as rain water, which fall during the growing season (Tesfaye *et al*., 2005; Abaye, 2007; IPMS, 2005).

Table 4. Land use pattern of Fogera Woreda

Land use	Area coverage/ha/	% coverage
Land planted with annual crops	51472	44%
Grazing Land	26999	24%
Area covered with water (wet land)	23354	20%
Infrastructure including settlement	7075	6%
Un productive land (hills)	4375	3.70%
Forest land	2190	1.80%
Swamp land	1698	1.40%
Perennial crops	2190	0.20%
Total	117414	100%

Source: ILRI /IPMS, 2008

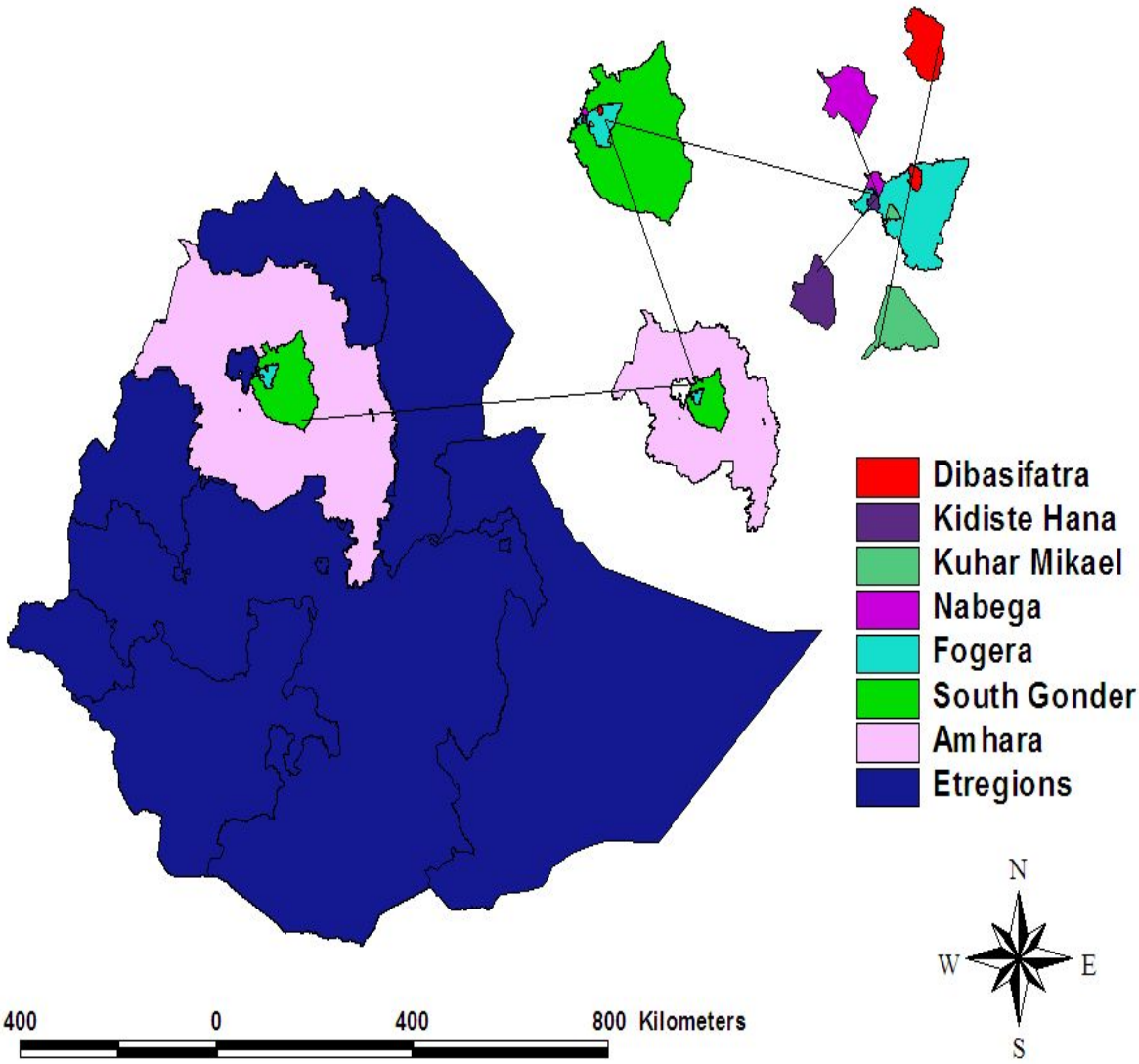


Figure 1. The study areas south Gondar Zone and Fogera woreda

3.2. Methods of Data Collection

The data for this study were collected from both primary and secondary sources. Primary data were collected from samples of the respondents. Sources of primary data were smallholder farmers, traders, brokers, retailers and rice millers. The data collected through a questionnaire survey includes the following:

a) Data on quantity of rice marketed, price of rice supplied, total acreage of rice cultivated, expenditure on factors of production, distance from market, size of output, access to market, market information, livestock ownership, land holding, extension service contact, credit access, family size, were collected and these were used to analyse factors determining marketable supply of rice.

b) Data on output produced and sold, production costs, input costs, and marketing costs were collected and used to analyse the net returns (profitability) of rice production and the cost and price information used to construct marketing costs and margins.

c) Data on market information system, exchange arrangements, system of storage, transport facilities, price setting strategy, purchasing strategy, selling strategy, barriers to entry and capital were collected from sample informants using a questionnaire, and these were used to investigate the structure and conduct of the market.

d) Data on input usage, credit facilities, agriculture extension service, marketing information, and institutional support activities were collected and used to analysis production and marketing support services.

In addition to primary data on the above issues, secondary data like population number, agricultural inputs and output prices, land use pattern, agro-ecology, list of licensed and non-licensed traders, marketing agents and their role, marketing directions, conversion factors were collected from different sources. Secondary data sources were Woreda office of

Agriculture Rural Development, Research centers, Cooperatives at different levels, Office of Trade and Industry, and other bureaus, different publications, research studies, websites, etc.

3.3. Sampling Procedure

For this study, a multi-stage random sampling technique was employed. The sampling covered farmers, traders on proportional to size basis.

3.3.1. Producers sampling

For producers, a multistage sampling technique was used to draw sample units. In the selection process both Woreda agricultural office experts and IPMS experts were consulted. In the Fogera woreda, there are 5 urban and 29 rural kebeles. Out of 29 rural kebeles, 14 administrative *kebeles* are producing rice. These were selected purposively and is stratified based on the existing rice production farming system (up land and low land rice producing system). From each farming system two PAs were selected randomly (a total of 4 PAs were selected). Then samples of respondents from each farming system were selected randomly proportional to its population size. The sample frame of the study is the list of household obtained in the Fogera woreda of agricultural office. Hence, a total number 165 farmers were selected and interviewed for the study (Appendix Table 13,15and 17).

3.3.2. Traders` sampling

According to Mendoza (1995) researchers do not agree on sample size and procedure that should be used in each segment of the marketing chain. The decisions involved were partly a function of information currently known, time and resources available, accessibility to and openness of the marketing participants as well as the estimated size of the trading population.

At first in order to have the possible level of representative traders, secondary information from and discussion was made with the Woreda Trade and Industry Office, Woreda agricultural office experts and IPMS experts (Since there was a new structural change of rural

kebeles and urban *kebele*s). Rural assemblers were selected from two local small markets points (Maksegnt from Nabega) and Hodgebya (from Kidist Hanna) during main market days. And urban assemblers were selected from the main city Woreta during marketing days. There was no recorded data for neither rural assemblers nor urban assemblers in the trade and industry office of the Woreda. Consulting other traders, information was gathered (counting) and size of assemblers was determined by developing a sample frame. Hence, 20 rural assemblers and 5 urban assemblers, a total of 25 assemblers were selected out of 75 and interviewed by administering structured questionnaire randomly.

In the case of wholesalers, milers and retailers, sample respondents were selected from the sample frame obtained from the trade and industry office of the Woreda. Based on the list of sample frame, 6 wholesalers, 10 millers and 10 retailers were selected randomly at Woreta. Similarly retailers and distributors samples were also collected from different main towns. Hence, 5 distributors and 21 retailers from Bahir Dar, 29 retailers from Gondar were selected randomly and information was gathered by administering structured questionnaire. A total of 60 retailers were selected randomly. The distributor's data were also collected at Bahir Dar town. They are all 5 in number and all were interviewed purposively. Since there were only three brokers at Woreta, only one broker was interviewed and information was gathered through discussion (Appendix Table 14).

3.4. Methods of Data Analysis

In this study, both descriptive and econometric methods were used in analyzing data from farmers and market survey.

3.4.1. Econometric analysis

To look at factors that increase the level of participation in the market ideally, the OLS model is applicable when all households participate in the market. In reality, all households may not participate. Some households may not prefer to participate in a particular market in favor of another; while others may be excluded by market. If the OLS regression is estimated

excluding the non-participants from the analysis, the model would have sample selectivity bias problem (Gujarati, 2003).

If only the probability of selling is to be analyzed, Probit or Logit models would be adequate techniques for addressing it. But if one is interested to know factors that influence the level of sales, at the same time, there is a need for a model that is a hybrid between the Logit or Probit and the OLS. The appropriate tool for such is the Tobit model that uses maximum likelihood regression estimation.

According to Gujarati (2003) a sample in which information on the regressand is available only for some observations are known as a censored sample**.** The Tobit model is also known as a censored regression model originally developed by James Tobin**.** Some authors call such models limited dependent variable regression models because of the restriction put on the values taken by the regressand. Hence, a Tobit model answers both factors influencing the probability of selling and factors determining the magnitude of sale.

Following the Tobit model specified in Maddala (1992), the maximum likelihood Tobit estimation (Tobin, 1956) with left-censoring at zero is specified as:

$$Y_i^* = \beta_0 + \sum_{i=1}^{m} \beta_i X_i + \mu_i \qquad i=1,2.3,...m \tag{1}$$

$$Y_i = Y_i^* \text{ , if } Y_i^* > 0,$$
$$Y_i = 0 \text{ if, } Y_i^* \leq 0 \quad \text{and} \quad Y_i = \max\ (Y_i^*, 0) \tag{1a}$$

Where, Y^* = quantity supply

β_0 = an intercept

β_i = cofficient of i^{th} independant variable

X_i = independent variable,

μ_0 = Unobserved disturbance term

The model parameters are estimated by maximizing the Tobit likelihood function of the following form:

$$L = \prod_{Y^* > 0} \frac{1}{\sigma} f \frac{(y - \beta_i X_i)}{\sigma} \prod_{Y^* \leq 0} F \frac{(-\beta_i X_i)}{\sigma} \quad (2)$$

Where f and F are respectively, the density function and cummulative distribution function of Y_i^*

$Y^* \prod y_i^* > 0$, means the product over those i for which $y_i^* > 0$ and $\prod y^*_i \leq 0$, means the product over those i for which $y^*_i \leq 0$

β_i is a vector of tobit maximum likelihood estimates and σ is the standard error.

Since Tobit model has some notable limitations, it can be remedied with the use of a sample selection model in its place. Firstly, in the Tobit model, the same set of variables and coefficients determine both the probability that an observation will be censored and the value of the dependent variable. Secondly, this does not allow a full theoretical explanation of why the observations that are censored are censored (Blaylock and Blisard, 1993).

Sample selection models address these shortcomings by modifying the likelihood function. According to Heckman (1979), sample selection bias may arise in practice for two reasons, first there may be self selection by an individual or data units being investigated. Second sample selection decision by analysts or data processors in much the same fashion as self selection.

Selective samples may be the result of rules governing collection of data or the outcome of economic agent's own behavior. The latter situation is known as self-selection. Statistical analyses based on those non-randomly selected samples can lead to erroneous conclusions and poor policy (Heckman, 2008).

The Heckman's correction, a two-step statistical approach, offers a means of correcting for non-randomly selected samples. The first stage formulates a model for the probability of participation used to predict the probability for each individual and then in the second stage, removing the part of the error term correlated with the explanatory variables and avoiding the bias.

Though the Heckman procedure was easy to apply and it yields consistent estimates of the parameters, they are not as efficient as the ML estimates (Gujarati, 2003). Hence, in this analysis Tobit used for comparison purpose and will be discussed when ever needed. Study by Makhura (2001), Rehema (2006) also used Tobit for comparisons for market participation.

Scott (1995) explained that if majorities (95%) the sampled households are market participant's i.e. potential suppliers, then it is advisable to apply OLS model. For this study, therefore since out of 165 rice producers, 24% of the sampled households did not participate in the rice marketing, employing the Heckman's two stage model was appropriate. Many market studies also used this model, for the study of market participation, for instance, Rehima (2006) on pepper marketing, Abay (2007) on vegetable marketing, Zelalem (2008) on poultry marketing, Woldemichael (2008) on dairy marketing, and Makhura (2001) on transaction cost barriers to market participation in south Africa.

3.4.1.1. Heckman's two-stage selection procedure

James Heckman has proposed an alternative to the ML method, which is comparatively simple. This alternative consists of a two-step estimating procedure. In the first stage, a 'participation equation', attempts to capture factors affecting participation decision. The second stage provides heckit analysis that determines the level of participation. The probability of participation was modeled by Maximum Likelihood Probit, from which the inverse Mill's ratios will be estimated. The specifications for Heckman's two-stage models are as follows:

i. The participation Equation: The Probit model is specified as:

$$Y_i = X_i\beta_i + \varepsilon_i, \quad i = 1,2,.n \tag{3}$$

$$y_i^* = \begin{cases} 1 & \text{if, } Y_i^* > 0 \\ 0 & \text{if } Y_i^* \leq 0 \end{cases} \tag{3a}$$

Where, Y_i^* is the latent dependent variable which is not observed and

Y_i is a binary variable that assumes 1 if household *i*, sells rice and 0 otherwise.

β_i is a vector of unknown parameters in participation equation .

X_i is a vector of explanatory variables in the Probit regression model.

ε_i is random error term that are assumed to be independently and normally distributed with zero mean and constant variance.

ii. Regression (OLS): Selection model is specified as:

$$Q_i = Z_i\alpha_i + \mu\lambda_i + \eta_i \quad (4)$$

Where: Q_i is the volume of rice supplied to market

α_i is a vector of unknown parameters to be estimated in the quantity supply equation

Z_i is a vector of explanatory variables determining the quantity supplied

μ is the parameter that helps to test whether there is a self selection bias in market participation

η_i is the error term.

Lambda, which is related to the conditional probability that an individual household will decide to participate (given a set of independent variables) is determined by the formula..

$$\lambda_i = \frac{f(\chi\beta)}{1 - F(\chi\beta)} \quad (5)$$

Where, $f(\chi\beta)$ is density function and $1 - F(\chi\beta)$ is distribution function.

Econometric Software known as "LIMDEP" were employed (Maddala, 2001) to run the model (Heckman two-stage selection). Before fitting important variables in the models, it was necessary to test multicolinearity problem among the variables which seriously affects the parameter estimates.

Several methods of detecting the problem of multicollinearity have been used in various studies. Two measures are often suggested in the discussion of multicollinearity are the *variance –inflation (VIF)* factor and the condition number. VIF is defined as:

$$\text{VIF}(\hat{\beta}_j) = \frac{1}{1 - R^2_j} \tag{6}$$

We can interpret VIF ($\hat{\beta}_j$) as the ratio of the actual variance of $\hat{\beta}_j$ to what the variance of $\hat{\beta}_j$ would have been if X_i were to be uncorrelated with the remaining X's, it compares the actual situation with the ideal situation. The conditional number is supposed to measure the sensitivity of the regression estimates to small change in the data (Maddala, 1992).

As a rule of thumb, the values of VIF greater than 10 (that is, R_j^2 exceeding 0.90) are often taken as a signal that the model have multicollinearity problem .The measure of tolerance can also be used, alternatively, to detect multicolinearity. The inverse of the VIF is called tolerance (TOL). That is,

$$\text{TOL}_j = (1 - R_j^2) = \frac{1}{\text{VIF}_j} \tag{7}$$

When $R_j^2 = 1$ (i.e., perfect collinearity), $\text{TOL}_j = 0$ and when $R_j^2 = 0$ (i.e., no collinearity what so ever), TOL = 1 Because of the intimate connection between VIF and TOL, one can use them interchangeably (Gujarati, 1995). I used VIF test for the analysis.

Similarly, the Contingency Coefficient is employed as one of the means to check for association among discrete variables. It is a measure of association from cross-classification data and is computed as

$$C = \sqrt{\frac{\chi^2}{n + \chi^2}} \tag{8}$$

Where, $\chi^2 = \frac{(O-E)^2}{E}$ and n =Total sample size.

The contingency coefficient is relatively easy to compute and satisfies the condition that it equals 0 when there is no association between the variables. However, it does have some disadvantages as a measure of association. For detecting both multicollinarity tests for continuous and dummy variables, Statistical package SPSS version 12 was used to compute both VIF and CC.

3.4.1.2. Specification of variables

Dependent variables

Market participation decision (MPD): The dummy participation decision variable is the dependent variable in the first stage of the Heckman two stage estimation procedures. For the respondents who participate in rice market it is = 1, and = 0 for the respondents who did not participate in the market in the year 2007/8.

Market supply (MS): It is a continuous variable which represents the actual amount of rice supplied to the market by the farm household.

Independent variables

Different variables are expected to determine a farmer's decision to participate in the market and supply a certain volume of output. A number of studies revealed that farmer's decision to participate in a market could be determined by a number of socio-economic and demographic factors. The following are hypothesized to influence market participation decision **(**Kinde, 2007; Rehima, 2007; Abay, 2007).

Age of the household head (AGE): Age is continuous variable and measured in years. The expected influence of age was assumed positive taking the presumption that as farmers' gets older they could acquire skills and hence produce much and developed skills to participate to a market. It is also a proxy measure of farming experience. Gebremedhin and Hoekstra (2007) in their study showed that there is a U-shaped relation between age of household head and market orientation of household in the cereal crops. On the other hand, Tshiunza et al. (2001) found that younger farmers tended to produce and sale more cooking banana for market than older farmers.

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

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

Education level of the household head (EDU): This variable hypothesized to affect marketable supply positively. It has dummy values.

Extension frequency (EXC): This is a dummy variable indicating the extension service farmers were getting. This variable was expected to influence participation and supply positively. Obviously, as farmers learned more and knew much it would be obvious that they would produce much and ultimately participated in a market.

Distance from market (MRD): This is a variable used to measure access to markets measured in travel hours for a feet single trip. It is a continuous variable and expected to influence participation and supply negatively. Again Makhura (2001) explained that those households located closer to market centers will experience lower costs since they can get information more easily. The study by Sirak *et al.* (2007) on the analysis of cattle marketing participation in South Africa shows that distance to the preferred market channel is negatively related with the probability of selling. Also Shilpi *et al.* (2007) found that the likelihood of sales at the market increases significantly (positive) with an improvement with market facilities and a decrease in travel time from the village to the market.

Market price (MRP): This variable is measured in Birr per quintal. Tomek and Robinson (1985) argued that the product price has direct relations with marketable supply and hence it was expected to affect the household marketable supply of rice positively. But they argued that in the short run prices could not stimulate market supply due to the biological nature and time lag requirement of production.

Lagged market price (LMP): This is also the variable measured in Birr per quintal and is expected to affect the marketable supply of rice positively. Because, lagged prices can stimulate production and thus marketable supply of rice for the next year. According to Myint (2003) explains that if prices in one year are bad, farmers will often respond by planting less in the next year. This will lead to lower production and higher prices, so encouraging more plantings in the following year and a consequent fall in prices. This cyclical nature of production and prices is quite common. Successful farmers are sometimes those who do the opposite to what is being done by other farmers. Boughton (2007) also discussed that local maize prices had a strong positive and highly significant effect on the probability of market participation as a seller on his study on maize market participation in Mozambique.

Quantity produced (TQP): It is a continuous variable. A marginal increase in rice production has obvious and significant effect in volume of rice supply. The volume of production of rice is expected to have positive relation to market participation and marketable surplus. Study by Chauhan and Singh (2002) also showed that, marketed surplus of paddy is positively related to the volume of production as well as with area under crop.

Total land size (TLS): The total size of farm land owned by a farmer is among the variables that could influence both participation and supply. If a farmer owns more land, the probability of allocating land for rice crops would increase. It is a continuous variable expected to influence participation and supply decision in similar direction. The study by Boughton (2007), the coefficients on available land area are highly significant for both the linear (positive) and quadratic (negative) terms, indicating a diminishing marginal effect on maize market participation as land area increases over the whole range of the data. On another study

also land holding has an indirect positive effect on market participation, though it is positive effect on farm output (Indo kan *et al.*, 2006).

Number of oxen owned (OXN): Being a power for plowing, rice supply would increase as farmers increased their number of oxen ownership. The expected influence is positive on supply. It is a continuous variable

Labor (FL): It is a continuous variable, measured in man equivalent. This variable had a positive influence on market supply. As farmers own more number of labor power the interest to farm more size of land would increase.

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

Credit Access (CREDIT): This is a dummy variable, which credit indicates taken for rice production. Access to credit would enhance the financial capacity of the farmer to purchase the necessary inputs. Therefore, it is hypothesized that access to credit would have positive influence on market participation and volume of sale. Study by Black and Knutson, (1985) in Texas survey showed credit users showing better production and market participation among cooperative members. Access to credit would enhance the financial capacity of the farmer to purchase the bird. Therefore, it is hypothesized that access to credit would have positive influence on level of production and sales.

Non-farm income (NFINC): It is a continuous variable that obtained from non-farming activities by the household head. A study by Iddo *et al.* (2006) confirmed that non-farm

income has affected the decision of farmers to sell their farm out put (market participation) negatively in the study of rural Georgia.

Total livestock unit (TLU): This is a continuous variable defined in terms of tropical livestock unit (TLU). Farmer could sell more rice when he/she produces more. On the other hand, when the household has less production; it must either borrow money or sell his livestock to meet household needs. Farmers who have low production of rice need to specialize in livestock production and hence it has an inverse relationship with crop production and marketable surplus. Study by Rehima (2006) on pepper marketing at Alaba and Siltie in SNNPRS of Ethiopia showed that TLU showed a negative sign on quantity of pepper sales. On the other hand, study by Makhura (2001) on maize market participation suggests that an increase in the value of livestock owned leads to an increase in maize sale. Therefore, it is expected to have positive and negative relationship with market participation.

3.4.2. Descriptive analysis

In this section descriptive statistics analyses were employed to analyse the S-C-P model for rice market.

3.4.2.1. Analysis of market structure

The perfect competition market model is often used in economics as a standard by which structure and conduct of markets can be compared and evaluated. Knowledge regarding structure can give indications about competitiveness. The variables used to explain market structure are the degree of concentration, vertical and horizontal integration, condition of entry in the market and magnitude of product differentiation (Nambiro *et al.*, 2001).

a. **Concentration Ratio (C):** A market concentration ratio is a measure of the percentage share of the market controlled by a specified percentage of firms ranked in order of market share from the largest to the smallest (Karugaia, 1990).

$$C = \sum_{i}^{r} S_i \quad (9)$$

Where: C= Concentration ratio

S_i= Percentage share of th i^{th} firm

r= Number of largest firms for which the ratio is going to be calculated.

$$MS_i = \frac{V_i}{\sum V_i} \quad (10)$$

Where V_i = Amount of product handled by the buyer

M_{S_i} = Market share of buyer i

$\sum V_i$ = Total amont of product handled by the r firms.

b) Barriers to entry: A barrier to entry is simply any advantage held by existing firms over those firms that might potentially produce in a given market. Potential entry barriers will be investigated based on demand conditions, product differentiation and price elasticity, control over input supplies, legal and institutional factors.

3.4.2.2. Analysis of market conduct

Conditions that are believed to express the exploitative relationship between producers and buyers was analyzed based on a) Pricing behavior analysis. Who sets prices? (e,g. one buyer or many buyers , factors considered in price setting (e.g. basic supply and demand conditions or artificially price restraint ?) and b) Buying and selling practices analysis (e.g. source of product, distribution channels used, formal and informal producer and marketing groups), were used for the study (Scot, 1995).

3.4.2.3. Analysis of market performance

To analyze the performance of rice markets, margin analysis was used to address the second objective. The cost and price information were used to construct marketing cost and margin. Many studies used market margin than net returns for the analysis to compute profit. Rehima (2006) used marketing margin analysis to calculate profit of pepper marketing and Abay

(2007), also applied marketing margin analysis for vegetables. The two most common methods are

a) Marketing margin: It is calculated as the difference between producers and retail prices. The producers share is the commonly employed ratio calculated mathematically as, the ratio of producer's price to consumer's prices. Mathematically, producers share can be expressed as:

$$PS = \frac{P_x}{P_r} = 1 - \frac{MM}{P_r} \tag{11}$$

Where: PS = Producers Share

P_X = Producers' price of rice

P_r = Retail Price of rice

MM = Total marketing margin

$$TGMM = \frac{\text{End buyer Price} - \text{First seller Price}}{\text{End buyer Price}} \times 100 \tag{12}$$

Where, TGMM = Total gross marketing margin

The producer margin also estimated by introducing the idea of 'farmer's portion', or 'producer's gross margin' (GMMp) which is the portion of the price paid by the consumer that goes to the producer. It is calculated by using the following formula:

$$GMMp = \frac{\text{End buyr Price} - \text{Marketing gross margin}}{\text{End buyer Price}} \times 100 \tag{13}$$

Where , GMMp = The producers' share in consumer price

The net marketing margin (NMM) is the percentage of the final price earned by the intermediaries as their net income after their marketing costs are deducted. The percentage of net income that can be classified as pure profit (i.e. return on capital), depends on the extension to such factors as the middlemen's own (working capital) costs.

$$NMM = \frac{\text{Gross margin} - \text{Marketing Costs}}{\text{End Buyer Price}} \quad (14)$$

b) Profitability analysis

Nuru *et al*. (2006) also used the profitability analysis of processing crude honey. To estimate the profitability of crude honey at farm gates, local markets of the study areas were considered. Processing equipment and expenses were estimated based on current market price. The net profit of processing of crude honey was calculated by considering all inputs and expenses required to purchase and process the crude honey and also the output.

Dejene (2008) studied the profitability of extension package inputs for wheat and barley in Ethiopia. He employed simple calculation of value-cost-ratio (VCR). The unit of analysis is hectare of land. The model takes the usual gross profit formula. Hence, for this study the gross profit and the cost margin analysis were adopted to analyse the profitability of rice production in the study area.

$$\text{Gross Profit} = V - C = PQ - \sum_{i}^{n} p_i q_i \quad (15)$$

Where, P = Price of the produce

P_i = Price of input i

q_i = Quantity of input i

Q = Total production per hectare

V = Value of production

C = Total cost of production

The limitation of financial profit analysis is that it does not consider the economic costs and benefits. The financial analysis estimates the profit accruing to the project entity or to participant, where as economic analysis measures the effect of the project on national economy. The major difference lying in the definition of costs and benefits. In financial analysis all expenditures incurred under the project and revenues resulting from it are taken

into account where as in economic analysis attempts to assess the overall impact of on improving the welfare of the society. Moreover the price measurement is different, shadow price is used for economic analysis and market price is used for financial analysis. It measures simply the accountants cost and profits. Generally, an implicit cost is not considered in the calculation of the financial profit analysis.

4. RESULTS AND DISCUSSION

This chapter deals with the findings, descriptive statistics and econometric models, on rice marketing in Fogera Woreda especially, on marketing channels, and the marketing agents. It also deals with the analysis of cost and profit of paddy production. It quantifies costs and margins for key traders, identifies factors affecting rice market participation and volume of sales in the study area. This chapter, in addition, examines the support services (extension services, input supply, credit, and marketing services) in rice production and marketing. It also identifies major constraints and opportunities in production and marketing of rice.

4 .1. Household and Farm characteristics

4.1.1. Household characteristics

This section discusses the socio-economic characteristics of the sample households in the study area. These socio economic variables include sex, age, religion, marital status, education level, family size and labor.

4.1.1.1. Family size and age of the household

In the study area, the average family size was 5.72 with a minimum of 2 and maximum of 13. In upland rice production system the average family size was 5.74, it was also similar for low land rice production system. The t-test shows that there is no significant difference in family size between the two rice production systems at 5% level of significant.

Table 5. Age, family labour and family size of households

Characteristics	N	Mean	St. Dev	Min	Max	t-value
Age of household head	165	42.69	12.301	22	75	1.197
Family labor (man-equivalent)	165	2.67	0.881	1	6.15	2.295**
Family size	165	5.72	1.91	2	13	0.021

Source: Survey data, 2008/9 ** significant at 5% level

The family labor is the main input for rice production. The study shows that the farmers average family labor force was 2.67 in man-equivalent and 6.15 maximum (Low land rice production system and 1 minimum (in up land system). The mode was 1.8 man-equivalents. The t-test also indicates there was a significant difference in family labor force between up land and low land rice production systems at 5% level of significant.

The age of the household is considered a crucial factor, since it determines whether the household benefits from the experience of an older person, or has to base its decisions on the risk-taking attitude of a younger farmer. Based on the Table 5, the age of the respondents ranges from 22 to 75 with the median of 41 and multiple mode of 35 respectively. The youngest head is 22 years old, while the eldest is 75 years of age. The mean age of heads of households are about 42.69 years of age for all *kebele*s that is 40.43 for Kuhar Michael, 44.34 for Nabega, 43.55 for Kidst Hanna and 42.59 for Diba Sifatira respectively. There is no significant difference in ages of the sampled households between upland and low land rice production system.

4.1.1.2. Sex and education of the household

Normally the head of the household is responsible for the co-ordination of the household activities. As such it is pertinent to include some attributes such as sex and education of the head in the specification of market participation decisions. Of the 165 sampled respondents about 99% were male headed.

Another attribute of importance is the level of education attained by the heads of the household, who, normally, are the decision-makers. Education also enables the person with ability to do basic communications for business purpose. From all household heads 38.8% were found to be illiterate, 26.1% were able to read and write (adult education and religious school), 33.3% attained primary school education and the rest 1.8% was found to be in secondary school education. These groups are able to interpret market and other information better than those who have less or no education.

Table 6. Demographic characteristics of sampled farmers

Factors		Up land production		Low land production		Total	χ^2/t
		Quhar Michael	Diba Sifatira	Nabega	Kidist Hanna		
Sex of household head							
	Male	37	53	44	29	163	
	Female	1	1	0	0	2	
	Total	38	54	44	29	165	0.369
Religion of households							
	Orthodox Christian	38	54	44	29	165	
Age of households	≤18	-	-	-	-	-	
	19-59	33	50	36	27	146	
	≥60	5	4	8	2	19	
	Total	38	54	44	29	165	1.197
Family size of house holds	≤ 5	24	13	25	9	71	
	5-10	14	40	19	20	93	
	≥10	0	1	0	0	1	
	Total	38	54	44	29	165	0.021
Education level of households							
	Illiterate	19	15	19	11	64	
	Read and write	11	13	15	4	43	
	primary school	8	24	10	13	55	
	secondary school	0	2	0	1	3	
	total	38	54	44	29	165	0.205
Marital status	Married	35	53	43	29	160	
	Divorced	2	0	0	0	2	
	Windowed	1	1	1	0	3	
	Total	38	54	44	29	165	
Family Labor(man equivalent)							
	1-2.0	17	12	6	11	46	
	2.1-4.0	19	26	19	42	106	
	4.1-6.0	2	4	4	1	11	
	≥6.0	0	1	0	0	1	
	Total	38	43	29	54	164	2.295**

Note: *****, **** and ***** show the values statistically significant at 1%, 5% and 10% probability level respectively

Source: Survey data, 2008/9

4.1.2. Farm characteristics

4.1.2.1. Land holding

According to CSA (2003), farm holdings is referred to all land or livestock holdings which are mainly used for both crop and livestock production. Depending on the type of activities, and agricultural holders engaged with farm holding has been categorized into three groups. These are crop only, livestock only and both crop and livestock. In Amhara Region, most of the agricultural holders (30.5%) had a total size of land hold that ranges from 1 to 2 hectare. Similarly, 13.6% of agricultural holders that are involved in crop production has under 0.1 hectare of agricultural holdings.

On this study, the average land holding for households was 1.21 ha. About 52% rice farmers has land that ranges between 1 to 2 hectare and 6.1% of the farm households have an area above 2 hectare of land. In the study area farmers try to get access to additional land for production of rice through renting. There is a significant difference in land holding, private pasture land and cultivated land among the four sampled kebles at 1% and 10% level of significance.

Table 7. Land holding of household head in hectare

land use	N	average	Std. Deviation	F-value
Land holding	164	1.21	0.6	4.338***
Cultivated land	162	0.93	0.43	2.567*
Private pasture land	77	0.12	0.18	9.895***
Fallow land	2	0.004	0.04	-
Home stead	92	0.11	0.12	0.959

Source: Survey data ,2008/9

4.1.2.2. Crop production

A total of 165 household were interviewed from 4 administrative *Kebeles* and all of them were producers of paddy /rice during main cropping season. The major reasons for growing rice are home consumption and sale. Rice straw also is used for animal feed and roof thatching. In terms of land utilization, Table 8 shows that, on average, 0.60 hectares of land per household is allocated to rice as compared to 0.36 and 0.31 hectares for *teff* and Maize, respectively.

Table 8. Cultivated area and yield of paddy/rice crop per hectare, 2007/8

	Cultivated area in(ha)			Productivity(q/ha)		
Types of crops	N	Mean	Std. Deviation	N	Mean	Std. Deviation
Teff	89	0.36	0.25	86	7.14	5
Maize	144	0.31	0.19	142	19.96	13.87
Wheat	14	0.21	0.13	14	13.67	6.18
Barley	9	0.22	0.13	9	12.36	5.74
Chick pea	102	0.29	0.23	101	12.96	7.51
Lentil	15	0.19	0.1	15	7.56	3.93
F. millet	92	0.31	0.2	91	14.28	8.23
Niger seed	5	0.26	0.16	5	8	4.9
Field pea	27	0.46	0.33	25	7.93	7.7
Grass pea	45	0.36	0.22	42	9.86	7.35
Tomato	16	0.15	0.08	13	62.22	24.24
Pepper	36	0.11	0.07	36	35.71	33.98
Onion	23	0.23	0.2	23	74.33	83.28
Potato	3	0.07	0.05	2	72	22.63
Em.wheat	24	0.21	0.13	24	21.62	17.98
Spice	7	0.24	0.24	7	10.19	8.47
Rice total	164	0.6	0.33	164	32.73	19.76
Own land	154	0.48	0.25	154	36.06	20.98
Rented-in	60	0.38	0.26	59	22.93	14.74
Rented-out	6	0.3	0.17	6	14.17	9.81

Source: Survey result, 2008/9

In addition to rice, sample farmers cultivate other crops like, teff, maize, finger-millets chickpea, grass pea and vegetables during the off rice season. There was no any double cropping of rice by using irrigation (or supplement irrigation).

The mean production of milled rice is 13 quintal per household. Out of this 8.6 quintal is used for consumption purpose and 1.11 quintal is used for seed and the remaining 2.9 quintal of rice was marketed. As described in Table 9. The average production of rice per hectare was higher in Kidist Hanna than other *kebeles* and almost the same in other three *kebeles* (12 qt). The one way ANOVA analysis shows that there is a significant difference in rice production among four kebeles at 5% level of significant (F-value is 3.564 and P<0.016).

Table 9. Production of rice by sample households in qt/ha, 2007/8

Name of PAs	N	Mean	Minimum	Maximum	Sum	% of Total Sum	F-value
Kuhar Michael	38	11.725	1.4	31.5	445.6	21.30%	3.564**
Diba Giorgies	54	11.848	0.7	42	639.8	30.60%	
Nabega	44	11.558	2.8	40.6	508.6	24.30%	
Kidist Hanna	29	17.114	1.4	28.7	496.3	23.70%	
Total	165	12.668	0.7	42	2090	100.00%	

Source: Survey result, 2008/9 ** significant at 5% level

According to Tesfaye *et al.* (2005), rice can locally be prepared and consumed in a variety of traditional ways. In terms of importance and priority farmer utilize rice by making the following food types. Pancake or *Engera* which is prepared independently on its own or by mixing with teff or finger millet depending on the wealth status of the farmer, *Dabo* or bread which is prepared by mixing it with other cereal such as wheat and maize on different proportions. *Kinche* (boiled split rice mixed with either oil or butter) meals and local beer is also prepared from rice for home mainly for home consumption purposes. Utilizing rice by mixing up with other crops (mixing rice with crops like teff and finger millets) is common for urban consumers and hotels.

In Woreta (capital of the woreda) town, one farmers' multipurpose cooperative association, was established and is giving service currently. The main function is to collect rice from cooperatives member producers and sell it to different consumers (including other

cooperatives). The advantage is price stabilization mechanism for grain producers of farmers who are members of the cooperative association. The cooperative has different milling machines used to prepare different forms of rice products. For instance, it can prepared rice used for hotels, for consumers, and for *enjera.*

4.1.2.3. Livestock production

Livestock production is an integral component of the farming system in the study area and contributes very much to rice production in particular and to crop production in general. Important animals kept by the sample farmers are cattle, sheep, goats, mule, horses, donkey and poultry (Table 10). Oxen are the main source of farm power for plowing, short haulage, harrowing, and threshing. About 51% of the respondents owned one pair of oxen, 29.9% owned one, 11.5% owned three, 5.1% owned four, and the rest percent owned 5-6 respectively. The sample respondents have, on average, a pair of oxen (1.91) with standard deviation of 1.04. There is significant difference in number of yearling, sheep, oxen, Goats and in monitory value of livestock among 4 kebeles.

Table 10. Number of livestock owned by sample households, 2007/8

Types	N	Mean	Std. Dev	F-value
Cow	165	1.62	1.299	0.854
Oxen	165	1.91	1.041	3.470**
Heifer	165	0.97	1.05	0.945
Yearling	165	0.67	0.871	4.238***
Calves	165	0.85	0.945	1.729
Bulls	165	0.07	0.391	2.036
Mature Sheep	165	1.04	2.288	3.615***
Lamb Sheep	165	0.33	0.932	2.274*
Mature Goats	165	0.28	1.136	2.477*
Kids Goat	165	0.05	0.336	1.224**
Mature Donkey	165	0.59	0.634	1.509
Kids Donkey	165	0.19	0.412	0.849
Horses	165	0	0	
Mules	165	0.02	0.134	2.006
Total livestock unit (TLU)	165	5.465	3.44433	1.861
Total monitory value (birr)	165	13849	9122.55	2.138*

Source: Survey data, 2008/9 ***, ** and * show the values statistically significant at less than 1%, 5% and 10% respectively

4.1.2.4. Ownership and farm implements

The implements used in rice cultivation are generally traditional. Light hand-ploughs, drawn by oxen, are most frequently used. About 99 % of the respondents had plowing tools and 7 % farmers owned cart. About 73 % of the households also had grass roofed house and 65% had iron sheet roofed houses respectively. To assess the livestock holding TLU and birr were employed to calculate resource ownership per households. The average livestock owned was about 5.47 tropical livestock unit (TLU). In terms of monetary value it was about 13848 birr. There is significant difference in animal cart ownership only among the sampled kebeles.

Table 11.Ownership and farm implements of the sampled farm households

Ownership	N	Minimum	Maximum	Mean	Std. Deviation	F-value
Grass roofed house	165	1	2	1.27	0.44	1.108
Iron sheet roofed house	165	1	2	1.35	0.47	0.850
Plowing tools (*moffer, kenber, maresha*)	165	1	2	1.01	0.07	1.580
Animal cart ownership	165	0	2	1.92	0.30	2.492*
Total livestock ownership	165	0.01	23.24	5.45	3.44	1.861

Source: survey data, 2008/9. ***** show the values statistically significant at 10%

4.1.2.5. Farming experience and Income

The average year of farming experience for the rice producer's households was 22.54 and the non-farming experience was 1.7 years (Table 12). The survey results indicate that farmers from low land rice production had more experience in farming rice. Almost all the households in the study area depend on farming income. The average amount of income earned form farming activities was 12,029 birr per year and from non-farm activities was birr 460.40 per year. Non-farm income can be used to finance marketing activities and also accessing on-farm income has a bearing on market participation. The t-test shows that there is a significant difference in non-farm income ($p<0.025$) and non-farm experience ($p<0.033$) between the two rice production systems at 5% level of significant.

Table 12. Farming experience and farm income of a farmer

Rice production system		Farming experience	Non- farm experience	Annual income from farming	Annual income from non -farming
Upland	N	90	91	91	91
	Mean	21.8	2.47	12063.7	647.31
	Std. Deviation	11.37	5.96	9402.31	1426.01
Low land	N	73	73	73	73
	Mean	23.52	0.91	11985.8	227.39
	Std. Deviation	11.76	3.06	10847.1	942.7
Total	N	163	164	164	164
	Mean	22.61	1.78	12029	460.4
	Std. Deviation	11.54	4.93	10039.2	1248.66
t-value		0.903	2.157**	0.217	2.232**

Source: own survey result, 2008/9, ** shows the value statistically significant at less than 5% level.

4.2. Access to Services

4.2.1. Location and infrastructure

Location: Agricultural production is affected by the availability and utilization of inputs and service used such as credit, agricultural extension, and market information. Road accessibility and facility of transportation are also needed to market agricultural outputs.

In the study area, rice producing farmers travel a maximum of 4 hrs and a minimum of 0.08 hour to reach the nearest market center (woreda capital Woreta). The average distance needed for farmer to travel to the market was about 1.6 hours per trip. The distance to the local extension office (developmental centers) is an important factor since the interaction of the farmers with the extension office is crucial in making information available. The mean distance required to travel to the development (extension office) was about 0.57 hours. So, since the distance to this centre has a bearing on farmers' access to markets, proximity in walking hours will be included in the specification of the model for market participation. The

analysis of ANOVA indicted that there is a significant difference in distance to travel to the market center at 1% level of significant ($p<0.001$) but there was no any difference in distance to travel to development centers among the sampled Kebeles.

Table 13.Traveling time required to the market center and development center *(in hours)*

PA		Distance in hour to	
		Market center	Development office
Quahar Micheal	N	38	38
	Mean	1.12	0.46
	Std. Deviation	0.56	0.44
	Minimum	0.08	0.08
	Maximum	2	2
Nabega	N	44	44
	Mean	1.58	0.43
	Std. Deviation	1.25	0.35
	Minimum	0.08	0.08
	Maximum	4	1.5
Kidist Hanna	N	29	29
	Mean	1.62	0.38
	Std. Deviation	1.25	0.29
	Minimum	0.08	0.08
	Maximum	3.5	1.5
Diba Sifatira	N	54	53
	Mean	1.97	0.86
	Std. Deviation	0.81	0.87
	Minimum	0.25	0.08
	Maximum	3	3
Total	N	165	164
	Mean	1.60	0.57
	Std. Deviation	1.03	0.61
	Minimum	0.08	0.08
	Maximum	4	3
F-Value		5.621***	0.884

Source: Own survey, 2008/9

Infrastructure: Fogera woreda has about 17 kms asphalt road, 30 kms all weather gravel road, and much dry weather road. In the harvest season, vehicles and carts could travel to the direction they wish. However, about 91% of producers transport rice to local markets by packing animals and 4.2% by head load, they also use animal carts and some few producers

also use vehicles. The average market transportation cost is about 9.50 Birr per quintal. There is one bank service at Woreta, and there is also credit giving institution, ACSI, with wider service coverage. Mobile telephone worked in all 4 *kebeles*. All rural *Kebeles* had a telephone line.

Table 14. Means of transportation used by sample households in rice marketing

	Frequency	Percent
Head /back loading	6	4.2
Animal carts	5	3.5
Vehicles	2	1.4
Pack animals	130	90.9
Total	143	100

Source: Own survey, 2008/9

4.2.2. Credit availability

The survey result indicated that about 62% of the sampled farmers need credit but the majority of them did not take credit both on-cash and in-kind to purchase inputs like, fertilizer (Dap and Urea), seed, chemicals and sprayer. This is because fearing of interest rate and defaulters (to make grouping as means of collateral). There is a high significant difference in getting credit among sampled kebeles.

Table 15. Credit availability to the sample farm households

Did you take credit?	Name of peasant Administration					Percent of households with credit access	F-Value
	Kuhar Michael	Nabega	Kidist Hanna	Diba Giorgies	Total		
Yes	4	4	16	24	48	29.1	12.226***
No	34	40	13	30	117	70.9	
Total	38	44	29	54	165	100	

Source: own survey, 2008/9. ***, shows significant level at 1% level of significance.

With regard to credit source out of 48 sampled farmers, 26.1% of the farmer get credit from Amhara Credit and Saving Institute (ACSI), 3% get credit from service cooperatives.

Table 16. Credit giving institutions

Credit giving organizations	No. of sample households received	Percent (%)
ACSI	43	89.6
Cooperatives	5	10.4
Total	48	100

Source: Survey data 2008/9

From a sample of 48 credit users about 96% used the obtained credit to purchase animals either for fattening or plowing purpose or to purchase pump for irrigation of vegetables. About 2.1% used for grain seed purchase and food grain production purpose.

Table 17. Credit purpose for households

Credit purpose	No. of sample households	Percent (%)
To purchase animals for fattening , plowing or to purchase pump	46	95.8
To purchase grain Seed	1	2.1
To rent-in land for food grain production	1	2.1
Total	48	100

Source: Survey data, 2008/9

4.2.3. Market information and extension service

The distribution of market information refers to the availability of relevant market information to farmers, about demand, supply and price of the crops. The survey result indicates that 79.2% of the households had price information before they sale their produce to the nearby market but 20.3% of the interviewed farmers do not have access to any information.

a) **Supply, demand and price information**

As indicated in Table 18, out of 133 farmers, 42.9% obtained information about rice supply by using other rice traders from previous market days and through personal observation

during their market visits. A sample respondent of 139 rice farmers also revealed that 40.3% of them get information about rice market demand from other trader and their personal observation. On the same manner 42.9% of the sampled households obtained price information from another farmers and their personal observation

Table 18. Source of information about supply, demand and price, 2007/8

	Information					
	Supply		Demand		Price	
Source of information	Frequency	%	frequency	%	frequency	%
Personal observation	15	11.3	24	17.3	31	22.1
Rice traders	18	13.5	14	10.1	8	5.7
Another Farmer and personal observation	43	32.3	45	32.4	60	42.9
Other rice traders and personal observation	57	42.9	56	40.3	39	27.9
Radio	-		-	-	2	1.4
Total	133	100	139	100	140	140

Source: Survey data 2008/9

b) **Quality of source of information**

With regard to quality of source of information from a total of 129 respondents, 42.6% were indicated that the information quality was adequate, 21.7% also responded both reliable and adequate, and 20.9% responded only reliable and only 2.3% was recorded as quality of information is timely.

Table 19. Quality of source of information about supply and demand, 2007/8

	Quality of information			
	Supply		Demand	
	Frequency	%	frequency	%
Reliable	27	16.4	35	26.1
Adequate	9	5.5	10	7.5
Timely	3	1.8	3	2.2
Reliable* and Adequate**	28	17	25	18.7
Reliable and Timely	3	1.8	4	3
Adequate and Timely	4	2.4	4	3
Reliable ,adequate and Timely	55	33.3	53	39.6
Total	129	78.2	134	100

Source: Survey data, 2008/9, *means accuracy of the information &** means the amount and availability of enough information.

C) Extension service

The average number of contacts farmers have with extension officers is about four times per month. The distance to the extension office affects the cost of searching for information. On average a household takes 1.57 hour per trip to reach the agricultural development offices. The study shows that 65.7% of respondents had a weekly contact with extension agents and 19.6% had contact once in two weeks. About 18.2% of the sampled respondents get advice on production and animal feeding, 16% on production only, and 15.4% got advice on production of crops, marketing, credit and health aspect. There is a significance difference in extension contact among sampled kebeles at 1 % level of significant ($F=5.018$ and $p<0.002$).

Table 20. Frequency of extension contact

Extension contact frequency	Frequency	Percent
Weekly	94	65.7
Once in two weeks	28	19.6
Monthly	12	8.4
Twice in a year	2	1.4
Once in a year	2	1.4
Any time when I ask them	5	3.5
Total	143	100

Source: survey data, 2008/9

4.2.4. Agricultural input use

4.2.4.1. Chemical fertilizer and seed

It is evident that chemical fertilizer could boost both production and productivity. Despite this fact, rice producer at Fogera Woreda used very small amount of fertilizer on their rice field. According to IPMS (2005), the reason is that due to flooding and fertile alluvial soil (washed soil from highland area). As shown in Table 21, only 3% of the sampled households used urea, 1.2% use Diamonium phosphate (DAP) and 4.9% used organic fertilizer for rice production.

In general, the farmers use two types of seed variety known as *X-Jigna (local)* and *Gumara (IAC-164.)* the improved one**.** The mean of the seed rate is 258.61 kg per ha. A bout 96% of the sampled household used *X-Jigina variety* (mostly popularized by farmers) and 56 % in the upland and 37% low land rice production system used this variety. The survey result also showed that about 25% of the sampled households used *Gumara variety* (the improved one). However, since it is red in color it is less demanded and used for consumption purpose compare to the white seed *X-Jigina* variety which has high market demanded.

4.2.4.2 Herbicides and insecticides

In the study area farmers used little type of herbicides, namely *2-4-D* and *Malatainne* for the rice cultivation. The survey result indicates that out of the sampled households 3% of them used insecticide, and 16.5% used herbicides for rice production. The χ^2 show that there is a highly significant difference in utilization of insecticides, herbicides at 1% level of significant in up land and lowland rice production system.

Table 21. Input utilization of farmer for rice production

Inputs		Rice production farming system				Total	χ^2
		Upland rice		Lowland rice			
		Kuhar Michael	Diba Sifatira	Nabega	Kidist Hanna		
urea	yes	1	3	0	1	5(3%)*	1.222
	No	37	51	43	28	159	
	Total	38	54	43	29	164	
DAP	yes	0	2	0	0	2(1.2%)*	1.602
	No	38	52	43	29	162	
	Total	38	54	43	29	164	
Organic fertilizer							3.242*
	yes	1	1	4	2	8(4.9)*	
	No	37	53	39	27	156	
	Total	38	54	43	29	164	
Insecticides							6.519***
	yes	0	0	2	3	5 (3%)*	
	No	38	54	41	26	159	
	Total	38	54	43	29	164	
Herbicides							16.801***
	yes	6	0	17	4	27 (16.59)*	
	No	32	54	26	25	137	
	Total	38	54	43	29	164	
X-Jigina variety							9.244***
	yes	38	54	36	29	157(95.2%)*	
	No	0	0	7	0	7	
	Total	38	54	43	29	164	
Gumara Variety							50.205***
	yes	1	3	18	19	41(25%)*	
	No	37	51	25	10	123	
	Total	38	54	43	29	164	

Note: 1. Chi-square shows between the two rice production systems

2. ***, **, and * are significant levels at 1%, 5%, 10% respectively

3. Figures in parentheses are percentages.

Source: survey result, 2008/9

4.2.4.3. Labour and machinery use

Labour demand for rice farming is more than the other crops (Tesfaye *et al.,* 2005). The labour is employed in rice cultivation from soil preparation to harvest. The family labour force (owned labour) consists of the highst percent in rice cultivation. About 44% of the labour is used from owned and very small part 7.9% obtained from hired and shared labour. The analysis of variance shows that there is significant difference in sources of labour among the sampled kebeles (F- value is 3.076 at $p<0.005$).

With regard to farming implements the survey result shows that, 99.4% of the farmers had plowing tools for rice cultivation and 92.7% of the farmer also had two carts while the percentage varies among the Administrative *Kebeles*.

Table 22. Source of labour employed in rice cultivation 2007/8

Source	Frequency	Percent
Owned labour	72	43.6
Owned + hired labour	59	35.8
Owned + shared labour	13	7.9
Hired +shared labour	1	0.6
Owned+hired+shared	20	12.1
Total	165	100

Source: own survey result, 2008/9

4.2.4.4. Storage facilities

According to De Lucia and Assennato (1994), post harvest loss is defined as a measurable quantitative and qualitative loss in a given product .The loss can occur at any point during harvest, threshing, drying, storage or transport. An estimated 10-37 % of total rice production is lost due to post harvest factors (Saunders, 1979). During harvest, depending on the type of machinery or manpower used, small amounts of the grain will be left in the field. Similarly, losses may occur during the drying process, which in developing countries commonly takes place on the road side. Further losses are incurred during the storage process due to molds,

insects and rodents. Estimates from Sub-Saharan Africa have shown rodents can consume or contaminate up to 20% of a stored harvest (FAO, 1994).

Storage services helps for smooth and continuous flow of products to the market and create time utility. The survey result shows that all sampled farmer's store rice in local granaries called *Gottera or Gota* which is made of bamboo tree plastered with mud and 3.6% of them used sack. The duration ranges from 3-24 months. The average month identified was 9.24 month. There is statistically significant difference at 1% level among the sampled kebeles in storage duration (F-value is 0.128 at $p<5.012$)

The purpose of storage rice is 68.5% for sale and consumption and 31.5% for consumption purpose only. However, the motive behind storage was 60% of sample households respond that it is for saving and expecting higher future price. However, farmers reported that there was weight loss in rice during storage (change in quantity and quality).

Table 23. Average storage duration in months to store paddy

Name of peasant Administration	N	Mean	Std. Deviation
Kuhar Michael	38	9.18	3.56
Nabega	43	8.12	2.91
Kidist Hanna	29	11.06	3.79
Diba Sifatira	51	9.19	2.68
Total	161	9.24	3.29

Source: Survey result, 2008/9

4.2.5. Rice marketing of farmers

Out of the total 165 sampled farmers 75.8% of the households sold their produce to the market and 24.2% of the respondents did not sell to the market. It is believed that these farmers consume what they produce and stored their produce for seed use. Quantity of rice marketed by sample households is presented in Table 24. Total supply of rice that is marketed per household in 2007/8 was on average 479.6 quintal.

Table 24. Quantity of rice sales by kebeles in quintal (marketed surplus), 2007/8

Name of Kebele Administration	N	Sum	% of Total Sum
Kuhar Michael	38	76.3	15.90%
Nabega	44	123.4	25.70%
Kidist Hanna	29	123.2	25.70%
Diba Sifatira	54	156.7	32.70%
Total	165	479.6	100.00%

Source: Survey result, 2008/9

Among the two Rice production system, in upland rice production system 98.57 % of the rice sold went to Woreta market and in lowland production system 70.4% of the rice marketed to Woreta and 30% of the produced quantity went to local or rural market points.

Table 25. Use pattern of rice produce at a household level

Descriptive measures	Rice produced (qt)	Consumption (qt)	Seed (qt)	Rice sold (qt)
N	165	164	164	165
Mean	12.67	8.66	1.12	2.91
Std. Error	0.64	0.50	0.06	0.30
Minimum	0.70	0.00	0.00	0.00
Maximum	42.00	37.80	5.60	21.00
Sum	2090.20	1420.20	183.40	479.60
Proportions (%)	100.00	0.68	0.09	0.23
t-value	0.134	.638	.096*	.036**

Source: Survey result, 2008/9

4.3. Profit Analysis of Rice production

4.3.1. Unit and conversion factors

After harvesting, rough rice or paddy rice is dried, either mechanically or by open-air. Dried rice is then milled to remove inedible hull. Hulled rice is also called "brown" rice and consists of an average weight of 6-7% bran, 90% endosperm and 2-3 % embryo (Chen *et al.*, 1998). Further milling removing the bran layer yields white rice. On average, paddy rice produces 25% hulls, 10% bran, and 65% white rice (Saunders, 1979). There are several degrees of milling which can take place, depending on consumer preferences and desired degree of whiteness or opacity. Milled rice is referred to as polished or whitened and there are various degrees or fractions of polishing. White rice implies 8-10% bran removal.

Before proceeding to the calculation of profit and margins, the underlying assumptions must be explicit. In the present calculation we will try to estimate and fix the conversation rate that is used to convert from paddy to milled rice. For example the commonly conversation factor of paddy in Philippines is 0.65 but it applies to dry paddy also, however, most paddy hauled to mills is wet, for which the conversion factor of 0.58 were assumed. In this study based on farmers respond 0.70 was taken as the conversion factor for paddy yield. Hence the following points were considered in the calculation of profit and margin.

1. The conversion factor of paddy yield is 0.70. That is 0.30 is Husk yield. Husk yield is 30 percent of the grain yield.
2. Average selling price of a kilogram of husk is 25 cents per kg.
3. A straw yield is measured in "*shekim*", i.e. the amount of straw which is tied up with a rope having two meter circumference from one '*timad'* (=0.25ha). About 10-30 number of "*shekim*" (head /backload) of straw will be obtained
4. Since each farmer has plots with different soil fertility, flooding status, the opportunity cost of each farm will vary so the opportunity cost given by each farmer was considered as it is.

5. Transportation cost by donkeys' from farm to farmer's house was calculated based on the amount of quintal to be transported per day.
    5.1. If it is from1-10 quintal, it requires 1 donkey at a price of 10-15 birr/day
    5.2. If it is from 10-15 quintal, it requires 2 donkeys at a price of 10-15 birr/day.
    5.3 If it is above 15 quintal, it requires 3 donkeys at a price of 10-15 birr/day
6. Labour cost is estimated based on the price or wage of labour in each locality.
7. The Price of a pair of oxen per day is estimated based on the rental value in the each locality.
8. A 10% interest rate per month is considered for the interest rate calculation which is available for loans or credits from Amhara Credit and Saving Institute (ACSI).

4.3.2. Gross income of paddy production

The mean paddy rice production was 42.19 quintal per hectare with a standard deviation of 19.79. if it is converted to milled rice, the mean production (0.70% of paddy produced) was 30 quintal per ha.

Rice producers generate income from sales of paddy alone or sales of polished (milled) rice. It has two by-products. These are straw yield and husk yield. Straw yield used for construction of house and husk yield (cover rice) also used for cattle feeding and fattening purpose for farmers. Husk yield is also used for making chip wood. Usually farmers do not use the husk yield. It will be left for millers during milling of their paddy. In this study, straw yield is also considered to calculate the gross income of farmers. The gross income of paddy production was 17549.21 birr per hectare and the standard deviation was 9741.43 (Table 26).

Table 26. Profit and Cost of production of rice per hectare

Items	Average	Stedv
1. Revenue		
Paddy yield (qt/ha)	42.19	19.79
Price of paddy(birr/qt)	387.63	79.46
Straw yield (*shekim*/ha)	88.05	53.70
Price of straw (birr/*shekim)*	13.76	5.46
Value of paddy /ha **(1**)	16930.56	10021.58
Value of straw/ha **(4)**	1126.08	590.24
Total revenue (1+4)	***17549.21***	***9741.43***
2. Cost		
A. Opportunity cost of land (birr/ha)	4937.0	3009.34
B. labour cost		
Labor cost for plowing (birr/ha)	333.05	102.58
Frequency of plowing	4.15	1.02
Person required to plow (person day/ha)	16.73	4.20
Labor wage to plow (wage/person)	20.24	5.07
Labor cost for weeding(birr/ha)	2939.41	2171.96
Frequency weeding	2.76	0.62
Person required to weed (person day/ha)	144.19	93.86
Labor wage to weed (wage/person)	20.56	7.44
Labor cost for harvesting (birr/ha)	438.56	177.03
Person required to harvest (person day/ha)	22.47	8.33
Labor wage to harvest (wage/person day)	19.98	6.48
Labor cost for trashing and winnowing (birr/ha)	365.32	140.08
Frequency trashing and winnowing	1.55	0.51
Person required to trash &winnowing (person day/ha)	18.58	7.38
Labor wage for trashing and winnowing (wage/person day)	20.50	6.94
Total labour cost	4049.24	2263.06
C. Animal power cost		
Animal power cost for plowing (birr/ha)	903.93	408.47
Oxen required to plow hectare (oxen day/ha)	16.75	4.19
Rental rate of pair oxen (price/oxen day)	52.69	20.22
Animal power cost for trashing (birr/ha)	447.30	157.54
Rental rate of oxen required to trash hectare (ox day/ha)	20.41	3.33
Price of one ox for trashing (price/ox day)	22.54	8.14
Animal power cost for transport to home (birr/ha)	89.28	48.63
Total animal power cost	1424.19	480.68
D. Material input cost		
Amount of seed (kg/ha)	248.59	105.94
Seed cost (birr/ha)	1041.9	469.89
Amount of herbicides (litter/ha)	4.10	1.26
Herbicide cost (birr/ha)	242.21	51.28
Manure cost (birr/ha)	938.40	918.30

Table 26 *(continued)*

Total input cost	1114.22	521.59
2.5 Other cost		
Land rent (birr/ha)	25.00	0.00
Interest rate (birr/ha)	1004.65	759.60
Total other cost	213.75	510.38
Total cost /2.1+2.2+2.3+2.4+2.5/	**11688.23**	**4010.39**
Profit/1-2/	**5006.48**	**10040.62**

Source: Own survey 2008/9.

4.3.3. Cost of production of paddy

Table 27 gives expenditure per hectare on various inputs used in the production of rice. The Table reveals that the total cost per hectare was 11688.23 Birr on samples households. Opportunity cost of land (rental value of land), was the item taking maximum share in total cost (40.23%) followed by labour cost (34.65%) and animal power cost (13.11%). Material input cost like manure, herbicides, seed (10.26%) and value of other costs like value land rent/tax and interest in capital (1.75%) consists of the minimum share of production cost.

Table 27. Average cost per hectare of rice production

Type of costs	Cost/birr	% share
Opportunity cost (land rent)	4937.00	40.23
Labor cost	4049.24	34.65
Animal power cost	1424.19	13.11
Input cost	1114.22	10.26
Other costs	213.75	1.75

Source: Own computation from survey, 2008/9

4.3.3.1. Labor cost

Rice crop is a labor intensive crop, therefore, weeding labor ranked first. Weed is a major problem. About 67% of the cost expenditure goes for weeding purpose. Besides, harvesting, threshing and winnowing costs rank second and third in the cost component for rice production.

Table 28. Average labor cost per hectare of rice production

Activities	Cost/birr	% share
Plowing	333.05	9.81
Weeding	2939.41	67.39
Harvesting	438.56	12.58
Threshing and winnowing	365.32	10.63

Source: Own computation from survey, 2008/9

4.3.3.2. Animal power cost

Similarly, the share of animal power cost used was highest for plowing and it is about birr 903. It ranked 60% of the total animal power cost available.

Table 29. Average animal power cost per hectare of rice production

Activities	Cost/birr	% share
Plowing	903.93	60.39
Trashing	447.3	32.86
Transporting	89.28	6.75

Source: Own computation from survey, 2008/9

4.3.3.3. Material input cost

Percentage share of seed to the total input cost was about 61.47% and it was indicated that the total input utilization from the total cost of production of paddy is very low (10.6 %). Farmers do not use inputs, even fertilizer, because their land is fertile (alluvial soil) and there is flooding problem.

Table 30. Agricultural input cost per hectare of rice production for household

Inputs used	cost/birr	% share
Seed	1041.90	61.47
Herbicides	242.21	31.87
Manure	938.22	6.66

Source: Own computation from survey, 2008/9

4.3.3.4. Other costs (land tax and interest rate)

Land rent payment for farmer is calculated based on the available standard given by the bureau of finance. Its payment is based on the amount of hectare a farmer owned (appendix-1) Similarly the interest rate (cost) of credit users of the sampled farmers was about birr 1004 per hectare. Farmers are obtained credit from Amhara credit and saving institute (ACSI) and the interest rate was about 10% per month.

Table 31. Cost of land rent (tax) and interest rate per hectare of rice production.

Items	Cost/birr
Land rent/ha	25
Interest rate /ha	1004.65

Source: Own computation survey, 2008/9

4.3.4. Net income / profit

The cost benefit production of paddy per hectare bases shows that production of paddy was profitable. The average net income for production of paddy per hectare obtained was 5006.48 birr with a standard deviation of 9899.71.

Table 32. indicates that there is a significant difference between four kebeles in terms of gross income and profit at 1% significant levels. But there is no significant difference in terms of cost of production of paddy (Appendix Table 5). The least significance difference or mean difference (LSD) shows that Kuhar Micheal administrative *kebele* has a significant difference from other three kebeles' (Nabega, Kidist Hanna and Diba Sifatira.) in terms of gross income, cost and profit.

Table 32. Gross income, cost and profit of paddy production per hectare by *kebele*

PAS		Gross income	Total cost	Profit
Quahar Micheal	N	37	38	38
	Mean	12513.46	11648.26	535.89
	Std. Deviation	5914.36	3796.09	7102.64
Nabega	N	43	44	44
	Mean	17390.23	11175.91	5819.09
	Std. Deviation	9981.52	4004.05	10123.80
Kidist Hanna	N	29	29	29
	Mean	20131.31	11710.77	8420.54
	Std. Deviation	10403.46	3877.62	11083.35
Diba Sifatira	N	54	54	54
	Mean	17778.52	12121.68	5656.83
	Std. Deviation	8982.38	4283.12	10343.97
Total	N	163	165	165
	Mean	16899.55	11688.23	5006.48
	Std. Deviation	9235.34	4010.39	10040.62
F-value		4.434***	0.447	0.009***

Source: Own computation survey, 2008/9

4.4. Analysis of Econometric Results

4.4.1. Heckman two step results

In this study, those factors that influence the decision to participate as well as the volume of rice supplied to market would be determined. About 15 variables were hypothesized to determine household level decision to participate in rice market and the volume of marketed surplus. The Probit and Heckman selection model results are depicted in Table 34, 35 and 36.

4.4.1.1. Market participation determinants

Heckman two step estimates was analyzed using LIMDEP software. Both continuous and discrete explanatory variables were checked for the existence of multicollinearity. Variance Inflation Factor (VIF) was computed for continuous variables and contingency coefficients for dummy variables to see the existence of multicollinearity among variables. It was found that there is no problem of multicollinearity (Appendix Table 6 and 7). Moreover, explanatory

variables like market information access, land holding quantity produced were tested and only market information access were found to be endogenous variable. The problem of endogeneity occurs when an explanatory variable is correlated to the error term in the population data generating process, which causes, the ordinary least squares estimators of the relevant model parameters to be biased and inconsistent. Consequently, taking these variables their actual value can introduce endogeneity problem. The source of endogeneity could be omitted variables, measurement error and simultaneity (Maddala, 2001).

This problem can be overcome by using two stages least square (2SLS) method. The method involves two successive applications. The first stage is made by regressing the suspected endogenous variables over the pre-determined or pure exogenous variables to get their predicted values. Then the predicted values of the endogenous variables in the first stage are used to estimate the supply equation.

The Heckman model was estimated by using a two-step procedure. In the first step the Probit model was estimated to identify factors affecting decision to participate. In the second step the OLS adjusted for selectivity bias (heckit) model was estimated to identify the significant factors of level of participation or volume sold. The model is specified as:

$$Pr\ (MPD) = f\ (AGE, SEX, EDU, FS, FL, EXC, MRD, TLS, TQP, OXN, MINF, CREDIT, NFINC, LMP, TLU)$$

The Probit model estimation indicates that 4 variables were found to be the significant factors affecting the household market participation decision (Table 34). These variables are quantity of paddy produced, market information access, extension contact frequency and total Livestock value (TLU) respectively. Four of the variables had coefficients significantly different from zero. These significant variables increased the chance of household selling of rice to the market positively. More over all the significant variables had the expected signs.

Market information access significantly affect the probability of selling at 5% ($P<0.049$) level of significant. Those farmers with better market information are in a better position to supply their surplus production to the market. Goetz (1992), in his study of household food marketing behavior found that better information significantly raised the probability of market

Table 33. Description of dependant and independent variables used in econometrics models (the Heckman and Tobit models)

Variables	Description	Expected sign	Type of variable
MS	Total quantity (volume) of rice supplied to the market in quinta		Continuous
AGE	Age of households head in years	+/-	Continuous
FS	Family size in number	+/-	Continuous
MKD	Access to market distance (Hr/trip)	-	Continuous
TLS	Total land holding of household head in ha.	+	Continuous
TQP	Total quantity of paddy produced (qt/ha)	+	Continuous
NFINC	Annual income obtained from non- farming activities in Birr	-	Continuous
LMP	Lagged market price of wet paddy in price /qt	+	Continuous
OXN	Number of oxen owned in number	+	Continuous
TLU	Total livestock of households in TLU	- /+	Continuous
FL	Family labor of household head in man-equivalent	+	Continuous
MPD	Market participation decision		Dummy
EDU	Education level	+	Dummy
SEX	Sex of household head	+/-	Dummy
EXC	Extension contact frequency	+	Dummy
CREDIT	Credit access for farm households	+	Dummy
MINF	Market information access	+	Dummy

participation for potential selling households. Also quantity of rice produced has highly affected market participation positively at 1% significant level ($p<0.000$). This shows that the higher the output, the higher is the farmer willing to participate in the market. Study by Marcel *et al*. (2005), on coffee producers indicate that selling to the market is more likely when the quantity sold is large and the market is closed by.

It is also found that extension contact with extension agents is positively and significantly influence to the probability of selling rice at 5% ($P<0.022$) level of significant. This suggests that access to extension service improved market participation and farmers could be aware of the various aspects of the production and selling of rice. The study by Abay (2005) on vegetable marketing in Fogera woreda of South Gondar Zone of ANRS shows that extension contact with farmers has positive influence in the onion market participation decision.

Similarly, another variable which affect market participation is the total livestock value (TLU). It is significant at 10%. This indicates that as livestock value increase the income of farmers also increase, since the area is wet land (bordered by Lake Tana), both crop and livestock production are integrated activities and are connected each other. Hence, owning of more of livestock helps to increase to purchase agricultural inputs for production and this indirectly increase the production and market participation of rice. Study by Makhura (2001) on maize market participation suggests that an increase in the value of livestock owned leads to an increase in maize sale.

Table 34. Factors influencing the decision to sell rice (Probit results)

VARIABLES	COEFF. (STD.ERR.)	T-RATIO	MARGIONAL EFFECT
CONSTANT	1.044 (1.746)	0.598	.23255192
AGE	-0.009 (0.014)	-0.656	-.00207295
SEX	0.934 (1.090)	0.857	.29906007
EDU	-0.097 (0.310)	-0.314	-.02199104
FS	-0.097 (0.094)	-1.036	-.02167105
FL	-0.100 (0.182)	-0.547	-.02219815
EXC	1.206** (0.526)	2.291	.37863589
MKD	-0.128 (0.137)	-0.939	-.02859262
TLS	0.163 (0.284)	0.573	.03623407
TOP	0.070*** (0.017)	4.010	.01560285
OXN	-0.257 (0.185)	-1.390	-.05722679
CREDIT	0.079 (0.302)	0.262	.01730087
NFINC	-0.237 (0.182)	-1.307	-.05285606
LMP	0.000 (0.001)	0.893	.00010750
TLU	0.119* (0.069)	1.735	.02650310
MINF[B]	1.108** (0.563)	1.967	.15778388

Number of observations = 165	Prob [Chi Sq > value] = 0.3414741E-03
Log likelihood function = -69.82410	Prediction Success = 80.606%
Restricted log likelihood = -90.23058	Chi squared = 40.81295

[B] = Predicted MINF (endogenous variable)

Note: ***, ** and * show the values statistically significant at 1%, 5% and 10% probability level respectively

4.4.1.2. Market supply determinant /volume/

The model seeks to identify factors that influence the level of rice sales or volume marketed. The model is specified as

MS = f (SEX, EDU, FS, MAD, TQP, MINF, CREDIT, NFINC, LMP, LAMDA)

This means that the quantity supply or sales depends on the set of factors indicated. The second stage of the selectivity model (heckit or OLS accounting for bias) is estimated to determine factors influencing the level of rice sales.

Table 35 presents the results of the determinants regarding the quantity of (level of) sales. For the second-stage OLS results, the inverse mills ratio (lambda) for the level of rice sales was significant, implying that selection bias would have been resulted if the level of sales in rice had been estimated without taking into account the decision to participate. That is selection effects become important, the IMR is significant at the 5 percent level ($P<0.056$).

Two of the significant variables were positively associated with the level of rice sales meaning that the factors were important only among those who were selling rice to the market. Quantity produced is significant at 1% ($p<0.000$) and Education level at 10% ($p<0.065$) level of significant.

A study by Wolday (1994) on output of food grains (wheat, teff and maize) and Rehima (2007) on pepper market also found that quantity produced has positive effect on quantity supplied to the market. Study by Chauhan and Singh (2002) showed that, marketed surplus of paddy is positively related to the volume of production as well as with area under crop. On the same manner, Abay (2007) on the study of Vegetable marketing in Fogera woreda indicated that quantity produced has positive effect on tomato market supply.

The interpretation of the marginal effect is straight forward like any OLS interpretation. The results suggest that a one quintal increase in quantity of paddy production leads to an increase of about 0.12 quintal of sales.

On average, if paddy producer gets educated, the amount of paddy supplied to the market increases by 0.96 quintal. This suggests that education improves level of sales that affects the marketable surplus. On the other hand, if a family size increased, the amount of paddy supplied to the market would be decreased by 0.25 quintal.

Table 35. Factors influencing the level of rice crop sales/ OLS/ results

VARIABLES	COEFF. (STD.ERR.)	T-RATIO
CONSTANT	-1.949 (2.970)	-0.656
SEX	2.123 (1.817)	1.168
EDU	0.960* (0.520)	1.84636
FS	-0.253** (0.133)	-1.90631
MKD	-0.088 (0.260)	-0.336
TQP	0.128*** (0.023)	5.70103
CREDIT	0.024 (0.586)	0.040
NFINC	0.070 (0.299)	0.233
LMP	0.002 (0.001)	1.609
MINF[B]	0.795 (0.770)	1.032
IMR	0.719** (0.376)	1.91454
R-squared = 0.2493484	F[9, 155] (prob) = 4.92 (.0000)	
Adjusted R-squared = 0.2006048	Log likelihood = -414.9390	
Rho = cor[e,e(-1)] = 0.1104117	Restricted(b=0) = -438.6011	
Chi-sq [10] (prob) = 47.32 (.0000)	[B] = Predicted MINF (endogenous variable)	

Note: ***, ** and * show the values statistically significant at 1%, 5% and 10% respectively

4.4.2. Tobit model results

Tobit model tends to answer the two questions by identifying the factors affecting the decision to participate and the level of participation at the same time. Table 36, presents Tobit model results. The result indicates that quantity of paddy produced jointly affected both the probability of market participation and volume of supply. Quantity produced is significant at1% level ($p<0.000$).

This analysis reveled that applying Heckman two step model is appropriate because there was selection bias but if we had been using OLS model instead of Heckman two step model, the coefficients would have been inefficient. One of the weaknesses of Tobit model is that it assumes all producers are potential suppliers of a good and that volume of supply and market participation are influenced by the same variables in the same way (Blaylock and Blisard, 1993).

Table 36. Maximum likelihood estimates Tobit model

VARIABLES	COEFF. (STD.ERR)	T-RATIO	Change in probability /participation/	Change among rice sellers /intensity/	Total marginal effect
CONSTANT	-12.337 (6.939)	-1.778	-3.25471	-.00123	-.00123
AGE	-0.016 (0.056)	-0.288	-.00423	.00000	.00000
SEX	8.254 (5.264)	1.568	2.17742	.00083	.00083
EDU	1.618 (1.263)	1.282	.42697	.00016	.00016
FS	-0.339 (0.407)	-0.834	-.08953	-.00003	-.00003
FL	0.008 (1.062)	0.007	.00201	.00000	.00000
EXC	0.998 (1.896)	0.527	.26340	.00010	.00010
MKD	-0.328 (0.566)	-0.579	-.08643	-.00003	-.00003
TLS	0.012 (0.820)	0.015	.00326	.00000	.00000
TQP	0.255*** (0.053)	4.780	.06721	.00003	.00003
OXN	-0.607 (0.965)	-0.628	-.16002	-.00006	-.00006
CREDIT	-0.465 1.362)	-0.341	-.12255	-.00005	-.00005
NFINC	0.307 (0.579)	0.531	.08107	.00003	.00003
LMP	0.003 (0.002)	1.241	.00072	.00000	.00000
TLU	0.158 (0.303)	0.524	.04181	.00002	.00002
MINF[B]	1.789 (2.332)	0.767	.47189	.00018	.00018

Log likelihood function = -60.1125 LM test [df] for tobit = 103.664[16]

Number of observation = 165 [B] = Predicted MINF (endogenous variable)

Note: ***, ** and * show the values statistically significant at 1%, 5% and 10% respectively

4.5. Analysis of Structure-Conduct and Performance

In this part of the thesis, rice marketing participants and market structure, conduct and performance will be discussed.

4.5.1. Profile of rice traders in Fogera

The survey result showed that, wholesalers are fairly young average 36.6 years old and millers it is about 38.6 years (Table 37). On average, a wholesale trader household consists of five to six members and in millers about 6. Often family members are also involved in the business and usually act as accountant; or managers. It is indicated that most owners/managers in the wholesale market are male: about 93.3 percent. This also holds true for millers. In general male, dominate in the rice trade (wholesaling, milling, distributing, assembling and retailing).

Table 37. Personal profile of rice traders

Characteristics	Wholesalers	Millers	Urban Distributors	Assemblers	Retailers
Age of trader	36.6	38.66	43.4	32.52	29.5
Std. Deviation	(4.87)	(12.64)	(10.47)	(6.63)	(8.05)
Sex	All male	All male	4-male 1-female	All male	7-male 1-female
Number of family size	5.5	6.25	5.4	4.6	5.67
Std. Deviation	(2.38)	(1.83)	(3.36)	(1.41)	(3.38)
Number of persons employed	8	-	-	-	2.13
Std. Deviation	(6.74)	-	-	-	(0.835)
Family members employed	1.8	1.67	2.2	1.56	1.88
Std. Deviation	(0.447)	(1.225)	(0.837)	(0.651)	(0.835)
Non-family members employed	6.2	2.11	1.2	0	0.25
Std. Deviation	(6.6)	(1.36)	(1.78)	0	(0.46)

Source: Survey result, 2008/9

As shown in Table 38, rice wholesalers have 4.6 years experience in rice trading. On average, the rice millers and distributors just have 9 and 5 years experience and the rice assemblers and retailers have 7and 5 years of experience respectively.

Table 38. Commercial profile of rice traders

Characteristics of respondents	Wholesalers	Millers	Urban distributors	Assemblers	Retailers
Years of experience	4.6	9.33	5.00	7.20	4.88
	(1.94)	(9.0)	(3.082)	(2.70)	(3.78)
Permanent male employees	3.2	3.33	1.8	1.52	2.13
	(1.48)	(2.0)	(1.30)	(0.714)	(0.84)
Permanent female employee	0.40	0.33	1.6	0	0
	(0.548)	(0.5)	(1.94)	0	0
Temporary employees	0.40	0.56	0.40	0.040	0
	(0.89)	(0.8)	(0.89)	(0.20)	0

Source: Own survey result, 2008/9. Numbers in parenthesis are standard deviations.

Table 39 shows the current asset of the rice traders. The average value of assets is much higher among rice wholesalers, 515,943.6 Birr, while it is 333,927.27 Birr for rice millers and 66,283.8 Birr for rice distributors and only 12,879.6 for Assemblers. The initial working capital for wholesalers was high, for millers fairly low and for assemblers very low.

Table 39. Average value of asset for traders (in Birr)

Characteristics	Wholesalers (n=5)	Milers (n=10)	Urban distributors (n=5)	Assemblers (n=25)
Residence house	206000	77777.8	20447.4	12060
Separate store	155000	166600	10179.4	0
Store residence	0	5000		0
Mobile telephone	2413.6	2033.6	1059.4	703.2
Fixed line telephone	1130	450	219.4	116.4
Vehicle /personal truck /	100000	18500	30059.4	0
Bicycle	1000	615	259.4	0
Motor bicycle	0	0	0	0
Milling machine	50400	62950	0	0
Total value of shop shed in birr currently	0	0.9	4059.4	0
Total value	515944	333927	66283.8	12879.6
Amount of initial working capital	26720	20909.4	12300	4188
Amount of working capital currently (2007/8)	1092500	76666.7	44650	16560

Source: Survey result, 2008/9

4.5.2. Characterization of marketing actors

In the study area there are no traders who specialized in rice trading but they are grain traders in general. According to urban trade and industry office of the woreda there are 9 licensed grain wholesalers, 66 grain retailers and 26 rice millers or processors in 2008/9. Most grain traders are licensed and some are trading rice with out license, for instance, assemblers and some times brokers. Market participant (traders) can be characterized from the point of rice trading into different groups:

1. Producers: Producers are the first link in the marketing chain. Farmers produced paddy and sold to Woreta market or to local village market like (*Hod Gebeya and Makisegnit*). Out of 113 respondents 68.5% of the sample households answered that they sold to Woreta market (capital of Fogera Woreda) and the rest to local village market points.

Farmers sell their rice through different channels or roots. The main four channels are wholesalers and millers (71.9%), rural assemblers (14.1%), urban assemblers (11.9%) and consumers (2.2%) respectively.

Rural assemblers are traders who collect rice from farmers at local markets during market days and sell it to wholesalers or millers. The markets are placed in remote areas which are open once in a week usually to satisfy some farmers need. There are two main local markets these are *Hod Gebeya* and *Makisegnit Gebeya* market points. Urban assemblers are few in number and purchase rice from producers during market days. They used to sell to wholesalers' only to get better price.

Table 40. Percentage of rice market outlets

Outlets	Frequency	Percent
Rural Assemblers	19	14.1
Urban Assemblers	16	11.9
Consumers	3	2.2
wholesalers and millers	97	71.9
Total	135	100

Source: survey results, 2008/9

Farmers transport rice to the nearest markets (village market or Woreda market) using pack animals (90.9%), and the smaller percentage used head/ backload, animal carts and vehicles.

Large amount of grains is sold and purchased in the months of production season (December through March,) which is the month's immediately after harvest. Supplies of rice decrease in the months of May through October and reach the lowest level. The study shows that 21.7% of rice producers sales their out put immediately after harvest followed by 20.4% after three months and 11.8% after two and four months respectively.

2. Wholesalers: These are licensed grain wholesalers who store large bulk and assemble grains in either direction. Wholesalers don't move form one market to another like that of petty grain traders. They rather, permanently reside in town with their permanent store and collect rice grains brought by farmers, assemblers (rural and urban) and processors. They are few in numbers and most of the time they sold rice to Addis Abeba .

3. Millers (processors): Theses millers were licensed for both milling machine and retail trade. Millers, who is the owner of milling machine, have double participation in rice trading,

firstly they have involved in milling the paddy rice, secondly, they will purchased this milled rice for themselves to sold. They stored and sold rice to Addis Abeba, to locally available urban distributors and to consumers. Most of the time millers distribute regional wise. The distribution centers are Addis Abeba, Wollo, Bahir Bar, Gondar and Woldia. They collect rice from farmers, and rural assemblers. Except brokers almost all traders owned rice milling machine. Informal interview with brokers also told that there are 14 traders having with 2 milling machine and 8 traders having with one milling machine in Woreta Town.

4. Brokers: These are unlicensed legally but in reality they are doing like wholesaling activity. They don't have warehouse. Informal interview with traders indicated that currently only three main brokers are available at the Woreda town. They facilitate buying and selling other traders and sometimes their own purchase. No broker activities were reported from farmers in buying and selling activities.

5. Assemblers: These are also unlicensed assemblers of rice. They are rural and urban assemblers. The numbers of assemblers in the selected administrative kebeles were estimated to be 75 in Nabega, 25 in Kidist Hanna and 20 in Diba Sifatra respectively. They collect rice during main market day at local market points.

6. Urban distributors: These are grain traders which reside in towns or cities regionally and distribute grains including rice in ether direction, incase of rice they receive and transmit to consumers and retail shops. Discussion with traders indicates that there are 5 distributors at Bahir Dar, 10 at Gonder, 10 at Woldia and around 20 urban distributors at Addis Abeba.

7. Retailers: These are shop retailers who has legally licensed for retailing different products they are not specialized to sell rice only but used as a complement to other grain products for customers. They purchase smaller quantity and it takes a longer time to finish selling. They usually purchase from distributors incase of Bahir Dar, Gondar and Woldia but incase of Woreta they have alternatives, to purchase either from millers, wholesalers, farmers or assemblers.

4.5.3. Rice market channels

The analysis of channel is intended to provide a systematic knowledge of the flow of the goods and services from their origin to the final destination (consumer). The rice market channel drawn based on the data collected from different sources. The total quantity produced by farmers was about 2090.2 quintal and the total quantity supplied to the market is 479 quintal from sampled farmers.

Twenty four lines of market channels were identified. Five of these went outside the region and the rest sixteen ran inside. As can be understood from Figure 1, the main receivers from farmers were, wholesalers, Millers, Rural assemblers, Urban assemblers with an estimated percentage share of 44.9, 26.9,14.1 and 11.9 percent in that order. Besides, the volume that passed through each channel was compared and based on the result the channel that went out of region consisting 95 quintal hosted the largest, followed by channels that stretched from Farmer-→Wholesalers→ Retailers→ Consumers hosted 81.98 qt respectively. There are 9 main channels of rice marketing based on the volume (channel-3, 6, 7, 8, 19, 20, 21, 22, 23).

1. Farmer→ Assemblers (urban) → Wholesalers → Out of region = 13.50Q
2. Farmer→ Assemblers (urban) → Wholesalers → Consumers =16.30Q
3. Farmer→ Assemblers (urban) → Wholesalers → Retailers→ Consumers =21.72Q
4. Farmer→ Assemblers (urban) → Wholesalers → Distributors (urban) → Consumers= 13.05Q
5. Farmer→ Assemblers (urban) →Wholesalers →Distributors (urban) →Retailer → Consumer = 8.70Q
6. Farmer→ Wholesalers →Out of region = 50.97Q
7. Farmer→ Wholesalers →Consumers = 61.53Q
8. Farmer→ Wholesalers → Retailers→ Consumers = 81.98Q
9. Farmer→ Assemblers (rural) → Wholesalers → Out of region = 7.20Q
10. Farmer→ Assemblers (rural) →Wholesalers →Consumers = 18.23Q
11. Farmer→ Assemblers (rural) →Wholesalers→ Retailers →Consumers = 11.58Q

12. Farmer→ Assemblers (rural) → Wholesalers→ Distributor (urban) →Consumers= 6.96Q
13. Farmer→ Assemblers (rural) →Wholesalers→ Distributors (urban) →Retailer → Consumers =4.64Q
14. Farmer→ Assemblers (rural) →Millers→ Out of the region= 6.83Q
15. Farmer→ Assemblers (rural) →millers→ Distributors (urban) →Consumers = 6.49Q
16. Farmer→ Assemblers (rural) →Millers→ Distributors (urban) →Retailers→ Consumers = 4.32Q
17. Farmers→ Assemblers (rural) →Millers→ Retailers→ Consumers = 8.66Q
18. Farmer→ Assemblers (rural) →Millers →Consumers = 10.82Q
19. Farmer→ Millers→ Out of the region = 23.70Q
20. Farmer→ Millers→ Distributors (urban) →consumers =22.52Q
21. Farmer→ Millers→ Distributors (urban) → Retailers→ consumers = 51.54
22. Farmer→ Millers→ Retailers→ consumers = 30.04Q
23. Farmer→ Millers→ consumers=37.54Q
24. Farmer→ consumers=10.53Q

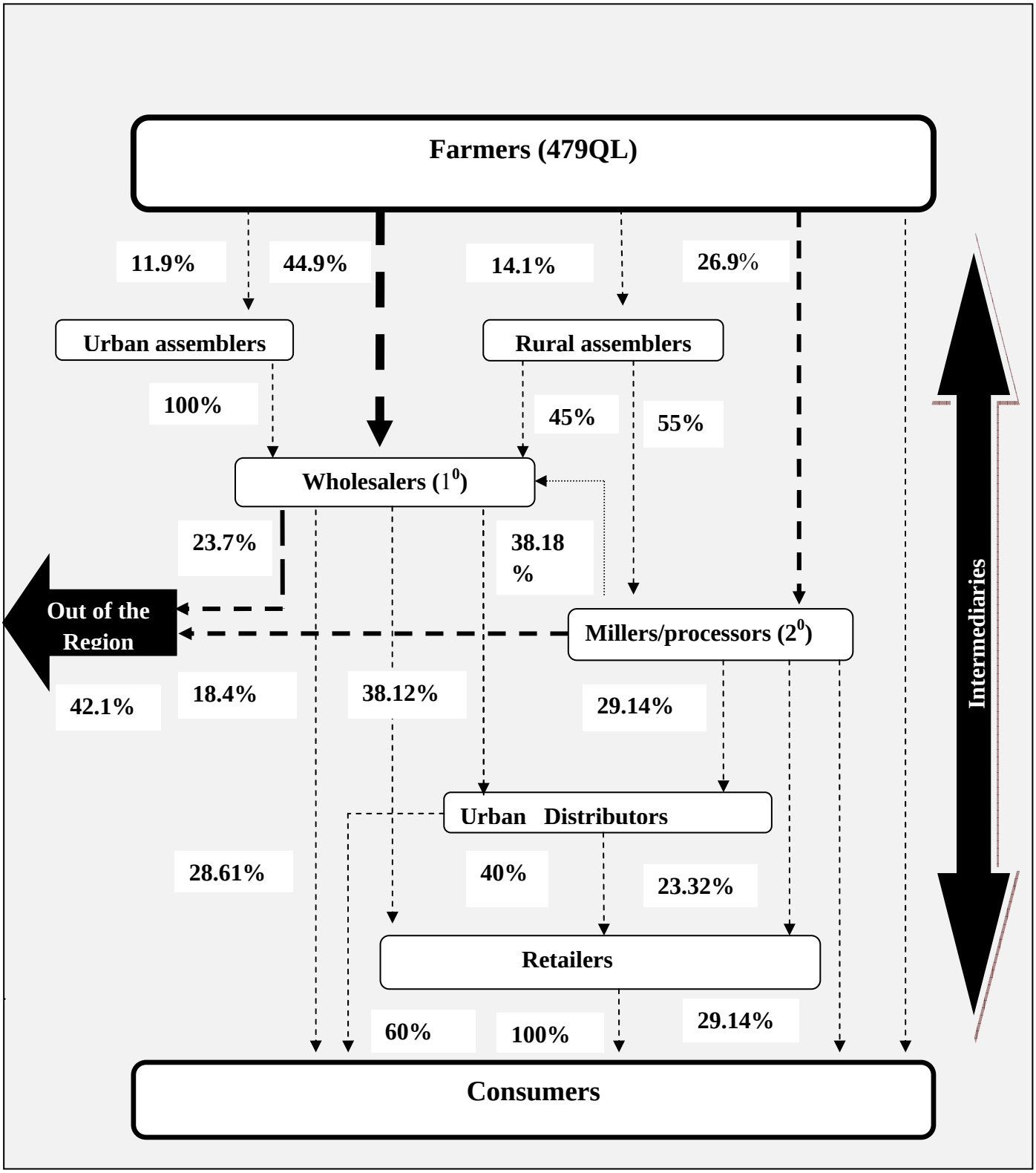


Figure 2. Rice marketing channels

4.5.4. Analysis of structure of the market

According to Pender *et al.* (2004), the structure of the 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. The structure analysis of rice market will be based on the above two points.

4.5.4.1 Barriers to entry into the rice market

The barriers to entry into the market reflect the competitive relationships between existing traders and potential entrants. If the barriers to entry are low, new traders can easily enter into rice markets and compete with established traders. However, with the presence of very high barriers to entry, established firms are difficult to stay longer in business.

4.5.4.1.1. Capital investment

The survey result indicated that various barriers to entry into the rice business were identified by the traders (wholesalers and millers): lack of investment capital, high competition with prior control of farmers, information asymmetry and severe competition among none-licensed traders were the main ones.

For wholesalers and millers, the most important barrier to entry was high competition with prior control of farmer and lack of investment capital. To enter in the market more capital is needed because they have to purchase more rice while his regular customers are coming during harvesting (peak purchase) time. They did not allow farmers go without purchase the available amount of paddy they brought, if they do so they will loss his customer at least in the short period of time.

Table 41. Barriers to entry for rice market

Number of response on sampled rice wholesaler and millers (n=15)		
Barriers to entry	Frequency	Percent
Capital and high competition to control farmers	5	33.3
Capital	3	20
High competition to control farmers	1	6.7
Information asymmetry and quality of rice	1	6.7
Information and high competition to control farmers	1	6.7
High competition and lack of working place	1	6.7
Capital, information asymmetry and high competition	1	6.7
Capital, competitions among traders and high competition to control farmers	1	6.7
Capital, high prior to control farmers and lack of working place	1	6.7
Total	15	100

Source: Survey result, 2008/9

4.5.4.1.2. Experience and education levels of rice wholesalers and millers

The survey result indicate that about 47% of the respondents have experience in rice trading between 2-5 years, 40% of them had experience of 6-10 years and 6.7% had 11-20 and the remaining 6.7 % had above 21 years of experience respectively.

With regard to education level, about 64 % were in secondary education and the rest are in primary education level. This indicate that education is not a barrier to rice traders because majority of rice traders had formal education

Table 42. Education level of wholesalers and millers

Education level of trader	Frequency	Percent
Primary school education	5	35.7
Secondary school education	9	64.3
Total	14	100

Source: Own survey, 2008/9

4.5.5. Conduct of rice traders

Market conduct refers to the set of competitive strategies that a trader or a group of traders use to run their business. In other words, market conduct focuses on traders' behavior with respect to various aspects of trading strategies such as buying, selling, transport, storage, information and financial strategy. In line with the literature on institutional economics, these are called the rules that define the play of the game.

4.5.5.1. Purchasing strategy

The survey result indicated that 66.7 % the wholesalers and millers were no any purchasing relationship based on ethnicity, family linkage and cloth relatives. Only about 7% purchase based on close relatives, socially meeting and some either combination was used.

Most of the time wholesalers and millers buy 80% of rice from Woreta (on their ware house) and 20% from village market. The reason to stay more in that area was due to high supply and better quality of rice than to look for other markets.

The purchasing strategy for wholesalers revealed that 13.33% of the sampled wholesaler purchase based on the long term client establishment**,** infra family link and spontaneous purchasing, 6.7% purchase with out median agent. The remaining percent were used to purchase on contract, broker and a combination of either methods. Convenient time of day preferable to purchase rice in terms of price was before 12a.m.

4.5.5.2. Pricing strategy

About 53% of sample traders indicated that price is set by the market. But 27% of them are setting prices by themselves, 13% set by negotiation of buyer and traders and the rest was by marketing experts from Woreda Agriculture office.

4.5.6. Market performance

4.5.6.1. Degree of buyers and sellers concentration

The degree of buyer and seller concentration refers to the number of rice traders in the rice market. This concentration ratio can be interpreted as an indicator for the degree of competitiveness among rice traders.

The study indicates that the rice market is dominated by few wholesalers. The CR4 ratio is about 77%. That means 77% of the market volume is occupied by few wholesalers (Appendix Table 8). The calculation of the concentration indices for both wholesalers and millers together is about 82.32%. This indicates the market is strongly oligopsonistic (Appendix Table 9). Black (2002), defined oligopoly is a market situation with only a few sellers, each anticipating the other reaction, where as oligopsony as a situation where there are only a few buyers in the market.

4.5.6.2. Marketing cost and margin analysis of rice traders

The marketing margin refers to the difference between prices at different levels in the marketing system. The total marketing margin is the difference between what the consumers pays and what the producer/farmer receives for his paddy or rice, in other words it is the difference between retail price and farm price. A wide margin means usually high prices to consumers and low prices to producers.

The total marketing margin may be subdivided into different components; all the costs of marketing services and profit margins or net returns. An analysis of marketing costs would estimate how much expenses are incurred for each marketing activity. It would also compare marketing costs incurred by different actors in the channel of distribution.

4.5.6.2.1. Marketing cost and margin of producers

Marketing cost of farmers are cost incur in transportation, loading and unloading and cost of milling for those farmers who sold after polishing (polished rice) which is summarized in (Table 43).

Table 43. Marketing cost and margin of farmers or producers

Cost items	Paddy /rice	
	Cost per unit (birr/qt)	%
Production cost /qt	332.43	94.53
Transporting cost /qt	9.33	2.65
Milling cost/qt	9.9	2.82
Total cost	351.66	100
Average selling price (paddy/rice)	387.63	
Profit/Q	35.97	

Source: Own computation, 2008/9

4.5.6.2.2. Marketing cost and margin of assemblers

The marketing cost of rice for rural and urban assemblers is summarized in Table 44 below. The study indicates that the main cost of rural assemblers are transport cost, personal travel cost and sorting and milling costs which is consisting of 14-33% of the total cost, while in urban assemblers the main cost components are sorting cost, information cost and personal travel costs which ranges from 13-19 % of the total cost.

Table 44. Marketing cost and margin of assemblers.

	Rural assemblers (N=21)		Urban assemblers (N=5)		Total (N=25)	
Cost Items	Average cost/qt	% of total cost	Average cost/qt	% of total cost	Average cost/qt	% of total cost
Cost of packaging material	4.5	6.37	5.2	10.23	4.85	7.98
Labor cost to fill the bag and stitch	1.8	2.54	2	3.93	1.9	3.12
Transport cost	23.35	33.05	3	5.9	13.17	21.69
Cost of storage loss	4.82	6.82	4.49	8.83	4.65	7.66
Cost of loss in transport and handling	4.41	6.24	6.12	12.04	5.26	8.67
Sorting cost /milling/	10	14.15	10	19.68	10	16.46
Information cost	3.1	4.38	8	15.74	5.55	9.14
Market search cost /fee	2.65	3.75	5	9.84	3.82	6.29
Personal travel cost	15	21.23	7	13.77	11	18.11
Other overhead cost	1	1.41	0	0	0.5	0.82
Total cost per qt	70.63	100	50.81	100	60.72	100
Average selling price	554.75		630		592.37	
Average buying price	378		408		393	
Margin	176.75		222		199.37	
Profit /Q	106.12		171.19		138.65	

Source: Own survey result, 2008/9

4.5.6.2.3. Marketing cost and margin of wholesalers

The marketing cost of rice wholesalers in the study area are summarized in Table 45. On average, the total marketing cost of rice wholesalers are 29.24 Birr per quintal. Cost of storage loss, cost of packaging material, cost of loss in transportation and handling and employer's salary are highest cost items (14-28 percent of the total cost).

Table 45. Average total cost and margin of wholesalers

Cost Items (N=6)	Average cost/qt	Stdev	% of total cost
Cost of storage loss	8.36	7.68	28.59
Cost of packaging material	5.8	0.45	19.84
Cost of loss in transportation and handling	4.18	6.25	14.29
Labor cost for loading	3	0	10.26
Labor cost for unloading	3	0	10.26
Labor cost to fill the bag and stitch	1.4	0.89	4.78
Employers salary	1.043	0.53	3.57
Cost for brokers commission	1	0	3.42
Cost for store rent	0.7	0.45	2.39
Market search cost/fee	0.34	0.51	1.17
Tax (1)	0.16	0.12	0.56
Watching and warding cost(2)	0.13	0.16	0.46
Interest rate /cost	0.07	0.16	0.24
Personal travel cost	0.03	0.06	0.09
License cost	0.02	0.02	0.07
Total cost per qt	29.24	13.84	100
Average selling price	708	4.47	
Average buying price	670	28.06	
Margin	38	24.14	
Profit /Q	8.76	36.05	

Note: **(1)** Tax fee is taken as based on proportion to grain volume hold.

(2) Watching and warding cost for rice wholesalers are taken as 10% of the total amount of grain volume cost.

(3) Transport cost is covered by the rice purchaser not by wholesalers

Source: own survey result, 2008/9

4.5.6.2.4. Marketing cost and margin of millers

Table 46 shows the marketing cost of rice millers. The major cost items are storage costs which are 9.53 birr per quintal, loose in transporting and handling, 6.63 Birr per quintal, cost of packaging material, 5.2 Birr per quintal, and loading and unloading 2.5-2.9 Birr per quintal, employers salary, 1.10 Birr per quintal, electricity used for operating the machines 5 cents per quintal and maintenance costs 0.48 cents per quintal. On average milling of one quintal of paddy costs 9.9 Birr per quintal, processing cost for *enjera* or consumption costs 8.75 Birr per

quintal and processing cost for hotels is 10 Birr per quintal. The total cost per quintal is 32.68 Birr.

Table 46. Average total cost and margin of millers/processors.

Items	Average cost/qt	Stdev	% of the total cost
Cost of storage loss	9.53	5.46	29.17
Cost of loss in transportation and handling	6.63	8.67	20.29
Cost of packaging material	5.27	0.68	16.13
Labor cost for loading	2.91	0.30	8.90
Labor cost for unloading	2.55	1.04	7.79
Employers salary	1.11	0.94	3.40
Labor cost to fill the bag and stitch	1.09	0.30	3.34
Cost for store rent	0.89	0.71	2.73
Cost for brokers commission	0.86	0.32	2.64
Electricity	0.5	0.20	1.53
Maintenance cost	0.49	0.00	1.49
Transport cost of Head/back load	0.45	0.93	1.39
Watching and warding cost(2)	0.15	0.17	0.49
Tax (1)	0.10	0.06	0.3
Market search cost/fee	0.08	0.11	0.24
Personal travel cost	0.05	0.09	0.15
License cost(3)	0.03	0.02	0.08
Total cost per qt.	32.682	10.66	100
Average Selling price	656.64	87.67	
Average buying price	619.55	84.54	
Margin	37.09	32.61	
Profit/Qt	4.408	28.35	

Note: **(1)** Tax fee, is taken as based on proportion to grain volume hold.

(2) Watching and warding cost, are taken as 10% of the total grain volume cost. Millers sell other crops also, there is no specialization of selling rice only.

(3) Milling cost usually covered by farmers, millers receive charges for their milling service. The advantage of having a milling service is to collect more rice and also to get milling charges.

(4) Electricity cost, fuel cost, and maintenance cost are estimated from 3500-4000 Birr/year.

Source: Own survey, 2008/9.

4.5.6.2.5. Marketing cost and margin of urban distributors

Compared to rice wholesalers, rice distributors and retailers incur more marketing cost (82.10 and 79.31 Birr/q) respectively. The most important cost item is store rent, storage loss and sorting cost respectively.

Table 47. Average marketing cost of rice distributors

Items	Average cost/qt	Std. dev	% share of the total
Cost for store rent	29.6	21.45	36.05
Cost of storage loss	14.19	3.32	17.28
Sorting cost	10	0	12.18
Transport cost of vehicle	9.2	1.10	11.21
Cost of packaging material	4.5	6.84	5.48
Cost of loss in transportation and handling	3.95	5.50	4.81
Labor cost for loading	3	0	3.65
Labor cost for unloading	3	0	3.65
Personal travel cost	2.033	1.92	2.48
Market search cost/fee	1.03	0.96	1.25
Tax(1)	0.84	0.75	1.02
Watching and warding cost(2)	0.49	0.17	0.60
Labor cost to fill the bag and stitch	0.2	0.45	0.24
License cost(3)	0.10	0.13	0.09
Total cost per qt	82.10	21.44	100
Average Selling price	782		
Average buying price	696		
Margin	86		
Profit/Qt	3.898		

Note: (1) The tax for rice distributors are taken as 10- 20% proportion to the total tax levied for the grain volume hold.

(3) License fee cost is taken as 10% of the total amount of grain volume cost.

4.5.6.2.6. Marketing cost and margin of retailers

The marketing cost of retailers at Bahir Dar, Gondar and Woreta are summarized in Table-48. The result shows that the marketing cost of rice were 79.3, 75.34 and 52.34 Birr per quintal respectively. The marketing margin for Gondar is highest among all markets. Besides, the cost in Gondar per quintal of rice is 75.34 Birr which is very low compare to the tree market places.

Table 48. Marketing cost and margin of retailers.

Cost Items	Bahir Dar (N=22)			Gondar (N=29)			Woreta N=(10)	
	Cost Birr/qt	STDEV	(%)	Cost Birr/qt	STDEV	(%)	Cost Birr/qt	(%)
Cost of packaging material	18.88	10.48	23.81	15.93	9.8	21.14	8.3	15.85
Labor to fill the bag and stitch	1.38	4.38	1.74	2.22	1.3	2.94	0	0
Labor cost for loading	0.15	0.56	0.2	2.51	1.04	3.34	0	0
Labor cost for unloading	0.25	0.68	0.31	2.46	1.74	3.26	0	0
Cost for brokers commission	0	0	0					
Transport cost of vehicle	5.81	2.83	7.33	8.75	7.75	11.62	0	0
Head/backload transport cost	0.22	0.75	0.28				3.6	6.87
Cost for store rent	7.02	9.34	8.85	2.2	0.44	2.91		0
Cost of storage loss	20.19	8.7	25.46	16.18	5.65	21.47	10.2	19.48
Cost of loss in transport& handling	1.82	4.7	2.3	12.15	7.56	16.13	11.75	22.44
Sorting cost	6.79	6.48	8.56	14.88	14.62	19.76		0
Other cost arrangement	0	0	0	12.5	10.6	16.59		0
Tax	5.56	13.31	7.01	1.82	2.39	2.42	8.66	16.54
License cost	0.44	0.78	0.56	1.36	2.06	1.8	3.83	7.31
Cost/ interest rate	0	0	0	0.002	0.012	0.003		0
Market search cost/fee	3.8	7.77	4.79	8.88	22.76	11.79	4.5	8.59
Watching and warding cost	1.89	3.38	2.39	4.62	11.66	6.13	1.5	2.86
Personal travel cost	5.02	16.09	6.34	11.26	22.68	14.95		0
Total cost/qt	79.3	31.75	100	75.34	50.09	100	52.34	100
Average selling price	814.61	106.01		947.65	105.34		770	
Average buying price	726.25	106.53		747.67	81.73		699	
Margin	88.36	52.35		199.98	97.18		71	
Profit/Q	9.05	44.75		124.63	125.81		18.66	

Note: **(1)** The tax cost, license fee cost, market search fee, watching and warding cost for rice retailers are taken as 2-15% of the total that grain volume cost. Source: own survey, 2008/9

4.5.6.3. Marketing costs, gross margin and profit margin of traders

Table 49 gives an overview of distribution of marketing margin among different actors in the channel. Assemblers (rural and urban) get the highest gross marketing margin (value added), which is 199 birr per quintal. Rice millers and wholesalers got almost equal gross margin (around 40 Birr/quintal). But millers get the lowest margin (37.09 Birr/qt).

Table 49. Summary of marketing cost, margins and profit of farmers and traders

	Cost Items	Cost and prices (birr/q)	Gross marketing margin[(1)] **(1)**	Total marketing cost **(2)**	Profit margins (birr/q) **(3)=(1)-(2)**	
					Amount[3]	As % of cost price
I	**Farmers**		55.2	19.23	35.97	10.22
1.	Production cost /qt	332.43				
2.	Total marketing cost	19.23				
3.	Cost price (3=1+2)	351.66				
4.	Average selling price	387.63				
II.	**Assemblers**		199.37	60.72	138.65	30.55
1.	Average buying price	393				
2.	Total marketing cost	60.72				
3.	Cost prices (3=1+2)	453.72				
4.	Average selling price	592.37				
IV.	**Millers**		37.09	31.69	5.4	0.83
1.	Average buying price	619.54				
2.	Total marketing cost	31.69				
3.	Cost prices (3=1+2)	651.24				
4.	Average selling price	656.63				
V.	**Wholesalers**		38	29.23	8.77	1.24
1.	Average buying price	670				
2.	Total marketing cost	29.23				
3.	Cost prices (3=1+2)	699.23				
4.	Average selling price	708				
VII.	**Urban distributors**		86	82.10	3.9	0.50
1.	Average buying price	696				
2.	Total marketing cost	82.10				
3.	Cost prices (3=1+2)	778.10				
4.	Average selling price	782				

Table 49*(continued)*

VIII.	**Retailers**		119.58	68.99	50.59	6.37
1.	Average buying price	724.50				
2.	Total marketing cost	68.99				
3.	Cost prices (3=1+2)	793.49				
4.	Average selling price	844.08				

Note: (1) *Gross marketing margin (value added) =Average selling price –Average buying price.*

(2) Average selling and /buying price at different level was based on the own survey of this study, 2008/9.

(3) The time dimension for profit margin is one year (2008/9)

It can be observed that although rice assemblers get the highest marketing margin, they also incur the highest marketing cost (60.72 Birr/qt). Wholesalers got the lowest marketing cost (among traders excluding farmers) and urban distributors the lowest profit margin. The last column of Table 48 also indicates that among the different rice traders, rice assemblers obtain a relatively large profit as a percentage of the cost price (30.55%) and the lowest one is obtained by urban distributors (0.50%).

4.6. Production and Marketing Constraints of Rice

4.6.1. Producers' constraints

- **Shortage of land:** Shortage of land is the primary problem of the sample Pas. It is about 77% of the farmers respond for this problem. This situation reduces directly rice production .and forces the farmers to produce rice by renting land.

- **Improved varieties:** As indicated in Table 50, lack of improved varieties was responded positively by 76.1 per cent of the farmers. Most farmers cultivate local Variety *X-Jigina* (local variety) and the improved once are not yet widely disseminate and used by farmers. Only one variety called *Gumara (IAC-164)* which is released by Adet Agricultural Research Center is currently used but the color is red produces red *enjera* and is not accepted by farmers for marketing. It needs attention to look for early maturing and better yielding variety.

- **Diseases and pests:** About 22 percent of the farmers also respond facing with problem of diseases and pests. According to IPMS (2005), the identified Diseases/pests for rice were wave worm, shoot fly, rice hispid (weevil) and rice blast.

- **Shortage of seed supply**: This is another problem as 36.2 per cent of farmers perceived it. It is also observed that 14.1 per cent of the farmers are lacking of improved post harvest management technologies such as storage and storage facilities.

- **Lack of polishing technology:** Problems of threshing machine or polishers were responded positively by 55.8 per cent of the farmers. This has an effect on the quality of rice for marketing.

- **Malpractice in selling method (Scaling or Weighing):** About 45 percent of the respondents were complaining various malpractices such as scaling or weighing, deduction, and quoting of lower prices than actual.

- **Lack of market:** About 33% also respond that there were market problems associated with low output price, maintenance of standards and grades. For Example, during husking, grains are broken in to pieces (farmer usually used traditional threshing i.e. by beating with stick and using ox) and this broken grain decreases market demand.

- **Lack of information exchange**: 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.

- **Transportation problem:** About 47% of the sampled farmers were responding positively about transportation problem. During raining seasons as the area is near to Lake Tana, excessive flooding is a common problem and transportation is difficult especially in this period.

- **Lack of capital and credit availability:** About 46% for capital shortage and 40% for credit availability of the sample producers respectively have responded these problems. Farmers have an urgent need for money immediately after harvest. Even if the price of paddy is always at lowest during that period, farmers badly needed cash during this period in order to pay their rent and debts as well as to buy certain necessities. Most of the time, lack of post-harvest credit forces farmers to sell their produce immediately after harvest, when prices are low.

Table 50. Production, marketing and institutional problems of farmers

No	Description	Number of respondents	Percentage (%)
A	**Production aspect**		
1	Problems of availability of improved rice variety (lack of improved and high yielding varieties)	163	14.7
2	Problems of fertilizer supply for rice production	163	14.7
3	Chemical supply problem	163	11
4	Seed supply problem	163	36.2
5	Shortage of land	126	77.3
6	Disease problem	163	22.3
7	Problems of farm implement	163	9.2
8	Problems of post harvest technology /storage loss/	163	14.1
B	**Marketing aspect**		
1	Lack of market	163	33.1
2	Problem of price setting	163	27
3	Malpractice in selling method (scaling or weighing)	163	44.8
4	Information exchange problem	163	21.5
5	Problem of storage facilities	163	19
6	Problems of threshing machine or miller /quality/	163	55.8
C	**Financing and institutional aspect**		
1	Loan repayment problem	163	22.7
2	Lack of capital availability	163	45.4
3	Problems of credit facility	163	39.9
4	Transport problem	163	47.2
5	Lack of institutional support	163	13.5
6	Problem of theft	163	33.7
7	Problem of tax or double taxing	163	32.5
8	Problems of excess water (flooding)	163	8

Source: own survey, 2008/9

4.6.2. Traders' constraints

a) Wholesalers and millers

As indicated in Table 51, the major problem of wholesalers and millers is capital shortage. This is responded by 53.7% followed by lack of information and high tax payment (20%). Usually millers as well as wholesalers pay tax based on the number of milling machine they have and their licensed trading. Another problem which was responded for wholesalers and millers were prior control of farmers (handling and attracting farmers to be a client supplier before other competitors handled) followed by lack of reliable information and competition. It is responded by 20% of the sampled millers and wholesalers.

Table 51. Problems of wholesalers and millers in rice market

Number of response on different levels (n=15)		
Problems	frequency	percent
Lack of capital	8	53.3
Lack of Information and competition	3	20
High tax rate	2	13.3
License procedure	1	6.7
Lack of information and high prior to control of farmers	1	6.7
Total	15	100

Source: Own survey, 2008/9

b) Problems associated with retailers

The common problem perceived by sample retailers at Bahir Dar, Gondar and Woreta are shortage of capital, quality, adulteration, and credit. The problem associated with retailers especially related to rice crop is quality. About 90% of sampled retailers at Bahir Dar responded that the quality of rice produced from Fogera is low as compare to the imported one. The common imported rice type available in shops and supper markets are *Basmati rice* (Pakistan), *Ponte rice (*Italy) and *Dana rice* (Pakistan). Similarly the problems of retailers at Gondar related to rice were capital shortage, tax payment, quality of rice, storage problems and competition with unlicensed traders.

Table 52. Main problems of retailers

	Bahir Dar			Gondar		
Problems	Yes	%	Total	Yes	%	Total
Taxation and other fees	16	59.3	27	16	55.2	29
Shortage of supply of rice	5	18.5	27	14	48.3	29
Storage	10	37	27	5	17.9	28
Quality	24	88.9	27	14	48.3	29
Adulteration	21	77.8	27	10	34.5	29
Information flow	6	22.2	27	12	41.4	29
Capital shortage	18	66.7	27	17	58.6	29
Access to credit	15	55.6	27	11	37.9	29
Too much competition with unlicensed traders	16	59.3	27	11	39.3	28
Un availability working place in the market	18	66.7	27	6		29

Source: Survey result, 2008/9

C) Problems of millers

About 25% of the respondents complain lack of market facilities, low quality of farmers' rice due to problem of threshing, improper handling and harvesting of farmers (spoilage). Storage facilities are also a problem which is responded by 25% of the mille owners.

Table 53. Problems to millers

Problems	Number of respondents (yes)	Percentage (%)
Low quality of rice	3	25
Lack of improved rice storage facilities	3	25
Lack of appropriate market facilities	3	25
Lack of improved rice threshing machines	2	16.7
Lack of improved rice huller or polisher	2	16.7

Source: Survey result, 2008/9

D) Rice assemblers

The main problem associated with assemblers are road accessibility specially during flooding, lack of market , storage problems , capital shortage, credit access, farmers reluctant to sell rice do to low price are the main one. Quality problem of rice, absence to support and improve rice marketing is also responded positively by 72% of the respondents.

Table 54. Problems of assemblers

Problems	Number of respondents (yes)	Percentage (%)
A. Market problem		
Storage and lack of market	25	100
Capital shortage and credit access	25	100
Farmers reluctant to sell due to low price	25	100
Quality problem	23	92
Absence of support to improve rice marketing	18	72
Adulteration	15	60
Information flow	15	60
Competition with licensed traders	1	4
Competition with unlicensed trader	1	4
B. Institutional problem		
Road and electricity access problem	25	100
Technical training	9	36
Theft	8	32
Business management	3	12
Telephone, tax, water availability	1	4

Source: survey result, 2008/9

5. SUMMARY AND CONCLUSIONS

5.1. Summary

Rice is a main stay of Fogera farmers and it is the only "*Rice basket of the region* ". The main objective of the study is to analyze the profitability rice production and marketing chain of rice in Fogera woreda. The study specifically has focused on the profitability of rice production of farmers and traders, structure and conduct of the rice markets. And it investigates factors contributing towards household's market participation in rice market and volume of rice supplied to market. The study also assesses the support inputs services, and constraints and opportunities of rice market in the study area.

The data were generated by using pre-tested structured questionnaires. Data were obtained both from primary and secondary sources. The primary information was collected by interviewing farm households. Secondary data were obtained from different sources like Rural and Development office, Trade and industry office the Woreda, IPMS, agricultural research centers, Inland Revenue offices, publications and research studies, CSA, websites and agricultural magazines.

A total of 165 farmers, 6 wholesalers, 10 millers, and a total of 60 retailers (from Bahir Dar, Gondar, Woreta) and 25 assemblers, 5 urban distributors were interviewed and the analyses were made using SPSS and LIMDEP. Summary of results obtained was the following.

The descriptive analysis shows that the average family size of all households was 5.72 and with minimum 2 and maximum 13. The farmer's average family labor force was 2.67 in man-equivalent with 6.15 maximum and 1 minimum.

Rice producers are private farmers who produced paddy during main cropping season. The major reason for growing rice is for consumption and sale. In terms of land utilization rice is planted approximately on 0.6 hectares of land as compared with 0.36 and 0.31 hectares planted in Teff and Maize.

The production inputs used were seed and to some extent herbicides and pesticides. only 3% of the sampled households used urea, 1.2% use DAP and 4.9% used organic fertilizer for rice production The application of fertilizer was very minimum, because of flooding and the soil is fertile alluvial soil (Abay,2006; IPMA,2005).

The common types of rice varities are *X-Jigna (local)* and *Gumara (IAC-164.)* the improved one**.** About 96% of the sampled household used *X-Jigina* variety (local and mostly popularized by farmers). However Gumara variety used less. Since it is red in color it is less demanded and used for consumption purpose as compare to the white seed *X-Jigina* variety which has high market demanded.

From a total of sampled producers of households about 24% of rice producers were found to be non-sellers of rice mainly for different factors. Farmers have different market outlets and traveled 1.6 hour per trip to sell their product. Twenty four lines of market channels were identified. Five of these went outside the region and the rest sixteen ran inside. The main receivers from farmers were wholesalers, Millers, Rural assemblers, urban assemblers with an estimated percentage share of 44.9, 26.9, 14.1 and 11.9 percent respectively. Besides, the volume that passed through each channel was compared and based on the result the channel that went out of region consisting 95 quintal hosted the largest (42.1%) , followed by channels that stretched from Farmer→ Wholesalers→ Retailers→ Consumers hosted 81.98 qt respectively.

The central question for this study is "What will influence farmers' decisions to sell rice and what will stimulate them to sell more?" many variables were hypothesized for analysis. In order to test the above hypothesis, different methods were followed. The selectivity models encompass two steps to estimate factors on market participation and volume of sale.

The result of the Heckman two step model indicates that market information access, quantity of paddy produced, extension contact with farmers and total livestock value increased the likelihood of households decision to sell rice. And education level and quantity of rice produced affects volume of rice sales positively but family size determines volume of sale

negatively. The Tobit result also revealed that quantity produced was jointly affected both the probability of market participation and volume of supply.

The SCP model analyses also showed that the important entry barrier in rice market was high competition with prior control of farmer and lack of investment capital. They had fewer problems with taxes and license procedures. The survey result indicate that 46.7% of the respondents have 2-5 years of experience in rice trading and about 40% of them had 6-10 years of experience. Their educational status also indicates 64.3% were in secondary education and the rest are in primary education level.

Regarding to pricing strategy 53.3% of sampled traders set price by the market, 26.7% set price by themselves, 13.3% set by negotiation of buyer and traders and the rest was by marketing experts.

The four-firm Concentration Ratio (CR_4) indicated that the rice market is dominated by few wholesalers. The CR4 ratio is about 77%. That means 77% of the market share going to major four wholesalers. This indicates the rice market is strongly oligopsonistic.

The profitability analysis of rice production shows that, the gross income obtained from paddy production was birr 17549.21 per hectare and the total cost per hectare was 11688.23 Birr on samples households. Opportunity cost of land (rental value of land) , was the items occupying maximum share in total cost (40.23%) followed by labour cost (34.65%), animal power cost (13.11%). Material input cost like manure, herbicides, seed (10.26%) and other costs like land rent/ tax and interest rate (26.86%) consists of the minimum cost share.

The cost benefit analysis of rice production shows that rice production is a profitable business for farmers. The net income obtained from production per hectare of rice is 5006.48 Birr. The cost margin indicates that producers obtain on average a profit of 35.97 Birr per qt with the market margin of 55.2 Birr per qt, assemblers get 139 Birr per qt, millers a profit of 5.4 Birr per qt, wholesalers 9 Birr per qt, urban distributors birr 3.88 Birr per qt and retailers around 19 Birr per qt. Though, assemblers get more profit, they also incur more marketing cost.

Constraints associated with farmers can be classified based on three categories, this are production constraints, marketing and institutional aspect. Shortage of land is the primary problem of the sample farm households in which 77% of households were respond it. The lack of improved varieties (disease resistant, high yield and early mature) was also a constraint in production which is responded positively by 76.1 per cent of the farmers. Most farmers cultivate local variety *X-Jigina* (local variety) than the improved variety *Gumara (IAC -164)*.

Marketing is the second main constraints of farmers. Problems of threshing machine or polishers to its marketing quality of rice were responded positively by 55.8 per cent of the farmers. And also 45% of the respondents were complaining various malpractices such as scaling or weighing, deduction and quoting of lower prices than actual. Moreover, about 33% also respond that there were market problems associated with low output price, maintenance of standards and grades.

The last constraints for farm households are the institutional and financing aspect. The main problems were transportation facilities, capital and credit availability. About 47% of the sampled farmers were responding positively for transportation problem and 40% to 46 % for capital and credit respectively were perceived these problems.

The major problems of wholesalers and millers are limitation of capital. This is responded by 53.7% followed by tax payment. Usually millers as well as wholesalers pay tax based on the number of milling machine they have and their licensed trading. Another problem which was responded for wholesalers and millers were prior control of farmers followed by information asymmetry and competition. It is responded by 20% of the sampled millers and wholesalers.

The problems associated with assemblers are road accessibility, lack of market; storage problems, capital shortage, and credit access were the main once. With regarding to retailers, the common problems were shortage of capital, quality, adulteration, and shortage of credit.

5.2. Conclusions and Recommendations

Rice is a newly introduced crop in Ethiopia. However; it is increasing in production and area coverage. Rice is an exceptional crop due to its water loving nature and its higher productivity than other field crops. Though Ethiopia has tremendous area suitable for rice production little has been used until recently while many tones of imported rice are consumed in Africa as well as in Ethiopia. Hence, increasing production and productivity of this crop may contribute to food security.

In Fogera and the nearby Woredas, rice is becoming a strategic crop for the livelihood of many farmers. In the past, the study area was very food insecure due to flooding problem. However, after the introduction of this crop, it is considered to be one of the surplus producing Woredas in South Gondar zone. The production trend shows that rice production increased from 160 qt in 1993/94 to 417,735 qt in 2007/08. Similarly, the area coverage of rice increased from 6 hectare in 1993/94 to 9,213 hectare in 2007/8.

A number of factors may have affected market participation decision and volume of sales of rice in the country. In the case of Fogera district, the identified factors are access to market information, quantity of paddy produced, extension contact and livestock value were the main determinants of market participation decision for a household positively. For the volume of supply, household head's education level (positively), quantity produced (positively), and family size (negatively) were the important variables that determines volume of rice sale in the market.

Findings based on the results of the study (Heckman two-stage model), to promote rice market participation in a sustainable way, some policy implications are suggested to be addressed.

1. **Strengthening the existing price and market information system**

Generally, commercial farmers are capable of sourcing price and buyer information from different sources whereas poor farmers rely on other farmers and government extension staff for the same information. There is therefore, a great need to make information available to farmers at the right time and place. In response to this challenge, it is good to develop an integrated agricultural marketing information system that will be linked to Woreda information center, and to link them to government's program.

2. Intervention to increase production and productivity of rice

The quantity of rice produced at the farm level affected marketable supply of rice positively and significantly. However, farmers are working under limited plots of land by natural as well as socio-economic factors without using improved technologies and agricultural inputs. Rice producers in Fogera Woreda used little inputs (like improved seeds, pesticides and insecticides and modern technologies). Hence, increasing production and productivity of rice per unit area of land is better alternative to increase marketable supply of rice. Introduction of improved varieties, application of chemical fertilizers, using of modern technologies, controlling disease and pest practices should be promoted to increase production.

3. Facilitating extension services

The results of the study indicates provision of extension service improve market participation of rice. Farmers have to linking production with marketing. And also it is good to enlightening farmers to produce based on market signals, consumer preferences and to direct or advice on the proper methods of handling, storing, transporting, and above all improving quality of rice. Hence, it is recommended to assign efficient extension system, updating the extension agent's knowledge and skills with improved production and marketing system.

4. **Promoting education and trainings in production and marketing**

Changing the attitudes of farmers is a crucial factor in improving the marketing performance of households. If farmers have awareness about the benefit of the specialty market, they do not need only immediate economic advantages from the sale of their product. In case of production, household heads with very limited education encounter in successfully managing, fertilizer and pesticide applications, and also what to produce inline with taste and preference of consumers demand, especially in the presence of ineffective extension services. So stakeholders' and Agricultural and Rural Development Offices have to create awareness about the specialty of market. Continuous education and training on production and marketing will have a positive impact on their attitudes.

5. **Promoting potentially collective organizations (cooperatives)**

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.

6. **Improving the quality of rice**

Most attributes for rice is its quality. The Fogera rice has poor quality as compared to imported ones (*Basmati, Ponte,* and others types) both in kernel size and in color. This results from, its poor post harvest handling, spoilage during harvesting, hulling and threshing problems all together reduces the quality of rice in the market upon its selling price. Hence, especial attention should be given to improve quality so as to satisfy consumer's desire, and farmer's market price return.

7. **Licensing the traders**

Traders should have license to operate at any level of trade, some of the traders have continued to operate with no license. Assemblers and brokers (though few) are with no

licensing. Also no clear demarcation of trading (fore instance, millers are acting as wholesaler). This has put the legal traders at a disadvantage when competing in the market. Therefore, public authorities in collaboration with representatives of traders should devise means of controlling those engaged in illegal trade.

8. **Promoting family planning**

Family size is one of the significant demographic variables that affect volume of supply. With limited production, supporting a larger and extended family size would have been difficult for the farmers. This can be possible through the intervention of integrating family planning with health extension service and with respective concerned bodies.

6. REFERENCES

Abbott,J.C., and J.P.Makeham, 1981. Agricultural Economics and Marketing in the tropics.

Abaye Akalu, 2007. Vegetable market chain analysis in Amhara National Regional State: the case of Fogera woreda, South Gondar zone. An M.Sc Thesis Presented to the School of Graduate Studies of Haramaya University.

Admasu Shibru, 1998. Performance evaluation of coffee marketing in Sidama Zone. An M.Sc Thesis Presented to the School of Graduate Studies of Alemaya University.

Agarwal D.R., 2001. Elementary athematics and statistics for Economist, Virinda publications (P) Ltd. Delhi.

Ana, R.R, W. A. Masters and G. E. Shively, 2008. Linkages between Market Participation and Productivity: Results from a Multi-Country Farm Household Sample.

Atteri, B. R., and G.Bisaria (2003). Marketable Surplus of Rice and Wheat and Benefits of Storage to the Farmers in India. *Indian Agricultural marketing journal*. Vol. 46 (1).

Bain, J.S. ,1968. *Industrial Organization*, 2nd Edition, John Wiley, New York.

Barnard C.S., J.S., Nix, 1979. Farm Planning and Control, Cambridge University Press, Cambridge.

Belllemare, Marc F. and Barrett, Christopher B., 2005.An orderd Tobit model of market participation: Evidence from Kenya and Ethiopia. Evidence from Kenia AND Ethiopia, Working papers 14748, Cornell University, Department of Applied economics and management.

Benfica, R., D. Tschirley and D. Boughton. 2006. Interlinked Transactions in Cash Cropping Economies: The Determinants of Farmer Participation and Performance in the Zambezi River Valley of Mozambique. Contributed paper presented at the 26th International Association of Agricultural Economists Conference, Gold Coast, Australia, August 12-18, 2006.

Berhanu Gebremedhin and D.Hoekstra, 2007. Cereal marketing and household market participation in Ethiopia: the case of teff, Wheat and rice. Proceeding of AAA conference. Addis Abeba, Ethiopia, 2007 (243-252), International livestock Research Institute (ILIR)

Benfica, R., D. Tschirley, and L. Sambo. 2002. The Impact of Alternative Agro- Industrial Investments on Poverty Reduction in Rural Mozambique. MINAG/DE/DAP Research Report No. 51E. (http://www.aec.msu.edu/fs2/mozambique/wps51e.pdf)

Black, J., 1997. Oxford dictionary of Economics, 2nd Edition, Oxford University press Inc., New York. Page. 331.

Black, W.E. and R.D. Knutson, 1985. Attitudes and opinions of Texas agricultural cooperative members. Report B-1483. Texas Agricultural Extension Service. USA.

Blaylock, J. R. and Blisard, W. N., 1993. Women and the demand for alcohol: Estimating participation and consumption. *Journal of Consumer Affairs. 27(2): 319-324*.

Branson R.E. and D.G. Norvell, 1983. Introduction to agricultural marketing, Mcgraw-Hill Inc, USA.

Bull, T.A. 1988. Agro-ecological assessment of Ethiopian vertisols. PP.89-10. Proceedings of a conference on Management of Vertisols in sub-Saharan Africa. Addis Ababa, Ethiopia, 31 August-4 September, 1988.

Chantal, P., Nielsen, 2002. Vietnam in the International Rice Market. A Review and Evaluation of Domestic and Foreign Rice Policies, Rapport 132.

Chauhan,V.K and R. Singh, 2002. Marketed surplus of paddy- A regression analysis. National Level Quarterly *Journal of Agricultural marketing.* Vol. 45 (2).

Christopher Winship, 1992. Models for sample selection bias. Department of Sociology, Northwestern University, 1810 Chicago Avenue Evanston, Illinois 6020.

Chen, H., Siebenmorgen, T. and Griffin, K. 1998. Quality Characteristics of Long-Grain Rice Milled in Two Commercial Systems *Journal of Cereal Chemistry.* 75 (4):560-565.

Central Statistics Authority (CSA, 2003). Statistical Report on Area and production of crops. part II-A. Addis Ababa, Ethiopia

Central Statistical Authority (CSA, 2004). *Ethiopia, Statistical Abstract, Addis Ababa*

Dawit Alemu, 2005. The status and challenges of agricultural marketing in Ethiopia. PP.1 Paper presented at a panel discussion organized by the Ethiopian Association of Agricultural Professionals (EAAP), April 22, 2005. Ethiopian Agricultural Research organization (EARO).

Dejene Legese, 2008. Profitability of extension package inputs for Wheat and Barley in Ethiopia.the case of Limuna Bilbilo Wereda (Arsi Zone). Rural Development and environment in Ethiopia; prospect and challenges. Proceeding of the 10th Annual Conference of Agricultural Economics Society of Ethiopia, Addis Abeba, Ethiopia, may 2008.

De Lucia, M. and Assennato, D., 1994. Agricultural engineering in development Post-harvest operations and management of food grains. *FAO Agricultural Services Bulletin No. 93* Food and Agriculture Organization of the United Nations, Rome. Available online at http://www.fao.org/docrep/T0522E/T0522E00.htm. Accessed May 11, 2006.

Doumach,W., C. Kodikara, and H. Maas,2004. Analysis of rice chain; towards sustainable (P) Rice, PP. 4-5, Report on an international workshop. Polonnaruwa, Sirlanka.11-3 March, 2004.

Duc Hai, L.T., 2003. The Organization of the Liberalized Rice Market in Vietnam.

FAO, 2005.Addressing Marketing and processing constraints that inhibit Agri-food Experts: a guide for policy analysts and planners. FAO agricultural service Bulletin 160.Rome, Italy.

FAO. 1996. Production year book, Vol.50.Rome

FAO, 1994. African experience in the improvement of post-harvest techniques. Synthesis Based on the Workshop held in Accra, Ghana, 4-8 July 1994 Agricultural Support Systems Div. Food and Agriculture Organization of the United Nations, Rome Italy.

Gauraha, A.K., K.N.S.Banafar, P.K.Verma, V.K. Choudhary, and B.C. Jain,(2002). Marketing Strategies of Rice in Chhattisgarh-A Case Study*,* 2002. *Indian Journal of agricultural marketing.* Vol. 45(3).

Gebremeskel Dessalegn, T.S. Jayne and J.D. Shaffer, 1998. Market structure, conduct, and performance. PP.12 .Constraints on performance of Ethiopian grain markets. Working paper 8, Grain market research project Ministry of economic development and cooperation, January, 1998. Addis Ababa.

Getachew Afework, 2000. Rice adaptation in Metema Woreda North Gondar one of the Amhara Regional State. Bureau of Agriculture, Bahir Dar. (Unpublished).

Giles G.B., 1973. Marketing the English language book society and Macdonald, Evans Ltd. London.

Goetz, S.J., 1992. A selectivity model of Household food marketing behaviors in sub-Saharan Africa. *America Journal of Agricultural Economics. 74(2):444.*

Gujarati, D.N., 2003. Basic Econometrics. 4th Edition. McGraw-Hill, New York. pp. 563-636

Harahap H,, 2003. Rice chain analysis in North Sumatra, Indonesia. Institute.(eds.). Rice improvement in Eastern, Central and Southern Africa. Proceedings of the International Rice Workshop at Lusaka, Zambia, April 9-19, 1984.

Heckman, J.J., 1979. Sample selection bias as a specification error *Journal of Econometrica*. Vol. 47(1).

Heckman's correction, the free encyclopedia. htt://en.Wikipedia.org, 2008. Access on Nov. 25, 2008.

Iddo K., Ayal K. and Zveleman, 2006. Farm out put, non-farm income and commercialization in rural Georgia, *The electronic Journal of Agricultural and development Economics, Food and Agriculture Organization of the United States.*Vol.3 (2): pages 276-286.

IPMS, 2005. Fogera Wereda pilot learning Site Diagnosis and program Design.

Irini ,M., and Aysen Tanyeri-Abur, (2005).Transaction Costs, Institutions and Smallholder Market Integration: Potato Producers in Peru .*Working Paper* No. 05-04

Kinde Aysheshm, 2007. Sesame market chain analysis: the case of Metema Woreda, North Gondar zone, Amhara National Regional State. An M.Sc Thesis Presented to the School of Graduate Studies of Haramaya University.

Kizito A., 2008. Famine early warning systems net work (FEWS NET) market Guidance No.2. Structure –Conduct –Performance and food security.

Koch, J.V.180. Industrial organization and prices 2nd Edition. London,UK; Prentice/hall International.

Kohls, R.L. and J.N. Uhl, 1985. Marketing of Agricultural Product. Fifth Edition. McMillian Publishing Company, New York, USA.

Kotler P., 2003. Marketing management. Eleven Editions. Pearson Education, Inc. USA.

Lampkin N., Measures M (Eds) (1994, 2001). Organic Farm Management Handbook, Organic Farming Research Unit, Institute of Rural Studies, University of Wales. Organic Advisory Service, Elm Farm Research Centre. Aberystwyth, Newbury.

Lawerence, D.S., 1992. Marketing and Agribusiness *Development Paper* No.1. Department of political Economy. University of Glasgow.

Lewis, T. C., B. Wade Brorsen, Kim B. Anderson, EmilioTostao, 2008. Gender difference in marketing styles. *Journal of Agricultural Economics.* Vol. 38: page 1-7.

Maddala, G.S., 2001.Introduction to Econometrics, third edition, John Wiley and Sons, Ltd, the Atrium, Southern Gate ,Chichester, West Sussex P019 8SQ, England.

Makhura, T., 2001. Ph.D dissertation on overcoming transaction costs barriers to market Participation of smallholder farmers in the Northern Province of South Africa. University of Pretoria. June, 2001.

Marcel, F. and R.V. HILL, 2005. Selling at the Farm gate or travelling to market. *America Journal of Agricultural Economics.* Vol. 87(3):717-734.

Mark, L., M. V. Gottret, W. Cifuentes, C. F. Ostertag, R. Best, D. Peters and S. Ferris, 2004. Increasing the Competitiveness of Market chains for Smallholder producers Manual 3: Territorial Approach to Rural Agro-enterprise Development project.

Menduoza, G., 1995. A primer on marketing channels and margins. Prices, Products and People: Analyzing Agricultural Markets in Developing Countries. Lynne Reinner Publishers, Boulder, London. 498p.

Ministry of Economic Development and Co-operation, 1999. Survey of Ethiopian Economy, Addis Ababa, Ethiopia

Mohammed Jabbar, 2007. Agricultural Market Development in Ethiopia: Problems and Issues. International Livestock Research Institute.

Moses, J., and Adebayo, E. F (2007). Efficiency of Factors Determining Rainfed Rice Production in Ganye Local Government Area, Adamawa State. *Journal of Sustainable Development in Agriculture & Environment* Vol. 3:20-30, Sept. 2007.

Myint U. Kyaw, 2003. Agricultural Marketing Information System in Myanmar. *Journal of agricultural marketing.* Vol. 45(4): PP -24.

Nombiro E., G. Hugode and O. Wills, 2001. Market structure and conduct of the hybrid maize seed industry a case study of the Trans NZOIA district in western Kenya.

Nuru Adgaba, Eddosa Negara, Sebsibe Zuber, 2006. Profitability of processing crude honey. PP.133. Reversing Rural Poverty in Ethiopia; Dilemmas and critical issues. Proceedings of the 9th Annual conference of the agricultural Economics society of Ethiopia, Addis Abeba, Ethiopia, July 2006.

Obasi, I.O., and E. Njpkuoma Chukwuma, 2008. Performance of rice market in Ebonyi State. *Journal of economic theory. 2(1):22-23.*

Onwueme, I.C., and Sinha T.D., 1991. Field crop production in Tropical Africa. Technical Center for Agriculture and Rural Development (CTA), Wageningen, Netherlands.

Osterteg, G., 2005. Identifying Market opportunities for Rural Smallholder Producers. Colombia.

Pomery, R.S., and A.C Trinidad, 1995. Industrial organization and market Analysis: Fish marketing, U.S.A.

Prasad, J. and A. Prasad, 1995. Indian Agricultural marketing Emerging trends and Prospective, Mital publications, New Delhi, India.

Reardon, T., and C.P. Timmer. 2005. Transformation of Markets for Agricultural Output in Developing Countries Since 1950: How Has Thinking Changed? In R.E. Evenson, P. Pingali and T.P. Schultz (Eds). Handbook of Agricultural Economics Volume 3. Agricultural Development: Farmers, Farm Production and Farm Markets. Amsterdam: Elsevier.

Rehima Musema, 2006. Analysis of red pepper marketing: the case of Alaba and Siltie in SNNPRS of Ethiopia. An M.Sc Thesis Presented to the School of Graduate Studies of Hararnaya University.

Saunders, R. and Betschart, A., 1979 in Inglett, GE and Charalambous, G (Eds) *Tropical Foods: Chemistry and Nutrition Academic* Press NY, USA. P. 191-216.

Scott, G.J., 1995. Prices, Products and People: Analyzing Agricultural Markets in Developing Countries. Lynne Reinner Publishers, Boulder, London. 498p.

Sewagegne Tariku, 2005. Status of Rice Improvement Research, Achievements, Major Constraints and Future Research Direction in the Amhara Region. PP.6-10. Proceedings of the National Workshop on the Status of Rice Research and Promotion in Ethiopia. Bahir-Dar, Ethiopia, 3-4, June 2005, Amhara Regional Agricultural Research Institute.

Shahi, B.B., 1995. Potential rice varieties for East Africa. Proceedings of the International Rice Workshop on Rice improvement in Eastern, Central and Southern Africa. Lusaka, Zambia, 9-19 April, 1995.

Shilpi, Forhad and Umali-Deininger, Dina, 2007 Where to sell? Market facilities and agricultural marketing. Policy research working paper series 4455, The World Bank.

Singh, J.P., (2001). Strategy for effective agricultural Marketing extension to meet the Challenges in 21st century. Manage Extension Research Review July - December, 2001.

Sirak,T., Bahta, S. Bauer, 2007. Analysis of the determinants of market participation within the South African small-scale livestock sector. Tropentag paper, October 9-11, 2007, Witzenhausen: "Utilisation of diversity in land use systems: Sustainable and organic approaches to meet human needs"

Solomon Tilahun, 2004. Performance of Cattle Marketing System in Southern Ethiopia with Special Emphasis on Borena Zone. An M.Sc Thesis Presented to the School of Graduate Studies of Alemaya University.

Stanton, Julie V., 2000. The roll of Agribusiness in development: replacing the Diminished Role of the Government in raising rural incomes, *Journal of Agribusiness.* Agricultural Economics Association of Georgia. Vol.18 (2).

Taddese Yeneneh, 2005. Rice crop production and Extension package (Amharic version), Addis Abeba ,Ethiopia.

Tareke Berhe, 2003. Rice: a high potential emergency and food security crop for Ethiopia Report no.2.

Tenagne Kidane, 2005. Rice Processing and Utilization. Proceedings of the National Workshop on the Status of Rice Research and Promotion in Ethiopia. Bahir-Dar, Ethiopia, 3-4, June 2005, Amhara Regional Agricultural Research Institute.

Timmer, C.P. 1988. The Agricultural Transformation. In H. Chenery and T.N. Srinivasan, Eds., *Handbook of Development Economics*. *Vol. 1.* Amsterdam: North-Holland, 275-331.

Tshiunza, M., Lemchi, J., and Tenkouano, A. 2001. Determinants of Market Production of Cooking Banana in Nigeria. *African Crop Science Journal. 9* (3): pp. 537-547.

Tomek, W.G. and K.L. Rrobison, 1990. Agriculture product prices.3rd Edition. Cornel University Press. Ithaca and London.

Verina, I., 2009. Magazine on low external input and sustainable agriculture (LEISA). June 2009.Volume 25, no.2

Wolday Amha, 1994. Food grain marketing development in Ethiopia after the market reform 1990: a case study of Alaba Sirarao district. Ph.D Dissertation. 1-Aufl-Berlin: Koster. Germany. 292p.

Wolelaw Sendeku, 2005. Factors determining supply of rice: A study in Fogera district of Ethiopia. An M.Sc Thesis Presented to the School of Graduate Studies of Hararnay University**.**

Zelalem Nega, 2008. Household poultry production and marketing: the case of Ada'a Wereda. An M.Sc Thesis Presented to the School of Graduate Studies of Haramaya University.

7. APPENDICES

Appendix Table 1. Amount of land size and Land rent payment in birr

Land size (ha)	Amount in birr	
	2007/8	2008/9
0.0-0.5	20	40
0.6-1.0	25	55
1.1-1.5	30	75
1.6-2	35	100
2.1-2.5	40	130
2.6-3	45	170

Source: Fogera Woreda Trade and Industry Office, 2008/9

Appendix Table 2. Conversion factors to compute tropical livestock unit

Animal category	TLU
Calf	0.25
Weaned calf	0.34
Heifer	0.75
Cow or ox	1
Horse/mule	1.1
Donkey adult	0.7
Donkey young	0.35
Camel	1.25
Sheep or goat adult	0.13
Sheep or goat	0.06
Chicken	0.013
Bull	0.75

Source: Storck et al., 1991.

Appendix Table 3. Conversion factor used to estimate man equivalent

Labour category	Sex	Age	ME
Child	M/F	< 7	0
Child	M/F	7-14	0.4
Adult	M	15-64	1
Adult	F	15-64	0.8
Elders	M/F	≥ 65	0.5

Source: Bezabih, 2008/9. Farm management course

Appendix Table 4. Type, quantity produced and productivity of crops in 2007/8

	Cultivated area (ha)					Quantity produced(q)					Productivity(q/ha)				
Types of crops	N	Minimum	Maximum	Mean	Std. Deviation	N	Minimum	Maximum	Mean	Std. Deviation	N	Minimum	Maximum	Mean	Std. Deviation
Teff	89	0.06	1.5	0.36	0.25	87	0.15	10	2.3	1.97	86	0.6	24	7.14	5
Maize	144	0.03	1.5	0.31	0.19	142	0.5	40	5.99	5.64	142	4	112	19.96	13.87
Wheat	14	0.06	0.5	0.21	0.13	16	0.5	10	3.16	2.76	14	4	26.67	13.67	6.18
Barley	9	0.06	0.5	0.22	0.13	10	0.7	8	3.07	2.49	9	4	24	12.36	5.74
Chick pea	102	0.06	1.5	0.29	0.23	51	0.1	2	0.59	0.36	51	0.5	8	2.07	1.49
Lentil	15	0.03	0.38	0.19	0.1	15	0.3	4	1.32	1.01	15	1	1	1	0
F. Millet	92	0.06	1.25	0.31	0.2	91	0.5	25	4.44	4.01	91	3	50	14.28	8.23
Niger seed	5	0.06	0.5	0.26	0.16	6	0.5	8	2.92	2.76	5	4	16	8	4.9
Field pea	27	0.13	1.5	0.46	0.33	27	0.5	8	3.06	2.08	26	2	40	8.08	7.59
Grass pea	45	0.06	1	0.36	0.22	42	0.5	14	3.13	3.06	42	0.67	32	9.76	7.35
Tomato	16	0.06	0.25	0.15	0.08	13	3	12	8.06	3.22	13	12	96	62.22	24.24
Pepper	36	0.03	0.25	0.11	0.07	36	0.3	15	3.52	3.27	36	4.8	192	35.71	33.98
Onion	23	0.06	1	0.23	0.2	23	1	70	13.02	15.16	1	432	432	432	.
Potato	3	0.03	0.13	0.07	0.05	2	5.5	7	6.25	1.06	2	56	88	72	22.63
Emmer wheat	24	0.04	0.63	0.21	0.13	24	1	12	3.81	2.69	24	8	96	21.62	17.98
Spice	7	0.06	0.75	0.24	0.24	8	1	5	1.63	1.38	7	1.33	24	10.19	8.47
Rice total	164	0.13	2	0.6	0.33	165	1	60	18.1	11.81	164	4	120	32.72	19.76
Own land	154	0.1	1.5	0.48	0.25	155	1	58	16	10.47	154	4	120	36.02	20.98
Rented-in	60	0.13	1.75	0.38	0.26	60	1	35	8.02	6.23	59	4	72	22.93	14.74

Source: Survey result, 2008/9

Appendix Table 5**.** ANOVA analysis of gross income, cost and profit among rice producer *kebeles* 2007/8

		Sum of Squares	df	Mean Square	F	Sig.
Gross income	Between Groups	1066754920	3	3.56E+08	4.434	0.005
	Within Groups	12750461515	159	80191582		
	Total	13817216434	162			
Total cost	Between Groups	21769895.08	3	7256632	0.447	0.72
	Within Groups	2615873917	161	16247664		
	Total	2637643812	164			
profit	Between Groups	1149387028	3	3.83E+08	4.01	0.009
	Within Groups	15384101960	161	95553428		
	Total	16533488988	164			

Source: Owen computation, 2008/9

Appendix Table 6**.** Contingency table for dummy independent variables (CC)

	sex	education level	extension contact	market information	credit
sex	1	0.005	0.053	0.009	0.087
education level		1	0.102	0.039	0.169
extension contact			1	0.203	0.132
market information				1	0.016
credit					1

Source: Owen computation, 2008/9

Appendix Table 7. Variance inflation (VIF) factor test

Variables	Collinearity Statistics	
	Tolerance(1/VIF)	VIF$(1-R^2)^{-1}$
AGE	0.633	1.58
FS	0.501	1.997
FL	0.525	1.905
MRD	0.908	1.102
TLS	0.533	1.875
TQP	0.511	1.957
OXN	0.354	2.822
NFINC	0.88	1.136
MRP	0.746	1.34
LMP	0.66	1.514
MS	0.73	1.37
TLU	0.313	3.191

Source: Survey result, 2008/9

Appendix Table 8. Market concentration of rice wholesalers.

	Name wholsalers	Amount of rice purchase				Main Destinations
		qt/month	% share	Rank	4 -firms	
1	Tegegne Gizachew	2200	24.58	1st	*	Addis Abeba, Wollo
2	Habite Wolde Adamtie	1350	15.08	4th	*	Addis Abeba, Wollo
3	Hashim Hussien	1750	19.553	2nd	*	Addis Abeba,
4	Wokiel Ahimed	1650	18.44	3rd	*	Addis Abeba,
5	Mohamednur Hassen	1250	13.97			Addis Abeba
6	Tadesse Mihretie	750	8.38			Addis Abeba
	Total	8950	100			
	Concentration ratio (CR4 in %)		77.65			

Source: Survey result, 2008/9

Appendix Table 9. Rice miller's sales list per product handled

	Name	Qt/month	% share	rank	four firms	Main Destination
1	Ato Adamitie MengeshA	800	13.07	3rd	*	AdisAbeba, BahirDar, Gondar,Wollo
2	Ato Kedir Ismael	1000	16.33	1st	*	Adis Abeba ,Wollo
3	Ato Henok Getnet	470	7.67			AdisAbeba,Woldeya
4	Ato Adane Baye	600	9.80			Addis Abeba
5	Ato Takele Tesfaye	550	8.98			Addis Abeba
6	Ato Adigo Taye	600	9.80	4th	*	Addis Abeba
7	Ato Abrarawu Ayal	900	14.70	2nd	*	Addis Abeba
8	Ato Tsegawu Nibiret	450	7.35			Addis Abeba
9	Ato Selomon Mershaw	450	7.35			Addis Abeba
10	Ato Fekadu Teka	300	4.90			Addis Abeba
	Total	6120	100			

Source: Survey result, 2008/9

Appendix Table 10. Market concentration of rice wholesalers and millers

Market	Name wholesalers	Amount in qt/year	% share	Rank	The 1st 4- firms
Woreta	Henok Getnet	4160	2.54	5th	
Woreta	Tegegne Gizachew	76800	47.04	**1st**	*
Woreta	Habitte Wold Adamitie	9600	5.88	**3rd**	*
Woreta	Adane Bayilie	2560	1.56	9th	
Woreta	Tsegaw Nibiret	1024	0.62	14th	
Woreta	Hashim Hussien	1600	0.98	11th	
Woreta	Solomon Mulusew	3200	1.96	6th	
Woreta	Adamtie Mengesha	1280	0.78	12th	
Woreta	Addis Ahimed	1280	0.78	13th	
Woreta	Adigo Taye	9600	5.88	**3rd**	*
Woreta	Kedir Esmaiel	3200	1.96	7th	
Woreta	Mohamednur Hassen	2560	1.56	10th	
Woreta	Takele Tesfaye	4800	2.94	4th	
Woreta	Kuhar Multi Purpose Coop	3200	1.96	8th	
Woreta	Zewdu Delalaw	38400	23.52	**2nd**	*
	Total sum	163264	100		
Concentration ratio (CR_4 in %)		82.32%			

Source: Survey result 2008/9

Appendix Table 11. Wholesalers purchase sources.

No	Name of trader	Monthly amount in quintal			
		Farmers	Rural assemblers	Processors	Total
1	Tegene Gizachewu	900	700	600	2200
2	Habitewold Adamite	450	450	450	1350
3	Hashim Hussien	750	700	300	1750
4	Wokeil	900	750	-	1650
5	Mehamed Nur Hassen	650	600	-	1250
6	Taddesse Mihiretie	450	300	-	750
	Total	4100	3500	1350	8950

Source: Survey result, 2008/9

Appendix Table 12. Millers/processors purchase sources

Name of trader	Monthly purchase per quintal				Monthly sale per quintal			
	Farmers	Rural Assemblers	Processors	Total	AA	Wollo	Woldia	Bahirdar, Gondar, Wollo
Adamitie Mengesha	600	200	-	800	600	66.6	66.6	66.6
Kedir Ismael	600	400	-	1000	700	300		
Henok Getnet	450	200	-	470	400		250	
Adane Baye	300	300	-	600	600			
Takele Tesfaye	400	150	-	550	550			
Adigo Taye	400	200	-	600	600			
Abrarawu Ayal	500	400	-	900	900			
Tsegawu Nibiret	250	200	-	450	450			
selomon Mersha	200	250	-	450	450			
Fekadu Teka	150	150	-	300	300			
Total				6120	5550	300	200	66.6

Source: Survey result, 2008/9

Appendix Table 13. Farmers' sampling distribution

Name of the rice produced Kebele		Characteristics of the rice produced kebeles			
		Farming system	population	Distance from the main city	Sample Selected
1	Woreta Zuria	Low land	5475	Near	
2	Kuhar Abo	Lowland	6635	Near	
3	Tiha Zekena	Lowland	5632	Near	
4	Shaga	Lowland	7346	Middle	
6	Shina	Lowland	9743	middle	
7	Nabega	Lowland	10917	Very far	44
8	Wagetera	Lowland	9556	Middle	
9	Kidist Hanna	Lowland	7333	Far	29
10	Kuhar Micheal	Upland	6338	Near	38
11	Diba	Upland	8422	Middle	54
12	Woji	Upland	9670	Middle	
13	Rib Gebireal	Upland	7574	Far	
14	Adis Betechristian	Upland	9112	Far	
	Total				165

Source: Survey result 2008/9

Appendix Table 14. Traders' sample

	Types of traders	Population	Sampled selected
1	Wholselares(grain)	9	6
2	Millers (grain)	26	10
3	Retailers(grain)		
3.1	Woreta	66	10
3.2	Bahir Dar	226 (39**)	21*
3.3	Gondar	251	29
4	Assmblers		
4.1	Rural Assemblers	70	20
4.2	Urba Assemblers	5	5
4	Brokers	3	1
5	Urban distributers	10	5

*indicates one super market. and ** indicates licensed grain retailers. Source: Survey result 2008/9

Appendix Table 15. Producers selected administrative kebeles

kuhar micheal		Nabega		Kidist Hana		Diba Sifatira	
kebeles	samle size	kebeles	sample size	kebeles	sample size	kebeles	sample size
Ada beas	1	Abu Dir	5	Aba Dirok	1	Billa	6
Ada bet	8	Baboatie	4	Abaro	3	Deldalit	4
Ajafeji	1	Boakissa	1	Abir Degu	2	Diba	6
Aqua bet /warka mnder	6	Daga	1	Bursi	1	Fisashi	9
Baragie	8	Debir Mender	2	Bursie	3	Genet mender	8
Deqie micheal	2	Deqie Bet	1	Dingiz	1	Giedion	8
Luwalua	5	Fogerie bet	1	Dinjet	1	Gomibil	1
Messino	4	Fota	2	Gaba	1	Kiero mender	5
Nura mender	2	Girargie	4	Gaba Goti	1	Lahida	1
shiwenze	1	Kubaza	3	Girar	3	Shewana	1
		Loha biet	1	Hudi Gebiya	3	Tachi Gulitochi	1
		Luabit	1	Kidist Hana	4	Tinish Terara	4
		Rieq	13	Maje	1		
		Rieq Fota	1	Tseyo	1		
		Sariqo	3	Yemushira Dingay	2		
		Tigrie mender	1	Zifnie	1		
sum	38		44		29		54

Source: Survey result 2008/9

Appendix Table 16. Cultivated area of crops in upland and low land rice production system

	Upland rice production system			Low land rice production system			Total		
Types of crop	N	Mean	Std. Deviation	N	Mean	Std. Deviation	N	Mean	Std. Deviation
Teff	52	0.35	0.23	37	0.37	0.29	89	0.36	0.25
Maize	79	0.27	0.13	65	0.36	0.24	144	0.31	0.19
Wheat	6	0.19	0.08	8	0.23	0.16	14	0.21	0.13
Barley	7	0.23	0.13	2	0.16	0.13	9	0.22	0.13
Chick pea	56	0.32	0.24	46	0.26	0.21	102	0.29	0.23
Lentil	1	0.25	.	14	0.19	0.1	15	0.19	0.1
Niger seed	5	0.26	0.16				5	0.26	0.16
Tomato	14	0.16	0.08	2	0.09	0.04	16	0.15	0.08
Onion	15	0.22	0.1	8	0.27	0.33	23	0.23	0.2
Finger millet	71	0.35	0.21	21	0.18	0.09	92	0.31	0.2
Field pea	17	0.41	0.27	10	0.54	0.42	27	0.46	0.33
Grass pea	36	0.35	0.2	9	0.42	0.27	45	0.36	0.22
Pepper	34	0.11	0.07	2	0.07	0.01	36	0.11	0.07
potato	2	0.04	0.03	1	0.13		3	0.07	0.05
E. wheat	18	0.2	0.14	6	0.23	0.05	24	0.21	0.13
Spice	3	0.13	0.11	4	0.33	0.29	7	0.24	0.24
Rice	92	0.49	0.27	72	0.74	0.33	164	0.6	0.33

Source: Survey result, 2008/9

Appendix Table 17. Farmers sample selection

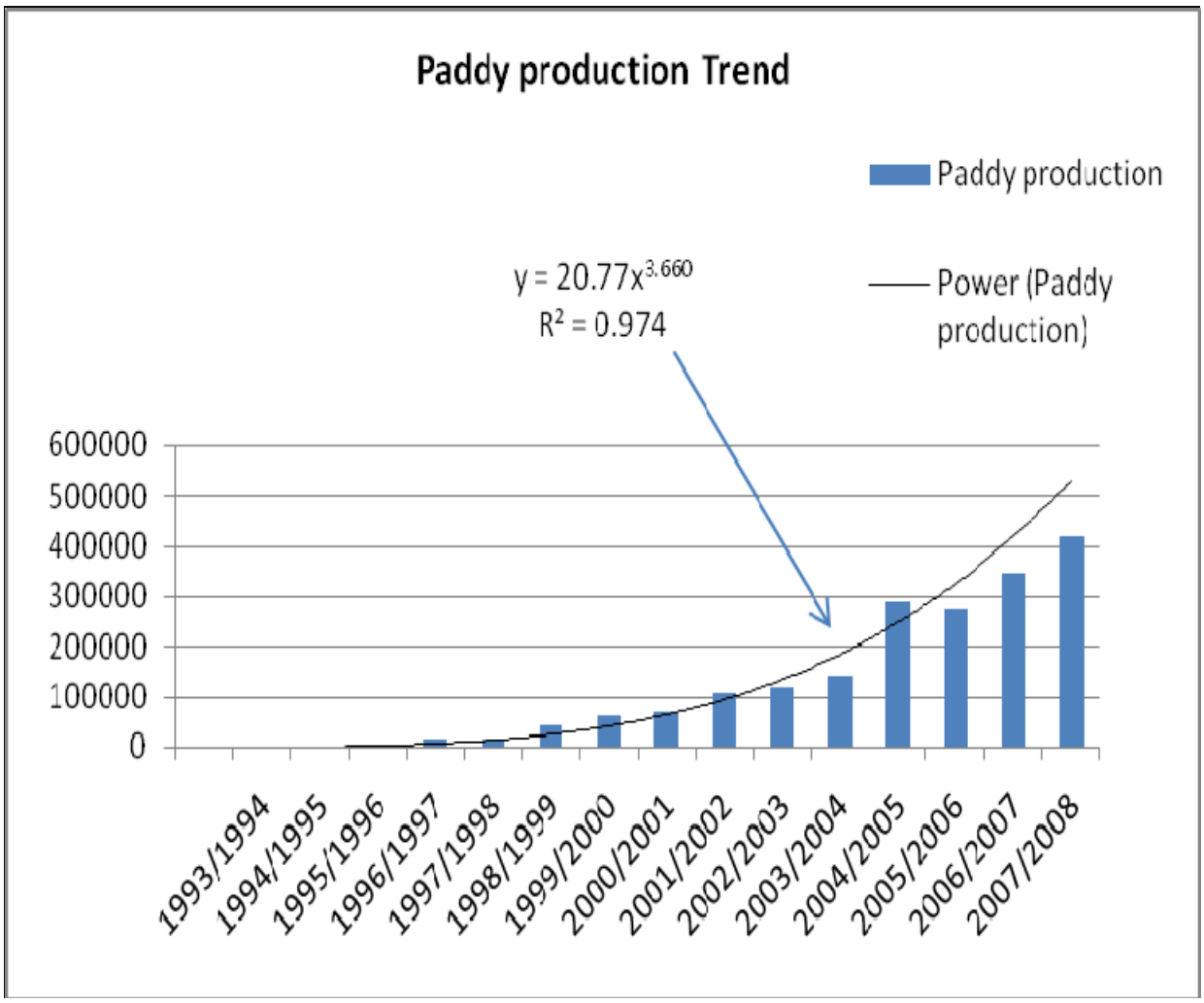
Name of PAs	Number of Households	No. Sample Size
Kuhar Micheal	1506	38
Diba Sifatira	1266	54
Nabega	1779	44
Kidist Hanna	1151	29
Total	6602	165

Appendix Table 18. Rice production, area and number of participant farmers by Woreda and region /2006-2008/

Region	Woreda /site	2006		2007			2008		
		No. of farmers	Size (ha)	No. of farmers	Size (ha)	Production (ton)	No. of farmers	Size (ha)	Production (ton)
Amhar Region	Metema	351	117	3840	1280	3840	9500	2500	9250
	Fogera	23616	7872	46800	15600	39000	116000	29000	81200
	Libo-kemkem	12567	4189	27600	9200	18400	48800	12200	28060
	Dera	8148	2716	15000	5000	10000	29380	7345	16159
	Sekela	1338	446	2700	900	1800	6400	1600	4480
	Achefer	208	52	360	120	240	1360	340	986
Sub-total-1		46228	15392	96300	32100	73280	211440	52985	140135
Tigray Region	L/koraro						2880	720	1800
	Tsegede						492	217	651
	Tselemt						228	334	835
	Welqayit								
	Humera								
Sub-total-2							3600	1271	3286
Benshangul	Bambasi						688	172	516
Gumz	Kurmuk						786	190	665
Sub-total-3							1474	362	1181
Oromiya Region	Chewaqa	740	185	5400	1800	6300	10248	2928	11126
	Dedessa	859	359	2085	695	2085	4740	1185	3555
	Borecha	291	77	960	320	800	3000	75	2850
	Bedelle	126	60	345	115	230	1520	380	1064
	Darimu	45	2	75	25	50	248	62	143
	Shebe						2280	570	1938
Sub-total-4		2061	683	8865	2955	9465	22036	5200	20676
Somali Region	Gode	70	15	5940	1980	5940	1734	3120	10920
	Kelafo	80	13	7650	2550	7875	3420	6800	27200
Sub-total-5		150	28	13590	4530	13815	5154	9920	38120
Southern Region	Yeki	150	75	450	150	300	1020	255	765
	Boreda	100	50	336	112	224	1000	250	750
	Gura-ferda	4515	2257	30000	10000	25000	12857	18000	75600
	Gimbo	68	34	288	96	192	804	201	563
	Shashego	12	3	18	6	12	24	6	16
	Misha	18	4.5	21	7	14	36	9	29
	Jinka/Bilate								
Sub-total-6		4,863	2,424	31,113	10,371	25,742	15,741	18,721	77,723
Gambella region	Gambella						240	479	1,533
	Abobo						417	835	2,923
Sub-total-7							657	1314	4,456
Grand Total (1-7)		53,902	18,527	149,868	48,966	122,302	260,328	90,547	285,924

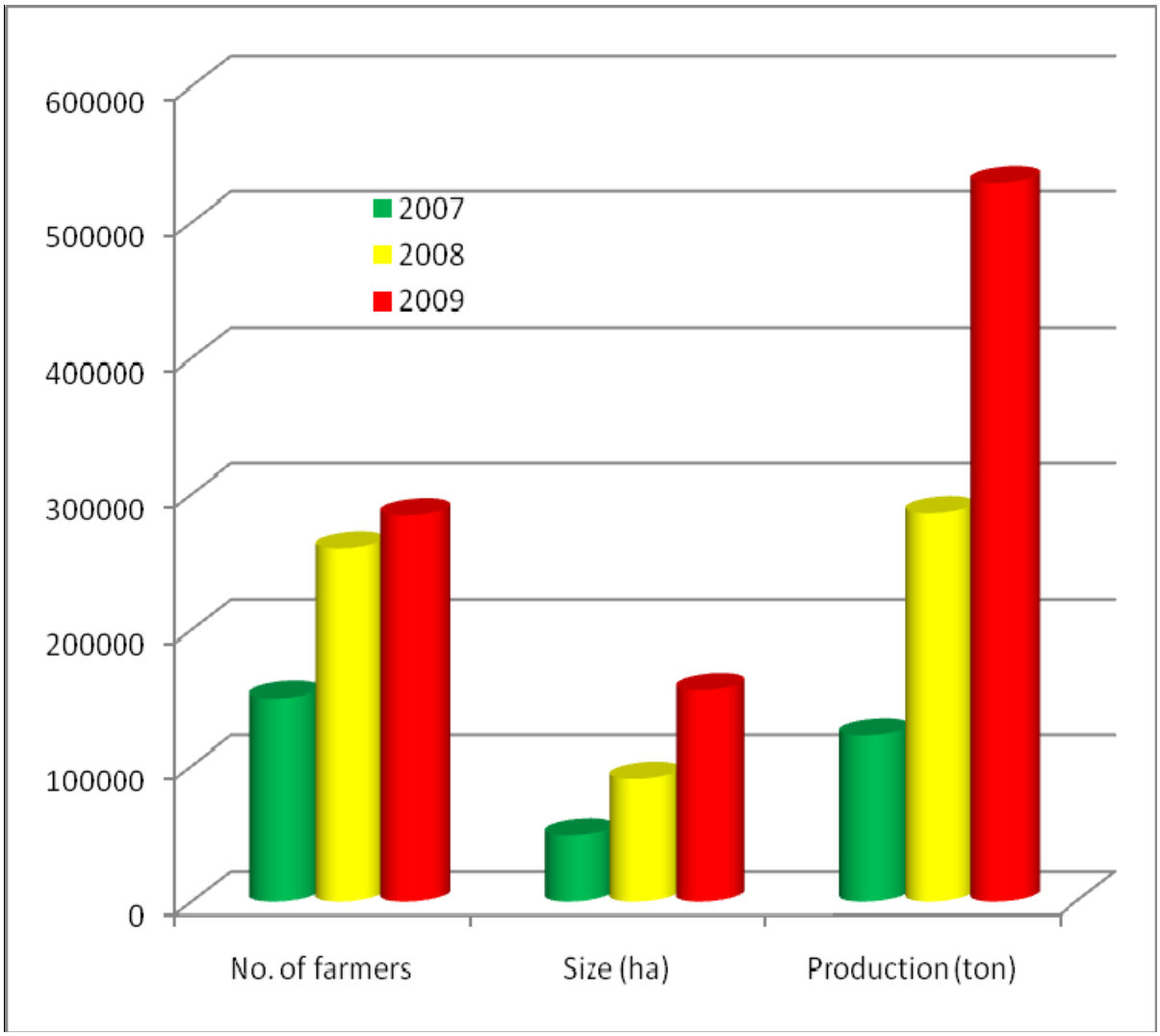
Source: Zewdie G/Tsadik, 2009 (unpublished)

Figure 3. Rice Production trend in Fogera Woreda in years



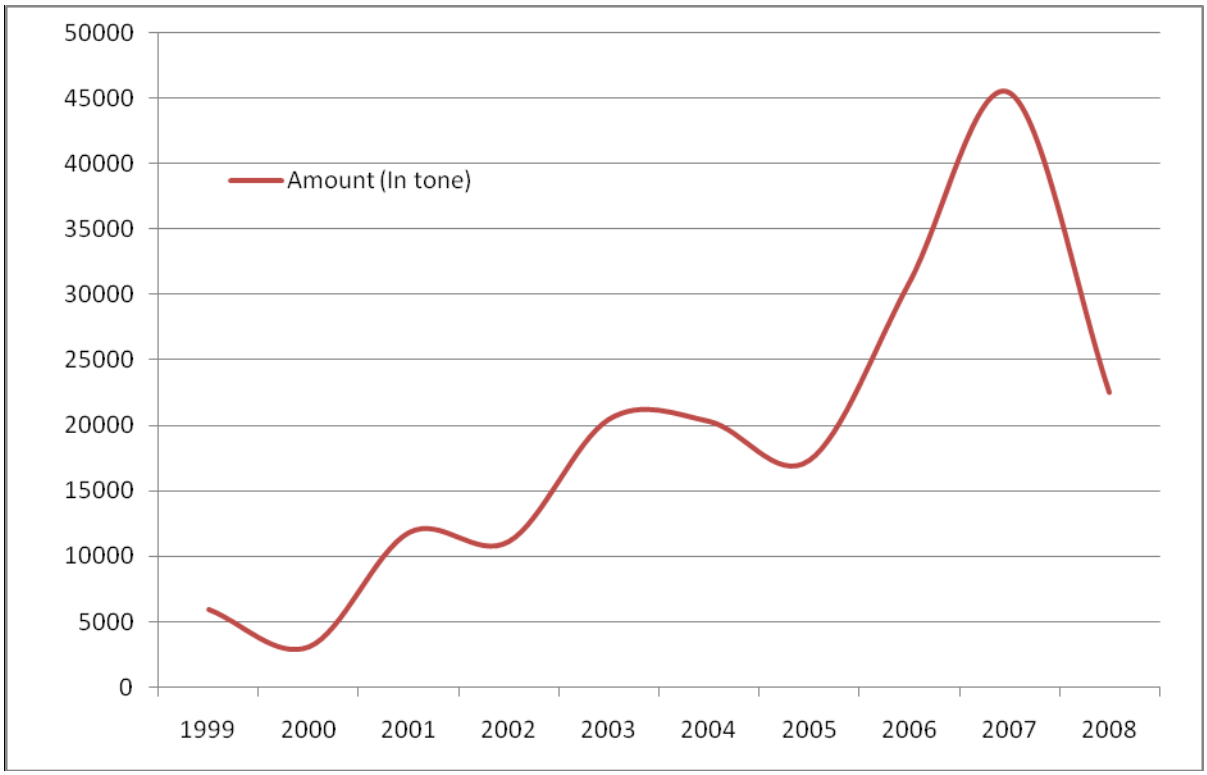
Source: Computed from using data on Fogera Woreda Agricultural and Rural Development Office, 2008

Figure 4. National rice production trend (2007-2009)



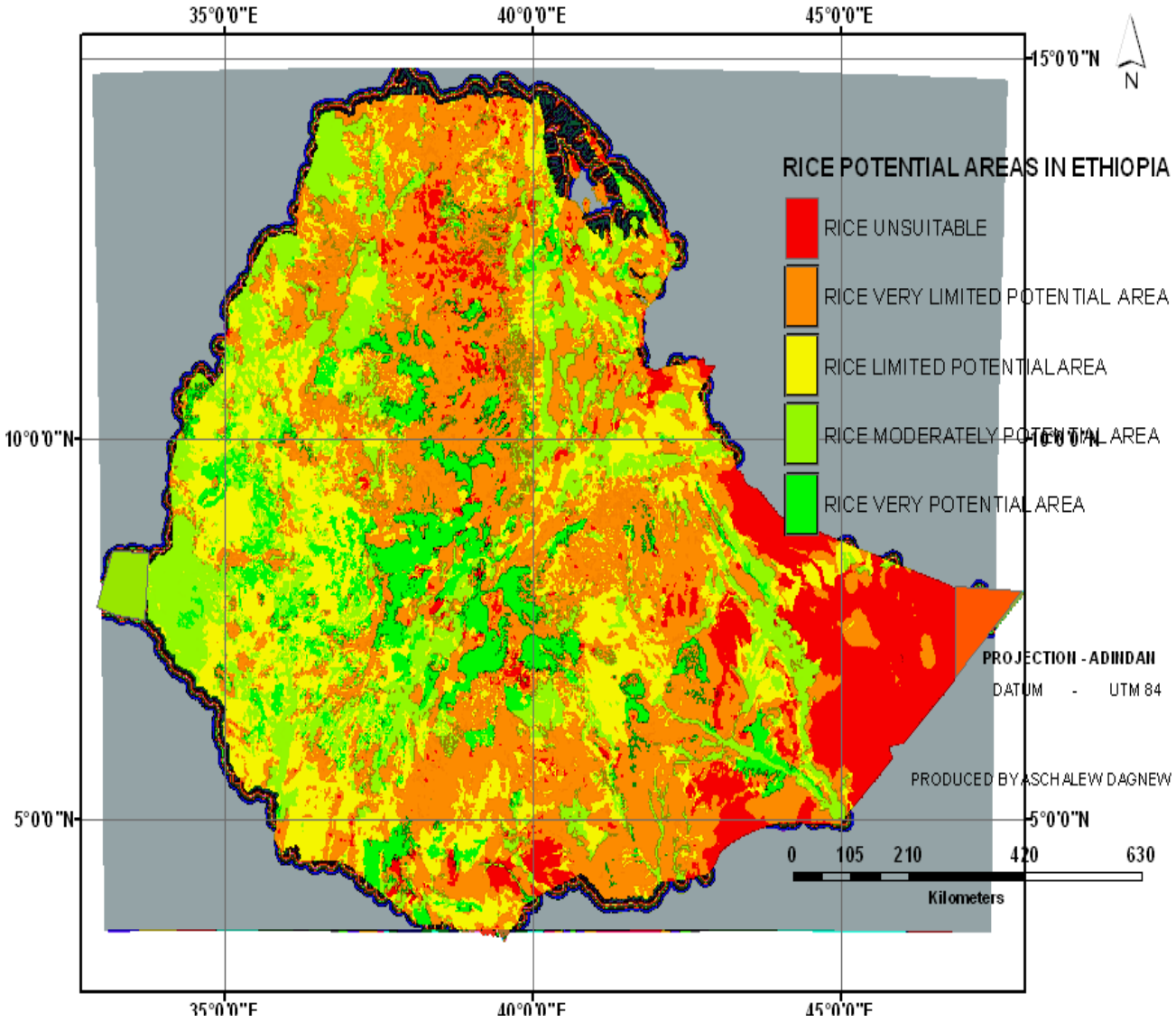
Source: Zewdie G/Tsadik, 2009 (Unpublished)

Figure 5.Trends in the amount of commercial rice import (1999 –2008)



Source: Ethiopian Customs and Revenue Agency for imports, estimated using data from Zewdie G/Tsadik, 2009 (Unpublished)

Figure 6. Distribution of rice potential areas in Ethiopia



Source: Report of NRDS Draft, 2009