ANALYSIS OF COTTON MARKETING CHAINS: THE CASE OF METEMA WOREDA, NORTH GONDAR ZONE, AMHARA NATIONAL REGIONAL STATE

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ANALYSIS OF COTTON MARKETING CHAINS: THE CASE OF METEMA WOREDA, NORTH GONDAR ZONE, AMHARA NATIONAL REGIONAL STATE

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DEDICATION

This thesis is in memory of my late mother **AYEHUSH ALENE,** who had played major role in nursing and educating me, and who was eager to see my successes, but who sadly passed away in April 1993 when I was a third year undergraduate student.

STATEMENT OF THE AUTHOR

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

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Place: Haramaya University, Haramaya.

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ACRONYMS AND ABBREVIATIONS

ACSI	Amhara Credit and Saving Institute
BLUE	Best Linear Unbiased Estimator
CFC	Common Fund for Commodities
CIAT	International Center for Tropical Agriculture
CIECRDC	Centre for International Economics and Cotton Research and Development Corporation
Coeff	Coefficient
CRS	Congressional Research Service
CSA	Central Statistical Authority of Ethiopia
DNIVA	Development Network of Indigenous Voluntary Associations
EBDSN	Ethiopian Business Development Service Network
ESTC	Ethiopian Science and Technology Commission
FEI	Friends of the Earth international
GDP	Gross Domestic Product
GMRP	Grain Market Research Project
ha	Hectare
ILRI	International Livestock Research Institute
IPMS	Improving Productivity and Market Success of Ethiopian Farmers
LIMDEP	Limited Dependant Variable
MoARD	Ministry of Agriculture and Rural Development
MOTI	Ministry of Trade and Industry
MT	Metric Tone
NAFTA	North American Free Trade Agreement
OECD	Organization for Economic Co-operation and Development
OLS	Ordinary Least Square
OoARD	Office of Agriculture and Rural Development
Qt	Quintal
RATES	Regional Agricultural Trade Expansion Support Program
SNNPRS	Southern Nations Nationalities and People Regional State
SPSS	Statistical Packages for Social Science
u.d	undated
WTO	World Trade Organization

BIOGRAPHICAL SKETCH

The author was born in December 1970 in Awi Zone of West Gojjam, Injibara. She attended her elementary education in Injibara Junior Secondary School at Injibara town, and her secondary education in Dangila Senior Secondary School at Dangila. In 1991, she joined Alemaya University of Agriculture and graduated with BSc. degree in Agricultural Economics in 1994. Then after, she worked in Bale Agricultural Development Enterprise at Herero State Farm, and in a private Company in Addis Ababa. In June 2003, she joined the Amhara Region's Agricultural Research Institute, Gondar Agricultural Research Center and worked there as socio-economics researcher until she rejoined Haramaya University in October 2005 for her MSc. program.

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ANALYSIS OF COTTON MARKETING CHAINS, THE CASE OF METEMA WOREDA, NORTH GONDAR ZONE, AMHARA NATIONAL REGIONAL STATE

ABSTRACT

In this study, factors affecting farm level marketable supply of cotton were analyzed using Robust OLS regression analysis. The results obtained from this analysis indicated that number of oxen owned by household, land allocated for cotton in hectare, the productivity of cotton per hectare, and access to credit for cotton significant factors affecting farm level cotton marketable supply. In order to evaluate the efficiency of cotton market chain that can have great influence on farm level marketable supply of cotton, structure-conduct-performance approach was adopted. Market concentration ratio (CR4) at District level was found to be 49.76 percent and there were observed barriers to enter into cotton market. These structural characteristics indicate oligopolistic structure of cotton market at District level. The study suggested that cotton market at ginneries and textile factories level is highly oligopolized by two ginneries and three textile factories. Buying, selling, and pricing strategies, which are indicators of market conduct showed deviation of cotton market from competitive market norms. Performance of cotton market chain was analyzed using Marketing Margins supplemented with analysis of costs incurred and gross profits generated for different market chain actors. The analysis showed poor performance of the chain in that farmers were the most disadvantaged chain actors, and assemblers and ginneries were better-remunerated ones. The major constraints and opportunities in cotton marketing in the chain were also identified. Based on the study, policy interventions required to increase farm level marketable supply of cotton are suggested and forwarded.

1. INTRODUCTION

1.1. Background

Cotton is an agro-industrial crop produced in both developing and developed countries. Cotton accounts for more than half of all fiber used in clothing and household furnishings (Goreux, 2003). Cotton for long has significant place in the economic and political history of the world. For example, it played immense role since the industrial revolution of the 17th century. Currently, it is an important cash crop to a number of developing countries at farm and national level (Baffes, 2004). In Africa, Asia and Latin America, cotton is contributing a lot towards overcoming food insecurity. In Africa, thirty-five of the fifty-three countries produce cotton. Twenty-two of these countries are known for exporting it (Valderrama, u.d). Ethiopia is one of the African countries that produce and export cotton. It has an estimated area of 2,575,810 hectares that is suitable for the cultivation of cotton (ESTC, 2006). However, the total production area is only about 100,000 hectares. Recently, Sneyd (2006) indicated that area of land allocated for cotton in the year 2004/05 was 113,000 hectares.

In Ethiopia, spinning and weaving to make cloths from cotton is perhaps as old as the history of the country. Though written records are scarce, it is widely believed that Ethiopians wore clothes woven from cotton fibers centuries ago. Still about 85% of the total population living in rural areas of the country, satisfies a significant part of its textile needs from the traditional non-industrial sector. Clothes that are woven from cotton are popular also in urban areas of the country (Mulat *et al.*, 2004). However, the amount of cotton exported and the amount of revenue generated from the export is low. Mulat *et al.* (2004) indicated that the average yearly domestic production of lint cotton during the period 1996/97-2000/01 was only about 29,849.7 tons. Of this amount, 24,861.0 tons (nearly 83% of the total produce) was destined for the domestic market and only 4,989 tones (that is 16.9 %) was exported. Textile mills and handlooms and handcrafts together consume 86% of the total product and about 14% of the annual domestic sales of lint cotton. MoARD (2005) indicated that the average annual export of lint cotton in Ethiopia from 1998/99 to 2004/05 was 6,055 tones whereas the average revenue obtained from sales

of this amount was only 52,457,000 Birr. Mulat *et al.* (2004) argued that despite its potential capacity to produce abundant cotton, Ethiopia performed weakly in its exports of textile and garment products. One indicator is the fact that the country is largely limited to semi-processed textiles (e.g. woven cotton fabrics and cotton yarn) and, to a certain extent, apparel products made of cotton. Mulat *et al.* (2004) revealed that during 1996/97-2000/2001 the country's textile and garment exports grew only at an average annual rate of 19% in value terms. Due to this, the textile and garment exports accounted only for 0.17 to 0.42% during that period. This clearly indicates that the sector is predominantly domestic market oriented.

Cotton crop has direct connections with various agro processing industries like textile, oil mills and with the livestock sub sector. In other words, the crop has a direct linkage with the industrial sector. The availability of adequate and suitable land, conducive climate and labor for cotton production are also bases for planning and implementing extensive cotton production.

The Amhara Regional State is potentially suitable to produce cotton. Due to this, the Agriculture and Rural Development Bureau of the region has identified districts that have adequate potential. The identified districts are Quara, Metema, Tach Armachiho, Tegede from North Gondar Zone and Kobo from South Wollo (Demelash, 2004). According to Demaelash (2004), the productivity of cotton in the region is low, the available land, which is suitable for cotton production is not utilized, and quality of cotton produced is low.

The main aim of this study is twofold. One is analyzing and evaluating the efficiency of cotton marketing in the chain. The other is investigating factors that affect the marketable supply of cotton in Metema district. Making such an analysis and evaluation can enable one to gain information about the flow of goods and services from their origin to their final destination (Mendoza, 1995). The study attempts to identify factors that affect marketable supply of cotton at small-scale farmers' level, market players and their role, marketing costs and margins at different market levels, constraints and opportunities in cotton production and marketing.

1.2. Problem Statement

According to Westlake (2005), increasing only the value of commodities at export market level cannot make a market efficient and ensure economic growth. In other words, he means that increasing the value of exports is not an end in itself and it is only a means of accelerating the pace of economic growth. In the context of processing and marketing a specific commodity, economic growth is accelerated directly by increasing the value that is added between the producer and the value point of export, and indirectly by improving cost efficiency. Part of this improvement must be captured domestically in the form of higher prices and profits for producers and/or higher profit for traders and processors. Doing this may accelerate economic growth as the increased profits are invested (Westlake, 2005). Thus, if market performance is inefficient, the sustainability of the production become questionable and, as a result, a steady supply of a commodity for the market may become difficult.

In relation to this, Kaplinsky and Morris (2000) outlined three main reasons why value chain analysis is important in this era of rapid globalization. The first is that with the growing division of labor and the global dispersion of the production of components, systemic competitiveness has become increasingly important. The second is that efficiency in production is only a necessary condition for a successful penetration of global markets. Thirdly, entry into global market and making the best use of globalization requires an understanding of dynamic factors that are inherent in the whole value chain.

The most fundamental factor that constrains increased domestic value added is lack of production. In addition, deficiencies in processing and marketing systems constrain production by reducing producers' prices and by raising uncertainty over future producer price level. They also constrain production by causing delayed payment and by being incompatible with the effective supply of finance and inputs to farmers (Westlake, 2005).

In Ethiopia, income generated from export of cotton and textile products is low when compared to other commodities. In its September 2006 report, the Secretariat of the International Cotton Advisory Committee (ICAC) indicated that in Ethiopia the area of land covered by cotton crop in 2005/06 was only 83,000 hectares. The report indicated also that the productivity of lint cotton was only 265 Kg/ha. According to the report, total

production of lint cotton in metric tone for the year was only 22,000 tones. The report elucidated that 20, 000 metric tones (about 90%) of the total production was domestically consumed. Only the remaining 10 % of the total production was exported. This situation shows that the country is extracting insignificant benefits from its cotton and textile products export.

It is important, therefore, to study factors that are responsible for low production, and efficiency of cotton marketing in the country. In the Amhara Regional State, which is the region of the current study area, investigating the problem seriously is important. So far, only Demelash (2004) made an informal survey and identified some factors that have been impeding the production and marketing of cotton in the region, including Metema District. To come up with a better-grounded finding, one needs to conduct more structured and focused study. The information obtained through rigorously structured studies may provide with better insights as to what should be done to improve the production and marketing of the commodity. Hence, this study was initiated to address these gaps in Metema District.

In this regard, the current study wants to answer the following research questions:

1. Which factors determine cotton supply in Metema District?
2. How is cotton marketing system organized and functioning?
3. What are the components of cotton marketing costs?
4. What are the key constraints and opportunities in cotton marketing chains?

1.3. Objectives of the Study

The overall objective of this study was to investigate cotton marketing chains. The specific objectives were to (1) analyze factors affecting cotton supply at farm level in Metema District, (2) identify cotton marketing channels, the role and linkage of marketing agents, (3) assess cotton marketing cost and margins for key marketing channels and (4) identify key constraints and opportunities in cotton marketing.

1.4. Significance of the Study

The study may give detailed information on how cotton marketing chain is currently functioning in Metema District. It may point out factors that constrain cotton production and marketing system. The study may also generate information that help how to formulate cotton marketing development programs and guidelines for interventions that would improve efficiency of the cotton marketing system. The findings of the study may benefit cotton farmers and traders, policy makers, governmental and non-governmental organizations that have a stake in cotton marketing system and want to intervene in it in the future. Finally, researchers who want to make further investigation in cotton may equally benefit from the results.

1.5. Scope of the Study

The study is limited to cotton marketing in Metema District. The focus of the study is seed cotton, cottonseed, and lint cotton production and marketing aspects. One thing that limits the quality of the current study is that absence of analysis of marketing margin at export market level due to absence of export of lint cotton from the two ginneries found in Gondar, which are the major consumers of seed cotton from Metema District. Due to this gap, it is not possible to know the extent of share from export market for each market level in the study.

2. LITERATURE REVIEW

The aim of this chapter is to discuss concepts of market, marketing, marketable supply, and market chain. In relation to these issues, the chapter highlights about production and supply of cotton and major constraints in cotton production and marketing in Ethiopia. In addition, the chapter deals with analysis of empirical studies that are concerned with variables that affect marketable supply of agricultural commodities. What is more, the chapter tries to make analytical discussion of price trends of cotton in the world and the major factors that have been affecting cotton marketing by taking into consideration the market situations of cotton in the world.

2.1. Concepts of Market, Marketing, Marketable Supply, and Market chain

Various marketing scholars have long been defining or conceptualizing what market, marketing and supply are. For example, Kohls & Uhl (1985: 9) define market as an "an arena for organizing and facilitating business activities and for answering the basic economic questions: what to produce, how much to produce, how to produce, and how to distribute production." The authors argue further that market can be defined by location, product, time, and level and how we should define what market is depends, largely, on the problem to be analyzed. On the other hand, marketing is about flow of goods and services from their point of production to consumption (Abbott and Makeham, 1981; Kohls and Uhl, 1985). For Mendoza (1995), marketing is a ''system'', which comprises several and usually stable and interrelated structures that along with production, distribution and consumption, strengthen the economic process. Usually, the marketing of agricultural products begins at the farm when the farmer plans his production to meet specific demand and market prospects (Abbott and Makeham, 1981; Kohls and Uhl, 1985). Supply ''is a schedule of differing quantities that will be offered for sale at different prices at a given time and place" (Kohls and Uhl, 1985:150). Marketable supply is the amount of supply that is actually taken to the market irrespective of the needs for home consumption and other requirements (Wolday, 1994).

Market chain is the term used to describe the various links that connect all the actors and transactions involved in the movement of agricultural goods from the producer to the consumer (CIAT, 2004). Commodity chain is the chain that connects smallholder farmers

to technologies that they need on one side of the chain and to the product markets of the commodity on the other side (Mazula, u.d).

2.2. Approaches to the Study of Marketing

Under this sub-topic, approaches to the study of marketing that have been in use are discussed. Examples of the approaches are Functional (Marketing functions), Organizational (Institutional), Commodity (Individual), Post harvest, and Mixed approaches (Branson and Norvell, 1983; Mendoza, 1995). Out of these, Functional, Institutional and Commodity approaches are the most commonly used ones, and are discussed below one after the other.

2.2.1. Functional approach

Functional approach involves classifying and studying specialized activities performed as marketing works (Branson and Norvell, 1983; Kohls and Uhl, 1985). “A marketing function is a fundamental or basic physical process or service required to give a product the form, time, place, and possession utility consumers’ desire” (Branson and Norvell, 1983:12). In this approach, the performed activities in marketing agricultural production are taken and analyzed. The chief marketing activities are selling, buying, transporting, warehousing, financing, risk-taking and carrying out market-intelligence (Branson and Norvell, 1983; Kohls and Uhl, 1985).

2.2.2. The systems (Institutional) approach

In this approach, the concern is with “the number and kinds of business firms that perform the marketing task” (Branson and Norvell 1983:7). Marketing institutions that are analyzed in this approach include market stabilization agencies, board of foreign trade, supermarket chains, wholesaler/retailer network, a town’s central market, or agreements between producers and millers. The efficiency of marketing institutions depends on the quality of involvement of the relevant people (Mendoza, 1995).

2.2.3. The commodity (Individual) approach

This approach involves studying problems encountered while marketing particular products. These products could be consumers, industrial or agricultural product (Branson and Norvell, 1983; Kohls and Uhl, 1985; Mendoza, 1995). This approach is used to deal with list of products and this detail analysis includes the classification of products, characteristics of products, source of supply, persons engaged in the exchange process, transportation of the product, its financing, storage, and advertisement (Branson and Norvell, 1983). Institutional analysis in this approach involves identifying major marketing channels, analysis of marketing costs and margins (Mendoza, 1995).

2.3. The Global Cotton Production and Consumption

In the world, the largest volume of cotton production is concentrated in countries like China, United States, India, Pakistan and Brazil. And yet, low-income countries in Sub-Saharan Africa (e.g. Benin, Burkina Faso, Chad) and other similarly poor countries elsewhere in the world depend heavily on cotton for earning foreign exchange (Anderson and Valenzuela, 2006). Anderson and Valenzuela (2006) stated that exports of lint cotton in US, Australia, Uzbekistan and Brazil accounts for almost two-thirds of the world's exports. The well known lint cotton importing countries in the world are Pakistan, India, Greece, Djibouti, Egypt, Oman, United Arab Emirates, Srilanka, China, Brazil, Japan, Portugal, Sudan, Morocco, Thailand, Denmark, Indonesia, Yemen, Turkey, Switzerland, Vietnam, Italy, Mexico, Korea Republic, Russia Federation, Germany, Canada, South Africa, Tunisia (MoARD, 2004, cited in EBDSN, u.d).

2.4. Recent Trends in Cotton Production

Recent trends in cotton production focuses on cost reductions by using less intensive inputs, for example, using genetically modified (GM) seed technology and organic methods of production. Again, absence of opposition on GM cotton has allowed more rapid adoption (Baffes, 2004).

2.4.1 Genetically Modified Cotton

Genetically Modified (GM) cotton has the potential of reducing the cost of production and thus increased profitability for the early adopters of the technology (Baffes, 2004). There are two types of GM cotton: Bt cotton (first used in the US in 1996) and herbicide-tolerant cotton (which gained approval by the US Environmental Protection Agency in 1998). BT (*Bacillus thuringiensis*) is a naturally occurring soil bacterium used as a biological pesticide for many years. The gene that produces an insect toxin has been transferred from that bacterium into the cotton plant. In turn, since the plants produce their own toxin, there is no need for the grower to apply pesticides. In economic terms, GM-type cotton (as well as all other GM products) acts as insurance against pests, insects, or weeds. Marra and Martin (2007) stated that herbicide and insect-resistant cotton, improved cotton cultivars as well as the Boll Weevil Eradication program are recent innovations in cotton cultivation. Anderson and Valenzuela (2006) argued that developing countries could improve their economic welfare if they adopt GM cotton instead of holding back cotton subsidies and tariffs. As part of this argument, Friends of the Earth International (2007) indicated that Argentina, Australia, China, Colombia, India, Indonesia, Mexico, South Africa and the United States allowed GM cotton cultivation.

2.4.2 Organic cotton

Organic cotton is potential for the developing countries because of their low dependence on chemicals and fertilizer. However, Baffes (2004) states that there is limited potential of organic cotton in Africa despite a considerable large initiative. Thus, in Africa, the scale of organic cotton is still insignificant compared to global production of conventional cotton. Factors related both to demand and supply are causes for the limited potential. On the supply side, the certification process is costly for the cotton farmers. On the consumption side, the demand for organic cotton is not as high as other commodities.

2.5. World Cotton Price Trends and Distortions in the Cotton Market

The world cotton price has been declining throughout history although the pattern of the decline has always been fluctuating. For example, Table 1 below depicts the trend of real

cotton price from early 1950s to 2003. The table shows that one kilogram of cotton in early 1950s was about five US dollar, but in 2000s, it reached almost to one US dollar. In addition to this decline in real price, there is also fluctuation in seasonal and annual prices.

Table 1.Annual cotton prices (US dollars per kilogram) (1950-2003)

Year	Nominal Price	Price index	Real Price*	Year	Nominal Price	Price index	Real Price*
1950	0.92	0.18	5.05	1982	1.60	0.76	2.09
1951	0.96	0.21	4.56	1983	1.85	0.74	2.49
1952	0.95	0.22	4.31	1984	1.79	0.73	2.45
1953	0.83	0.21	3.87	1985	1.32	0.72	1.83
1954	0.86	0.20	4.10	1986	1.06	0.83	1.27
1955	0.82	0.21	3.84	1987	1.65	0.91	1.81
1956	0.74	0.22	3.34	1988	1.40	0.96	1.45
1957	0.74	0.22	3.28	1989	1.67	0.96	1.74
1958	0.71	0.22	3.09	1990	1.82	1	1.82
1959	0.63	0.22	2.78	1991	1.68	1.02	1.64
1960	0.65	0.23	2.81	1992	1.28	1.06	1.21
1961	0.67	0.23	2.85	1993	1.28	1.07	1.20
1962	0.65	0.23	2.73	1994	1.76	1.1	1.60
1963	0.65	0.23	2.71	1995	2.13	1.17	1.82
1964	0.65	0.24	2.68	1996	1.77	1.11	1.59
1965	0.64	0.24	2.59	1997	1.75	1.04	1.69
1966	0.62	0.25	2.42	1998	1.44	0.99	1.45
1967	0.68	0.26	2.57	1999	1.17	0.99	1.18
1968	0.68	0.25	2.68	2000	1.30	0.97	1.34
1969	0.63	0.27	2.31	2001	1.06	0.95	1.12
1970	0.63	0.28	2.25	2002	1.02	0.94	1.09
1971	0.74	0.29	2.51	2003	1.40	1	1.40
1972	0.79	0.32	2.46				
1973	1.36	0.37	3.63				
1974	1.42	0.45	3.11				
1975	1.16	0.50	2.30				
1976	1.69	0.51	3.31				
1977	1.55	0.55	2.81				
1978	1.57	0.64	2.45				
1979	1.69	0.72	2.36				
1980	2.05	0.79	2.60				
1981	1.85	0.79	2.34				

*. Real prices have been deflated by the manufacture import unit value (1990=1.0).
Real Value = (Nominal value/Price index)
Source: Extract from World Bank Commodity Price Data of Baffes (2004)'s document.

The reasons for decline in real cotton prices are the following. These are increase in subsidies paid to cotton farmers in the United States (FEI, 2007), long term inroad of synthetics fibers, recent slow down in economic activity, fluctuation in exchange rate, and large subsidies granted from key industrialized countries (Goreux, 2003), influence of US and China's high degree of market importance (CIECRDC,2002; CFC, 2005). The other cause is the advent of various marketing and trade interventions through domestic market activities and dramatic increase in the trade of secondhand clothing during the last two decades (Baffes, 2004). These factors caused price distortion in the cotton market.

The International Cotton Advisory Committee (2002, 2003), which has been monitoring the level of assistance to cotton production by major producers since 1997/98; found that eight countries provide direct support to cotton production. These are USA, China, Greece, Spain, Turkey, Brazil, Mexico, Egypt (Baffes, 2004; Goreux, 2004). Cotton producing countries with little or no government intervention are Argentina, Australia, El Salvador, Guatemala, Israel, Nicaragua, Nigeria, Paraguay, Peru, and Venezuela (Baffes, 2004).

It is obvious that subsidizing farmers in US and other nations affect the fate of poor countries. On the other hand, stopping subsidizing farmers in these countries may benefit farmers elsewhere. For example, revenues for cotton farmers in West and Central Africa would increase by some USD 250 million if US cotton subsidies were abolished (CFC, 2005). Similarly, Anderson and Valenzuela (2006) suggested that removal of all cotton subsidies and tariffs would boost global economic welfare by $283 million per year and raise the price of cotton in international markets by an average of 12.9 percent. The price rise ensures that all cotton exporting countries would benefit (Goreux, 2003; Anderson and Valenzuela, 2006). Expecting all industrialized countries to eliminate all agricultural subsidies in the near future would be unrealistic. However, the distorting effect of subsidies could be considerably reduced thereby lowering the total cost of subsidies and replacing subsidies with strong distorting effects by subsidies with weak distorting effects (Goreux, 2004).

2.6. Cotton Production in Developing Countries

Cotton is an important cash crop to a number of developing countries. Especially in Africa, cotton is typically a smallholder crop, and the main cash crop grown in rain fed land where

the use of purchased inputs such as chemicals and fertilizer is minimal (Baffes, 2004). Cotton has a strong poverty reduction impact, because cotton is cultivated in small family farms in areas where opportunity for growing other crops are very limited and per capita income very low (Goreux, 2004).

Table 2. Cotton area, yield, production and exports in selected African Countries*2004/05

Country	Area (000ha)	Yield Kg/ha	Production (000 tone)	Exports (000 tone)	Est.exp value in million $**	Cotton Dependence ***
Benin	325	441	143	105	199	1
Burkina Faso	450	533	240	189	190	1
Cameron	217	507	110	77	97	5
Central African Rep.	10	250	3	5	7	3
Chad	310	274	85	56	79	1
Cote D'Ivoire	300	467	140	88	102	5
Ethiopia	113	177	20	7	6	-
Ghana	20	275	6	-	4	-
Guinea	14	222	3	3	15	-
Kenya	50	97	5	-	-	-
Mali	540	435	240	211	205	1
Mozambique	230	115	26	22	20	4
Niger	5	423	2	1	-	-
Nigeria	790	127	100	-	18	4
Senegal	50	420	21	17	19	3
South Africa	40	510	20	-	-	-
Tanzania	420	250	105	98	51	2
Togo	202	347	70	58	103	3
Uganda	120	308	37	27	24	2
Congo D.R	11	265	3	-	-	-
Zambia	180	273	49	34	23	-
Zimbabwe	360	327	118	84	44	3

Source: Sneyd, 2006; his sources of this data are the following:

*Source: ICAC, Cotton: Review of the International Situations, 58, 2, p.16

**Source: Oxfam," Finding the Moral Fiber,"p.39.Figures are the latest available from 2002/03.

*** Cotton Dependence: ranking of the contribution of seed cotton to Foreign exchange earnings relative to other agricultural products. Source: UNCTAD Info Comm.

Sneyd (2006) indicated that over the past fifty years, production of cotton in sub-Saharan Africa raised by a factor of 8.5 from 200,000 tones per year to over 1,700,000 in 2004/05 while during the same period the world production volume only tripled. However, over the past decade yields have stagnated at roughly half due to lack of irrigation and due to inconsistency in the provision of inputs and advice across the region (Sneyd, 2006).

In 2001, there were 100 million rural households involved in cotton production worldwide. In China, India, and Pakistan about 45, 10, and 7 million rural households were respectively engaged in cotton production. In Nigeria, Benin, Togo, Mali, and Zimbabwe together six million households were engaged in the production (Baffes, 2004). According to Sneyd (2006) and as shown in Table 2 below, the Sub-Saharan Africa is dependent upon cotton. This is problematic as far as there has been a six-decade decline in the world price of lint in real terms. Baffes (2004) indicated that the high dependence on cotton in these countries has important poverty ramification, especially when price changes occur. According to Sneyd (2006), in Africa, the land covered by cotton is increasing while the productivity of cotton is still only half of the world's production. Table 2 reveals that 14 countries in Africa are dependant on cotton for their foreign exchange. For example, for Benin, Burkina Faso, Chad, and Mali, which are the so called the cotton four (C4) countries in Africa, cotton takes the lion's share of the foreign exchange earnings relative to other agricultural products. For Tanzania and Uganda, cotton is the second largest export commodity. For Central African Republic, Senegal, Togo and Zimbabwe the crop is the third largest export commodity. In the same way, for Mozambique, and Nigeria cotton stands as fourth export commodity. For Cameron and Cote D'Ivoire, it is the fifth export commodity. One can conclude that given high price fluctuation in cotton market, high dependence of these countries on cotton for their foreign exchange earnings can affect the economy of these nations, particularly when decline in world price of the crop occurs as in 2001/ 2002 production year.

2.7. Cotton Production and Marketable Supply in Ethiopia

In Ethiopia, out of the total 2.6 million ha of land suitable for cotton production, 1.7 million ha or 65% is found in 38 high potential cotton producing areas. The remaining 0.9 million ha or 35% is in 75 medium potential districts. Regardless of this immense potential, Ethiopia produced only about 77,000-84,000 MT of seed cotton annually from a

total cotton area of 42,371ha from 1996/97-2000/2001 (Appendix Table 1 and Appendix Table 2) (RATES, undated). ESTC (2006) indicated that in the country, the area under cotton is about 100,000 hectares. Sneyd (2006) also indicated that the area of land under cotton in the year 2004/05 was 113,000ha. Cotton is produced under both rain-fed and irrigated condition in state farms, private commercial farms and small holders (RATES, undated). The major cotton growing area in the country are the Awash basin. Others are Abela, Bele, Arba Minch, Sille and Omorate in the South, Gambella and Beles in the West, Metema and Humera in the North and Gode in the East.

From 1940's to 1970's, Ethiopia was importing raw cotton to satisfy the domestic demand of its textile factories. Following the establishment of state farms and large-scale private farms in 1970's, the country started exporting cotton. However, due to the drought in the 1980's, the country discontinued the export of cotton. Then, in 1994/95, the country resumed exporting lint cotton (MoARD, 2005). At an extraction rate of 37%, the average yearly domestic production of lint cotton during the period 1996/97-2000/01was about 29,849.7 About 24,861.0 metric tons or nearly 83% was domestically consumed. The respective share of textile mills and hand looms and hand crafts was 86% and 14% of the annual domestic sales of lint cotton, respectively (RATES, u.d; Mulat *et al.*, 2004).

The amount of lint cotton exported from Ethiopia and the revenue obtained from its production in 1998/99-2004/05 is indicated in Appendix Table 12. Even though there are some differences in figures of export data of lint cotton from 1998/99 to 2000/01 between the two sources, they give some insights about the volume of export of the product in the country. The average amount of lint cotton exported from Ethiopia in the years 1998/99-2004/05 was 6,055 tones. The average revenue obtained from this amount of export was 52,457,000 Birr.

Ethiopia grows relatively good raw cotton with a fiber length of 27-28 mm. of course, there is a high potential in the country to produce first class cotton if conditions that ensure stable standards of quality are fulfilled (RATES, u.d).

2.8. Cotton Production Constraints in Ethiopia

Factors that constrain the production of cotton are shortage of improved seed varieties, shortage of technical inputs, absence of extension service, and limited irrigation practices (RATES, u.d).

2.9. Cotton Marketing Constraints in Ethiopia

Cotton marketing constraints identified by RATES (undated) are inadequate knowledge about market standard, lack of market information, absence of a system for contractual production and marketing arrangements, inadequacy of support through service cooperatives and lack of finance. Rates (undated) identified constraints on cotton marketing. However, the finding was entirely based on secondary data and rapid appraisal methods. Cotton marketing constraints in the chain were not identified in detail through formal survey. Therefore, detailed formal survey analysis of marketing constraints in the chain is essential to know currently prevailing problems in the cotton marketing chain and their extent of prevalence.

2.10. Empirical Literature on Marketable Supply

A number of studies pointed out factors that centrally affect marketable supply of agricultural commodities. For example, Wolday (1994) identified major factors that affect teff, maize and wheat at Alaba Siraro District. He studied the relationship of farm level marketable supply of the cereals using cross-sectional data. To capture the influence of the independent variables on the marketable supply of food grain, he adopted multiple regression analysis with both dummy and continuous variables as independent variables. He found out that the size of output, access to market and family size had affected marketable supply of food grain.

Wolelaw (2005) identified the major factors that affect the supply of rice at Fogera District using multiple linear regression as a model to study the relationship between the determining factors of supply and the marketable supply of rice. His study revealed that the current price, lagged price, total amount of rice production in the farm, consumption in the

household and weather had affected marketable supply of rice. In similar way, Kindie (2007) identified major factors that affect marketable supply of sesame in Metema District using cross-sectional data with dummy and continuous independent variables. Like Wolelaw (2005), Kindie (2007) adopted multiple linear regression to identify the relationship between the marketable supply of sesame and the hypothesized independent variables. Kindie's study revealed that the amount of productivity of sesame, number of oxen owned, number of languages spoken by the head of the household, modern inputs used, sesame area, and time of selling of sesame influenced marketable supply positively. In related studies, Rehima (2007) identified that the major factors that affect marketable supply of pepper at Alaba and Siltie of SNNPRS using cross-sectional data with both dummy and continuous independent variables. To identify the variables, Rehima (2007) adopted Tobit model and came up with the finding that market distance, quantity of pepper produced, frequency of contacts with extension agents and access to market information influenced marketable supply of pepper. Except that of distance to market, these variables influenced marketable supply of pepper positively.

From these studies, one can conclude that most of the factors that affect the supply of each commodity differ from other commodities. Hence, difference in the marketing system of these commodities, type of commodities (food or industrial commodity), and location of the study area can result in differences in factors affecting marketable supply of the commodities. Hence, it is important to analyze factors affecting marketable supply of cotton, which is an industrial crop at farm level.

3. MATERIALS AND METHODS

3.1 Description of Metema District

Metema District is located about 900 kms North West of Addis Ababa and at about 180 kms west of Gondar town and north of Quara and Alefa. It is found North of Quara and Alefa, West of Chilga and South of Tach Armachiho Districts. The district has twenty Kebeles of which 18 are rural based peasant administrations. It borders Ethiopia and Sudan in the West.

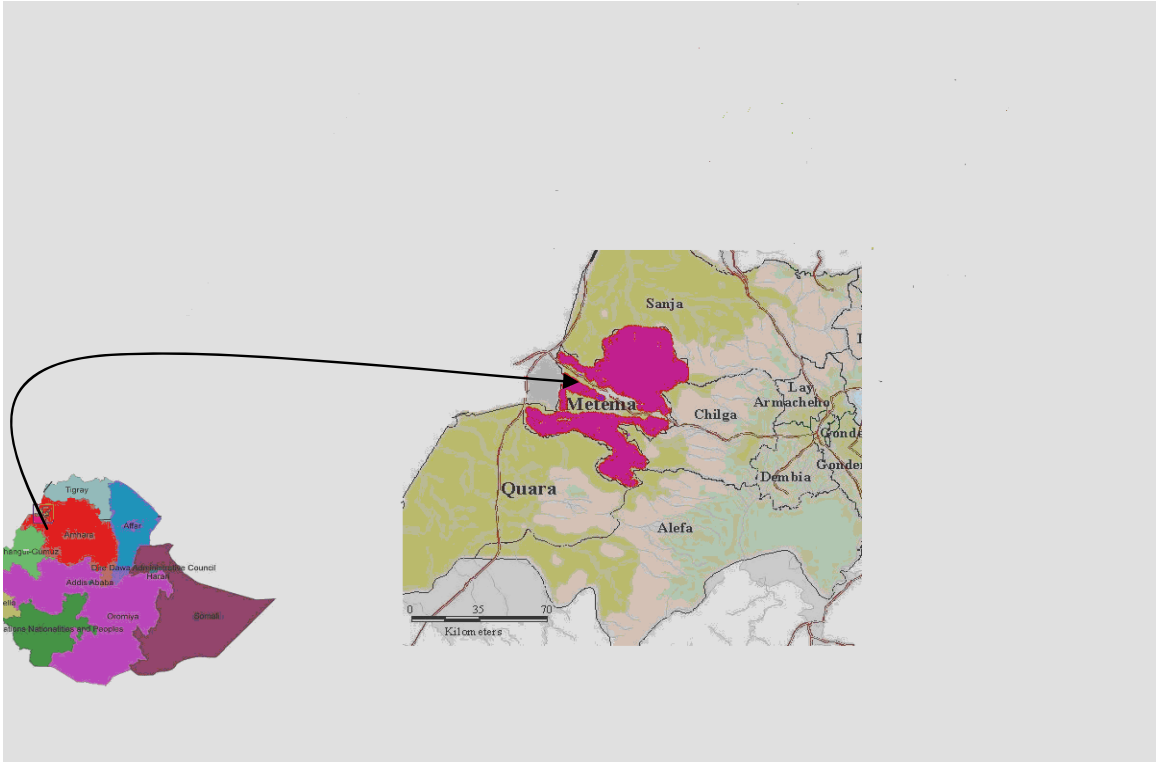

Figure 1: Location of the study area

The altitude of the district ranges from 550 to 1608 meters above sea level. Its minimum annual temperature ranges between $22^{o}c$ and $28^{o}c$. The daily temperature of the district is high from March to May and sometimes reaches $43^{o}c$. The District is considerably low land with exceptions of some mountaintops (IPMS, 2005). The mean annual rainfall of the district ranges from about 850 mms to 1100 mms and about 90% of it receives the mean annual rainfall of 850-1000 mms. The district has a uni-modal rainfall. Thus, the rainy

months extend from June to the end of September. However, a considerable mount of the rain falls in July and August.

In this district, there are about 15,675 rural agricultural households and about 4,991urban households. The district has a total population of about 91,216 and was originally settled by the *Gumuz***,** which are about 500 households. However, currently other people who moved from the neighboring highlands also settled in the district.

The soils in the area are predominantly black although some have *vertic* properties. About a quarter of the size of the district is *Haplic Luvisols* whereas about 22% of it is *vertisols* (that is with *vertic* properties). *Humic Nitosols* account only for about 6%. Water logging in the area is very high during heavy rainfall.

The district is known for cultivations of various cereals. About 90% of the district's cultivated area is covered by sorghum, sesame and cotton, which are the district's currently important marketable crops. In addition, the district is suitable to grow other cereals in addition to these three cereals though their quantity is small (IPMS, 2005). The people in the district keep cattle, goats, sheep, donkey, and poultry and in addition are engaged in bee production. However, according to IPMS (2005), rearing cattle and goat are the most dominant from livestock production. The woodland in the district is covered largely by *Acacia*. *Boswellia papyferia* from which incest produced covers about 68,000 ha. In addition, *acacia seyal* and *Apolyacantha* grow naturally and are used to produce gums (IPMS, 2005).

3.2 Methods of Data Collection

This study was based on primary and secondary data. The primary data were drawn from small-scale farmers in fourteen purposively selected kebele administrations, assemblers, primary cooperatives, the district's Cooperatives Union, ginneries found in Gondar, Bahir Dar Textile Factory and from Gondar Oil Mill that has been using cottonseed as raw material. In addition to these, different government offices having direct as well as indirect relation with cotton production and marketing were also contacted. Semi-structured questionnaires and personal interviews were used to collect

the data. Focused group discussions (FGDs) that involved key informants was the other method of data collection. Finally yet importantly, the researcher used direct observations as a method.

The secondary data came from primary cooperatives that were involved in cotton marketing, Metema District Agricultural Cooperatives Union, Metema District office of Agriculture and Rural Development, Small Scale Enterprise Development Office, District Office of Trade and Industry, Ginneries, Gondar Oil Mill, Bahir Dar Textile Factory, different published and unpublished reports, bulletins, and websites.

3.3 Sampling Procedure

For this study, 139 farm households were sampled and interviewed from the District. A two-stage sampling technique was used to draw sample cotton producer farmers. First, 14 kebeles from the District were selected through purposive approaches. During the selection, the kebele's potential for cotton production and the accessibility of the areas to travel were taken into consideration. In the second stage, using the population list of cotton grower farmers from sample kebeles, the intended sample size was determined proportionally to population size of cotton grower farmer. Then the predetermined size of the sample farmers from each kebele were randomly selected using systematic random sampling technique.

Prior to formal survey, a rapid market appraisal (RMA) was conducted in order to get the overall picture of cotton marketing chain. The sample size of cotton traders was 23. Since the number of cotton traders in each locality of the District was few, almost all of them were interviewed. Both licensed and unlicensed traders were included in the traders' survey.

Table 3. Number of traders interviewed and their location

Address of Respondent	Assemblers/Local collectors	Commission Agent	Total
Meka	1		1
Das	2	1	3
Tumet	1		1
Gubay Jejebit	3		3
Kokit	7		7
Kumer Aftet	1		1
Zebach Bahir	1	1	2
Shehedi/Gendewha	4		4
Awlala	1		1
Total	21	2	23

Source: Own survey

The cooperatives involved in cotton marketing in the year 2005/06 were six out of 18 cooperatives in the District. The cooperatives that were involved in cotton marketing were used as data source. The cooperatives involved in cotton marketing in the year were Gende Wuha, Kokit, Das, Tumet, Shinfa, and Kumer Aftet primary farmers' cooperatives. The Metema Farmers' Cooperatives Union was also one of the sources of data. In addition, *Dess* and *Gondar* Ginneries found in Gondar town were data sources from Ginneries. Bahir Dar Textile Factory was used to represent textile factories as a source of data. This factory is the major purchaser of lint cotton from ginneries found in Gondar whose source of seed cotton is Metema District and the vicinity. The *Gondar* Oil Milling Factory was also used as the other source of data.

3.4. Method of Data Analysis

For analyzing factors affecting marketable supply of cotton at farm level, an econometric model was used. To describe the characteristics of market players' descriptive statistics like mean, standard deviation and percentage were employed.

3.4.1. Descriptive statistics

To describe the characteristics of market players and to identify key constraints in cotton production and marketing descriptive statistics was used.

3.4. 2. Cotton marketable supply function

In this study, multiple linear regression model was used to analyze factors affecting farm level cotton supply in Metema District.

Model Specification

The economic model specification of the variables is as follows.

$$Y_i = F(X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, X_9, X_{10}, X_{11}, X_{12}, X_{13})$$

where: Y_i = quantity of seed cotton supplied to market

X_1 = Owned oxen number by household

X_2 = Access to credit for cotton

X_3 = Land allocated to cotton in hectare by a household

X_4 = Productivity of cotton in 2005/ 06

X_5 = Distance from main purchasers in the District

X_6 = Price of cotton in the year 2003/04

X_7 = Price of cotton in the year 2004/05

X_8 = Access to market information

X_9 = Access to extension service

X_{10} = Ownership of corrugated iron house

X_{11} = Educational level of household

X_{12} = Number of male family members aged 14 to 64 years

X_{13} = Years of experience of a household in cotton production

Econometric model specification of supply function in matrix notation is the following.

$$Y = \beta' X + U$$

where: Y = quantity of seed cotton supplied to market

X = a vector of explanatory variables

β' =a vector of estimated coefficient of the explanatory variables

u_i = disturbance term

When some of the assumptions of the Classical Linear Regression (CLR) model are violated, the parameter estimates of the above model may not be Best Linear Unbiased Estimator (BLUE). Thus, it is important to check the presence of heteroscedasticity and multicollinearity among the variables that affect supply of cotton in the area.

Test for heteroscedasticity: there are a number of test statistics for detecting heteroscedasticity. Among them are Park, Breusch-Pagan, Godfrey, White's testes, Koenker-Bassett (KB) test of heteroscedasticity. However, according to Gujarati (2003), there is no ground to say that one test statistics of heteroscedasticity is better than the other test statistics. Due to its simplicity, Koenker-Bassett (KB) test of heteroscedasticity was employed in this study. Like other test statistics of heteroscedasticity, KB test is based on the squared residuals u_i^2. However, instead of being regressed on one or more regressors, the squared residuals are regressed on the squared estimated values of the regressand. Specifically, if the original model is

$$Y_i = \beta_1 + \beta_2 X_{2i} + \beta_3 X_{3i} + \ldots + \beta_i X_{ni} + u_i$$

Then $\hat{u}_i$ is obtained from this model and then $\hat{u}^2$ estimated

$$\hat{u}_i^2 = \alpha_1 + \alpha_2 \hat{Y}^2 + V_i$$

where $\hat{Y}_i$ are the estimated values from the model

$$Y_i = \beta_1 + \beta_2 X_{2i} + \beta_3 X_{3i} + \ldots + \beta_i X_{ni} + u_i$$

The null hypothesis is that $\alpha_2 = 0$. If this is not rejected, then, one can conclude that there is no heteroscedasticity. The null hypothesis can be tested by the usual t- test or the F- test

(Gujarati, 2003). In the presence of heteroscedasticity, ordinary least squares (OLS) estimates are unbiased. However, the usual tests of significance are generally inappropriate and their use can lead to incorrect inferences. Tests based on a heteroscedasticity consistent covariance matrix (HCCM), however, are consistent even in the presence of the heteroscedasticity of an unknown form (Long and Ervin, 2000).

Test for multicollinearity: to detect multicollinearity problem for continuous variables, Variance inflation factor $(VIF) = \frac{1}{1 - R_j^2}$, for each coefficient in a regression as a diagnostic statistic is used. Here, R_j^2 represents a coefficient for determining the subsidiary or auxiliary regression of each independent continuous variable X. As a rule of thumb, Gujarati (2003) stated that if the VIF value of a variable exceeds 10, which will happen if R_j^2 exceeds 0.90, then, that variable is said to be highly collinear. Therefore, for this study, Variance inflation factor (VIF) was used to detect multicollinearity problem for continuous variables. On the other hand, for dummy variables contingency coefficient was used.

Determinants of marketable supply of cotton in Metema District

According to Branson and Norvell (1983), the supply offered by farmers is a function of:

- price of the commodity to be supplied;
- cost of all the inputs necessary to produce the commodity;
- net income or profit that could be obtained from alternative crops
- state of technology that affects potential yields;
- total acreage available, expectations about future price change and
- risk of production (weather, insects).

The factors that influence a person's decision on how much to keep, how much and when to sell are determined by the following. These are the price, the size of production, the availability of alternatives for household consumption, the storage capacity, the amount of cash required (paying tax debts, and purchasing non-farm production), the availability of time and labor during harvest period, the availability of transportation and the condition of the weather (Chung, 1975; cited in Wolday, 1994). Therefore, it is not possible to include

an entire list of variables that could affect the household level marketable supply of a product since it varies according to the type or kind of the product and according to the location of the production. This study, thus, attempts to estimate factors affecting farm level marketable supply of cotton in Metema District. It attempts to do this using the cross-sectional data of the following variables.

Dependant Variable:

Quantity Supplied to Market: It is a continuous variable representing dependant variable. It was amount of seed cotton supplied by households to market and measured in quintal.

The Independent variables are:

1. Owned oxen number (OX_NU): This variable is a continuous variable that has been measured by taking into consideration the number of oxen owned by the head of the household and expected to affects the marketable supply of cotton positively. This is because those farmers who have their own oxen can reduce their cost of production (oxen rent) and can plough their land on time and as a result, able to produce more cotton and supply for the market. Kindie (2007) found that the number of oxen owned by the household affected the marketable supply of sesame in Metema District.

2. Land allocated for cotton in ha (LD_AL_COT): Since cotton is an industrial crop having a direct relation with marketable supply, increase the area of land covered by the crop can directly increase the marketable supply of cotton. Therefore, this variable is assumed to have a positive relation with the dependant variable and is measured in hectares. Branson and Norvell (1983) and DNIVA (2005) found expanding the area under crop increased the marketable supply of the crop.

3. Distance from main Purchasers in the District (DIS_MAI): This is a continuous variable and is measured in kilometers from the household residence to main Purchasers found in the District where the household is used to sell. The distance of the household from the chief purchasers is assumed to influence marketable supply of cotton at a farm level. The assumption here is that the closer a household is to the market, the more the household is motivated to produce cotton and supply it to the market. Therefore, this

variable is expected to have an inverse relation with farm level marketable supply of cotton. Hence, negative sign is hypothesized for the parameter. Again, there is no doubt that transport is of great importance for marketing agricultural produce. In particular, rural communities in remote areas suffer from lack of transformation facilities. This happens due mainly to absence of adequate means of transformation and due to poor infrastructural conditions like roads (Robbins *et al.,* u.d)

4. Productivity of cotton in 2005/06 (YLD 97): Since cotton is produced for market, farmers who produce higher output per hectare are assumed to supply more cotton to the market than those with lower productivity. It is a continuous variable measured in quintal per hectare and assumed to affect the marketable supply of cotton by the household positively. According to Butler (2005) and DNIVA (2005), yield can have serious and unpredictable consequences on the supply. A number of factors can affect yield. Among these are the unavailability of water, droughts, unexpected rains, insect infestations, and a number of other local and regional seasonal occurrences can all contribute to fluctuations in the yield.

5. Price of cotton for 2003/04 (Pr_96) and Price of cotton for 2004/05 (Pr_97): Since there is variation in price which farmers receive from sales of seed cotton due to location difference as well as price imperfection, two years lagged price is hypothesized to affect the marketable supply of cotton at the farm level. This variable is a continuous variable measured in Birr per quintal. Positive relation of lagged prices is expected with marketable supply of cotton. Practices show that in the Metema District cotton is soled within the production year. Whether price is lower or higher does not affect the current year's marketable supply of cotton. Hence, the current price of cotton is not taken as a factor affecting the marketable supply of cotton at the farm level. According to Butler (2005), one of the most important factors that influence supply is the price that producers received in the previous two years. In general, if prices were relatively high in the previous years, there is a possibility for the acreage to increase.

Studies show that cotton farmers usually base their production plans on the price they expect to receive at the harvesting season. The price they expect or claim depends on their knowledge of the price received in previous season. In other words, if the price in the previous season was favorable, the farmers will be encouraged to step up their cotton

production plans, with the hope to benefit from the favorable price at the harvesting time. The bad history of cotton price in the previous season usually demoralizes the farmers in the subsequent season and the price they expect or is paid to them is most likely to be low (DNIVA, 2005).

6. Access to credit (CRED_COT): The production of cotton requires high capital investment. The reason is that a large sum of money is incurred to cover cost of seed, oxen rent and labor cost (for land clearing, plowing, seeding, weeding, picking and packaging operations). Since the cost of labor in the District is relatively high and hardly affordable to most of the small-scale farmers, access to credit can play important role in increasing the marketable supply of cotton at farm level. Therefore, among other things, credit is assumed to have positive contribution to farm level marketable supply of cotton. It is a dummy variable taking the value of one if a household takes credit for cotton and zero otherwise. In agriculture, credit is expected to facilitate to improve agricultural technology, transformation of traditional agricultural practices, mitigating adverse conditions (drought, crop failure, disease and price uncertainties) conditions of physical and human capital, in addition, it is expected to increase farm efficiency, the flexibility of farmers' decisions, and then helps attain economies of scale in production, and consumption smoothing (Edilegnaw, 2000).

7. Access to extension service (EXT): the objective of the extension service is introducing farmers to improved agricultural inputs and to better methods of production. In this regard, extension is assumed to have positive contribution to farm level marketable supply of cotton. It is a dummy variable with a value of one if a household head has access to extension and zero otherwise.

8. Access to market information (ACC_MAK_): access to cotton market information is assumed to have positive impact on marketable supply of cotton at the farm level. It is a dummy variable with a value of one if a household head has access to market information and zero otherwise. The general idea is that maintaining a competitive advantage requires a sound business plan. Again, business decisions are based on dynamic information such as consumer needs and market trends. This requires that an enterprise is managed with due attention to new market opportunities, changing needs of the consumer and how market trends influence buying (CIAT, 2004).

9. Ownership of corrugated iron house (WEALTH): ownership of corrugated iron house is used as proxy variable for the wealth of households. It is assumed that households with their houses covered or roofed by corrugated iron sheets are wealthier than those who have only thatch-roofed houses. As a result, households who have better asset (wealth) are assumed to be involved in cotton production since the production of cotton requires relatively more capital. The ownership of a house with corrugated sheet is a dummy variable with a value of one and zero otherwise. Therefore, it is expected that there would be positive relation between this variable and the marketable supply of cotton at the farm level.

10. Education (EDUE): this is a dummy variable with a value of one if a household head is literate and zero otherwise. Education increases farmers' ability to get and use information. Since households who have better knowledge are assumed to adopt better production practices, this variable is assumed to have positive relation with farm level marketable supply of cotton.

11. Number of male family members aged 14 to 64 years (MAL_14_64): cotton production is labor intensive. A household with more number of male family members aged 14 to 64 years is assumed to produce more cotton and as a result supply more amount of cotton to market than those households with relatively less number of male family members aged 14 to 64 years. Hence, in this study positive relation between this variable and marketable supply of cotton at farm level is expected.

12. Experience in cotton production (YR_CO_FA): this variable is the number of years a household practiced cotton production and is a continuous variable. A household with better experience in cotton farming is expected to produce more amount of cotton than one with only less experience and, as a result, is expected to supply more amount of cotton to market. Therefore, experience in cotton production is expected to have positive relation with farm level marketable supply of cotton.

3.4.3. Structure _Conduct _Performance

Structure _ conduct _ performance (S-C-P): the structure conduct performance (S-C-P) approach was developed in the United States as a tool to analyze the market organization of the industrial sector and then it was applied to assess the agricultural marketing system (Pomeroy and Trinidad, 1995). Hence, this approach is applicable to analyze performance of cotton market chain.

The study of competition in an industry usually rests upon an analysis of market structure, conduct, and performance. Structure refers to the external environment within which the firm's decisions are made. How a firm's policies, especially price policies, are determined is the measure of market conduct, and market performance describes the end results of market processes (Ford Foundation, 2007). As hypothesized in industrial organization theory, a causal flow exists between market structure, conduct and performance. This theory can be tested using indicators that determine the existence of and extent of deviations from the perfectly competitive model (Pomeroy and Trinidad, 1995).

Factors accounting for efficiency can be evaluated by examining enterprises for structure-conduct - performance. These elements measure the extent of deviation from the perfectly competitive norm. The larger the deviation, the more imperfectly competitive is the market, that is on extreme case would be monopoly (Abbot and Makeham, 1981). Due to its applicability, in this study the structure- conduct- performance approach is used as a framework to analyze and evaluate how efficiently cotton market chain is operating in the case of Metema District.

3.4.3.1. Market structure

Market structure is the environment in which the firm operates. It includes the following elements: buyers/ sellers concentration, product/service differentiation, and entry barriers (Pomeroy and Trinidad, 1995). It is defined as the characteristics of the organization of a market, which seem to influence, strategically, the nature of competition and pricing behavior within the market. Structural characteristics can be used as a basis for classifying markets. In this regard, one can categorize markets as perfectly competitive, monopolistic,

or oligopolistic (Bain, 1968; cited in Pomeroy and Trinidad, 1995). Among the major structural characteristics of a market is the degree of concentration, that is, the number of market participants and their size distribution and the relative ease or difficulty for market participants to secure an entry into the market (Gebremeskel *et al.*, 1998).

Market concentration: is defined as the number and size of distribution of sellers and buyers in the market. Concentration is expected to play a significant role in determining the behavior of market within an industry as it affects the interdependence of action among firms. The greater the degree of concentration, the greater is the possibility of non-competitive behavior, such as collusion, existing in the market (Pomeroy and Trinidad, 1995). The common measures of market concentration are:

A) Concentration Ratio(C):

$$C = \sum_{i=1}^{r} Si$$

Where $Si =$ the percentage market share of i^{th} firm and $r =$ the number of largest firms for which the ratio is going to be calculated.

Kohls and Uhl (1985) suggested that as a rule of thumb, a four largest enterprises concentration ratio of 50 percent or more is an indication of the existence of a strongly oligopolistic industry, 33 to 50 percent is a weak oligopoly, and less than that is an un concentrated industry. The problem with this index is the arbitrary selection of r (the number of firms that are taken to calculate the ratio). For example, the ratio does not indicate the size distribution of the r firms.

B) Hirschman Herfindahl Index (HHI):

$$HHI = \sum_{i=1}^{n} Si^{2}$$

Where Si is the percentage market share of i^{th} firm, and n is total number of firms. This index takes into account all points on the concentration curve. It also considers the number and size distribution of all firms. In addition, squaring the individual market shares gives more weight to the shares of the largest firms. This is more advantageous when compared to concentration ratio. A very small index indicates the percentage of many firms of

comparable size, whilst an index of one or near suggests that the number of firms is small. At the same time, the index suggests that the firms have unequal shares in the market (Scarborough and Kydd, 1992; cited in Admasu, 1998).This method is limited in its application as it requires or imposes additional burden given that its demand for more data (Admasu, 1998).

C) **Gini–coefficient**: Gini-coefficient is an alternative concentration measure that has some similarities to the concentration ratio. It is based on Lorenz curve. To use the Lorenz curve, the firms in an industry are ranked from smallest to largest in terms of their market shares. Then, the cumulative percentage of the firms is related to their market shares. Gini-coefficient compares the area between the diagonal and Lorenz curve with the area of triangle under the diagonal (Bronfenbrenner, 1971; cited in Admasu, 1998). An easy way to calculating the coefficient is to estimate the area of the trapezoids underneath the Lorenz curve at each quartile, subtracting the total sum from 10,000 and dividing the difference by 10,000 (Shughart, 1990; cited in Admassu, 1998).

The problem associated with Gini coefficient is that it favors equality of market shares without any regard for the number of equalized firms. In other words, the coefficient equals zero for two firms with 50 percent market share, for three firms with $33\frac{1}{3}$ percent market share each, and so on. Moreover, the coefficient is sensitive to market errors. The measured degree of inequality in an industry will tend to become larger as relatively smaller or relatively larger borderline firms are included (Admasu, 1998). From the available measures of market concentration due to its ease of calculation and interpretation, concentration ratio was selected to analyze cotton market concentration.

3.4.3.2. Market conduct

Market conduct refers to the behavior of firms or the strategies used by the firms, for example, in their pricing, buying, selling, etc., these activities may require the firms to take engage into informal cooperation or collusion (Gebremeskel *et al.,* 1998). Definition of market conduct implies analysis of human behavioral patterns that are not readily identifiable, obtainable, or quantifiable. Thus, in the absence of a theoretical framework for

market analysis, there is a tendency to treat conduct variables in a descriptive manner (Pomeroy and Trinidad, 1995).

In this study, conditions that are believed to express the exploitative relationship between producers and buyers were analyzed. Since there are no agreed up on procedures for analyzing the elements of market conduct, the following few questions were taken into consideration to systematically detect indicators of unfair price setting practices and conditions in places or areas where such market injustices are likely to prevail. The issues that were taken into consideration were the existence of formal and informal marketing groups that affect the bargaining power and the availability of price information as well as its impact on prevailing prices.

In analyzing the buying and selling practices, the source of product, the existence of formal and informal marketing groups that affect the bargaining power, the nature of the buying/selling practices in place, the distribution channels used, and observed trading practices that were unethical were taken into consideration.

During the analysis of pricing behavior, the following things were seriously considered. These were, the chief determinants of price (one buyer or many buyers), price setting mechanisms (the degree of personal contact among market participants), factors that influence the setting of price (example, basic supply and demand conditions or artificial price restraint), the basis for price differentiation and the impact of physical location of the market on prices and marketing arrangements.

3.4.3.3. Market performance

Market performance involves an assessment of the extent to which the economic results of an industry's market behavior deviate from the optimum contribution it could make to achieve the accepted goals of society (Kohls and Uhl, 1985; Ford Foundation, 2007). Knowledge of the impact of market structure and conduct on market performance provides a basis for evaluating public policy designed to promote competition. Antitrust laws, regulatory commissions, and legislation affecting competition on their part exert a direct influence on market performance. They do this by changing either the structure of markets or the conduct of sellers in those markets (Ford Foundation, 2007).

Market performance refers to the impact of structure and conduct as measured in terms of variables such as prices, costs, and volume of output (Bressler and King 1970; cited in Pomeroy and Trinidad, 1995). By analyzing the level of marketing margin and their cost components, it is possible to evaluate the impact of the structure and conduct characteristics on market performance (Bain, 1968; cited in Pomeroy and Trinidad, 1995). For most countries, it is generally accepted that a distribution system that displays acceptable performance allows technological progress, has the ability to adapt, innovate and utilize resources efficiently, and finally to transmit prices that reflect costs (OECD, 1982; cited in Pomeroy and Trinidad, 1995).

There are two major indicators of market performance: 1) net return and 2) marketing margin. Estimates of net return and marketing margin indicates an exploitative nature when net returns of buyers are much higher than the fair amount, that is including all marketing costs and returns to management and risk, and when marketing margins increase not because of higher real marketing costs but because price paid to producers are lower. Analysis of performance with the help of the industrial organization framework is as follows. Collusive pricing (market conduct) becomes possible if (1) the market concentration is high (market structure), (2) if entry barriers are high (market structure) and (3) if market information is not available to all participants (market conduct). Then, this in turn results in net returns and in marketing margins that are much higher than the ‘‘fair’’amount (Pomery and Trinidad, 1995). By considering these facts, an attempt was made to evaluate the performance of cotton market using marketing margins and their cost components at each market level in the chain.

Marketing Margins: When there are several participants in the marketing chain, the margin is calculated by finding the price variations at different segments and by comparing them with the final price to the consumer. The consumer price is then the base or the common denominator for all marketing margins. Comparing the total gross marketing margin (TGMM) is always related to the final price or the price paid by the end consumer and then expressed as a percentage (Mendoza, 1995).

The total marketing margin was calculated using the following formula:

$$\text{TGMM} = \frac{\text{Consumer price} - \text{Farmers' price}}{\text{Consumer price}} \text{x}100$$

where TGMM is total gross marketing margin

$$\text{GMMp} = 1 - \text{TGMM}$$

where $GMMp$ is producers' participation (farmers' portion)

Consumer price of cotton was taken from purchase price of textile industry and oil mills. As pointed out earlier, these are industries where cotton produce from Metema District go.

$$\text{Consumer price} = \text{Lint cotton value} + \text{cotton seed value}$$

$$= \text{Conversion factor for lint cotton} \times \text{Price of lint cotton/quintal} +$$
$$\text{Conversion factor for cotton seed} \times \text{price of cotton seed/quintal}$$

Mendoza (1995) warns that precise marketing costs are frequently difficult to determine in many agricultural marketing chains. The reasons are that these costs are often both cash costs and imputed costs, the gross and not the net marketing margin is advised to be calculated. According to Mendoza (1995), "marketing margins" should be understood as the gross marketing margins. He advises marketing researchers to emphasize on gross marketing margins in reporting their findings. In similar way, in this study, gross marketing margin was considered instead of net marketing margin, as it was difficult to estimate the implicit costs incurred during transaction of cotton.

4. RESULTS AND DISCUSSION

In this chapter, the socio-demographic characteristic of cotton producers and traders, cotton production characteristics, the nature of supply of cotton to market and determinants of supply, the role of the actors in the marketing chain, the Structure_ Conduct_ Performance of cotton market chain, and major constraints and opportunities in cotton marketing chain are analyzed and discussed.

4.1. Socio-demographic Characteristics of Cotton Producers and Traders

Out of 139 cotton producers, 98.76 percent were males and 1.4 percent were females. Their average age was 42.81 years and their age interval was 22 to 66 years. The level of education of 36 percent of them was illiterate, 34.5 percent of them can read and write, 27.3 percent of them attended formal education, and 2.2 percent of them attended religious education. The average family size of the farmers was 6.23 with maximum size of 16 family members and minimum of two. The religion of 76.3 percent of the farmers was Orthodox Christians and 23.7 percent were Islam. On ethnic bases, 87 percent of the farmers were Amhara, 4.3 percent Tigrie, 5.8 percent Agew and 2.9 percent Gumuz.

All of the interviewed traders were male and their age ranges from 28 years to 50 years. Their average age was 38 year. About 43 percent of the traders were able to read and write, 33 percent of them attended formal education, 14 percent of them attended religious education and about 10 percent of them were illiterate. About 38 percent of the traders were Orthodox Christian whereas 62 percent of them were Muslims. On ethnic bases, 95 percent of the traders were Amhara and 5 percent were Tegrie. About 62 percent of them have less than six years of experience in cotton trading. The minimum year of experience in cotton trading was one year while the maximum was 26 year.

4.2. Cotton Production Characteristics

4.2.1. Land holding and allocation pattern

The study indicated (Table 4) that the average size of land held by the cotton producers per household is 14.41 with standard deviation of 18.69. The maximum is 132 hectares while the minimum is 1.3 hectares. The average size of land allocated for cotton per household for 2005/06 was 2.48 hectares with standard deviation of 2.91. The maximum size of land allocated for cotton for 2005/06 was 20 hectares while the minimum was 0.25 hectares.

Table 4. Average land holding and allocation pattern for sample farmers in Metema District in 2005/06 (in ha)

Description	Minimum	Maximum	Mean	Std. Deviation
Land holding size	1.30	132.00	14.41	18.69
Cultivated area	1.25	132.00	11.04	16.90
Fallow area	0.25	30.00	4.18	4.32
Homestead area	0.04	3.00	0.38	.37
Land allocated for cotton	0.25	20.00	2.48	2.91

Source: Own survey, 2007

The cultivated land allocation pattern of the households in the District in 2005/06 was indicated in Table 5. As the table indicates, the highest proportion of the cultivated land in the cropping year was allocated for sesame. The table shows that the land allocated for sesame is 51.16 percent with an average per household allocation of 5.99 hectares and the standard deviation of 13.97. About 24.81 percent of cultivated land was allocated to sorghum. The average allocation of land for sorghum per household was 2.84 hectares with standard deviation of 3.14. Cotton shares about 21.83 percent of the cultivated land. Out of the land allocated for cotton, the average share by a household is 2.48 hectares with standard deviation of 2.91. The remaining 2.20 percent of cultivated land was allocated for crops like teff, maize, and finger millet.

Table 5. Total cultivated land allocation pattern for crops in 2005/06 in Metema District for households (in ha).

Description	Minimum	Maximum	Proportion	Mean	Std. Deviation
Land allocated for cotton	0.25	20	21.83	2.48	2.91
Land allocated for sesame	0	118	51.16	5.99	13.97
Land allocated for sorghum	0.25	30	24.81	2.84	3.14
Land allocated for other crops	0.1	2	2.20	0.56	0.49
Total cultivated area	1.25	132	100	11.04	16.90

Source: Own survey, 2007

4.2.2. Crop rotation pattern

The survey revealed that about 89.9 percent of the cotton producers practice crop rotation. However, the crop rotation does not have fixed pattern and the pattern differs from farmer to farmer. The most commonly practiced crop rotation patterns are sorghum $\rightarrow$ cotton $\rightarrow$ sesame (cotton $\rightarrow$ sesame $\rightarrow$ sorghum) and Sorghum $\rightarrow$ cotton.

About 45 percent of the households used sorghum $\rightarrow$ cotton $\rightarrow$ sesame (cotton $\rightarrow$ sesame $\rightarrow$ sorghum) rotation while 22.3 percent of them used Sorghum $\rightarrow$ cotton crop rotation pattern. Farmers used to grow sesame after cotton.

4.2.3. Inputs used for cotton production

According to the current study, in the 2005/06 production year, 52.5 percent of the households used modern inputs (chemical fertilizer, improved seed and chemicals) for cotton production while the remaining 47.5 percent of them did not use these inputs.

4.2.3.1. Cottonseed varieties utilized for cotton production and average prices

This survey indicated that out of the total farm households, 66.2 percent used local seed, 30.2 percent Gedera and 3.6 percent Deltapine90 for cotton production in the 2005/06 production year. It was reported during the study that Gedera cottonseed verity was imported from Israel while Deltapine90 was released by Werer Agricultural Research Center. There are about 13 cottonseed varieties released by Werer Agricultural Research Center, but for the production year, only Deltapine90 cottonseed was utilized in the District. About 31 percent of the cotton producers preferred to use local cottonseed due to its heavy weight of its seed cotton while 31 percent of them preferred to use it for its low sells price. About 14 percent of them who used the local cottonseed reported absence of supply of alternative varieties in their vicinity.

Table 6. Percentage distribution of the farmers utilized different seed varieties in 2005/06 production year.

Cottonseed Verities used	**Percent**
Local	66.2
Gedera	30.2
Deltapine90	3.6
Total	100.0

Source: Own survey, 2007

The survey result indicated that the average price of local cottonseed per kilogram for the District in the 2005/06 production year was 2.03 Birr with standard deviation of 0.44. It showed also that the average price of chemically dressed improved cottonseed was 8.48 Birr with standard deviation of 1.56. The maximum price of chemically dressed improved cottonseed was 13.03 Birr per kilogram and minimum price of it was 5.20 Birr per kilogram. The average price of improved cottonseed not dressed by chemicals was 2.21 Birr with standard deviation of 0.39 for the production year (Table 7). According to this survey, about 86 percent of the farmers were complaining that the improved cottonseed variety dressed by chemical is costly when compared to the price of the local cottonseed.

Table 7.The average price of cottonseed based on chemical dressing status and varieties in 2005/06 production year(in Birr/Kg)

Description	Minimum	Maximum	Mean	Std. Deviation
Price of local seed not dressed by chemical	1.10	3.00	2.03	0.44
Price of improved seed dressed by chemical	5.20	13.03	8.48	1.56
Price of improved seed not dressed by chemicals	1.20	3.50	2.21	0.39

Source: Own survey, 2007

Traders and primary cooperatives were sources of cottonseed for the farmers in the study area. Table 8 indicates that out of the households using Gedera cottonseed, 86.79 percent of them used cooperatives as their seed sources whereas 3.77 percent of them used traders as seed source. Of the users of Deltapine90, 50 percent used cooperatives as seed source while 50 percent of them used traders as seed source. Of local cottonseed users, 65.14 percent used traders as seed source whereas 34.86 percent of them used cooperatives as sources of seed. The majority of the farmers used cooperatives as the major source of improved seed while the majority of them used traders as sources of local seed. The study revealed that of the households that used Gedera cottonseed, 58.50 percent purchased on credit basis while the remaining 41.5 percent of them purchased on cash basis. Of local seed users, 77.78 percent purchased local cottonseed on cash basis whereas the rest 22.22 percent of them purchased on credit basis. The mode of purchase of Deltapine90 variety had equal ratio on both credit and cash basis, but farmers who used this variety for the production year were few.

As can be observed in Table 8, most of the farmers who purchased cottonseed from primary cooperatives purchased on credit basis. The table reveals also that for those who purchased from traders, the only alternative is purchasing on cash basis.

Table 8. Suppliers of cottonseed varieties for the farmers and mode of supply in 2005/06 production year

Variety name	Source	percent of the households purchased on		Proportion of households
		cash	credit	
Gedera	Market	3.77		3.77
	Cooperatives	37.73	58.50	86.79
	Sub total	41.50	58.50	100
Deltapine90	Market	25		25
	Cooperatives	25	50	75
	Sub total	50	50	100
Local	Market	65.14		65.14
	Cooperatives	12.64	22.22	34.86
	Sub total	77.78	22.22	100

Source: Own survey, 2007

4.2.3.2. Chemical used in cotton production

In Metema District, recently the attack of flee beetle on cotton seedlings, mainly during whether conditions that are favorable for pests is a common phenomenon. There is also attack of bollworm. The farmers call this pest "*Argef*". However, the farmers did not consider bollworm attack of as serious problem when compared to the worst situation they are facing from flee beetle attack. About 78 percent of the farmers reported pest problem as one of the major factors that made them to decrease land allocated for cotton production over the last five years. Even though they reported the problem as a serious problem, only few of them utilized chemicals in 2005/06. From the households, only 24 percent used insecticides for the production year. During informal discussion, the farmers made clear that lack of knowledge of the type of chemical, application rate, and application system. The study revealed that the rate of insecticides applied in liter per hectare by the farmers in 2005/06 ranged from 0.04 liters to five liters per hectare. About nine percent of the farmers applied one liter, three percent applied 0.50 liters and two percent of them applied two liters per hectare. The households who used chemicals in 2005/06 used a total of 54 liters

of chemical. From this amount, 16.67 percent was purchased from traders, 3.71 percent was purchased from market and cooperatives, and the remaining 79.62 percent was purchased from cooperatives. This indicates that cooperatives were the major sources of chemicals for farmers during the production year. The unit price of insecticide ranged from 40 to 90 Birr and the average price was 63.44 Birr.

Table 9. Sources and amount of chemical used by farmers in 2005/06

sources of insecticide	**Percent of households used**	**Quantity of insecticides used in liter**	**Percent from total quantity used**
Market	5.75	9	16.67
Market and cooperatives	0.72	2	3.71
cooperatives	17.27	43	79.62
Total	23.74	54	100

Source: Own survey, 2007

4.2.3.3. Chemical fertilizer use in cotton production

Cotton production in Metema District is rain fed. The erratic nature of rainfall in the area was reported as one of the factors that limited the use of fertilizer to produce cotton. Out of 139 farmers, only six percent used DAP and eight percent used UREA, respectively for the 2005/06. The study indicated that 3.60 quintals of DAP and 4.10 quintals of UREA fertilizer were utilized by these households. As Table 10 below shows, in the area, cooperatives and traders were sources of fertilizer for the year.

Table 10. Amount of chemical fertilizer used by households and its sources in 2005/06 production year

Source of fertilizer	Quantity of DAP (Qt)	Percent of farmers used DAP from	Quantity of UREA used in Qt	Percent of farmers used UREA from
Market (Traders)			0.75	2
Cooperatives	3.6	6	2.25	6
Total	3.6	6	4.10	8

Source: Own survey, 2007

4.2.4. Cotton production calendar

The period for preparing land for cotton production differs from farmer to farmer. Some start land preparation immediately after harvest while others start lately. However, the main period for planting cotton is from June to July. In the 2005/06, 69.78 percent of the households planted cotton in June, 28.1 percent of them in July, 0.72 percent of them in June to July, and the remaining 1.4 percent in May. The farmers reported that weeding is the most laborious activity in cotton production. According to them, weeding a plot three times is a common practice, but there are cases when they do the weeding four times. In the area, cotton is harvested from November to January. Regarding this, about 77 percent of the farmers indicated that during the production year of 2005/06 they harvested their cotton from November to January, 9.4 percent of them from December to January and the remaining 13.6 percent of them in February. In the study area, farmers do not hurry to harvest cotton as other crops since it can stay on field for a long period after blooming. However, they reported that the seed cotton, especially the local one, does not mature during the same time. However, 28.78 percent of the farmers reported that they did not pick seed cotton following its maturity stage. According to them, factors that force them to harvest cotton lately are shortage and expensiveness of labor, hardship during second and third picking and giving priority to other crops. In 2005/06, 48.2 percent of the farmers harvested their cotton plot once, 46 percent of them twice and the remaining 5.8 percent three times.

4.2.5. Productivity of cotton

The study indicated that average productivity of cotton in quintal per hectare for the District in 2005/06 was 8.12 Qt/ha with a standard deviation of 4.74. The maximum productivity in quintals per hectare was 26.66 while the minimum was 0.3 quintals. Productivity of cotton in 2005/06 for Gedera and Deltapine90 without use of fertilizer was 8.8 Qt/ha with a standard deviation of 5.86. However, using improved seed and fertilizer the average productivity increased to 10.44 Qt/ha with a standard deviation of 8.66. Using local variety seed and fertilizer that was practiced in the production year by only one sampled farmer resulted in 16 Qt/ha. The study showed that 59.71 percent of the farmers who used local variety seed without fertilizer obtained 8.35 Qt/ha of cotton with a standard deviation of 5.81.

MoARD (2005) indicate that, productivity of cotton in Ethiopia of rain feed small-scale farmers ranges from five to ten quintals per hectare. RATES (u.d) also indicated that productivity of cotton at small-scale farmers' level is eight Qt/ha. The study result of Metema Woreda also shows similar result.

4.2.6. Cotton packaging materials, storage system and duration at storage

In the study area, two types of packaging materials are used for packing seed cotton. These are sisal sack and polythin sack. There are differences of cost as well as quality between the two. In 2005/06, about 46.8 percent of the farmers used only sisal sacks, 5.7 percent used sisal and polythin sacks, and the remaining 47.5 percent used only polythin sacks. Sisal sack is the most preferred one for packing. Sisal sack is preferred for its strength and capacity to hold a larger amount of cotton. Farmers who have access to cart service mostly use sisal sack for packaging whereas those who are far from the local markets mostly use polythin sacks for these make transportation, using pack animals easier.

In the study area, farmers are the ones who pack seed cotton after they have harvested using their own packaging materials. However, the farmers reported as problem unavailability and expensiveness of original sisal sacks. This forces them to use secondhand sisal sacks. About four pieces of secondhand small sisal sacks sewed together

are used for packaging seed cotton. Polythin sacks are low in cost as well as in quality when compared to sisal sacks. There are also quality differences within polythin sacks. The study showed that the cost of sisal sack ranged from 11 to 22 Birr while that of polythin sack ranged from 1.5 Birr to six Birr per piece in 2005/06.

Unlike other crops, cotton is not mostly stored in store or at home in the District. This is due mainly to its extra bulkiness. The study revealed that only 12.2 percent of the farmers have owned store for cotton. However, the quality of the stores they used to store seed cotton is very poor. They built simple huts constructed from un-walled, roofed grass. Table 11 below indicated that about 37.4 percent of the farmers stored their cotton by filling it in sacks and pilling around homestead while 19.4 percent of them stored by filling in sacks and pilling at store. Average duration of cotton at storage in 2005/06 was about two months with a standard deviation of 1.52. The maximum duration was six months. The study indicated that 26 percent of the farmers stored seed cotton for one month, 24 percent for two months, 2 percent for three months, and about two percent of them for six months.

Table 11. Cotton storage methods of the farmers

Description	**Percent**
Not used to store cotton	12.9
Filling in sacks and pilling at store	19.4
Filling in sacks and pilling at home	19.4
Filling in sacks and pilling around homestead	37.4
Filling in sacks and pilling at farm	10.8
Total	100.0

Source: Own survey, 2007

About 73 percent of the farmers stored cotton to wait for future high price. About 7 percent of them stored to wait for future high price and due to lack of infrastructure. Again, lack of transport facility during wet seasons was another problem that prevented the farmers from transporting their cottons to markets immediately after harvest. Usually, farmers who face this problem are those who are far away from main roads and have no access to paved roads. Asked if there is problem of quality loss at storage, 68.3 percent of them reported that there is no quantity loss at storage, 30 percent reported presence of quantity loss and 3 percent indicated that they could not realize since they did not measure it before sells.

About 18, 5, and 7 percent of the farmers respectively reported that rodents, loss of moisture from cottonseed, and consumption by livestock are factors that cause loss of quantity in their cotton at storage. About 28 percent of the farmers reported quality loss due to storage. About 58.3 percent of them reported absence of quality loss at storage. About 13.6 percent of them reported that they are not aware whether there is quality loss or not. About 13, 18, and 2 percent of the farmers reported that rodents, moisture, and dust respectively were causes for loss of quality in their cotton at storage.

4.2.7. Cotton production and access to services

4.2.7.1 Access to extension service

Only 55 percent of the farmers reported that they had access to extension service in 2005/06. About 44 percent of them pointed out that although they had access to extension services, the extension agents are not available when they are wanted and because of this they could not contact them particularly when they need expert advices on how to deal with pests like flee beetle (Table 12).

Table 12. Farmers' extension agent contact frequency

Description	Percent of households
No contact	44.6
weekly	2.2
Once in two weeks	3.6
Monthly	2.2
When require	3.6
No regular program	43.9
Total	100.0

Source: Own survey, 2007

4.2.7.2. Access to credit service

Cotton production requires high cost of production**.** The farmers have to incur on seed, chemicals, oxen rent and labor input. For clearing land, plowing, seeding, weeding, picking and packaging, the farmers in the district need to depend on hired labor (Appendix Table 7). To cover the cost, the farmers in the area are obliged to take credit. About 77 percent of the farmers reported that they took credit in 2005/06. They indicated that their sources of credit are ACSI, usurers, friends/relatives, and cooperatives. In order to see compatibility of these credit institutions to farmers' situation, some analysis was done by taking into consideration criteria like interest rate, collateral requirement and the availability of the required amount of credit.

ACSI is one of credit institutions found in the District. The farmers were asked to rank ACSI's interest rate. About 27 percent of them reported the rate as excellent, 31.7 percent reported it as very good and the remaining 27.3 percent reported it as good. About 14 percent of them reported that they have no knowledge about the interest rate of ACSI. Therefore, 85.6 percent of them accepted ACSI's interest rate as it is affordable to them. However, even though the majority of them appreciate ACSI's interest rate, some complained on group collateral system. During RMA, they reported that when some group members left away or failed to pay the loan, the group is forced to pay the loan made available for those group members. Due to this problem, 30.2 percent of them ranked the collateral system as bad while 59.7 percent of them ranked it as excellent to good.

Asked about the amount of credit provided by ACSI, 90.2 percent of the farmers, reported from excellent to good. However, about 10 percent of them reported that they have no knowledge about the amount of credit provided by ACSI. During informal discussion, there were farmers who reported that they need the amount that exceeds the upper limit in ACSI's credit amount, which is 5000 Birr. In kebeles where there are relatively better-organized cooperatives, cooperatives are also providing credit to the farmers. They provide credit in kind as well as in cash. During informal discussion, some Muslim farmers stated that their religion prohibits them from taking credit as they are expected to pay the loan with interest. The informal discussion made clear that other religious members in their society condemned those who took the credit.

Usurers are the other sources of credit in the District. Farmers appreciate the availability of credit on demand from usurers, but they complained about the high interest rate, which the usurers require them to pay. About 83 percent of them pointed out the interest rate which they are required to pay when they return the loan of the usurers is “bad ’’. About 12 percent of them reported that they have no knowledge of interest rate by local usurers and 5.7 percent said well.

Asked about the timely availability of the loan offered by the local usurers, 78.4 percent of the respondents indicated excellent to good. About 10 percent of them rated bad, and about 12 percent rated that they have no knowledge of the timely availability of loan from usurers. Asked about the usurers’ collateral requirements, 40 percent of the farmers reported that it is fair, but 48 percent of them reported that getting credit from the usurers is a highly demanding task. About 12 percent of them reported that they do not know.

4.2.7.3. Access to market information

During the survey, it becomes explicit that the major sources of market information for farmers in Metema District are assemblers, cooperatives, friends and neighboring farmers. The study revealed that 81, 32, 50 and 56 percent of the farmers used respectively assemblers, cooperatives, friends, and neighboring farmers as their sources of market information. On the other hand, traders use telephone to obtain market information from ginneries and other traders. On their part, cooperatives use telephone while the weaker ones use other cooperatives as well as assemblers as their major source of market information. In a more advanced way, ginneries use radio and newspapers to search market information and to participate in bid while textile factory uses telephone and internet to get market information. Even though they have access to information from different directions, the farmers reported that they lack reliable information and the power of deciding on the price of seed cotton.

4.2.7.4. Access to road and transport service

To transport seed cotton from farm to local market or to store in their vicinity farmers used animal pulled cart, pack animals and tractors. Table 13 below shows that 33.8 percent of

the farmers pointed out that they used animal pulled cart, 36.7 percent of them stated that they used pack animals, 14.4 percent of them indicated that they used vehicle and the remaining 7.2 percent of farmers revealed that they sold their cotton produce at farm in 2005/06. Assemblers and better off farmers, on the other hand, used big and/or medium sized trucks to transport from farm to any location they want.

Table 13. Means of transport farmers used to transport seed cotton in 2005/06

Description	**Number of sample households**	**Proportion**
Animal pulled cart	47	33.8
Animal pulled cart and pack animal	9	6.5
Animal pulled cart and vehicle	2	1.4
Pack animal	51	36.7
Vehicle	20	14.4
Transported by purchaser	10	7.2
Total	139	100

From the surveyed areas Das, Mender 6 7 8, Gubay Jejebit, Tumet (from Shinfa to Tumet), Lencha and Ziebach Bahir have no access to all-weather roads while the rest have. For those *Kebeles* that have no all-weather roads, it is hard to transport their produce during the rainy season and before the mud dries out well. Farmers in these areas have_suffered a lot to transport their seed cotton produce to Local as well as central markets. Hence, the only alternative for the majority of farmers is selling at relatively low price for local assemblers living in their locality. Figure 2 below reveals the structure of road in Metema District.

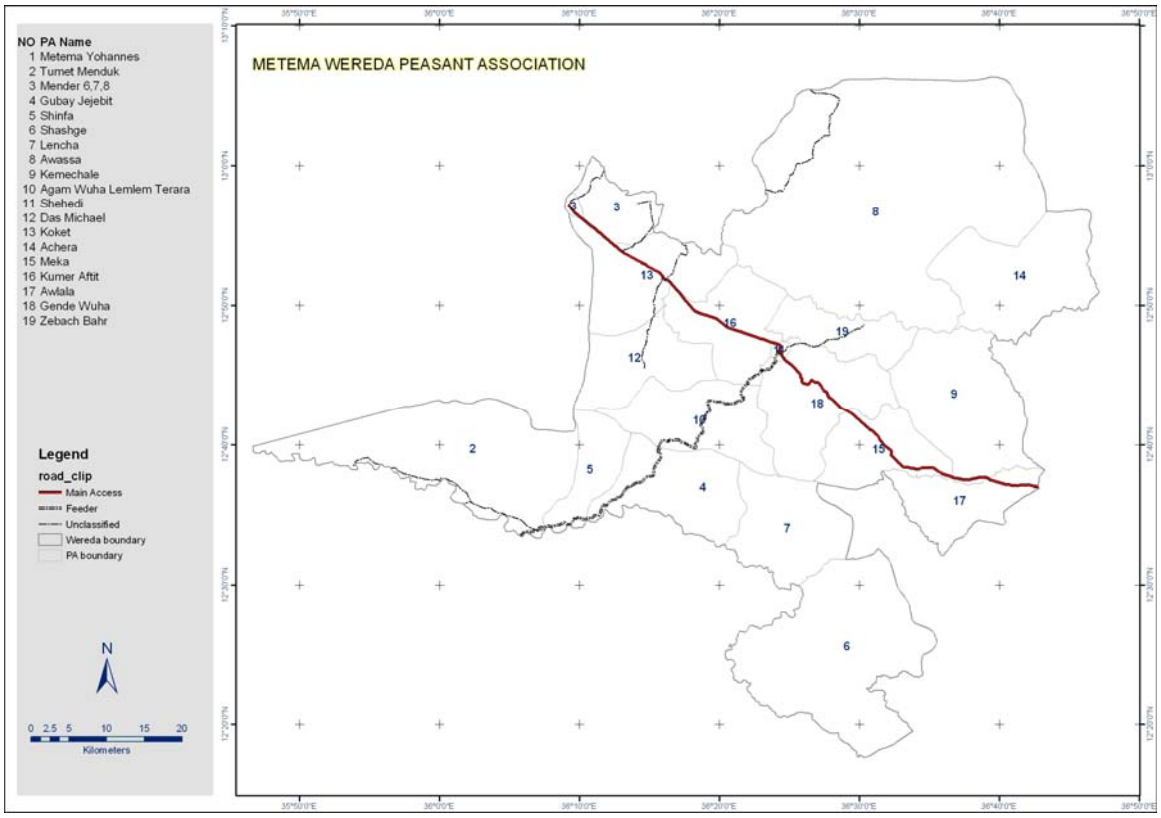

Figure 2. Map of the road structure of the study area
Source: Courtesy by Yasin Getahun, GIS Department of IPMS

4.2.7. 5. Access to telephone services

In the survey area, wire-less telephone is giving service in a number of kebeles. In Kebeles like Kokit, Shehedi and Metema Yohannes even though there was network problem, there is service of mobile telephone. In Shehedi and Metema Yohannes there is also fixed telephone. The researcher observed in Kokit area during the survey that when individuals want mobile telephone service and lack network connection they climb on tree in search of better network. Asked about the availability of market information during the survey, one farmer, who is also an assembler of seed cotton at Kokit kebele, replied, “Recently, there is no problem on market information, the only thing is climbing on the tree and dialing”. During discussion with other assemblers, they too reported that access to telephone service is somewhat improved. This indicates that for better off farmers and traders who have the potential to afford cost, there is an improvement in telephone service.

4.3. Supply of Cotton to Market and Its Determinants

As indicated in Table 4, the minimum area of land allocated for cotton in the production year was o.25ha. Table 14 shows that the minimum amount of cotton produced by a household is 0.20 quintal. This gives per hectare productivity of 0.80 quintal if this much amount of cotton is produced from the minimum 0.25 hectares of land. However, this figure deviates more from the average productivity of cotton for the District for the production year, which was 8.12 Qt/ha. This low productivity is attributed to attack by flee beetle and the existence of water logging problem. Even incidence of total devastation of the crop in a field due to these two problems was reported during the survey.

Table 14. Cotton produced and sold by farmers in 2005/06 (in Qt)

Description	Minimum	Maximum	Mean	Std. Deviation	Percent supplied to market
Production of cotton in quintal per household	0.20	180.00	21.03	30.04	
Cotton supplied to market in quintal per household	0.20	180.00	20.94	30.06	99.59

Source: Own survey, 2007

The survey indicated that 99.59 percent of cotton produced by farmers in 2005/06 was supplied to market. About 0.41 percent of it was retained for home consumption, payment in kind for land rent and/or other reasons. The average production of cotton per household was 21.03 quintal with standard deviation of 30.04. The maximum production per household was 180 quintal and the minimum was 0.20 quintal. The average amount of cotton supplied to market per household was 20.94 quintal with standard deviation of 30.06. The maximum amount of cotton supplied by farm households was 180 quintal and the minimum was 0.20 quintal. Analysis of factors affecting farm level marketable supply of cotton was found to be important to identify factors constraining cotton supply to market. In this respect, 13 variables were hypothesized to affect farm level marketable supply of cotton. Multiple linear regression model was employed to identify the factors.

For the parameter estimates to be efficient, assumptions of Classical Linear Regression (CLR) model should hold true. Hence, multicolliniarity and heteroscedasticity detection test were performed using appropriate test statistics for each as follows.

Test for Multicollinearity:, all VIF values are less than 10. This indicates absence of serious multicollinearity problem among independent continuous variables (Appendix Table 5). Contingency coefficient results indicated absence of serious multicolliniarity problem among the independent dummy variables (Appendix Table 6).

Test for heteroscedasticity: According to Koenker-Bassett (KB), test of heteroscedasticity, the results obtained for α_1 and α_2 were 28.753 and 0.095 respectively, while the corresponding t-values for α_1 and α_2 were 1.147 and 10.975 indicating presence of heteroscedasticity problem. Hence, to overcome the problem of heteroscedasticity, Robust OLS analysis with heteroscedasticity consistent covariance matrix (HCCM) of which small sample versions of heteroscedasticity consistent covariance matrix HC3 was employed. The results obtained from analysis before and after correcting for heteroscedasticity using LIMDEP software are indicated in Table 15 and Table 16, below. In the analysis before the model was corrected for heteroscedasticity, R^2 value is 0.8543584 and adjusted R^2 value is 0.8392117. The number of significant variables are four (Table 15), which are number of oxen owned by household at 10% significance level, access to credit at 5% significance level, land allocated for cotton in hectare at 1% significance level and the productivity of cotton per hectare in 2005/06 at 1% significance level. However, since there is heteroscedasticity problem in the data set, these parameter estimates of the coefficients of the independent variables cannot be BLUE. Therefore, to overcome the problem, Robust OLS analysis with heteroscedasticity consistent covariance matrix was estimated (Table 16).

Table 15. OLS estimation of factors affecting farm level marketable supply of cotton (before correction for heteroscedasticity)

Variables	Coefficients	Stad. error	t-value	Sig.
(Constant)	-25.5438	10.2238	-2.49846***	0.013771
Owned oxen number	0.004638	0.002702	1.71657*	0.088535
Access to credit	4.59118	2.18359	2.10259**	0.037508
Land allocated for cotton in ha	8.43604	0.39775	21.2094***	0
Productivity of cotton in 2005/06	2.34078	0.232254	10.0786***	0
Distance from main purchasers in the District	-0.0506	0.062606	-0.808168	0.420529
Price of cotton in 2003/04	0.000351	0.003005	0.116824	0.907187
Price of cotton in 2004/05	0.00087	0.005375	0.16187	0.871669
Access to market information	5.58931	9.09182	0.614763	0.539829
Access to extension service	2.24376	2.14559	1.04576	0.297692
Ownership of corrugated iron house	0.027333	2.48779	0.0109869	0.991251
Educational level of Household	-1.19367	2.47564	-0.482167	0.630531
Number of male family members between age of 14 to 64 years	0.88596	0.940133	0.942378	0.347817
Years of experience in cotton production	-0.11951	0.118665	-1.00713	0.315817

*** significant at 1% level of significance, ** significant at 5% level of significance, * significant at 10 % level of significance

$F = 56.41,\ R^2 = 0.8543584, \overline{R}^2 = 0.8392117, n = 139$

Table 16. OLS estimation of factors affecting farm level marketable supply of cotton (after correcting for heteroscedasticity)

Variables	Coefficients	Std.Err.	t-ratio	P-value
(Constant)	-25.5438	8.89928	-2.87032***	0.00481697
Owned oxen number	0.00463762	0.00268004	1.73043*	0.0860218
Access to credit	4.59118	2.27939	2.01422**	0.046133
Land allocated for cotton in ha	8.43604	1.60276	5.26344***	5.96033e-007
Productivity of cotton in 2005/06	2.34078	0.404966	5.78019***	5.60973e-008
Distance from main purchasers in the District	-0.0505963	0.070969	-0.712935	0.477215
Price of cotton in 2003/04	0.000351074	0.00201008	0.174657	0.861632
Price of cotton in 2004/05	0.000870113	0.0027974	0.311044	0.756285
Access to market information	5.58931	7.81886	0.71485	0.476035
Access to extension service	2.24376	2.40572	0.932679	0.352784
Ownership of corrugated iron house	0.0273332	2.77887	0.00983608	0.992168
Educational level of Household	-1.19367	2.61693	-0.456135	0.649084
Number of male family members between age of 14 to 64 years	0.88596	0.90338	0.980717	0.328627
Years of experience in cotton production	-0.119511	0.0764203	-1.56387	0.120377

Dependant variable: Quantity of seed cotton supplied to market in the 2005/06 production year

*** significant at 1% level of significance, ** significant at 5% level of significance, * significant at 10 % level of significance

$F = 56.41,\ R^2 = 0.8543584, \overline{R}^2 = 0.8392117\ n = 139$

Results from Robust OLS analysis with heteroscedasticity consistent covariance matrix are considered as BLUE. The F-value for the model from this analysis, after correcting for heteroscedasticity, is 56.41 and it is significant at 1% significance level. This indicates that the model fit is good. R^2 value of the model is 0.85 and adjusted R^2 value is 0.83 (Appendix Table 10). This result indicates that about 83 percent of the variation in farm level marketable supply of cotton was attributed to the hypothesized variables. However, from the hypothesized variables, only four variables significantly affected farm level marketable supply of cotton in the district. These variables are the number of oxen owned

by household at 10% significance level, access to credit at 5% significance level, area of land allocated to cotton in hectare at 1% significance level, and the productivity of cotton in quintal per hectare at 1% significance level. The signs of the parameter estimates of the significant variables are as expected.

The positive coefficient for the number of oxen owned by household implies that an increase in number of oxen increases marketable supply of cotton. An increase in one ox increases farm level marketable supply of cotton by 0.00463762 quintals, keeping other factors constant. Even though an increase here seems a small figure, its cumulative effect in the District can be large since the number of farmers living in the District is large. Kindie (2007) also found that number of oxen owned by household significantly and positively affected farm level marketable supply of sesame in Metema District. In a similar way, Larsen (2006) found that possession of draught power (animals, tractors) affected volume of cotton sales at the household level in Tanzania. Positive coefficient for access to credit, which is a dummy variable, indicates that households who took credit for cotton production had supplied more amount of cotton to market than those who did not. In this case, farm level marketable supply of cotton by farmers who took credit was greater than those who did not take credit by 4.59118 quintals, keeping other factors constant.

The positive coefficient for land allocated to cotton production implies that an increase in land allocated to cotton production increases marketable supply of cotton. Increase in the size of one hectare of land allocated to cotton resulted in an increase in farm level marketable supply of cotton by 8.43604 quintals, keeping other factors constant. In support of the finding here, Kindie (2007) indicated that the area of land allocated for sesame production in Metema District significantly and positively affected farm level marketable supply of sesame. Similarly, Larsen (2006) found size of landholdings positively affected the volume of cotton sales at the household level in Tanzania.

For productivity of cotton, positive coefficient indicates that an increase in productivity of cotton increases marketable supply of cotton. Since this variable is a proxy variable for amount of cotton produced by households, it indicates that households who had produced more amount of cotton had also supplied more amount of cotton to market than those who had produced less amount of cotton due to insignificant consumption of cotton at home. The value of the coefficient for productivity of cotton implies that an increase in

productivity of cotton by one quintal per hectare resulted in an increase in farm level marketable supply of cotton by 2.34078 quintals, keeping other factors constant. In similar way, previous studies, for example, Wolday (1994), Wolelaw (2005), Kindie (2007), and Rehima (2007), found that the amount of grain, rice, sesame and red pepper respectively, produced by household affected marketable supply of each of the commodities significantly and positively.

Lagged prices of cotton (price of cotton in 2003/04 and price of cotton in 2004/05) did not affect farm level marketable supply of cotton in the District significantly as expected. This might be due to absence of significant variation in price of cotton received by farmers due to collusive price setting strategy adopted by purchasers of seed cotton. Ownership of corrugated iron house, which is a proxy variable for wealth, did not affect farm level marketable supply of cotton significantly. This might be due to none or low profitability of cotton; those wealthier farmers might not have invested more of their resource on cotton.

Access to extension service that was originally expected to affect farm level cotton marketable supply did not affect significantly. This may be attributed to lack of sound extension service for cotton production that can bring about significant difference between those who had access and those who had not. In this study, access to market information did not significantly affect farm level marketable supply of cotton and this can also be attributed to absence of significant variability to access to market information. The level of education of a household and number of years of experience in cotton production did not significantly affect farm level marketable supply of cotton. This might be attributed to the fact that none or low profitability of cotton might have deprived those individuals from investing more on cotton production. The number of male family members aged from 14 up to 64 did not significantly affected farm level marketable supply of cotton. This can be attributed to the opportunity cost of labor, that is, those family members might have involved themselves in other alternative activities than producing cotton.

4.4. Cotton Marketing Chain Actors and Their Role

Cotton produced in Metema District passes through different channels before it reaches the end users. The major actors in cotton marketing channel are producers, local assemblers, cooperatives, cooperatives' union, commission agents, brokers, ginneries, textile and garment factories, oil mills, wholesalers and retailers. The characteristics of and roles played by each market actor are described in the study except that of garment factories, wholesalers and retailers of clothing and oil which is beyond the scope of this study.

Producers

Seed cotton producers are the starting point in the chain. In Metema District, there are two types of cotton producers. These are large scale and small-scale producers. However, recently the trend has changed to almost small-scale production, which is also characterized, by small number of producers. Seed cotton producers in the District sell their produce to local collectors/assemblers, to primary cooperatives, to retailers who come from different Districts, or directly to ginneries in Gondar. The study indicated that from the seed cotton produced by farmers, 37.61 percent was directly sold to ginneries, 45.09 percent was sold to local assemblers, 15.55 percent to primary cooperatives and 1.75 percent to those traders who came from different Districts that supply to hand crafts use (traditional spinning) (Table 17).

Table 17. Amount of seed cotton supplied to different market actors by cotton producers in 2005/06 production year

Description	Amount sold in quintal	Percent of sales
To ginneries	1095	37.61
To local assemblers	1313.03	45.09
To primary cooperatives	452.80	15.55
To retailers	51	1.75
Total	2911.83	100

Source: Own survey, 2007

About 43 percent of the farmers who sold cotton to traders reported that traders are price settlers. About 11 percent of them who sold their cotton to ginneries reported that ginneries are price settlers. About 9 percent of them who sold cotton to cooperatives reported that cooperatives are price settlers. About 27 percent of them reported by saying that, purchasers of seed cotton are price settlers. Only about10 percent of them pointed out that price of seed cotton is determined by negotiation with purchasers. Hence, about 90 percent of the producers reported that they do not have decision-making power on the price. This indicates that almost all producers of cotton in the District are obliged to take the price suggested to them by buyers.

Assemblers/Village collectors

In Metema District, there are local assemblers of seed cotton even though their number is not as such large at each local market level. They purchase the produce from producers and sell either to other assemblers, to retailers who come from different Districts, to primary cooperatives, to cooperatives union, or transport to Gondar and sell to ginneries. The assemblers purchased totally 6870 quintals of cotton in 2005/2006. About 75 percent of the cotton purchased by the assemblers was transported to Gondar and sold to ginneries. About 9 percent of the cotton purchased by assemblers was sold to retailers who come from different district, who, in turn, sell to handcraft users. About 12 percent of the produce was sold to cooperatives union, and about four percent was sold to other assemblers in the district (Table 18).

Table 18. Amount of sales of cotton to each market actors by surveyed assemblers in 2005/06 production year

Description	**Amount sold in quintal**	**Percent of sales**
To ginneries at Gondar	5170	75.25
To retailers	615	8.95
To cooperatives union	795	11.58
To other assemblers	290	4.22
Total	6870	100

Source: Own survey, 2007

The local assemblers' financial position is weak. The maximum amount of working capital, including loan as of February 2007, was 80,000 Birr while the minimum was 2000 Birr. An average amount of their working capital during the specified time was 29,095.24 with a standard deviation 23185.99 (Appendix Table 4). To overcome the problem of financial shortage, the assemblers agree with farmers to pay money in the future.

Cooperatives

There are 18 primary cooperatives of farmers and one cooperatives union in Metema District. Out of the 18 cooperatives, only six and the union were involved in cotton marketing in the 2005/06. These were Gende Wuha, Das, Tumet, Shinfa, Kumer Aftet, and Kokit farmers' primary cooperatives and Metema Primary Cooperatives Union.

The primary cooperatives as well as the union, except Kokit, suffer a lot from administrative problems. It was reported that there is a large-turn over of management personnel every time and those assigned are not devoted to cooperatives work due to their own private workload. The farmers reported that the cooperatives do not purchase the produce in time. They reported that the cooperatives start purchase after a long time has past from harvest of their produce and after most farmers sold the produce to assembler. They also reported that the purchase price of cooperatives is not as such different from assemblers. However, Kokit farmers who are members of primary cooperative preferred selling their produce to their cooperative. They do this because they have benefited from dividend and they have great desire to strengthen their association. This cooperative is the strongest cooperative in the district. Table 19 shows that among the primary cooperatives, which made cotton purchase in the 2005/06, the largest purchase was made by this cooperative. During the survey, the management committee of Kokit Primary Farmers' Cooperative reported as a serious problem lack of skilled manager. The effort made by the management committee and the devotion of the farmers is appreciable at Kokit. The management committee was highly demanding the support of concerned institutions in training and recruiting effective manager for their cooperative.

Table 19. Amount of seed cotton transaction by primary cooperatives and the Union in 2005/06 (in Qt)

Name of cooperative	Total purchase	Total sales	Percent sold until March 2007
Gende Wuha	897.34	1244.09	138.64*
Das	1324.02	1324.02	100
Tumet	223	223	100
Shinfa	152.39	152.39	100
Kummer	976.78	976.78	100
Kokit	4354.62	4354.62	100
Cooperatives Union	15075.24	5825.22	34.64

Source: Own survey, 2007

Note * 38.64 percent was leftover from 2004/05 purchase which was sold in 2005/06

Farmers are suppliers of seed cotton for the primary cooperatives. The cooperatives union purchased seed cotton directly from primary cooperatives and assemblers in 2005/06 (Table 20). Of the entire seed cotton purchased by the cooperatives union, 87.64 percent was supplied by the primary cooperatives while 12.36 percent was obtained from assemblers.

Table 20. Suppliers of cotton for cooperatives union and amount supplied by each supplier in 2005/06

Suppliers	Amount supplied in quintal	Percent supplied
Assemblers	1863.82	12.36
Member primary cooperatives	13211.42	87.64
Total	15075.24	100

Sour: Own survey, 2007

Until the time of the survey (March 2007) out of 15075.24 Qt of cotton purchased in 2005/06 only 5825.22 Qt (34.64 percent of purchase) was sold after it was ginned in Gondar. The remaining was stored at Gondar *Dess* ginnery. Even for the sold amount of cotton, large sum of marketing cost had incurred and it was not profitable (a loss of about

45.90 Birr/Qt) (Table 22). Volume of transaction of Metema cooperatives union for the years 2001/02 - 2005/06 was indicated in Table 21.

Table 21. Metema Cooperatives Union cotton transaction (2001/02-2005/06)

Year	Amount purchased (Qt)	Purchase value in Birr	Average purchase price Birr/Qt	Amount sold (Qt)	Sales value in Birr	Average sales price Birr/Qt
2001/02	859.39	187088.7	217.69	859.39	233111.3	271.25
2002/03	1421.34	190514.8	134.04	1421.34	266446.1	187.46
2003/04	1002.13	257791.3	257.24	1002.13	288216.8	287.60
2004/05	19297.07	7380477	382.47	19297.07	77850888*	403.43
2005/06	15075.24	11027538	320.2	5825.22	1941536	334.51

Source: Metema Farmers Cooperatives Union

Note:* Cash not collected yet

To get some insight about profitability aspect of the union, gross profit from the amount of cotton sold in 2005/06 was calculated. Total marketing cost per quintal was about 60.21 Birr and average purchase price of seed cotton was 320.20 Birr per quintal, which add up to give total cost of 380.41 Birr per quintal. This purchase price of the cooperatives union is greater than the average purchase price of assemblers because cooperative union had made purchase from assemblers and from the primary cooperatives with relatively higher price. Since revenue from sales of lint cotton and cottonseed derived from one quintal of seed cotton was about 334.51 Birr, this resulted in a loss of 45.90 Birr per quintal (Table 22). This indicates that even though the cooperative union is creating market for farmers its performance is weak. Officials from the cooperatives union attributed this poor performance to weak management system. Even during the survey, there was no experienced manager, who can give full information about the overall condition of the union. The information required for the current study was obtained only from those who are below him in managerial position and who have been serving in different positions.

Table 22. Profitability analysis of Metema Cooperatives' Union for 2005/06 sold cotton

Description	**Birr/Qt**	**Percent of marketing cost**
Cooperatives union's purchase price	320.20	
Ginning cost	35.00	58.13
Transportation cost	18.54	30.79
loading and unloading	5.00	8.30
Overhead cost	1.67	2.77
Total marketing cost	60.21	100
Total cost	380.41	
Revenue from sales of lint cotton and cottonseed	334.51	
Gross profit (Loss)	(45.90)	

Source: Own computation

Brokers

The role of brokers in marketing is mainly brining together potential buyers and sellers. However, their role in the case of cotton marketing chain is not as such significant. They play some role at the district level on the aspect of transportation. Their service is more limited to bringing together assemblers with transport service providers. Sometimes, for assemblers who came from other areas outside the locality, the brokers provide insight about the availability of stocks. However, there is no as such experienced broker involvement in cotton marketing. One broker who took license for brokerage was available in Kokit kebeles. There were about three at *Shehedi*/ *Gende Wuha*, but their contribution is still insignificant.

Commission agents

The number of commission agents working in cotton marketing is very few in number. During the survey, the researcher got only two commission agents, one at Das *kebele* and one at Ziebach Bahir *kebele*. These *Kebeles* have no paved roads and no frequent transport services. In the study area, using commission agents was, taken as a strategy for cotton

assemblers who are living in other localities to collect cotton from those relatively remote areas. Commission agents purchase on behalf of the owners, that is, the assemblers. They receive money from the owner of the business, purchase and handle the product until the owner comes, receive and then load it. Business owners cover all marketing costs, make purchase price decisions, and are sources of information for commission agents. The survey revealed that the commission agents purchased about 545 quintals of seed cotton in 2005/06. The study made clear that the amount of commission charged by commission agents was based per quintal ranged from one Birr per quintal to 2.5 Birr.

Ginneries

There are two ginneries found in Gondar town, named *Dess* Ginnery and *Gondar* Ginnery. *Dess* Ginnery is a share of two individuals while Gondar Ginnery is owned by an individual. There are about 313 employees at *Dess* Ginnery and about 134 at Gondar Ginnery. *Dess* Ginnery was established in 1998 whereas Gondar Ginnery was established in 1972. The Gondar Ginnery was first established as a share company and reestablished in1977 as government enterprise until it was privatized in 1998.

The main objective of establishment of ginneries, according to the officials from ginneries, was to provide ginning service to private commercial farmers and cotton traders operating at Metema and the surrounding. However, the officials indicated that they faced low demand of rental service to depend only on rental ginning activity. Hence, they purchase seed cotton by themselves and supply lint cotton and cottonseed to domestic and foreign markets even though exporting is minimal and is operated only in rare cases.

The ginning capacity of *Dess* ginnery is 1,500 quintals of seed cotton per 24 hour but due to shortage of raw cotton, it cannot use its potential capacity. Ginnery officials informed that, in prior periods before the establishment of the ginnery at *Humera,* and while there was a large commercial farm named (*Zeleke* farm) in Metema, it had been working in three shifts and had been ginning more cotton than the current. However, currently by using only one shift (eight hours working time) only 500 quintal of seed cotton has been ginned. Even ginning of this amount is done only for a short period of season within a year. Therefore, the machine sits idle for a long period within a year due to lack of seed cotton. As officials reported, another machine was also purchased two years ago for further value addition of

cotton beyond lint. However, the supply of seed cotton constrained its operation and this machine was idle up to survey time.

Ginning capacity of *Gondar* ginnery is 540 quintal of seed cotton per 24 hour. This ginnery supplies its cottonseed to Gondar oil mills in which *Gondar* ginnery's owner is one of the shareholders of this oil mill. According to the officials from ginneries, the conversion rate of *Dess* ginnery on average is 36% lint cotton, 59% cottonseed and 5% foreign materials and that of *Gondar* ginnery is 35% lint, 56 % cottonseed and 9% foreign materials.

These ginneries mostly supply lint cotton to domestic textile industries and export is insignificant. In 2005/06, there was no export of lint cotton from the ginneries found in Gondar. The amount of seed cotton ginned by the two ginneries in 2005/06, excluding that ginned on rental basis was 45,850.16 quintal. From this amount of seed cotton, 21,458.91 quintal of lint cotton was processed and supplied to domestic textile factories (Bahir Dar textile factory, Akaki textile factory and Dire Dawa textile factory). The amount of cottonseed produced from this amount of seed cotton by the same ginneries in the same year was 22,095.20 quintal. The cottonseed was sold to oil mills, to cooperatives union, to wholesale traders, and directly to farmers.

However, the officials in the ginneries complained about lack of adequate supplies of seed cotton, which is leading to excess capacity and high unit cost. To verify this situation, analysis was made on cotton purchased and on the processing trend of six years by ginneries found in Gondar. However, data were available only from one ginnery. The ginnery's purchasing trend can indicate the situation since the operating environment is almost the same for both ginneries. Figure 1 below shows what the situation looks like from the year 2003/04 to 2006/07.

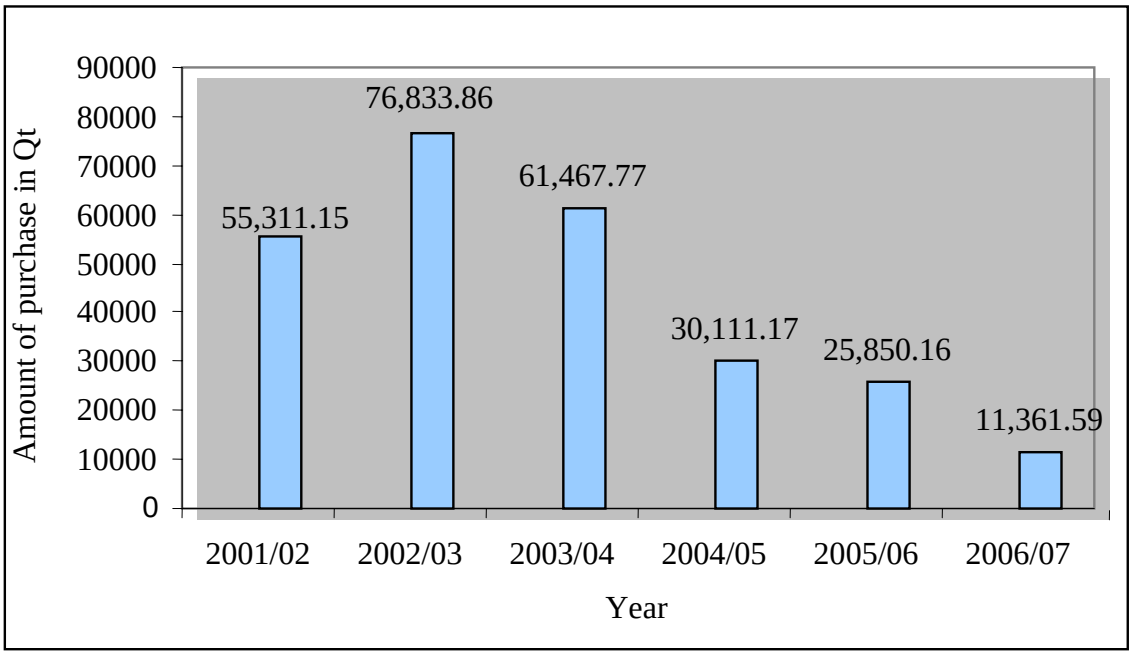

Figure 3. Amount of seed cotton purchased and processed by Dess Ginnery (2001/02 - 2006/07)

Source: Own Survey, 2007

Textile Factories

The entire lint cotton produced by the two ginneries in Gondar in 2005/06 was sold to the Bahir Dar Textile Factory, Dire Dawa Textile Factory and Akaki Textile Factory. However, Bahir Dar Textile Factory utilized about 51.56 % (11,064.11Qt) of lint cotton processed by ginneries found in Gondar. This textile factory is closer to Gondar and Metema (360 Kms from Metema and 180 Kms from Gondar). It processes lint cotton into different types of cloths for domestic and export markets. The factory's main business is processing and wholesaling. There are about 1800 employees including temporary employees. The annual potential lint cotton consumption by the factory is about 25,000 Qt while the actual annual lint cotton consumption of the factory is 20,000 to 22,000 Qt. In 2005/06, about 20,000 Qt of lint cotton was utilized by this factory. Due to its proximity to cotton producing areas of North Gondar, on average 90 percent of Bahir Dar Textile Factory's lint cotton consumption comes from North Gondar, of which the Metema District is one of the suppliers of seed cotton. About 10 percent of the purchase is performed from Middle Awash areas.

About 20 types of textile products are manufactured by the factory. However, the major products are bed sheet, market yarn and *Abujedie.* The factory uses cotton produced from Metema and the vicinity for producing domestically consumable textile products. Lint cotton purchased from Middle Awash areas by the factory is utilized for producing exportable textile products. Officials from the factory reported that the quality of cotton from Middle Awash areas is better than that from Metema and its vicinity. That is why purchase of lint cotton from Middle Awash areas for producing exportable commodities that are better in quality when compared to the domestically consumable ones is performed irrespective of nearness of the textile factory to Gondar from which it can make total purchase. Officials from the factory appreciated the quality of cotton that had been produced in Metema District when there was a private commercial farm named *Zeleke* farm. According to the officials, the factory has not yet faced shortage in quantity of lint cotton supply, but they indicated the existence of quality problems on the lint cotton supplied from Gondar areas, where Metema Woreda is one of the suppliers of seed cotton.

The officials reported that following privatization of the factory, its production has become market-oriented. Hence, there is no problem of lack of demand for the products of the factory. However, they disclosed that lack of quality lint cotton has limited the benefits they should have gained from export. High inflow of low-priced and low quality new and secondhand clothing has also constrained the factory's competitive potential in the domestic market. This has forced the factory to stick to producing only textile products that are highly demanded in domestic markets like bed sheet, market yarn and *Abujedie* that have sustainable demand.

Oil Mills

There is one privately owned modern oil-milling factory in Gondar named *Gondar Oil Factory*. The factory utilizes cottonseed as raw material in addition to other oil crops like sesame, groundnut, niger seed (*Nug*). The oil mill started its operation in 1997. The estimated potential capacity of this oil mill is 3000 metric tone of edible oil per annum. In 2004/05 and 2005/06, the factory used about 30,000 quintal of cottonseed annually. The officials in the oil mill factory reported that recently there is serious shortage of oil crops for oil milling. They added that cost of oil crops become infeasible for the oil milling operation. Therefore, the oil mill is using cottonseed as an alternative oil crop due to

relatively lower cost of cottonseed. Suppliers of cottonseed for the oil mill are Gondar Ginnery, Metema Cooperatives Union and *Hiwot* Ginnery from Humera. According to officials from the oil mill, 95 percent of the cottonseed utilized by this industry is supplied by *Hiwot* Ginnery. The oil mill produces oil and oil seed cake from cottonseed. The factory supplies these products to wholesalers, retailers and directly to consumers. The oil produced from cottonseed is then used for human consumption while the oil seed cake is used for dairy and fattening animals as feed. The oil produced from cottonseed by the oil mill is consumed by a number of consumers from different parts of the country in addition to the local consumers. However, shortage in supply of cottonseed was reported as a serious problem.

According to RATES (u.d), 7.69 Kegs of cottonseed is required to produce one liter of oil. The annual potential of Gondar oil mill is estimated at 3000 metric tones of edible oil. Based on this information:

$3{,}000\ \text{Metric tones} \times 10\ \text{Qt/Metric tone} \times 100\text{Kg/Qt} = 3{,}000{,}000\text{Kg} = 3{,}000{,}000\text{Lts}$ of oil can be potentially produced by this factory. Hence,

$3{,}000{,}000\text{Lts} \times 7.69\text{Kg/Lt} = 23{,}070{,}000\ \text{Kg} = 230{,}700\ \text{Qt}$ of cottonseed can be potentially consumed by this oil mill if it utilizes only cottonseed as a raw material for oil extraction.

Wholesalers and retailers

The textile finished products and the edible oil produced by oil mills pass through wholesalers and retailers before they reach the hands of final consumers. Retailers play an important role in delivering textile products, cottonseed and byproducts of cottonseed (oil and oilseed cake) to final consumers. However, a detailed analysis of these market actors beyond this is outside the scope of this study.

4.5. The Marketing Chain of Cotton

The chain of cotton market connects producers, cooperatives, cooperatives union, assemblers, ginneries, textile factories, oil mills, seed cotton retailers, wholesalers, retailers and consumers of final products as shown in Figure 2. The starting point in the chain of

cotton market is the producers. The final users of the outputs are the consumers of textile products, cottonseed and cottonseed products like oil and oil seed cake. Ginneries receive the seed cotton from different sources. From ginneries, textile factories use lint cotton as raw material for producing cloth. Similarly, oil mills use cottonseed as raw material to produce oil and oilseed cake. Ginneries supply cottonseed to farmers', wholesale traders and cooperatives' union for seed. Oil mills use cottonseed for extraction of oil and oilseed cake. The textile factories supply textile products mainly through wholesalers then to retailers and then after to consumers. The detailed chain analysis is indicated as follows:
The market chains identified during the survey were:

A) Chains from seed cotton to consumers of clothing

1. Producers → Assemblers → Ginneries → textile factories → Wholesalers → Retailers → Consumers
2. Producers → Assemblers → Seed cotton retailers from other districts → handcraft → Retailers/ consumers
3. Producers → ginneries → textile factories → Wholesalers → Retailers → Consumers
4. Producers → primary cooperatives → Cooperatives Union → Wholesale traders → Textile factories → Wholesalers → Retailers → Consumers
5. Producers → Assemblers → Cooperatives Union → Wholesale traders → textile factories → Wholesalers → Retailers → Consumers
6. Producers → Assemblers → Assemblers → Ginneries → textile factories → Wholesalers → Retailers → Consumers
7. Producers → Commission agents → Assemblers → Ginneries → Textile factories → Wholesalers → Retailers → Consumers
8. Producers → Seed cotton retailers from other districts → handcraft → Retailers/ consumers
9. Producers → primary cooperatives → Cooperatives Union → Ginneries → Textile factories → Wholesalers → Retailers → Consumers

B) Chains from cotton seed to consumers of cottonseed, oil and oil seed cake

Note: it is after seed cotton has reached to ginneries through different actors that seed cotton is ginned at ginneries and cottonseed is produced. Its chains are:

1. Ginneries → Oil mills → Wholesalers → Retailers → Consumers (for edible oil)

2. Ginneries → Cooperatives Union → Primary Cooperatives → Farmers (for cottonseed)
3. Ginneries → Wholesalers → Retailers → Farmers (for cottonseed)
4. Ginneries → Farmers (for cottonseed)
5. Ginneries → Oil mills → Consumers (for edible oil)
6. Ginneries → Oil mills → Dairy and fattening (for oilseed cake)
7. Ginneries → Oil mills → Retailers → Consumers (for edible oil)

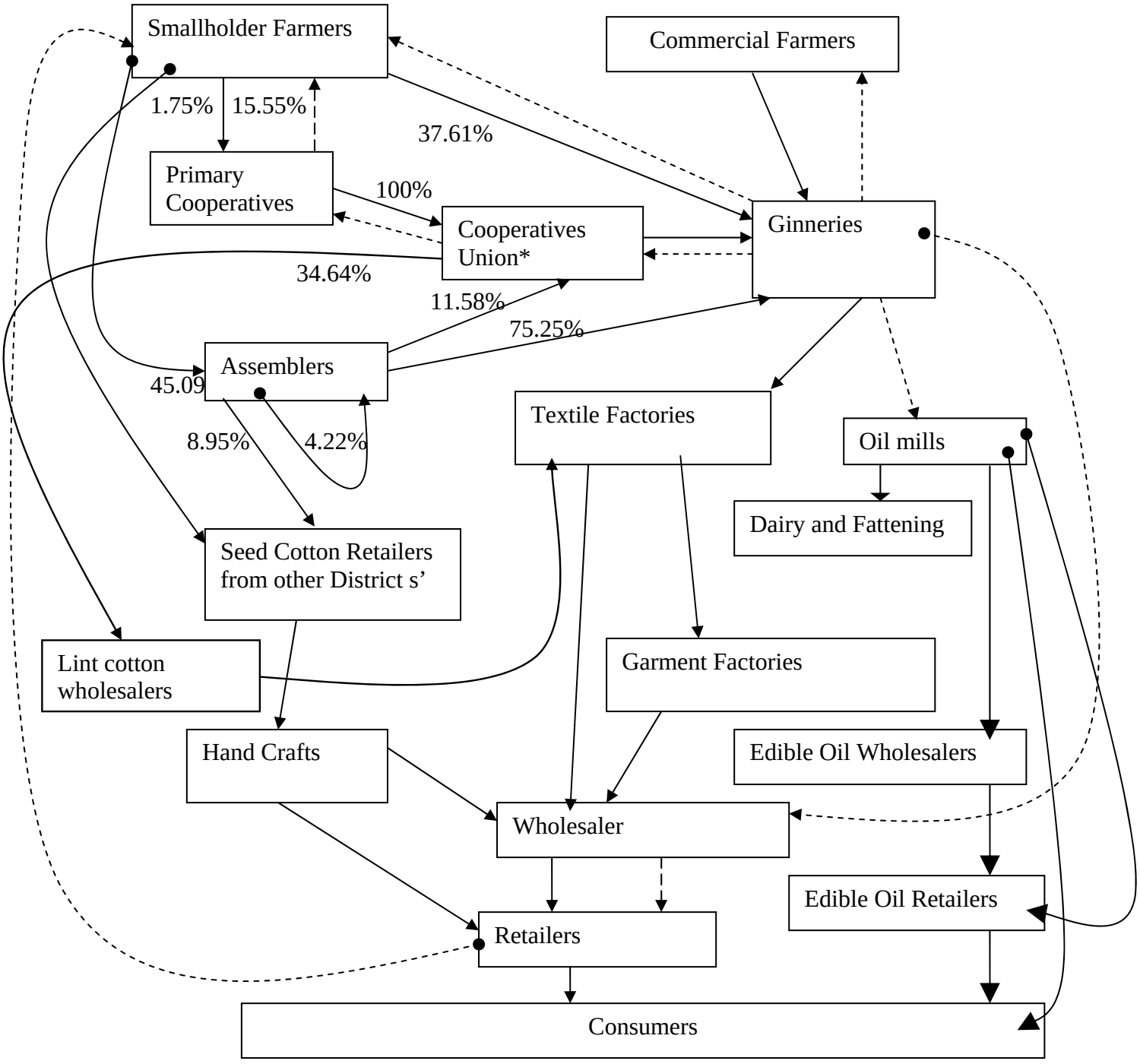

Figure 4. Cotton market channels
Source: Own survey, 2007

Note * 1. Recently Metema Cooperatives Union has started ginning cotton at rental basis and sales lint cotton by bidding and supplying cottonseed to Gondar oil mill. From seed cotton purchased in 2006 only 34.64 percent was sold up to survey time (March 2007).

2. ---------> represents channels of cottonseed

4.6. Structure- Conduct - Performance of the Cotton Market

4.6.1. Cotton market structure

In order to know the structure of cotton market at each market level, that is the level of competition existing in the cotton market, the market concentration ratio and barriers to entry and exit into cotton market were used as evaluation criteria.

4.6.1.1. Measure of market concentration ratio

Since the number of traders at each local market level was few, the market concentration ratio was calculated at the district level to analyze the concentration of cotton market prevailing in the district as indicated in Table 23.

Table 23. Cotton Traders' Concentration Ratio in Metema District

Number of traders (A)	**Cumulative frequency of traders** (B)	**% of traders** $\left(D=\frac{A}{23}\right)$	**Cumulative % of traders** (E)	**Quantity purchased in Qt** (F)	**Total quantity purchased in Qt** $(G=AXF)$	**% share of purchase** $Si=\frac{G}{7415}$	**% cumulative purchase** $(C=\sum_{i=1}^{r} Si)$
1	1	4.35	4.35	2000	2000	26.97	26.97
1	2	4.35	8.7	700	700	9.44	36.41
1	3	4.35	13.05	500	500	6.75	43.16
1	4	4.35	17.4	490	490	6.61	49.76
1	5	4.35	21.75	400	400	5.40	55.16
1	6	4.35	26.1	350	350	4.72	59.88
4	10	17.39	43.49	300	1200	16.18	76.06
1	11	4.35	47.84	255	255	3.44	79.50
1	12	4.35	52.19	250	250	3.37	82.87
3	15	13.04	65.23	200	600	8.09	90.96
1	16	4.35	69.58	120	120	1.62	92.58
2	18	8.69	78.27	100	200	2.70	95.28
1	19	4.35	82.62	90	90	1.21	96.49
2	21	8.69	91.31	80	160	2.16	98.65
2	23	8.69	100	50	100	1.35	100
23		100			7415	100	

Source: Own Computation

Kohls and Uhl (1985) suggested, as a rule of thumb, a four largest enterprises concentration ratio of 50 percent or more as an indication of a strongly oligopolistic industry. The result of the District level concentration ratio CR4 was found to be 49.76 percent (Table 23). This indicates that the top four traders handled almost 50 percent of the cotton market. Hence, according to Kohls and Uhl (1985) the cotton market at the district level has an oligopolistic market structure. Except some amount supplied for hand craft purpose (about 1.75 percent from farmers supply and about 8.95 percent of assemblers supply), seed cotton from Metema District is supplied to ginneries found in Gondar. The ginneries found there are only two. This also indicates that cotton market in Gondar is highly oligopolistic too. The number of textile factories that purchased lint cotton in 2005/06 from ginneries found in Gondar are only three. The study revealed that about 52 percent of the purchase was made by Bahir Dar Textile Factory. This shows that at textile factories level too, the cotton market is characterized by a strongly oligopolistic market structure.

4.6.1.2. Regulation of entry and exit in cotton market

The Ministry of Trade and Industry, Small Scale Enterprise Development Agency, and Customs Authority have district offices that provide services and regulate markets. However, during the survey, there was as such no strict regulation on cotton trade. Due to the absence of strict regulation, about 62 percent of the assemblers in the survey were unlicensed. The measure, which the District Office of Trade and Industry takes against the unlicensed assemblers, is closing their business. However, to escape from this strategy in most cases the unlicensed assemblers simply store their cotton in an open space where the concerned body cannot take any measure. It is not surprising that the licensed assemblers who have cotton store also use the same strategy to decrease amount of income tax levied on them.

4.6.1.3. Factors for entry and exit in cotton marketing

Capital: Even though there is a game between the cotton assemblers and the officials of the trade and industry offices, capital is reported to be the major entry barrier to cotton trading. In the survey, about 96 percent of assemblers identified capital as the entry barrier to cotton trading.

Price fluctuation: Price risk of cotton (price fluctuation) is reported to be one of the entry barriers in cotton marketing and processing. The study made clear that about 17 percent of assemblers considered price fluctuation as the entry barrier to cotton marketing.

Licensing: the study revealed that licensing is not as such a limiting factor by being entry barrier. Of the interviewed 21 assemblers, only 38 percent had license to trade cotton whereas the remaining 62 percent of them are without the license. However, according to the rules and regulations of Trade and Industry in the country, licensing is imperative to enter into cotton trading. At the level of ginneries and textile factories, licensing is a necessary condition to enter into the business.

Inability to compete with unlicensed traders: About 26 percent of the interviewed assemblers pointed out that one of their serious problems is competition with unlicensed assemblers in the cotton market. This is one of the indications for the presence of imperfect competition in cotton market.

Generally, inadequate capital, fluctuation in prices, problems in licensing and their subsequent inability to compete with the unlicensed traders are identified to be the major entry barriers to cotton marketing even though there are no exit barriers. Since the market concentration ratio is high and since there are entry barriers into cotton market, the cotton market chain has deviated from the norms of competitive market structure. Because of these, the cotton market chain has an oligopolistic market structure.

4.6.2. Cotton market conduct

Cotton producers' market conduct

The farmers pointed out that they sold their cotton from November to May. According to them, the months of January, February and March are crucial times for cotton selling. The study also revealed, that about 30 percent of total sales of cotton was performed in January, about 38 percent in February and about 20 percent in March in 2005/06 production year. Therefore, 88 percent of seed cotton sale was performed within those three months. The remaining portion was sold in November, April and May. There was no sale in the months of June, July, August, September and October.

The frequency of cotton supplied to market by each household was at most twice. The study indicated that about 82 percent of the farmers supplied cotton to market twice in 2005/06. It revealed also that there is no specific market day for cotton sales. The study indicated that farmers take their produce to market on any day that is convenient to them and the assemblers are ready to receive the produce any day. However, the commonest day on which and the largest number of farmers take their seed cotton produce to the market are on Saturdays. Concerning time of getting money from sales of cotton, 5.8 of the producers reported that they obtain after some time, 8.6 percent of them indicated sometimes soon and some times after some time latter, and 85.6 percent of them pointed out that they get the money during the transaction.

The cotton farmers in Metema District have weak or no organizations. Due to this, they lack the power to negotiate. Because of this, they simply take price and other terms like payment deadline from input suppliers and buyers of seed cotton. Most of them, therefore, are not in a position to interact effectively with other stakeholders in the cotton market chain. About 18 percent of the farmers reported that they had faced very low sells price of cotton as a problem after they had brought their cotton to market. Asked the action they took after they faced low price on the market, 2.9 percent of them pointed out that they took the produce back home to take it to another market, 3.6 percent of them indicated that they sold it at cheaper price, and 11.5 percent indicated that they stored it and waited for another market. During survey, it was observed that storing at assemblers storage and

waiting another market day is a common practice of cotton producer farmers in the District.

During the study, all of the farmers identified price as the major determining factor that affect their decision as to whom to sell their seed cotton. Hence, this is an indication of absence of competitive pricing system, which in turn indicates that the deviation of cotton market from the norm of competitive market. Cooperatives spirit, family linkages, the availability of transport facilities are considered by farmers when they decide for whom they have to sell their seed cotton produce to. Similarly, the farmers use assemblers, cooperatives, friends and personal visit as their sources of market information. Usually, they lack reliable market information and because of this, they are usually unable to decide or influence the market price. About 90 percent of them clearly pointed out that they have no power to decide the price.

Buying and selling strategies in cotton marketing

For about 86 percent of the surveyed assemblers, the purchasing site of seed cotton was adjacent to their home (storage places). About 14 percent of them indicated that they purchased seed cotton from places that are far about 12 kms away from their residence (storage place) in the 2005/06 production year. In contrast, ginneries purchase seed cotton at the site of the industry.

During the survey, there was no serious competition observed for purchasing seed cotton. It was observed that most assemblers wait supply of cotton by setting their scale at open space near a place where they store their purchased cotton. All days in the week are used for transaction of cotton at district as well as ginneries levels. Respondents from each market level reported absence of government restrictions on the location of cotton purchasing and selling. Financial position of the purchasers and the profitability are the only factors considered in selecting the locations. Due to this situation, about 91 percent of assemblers preferred purchasing cotton at nearby storage place (market). Ginneries' officials also preferred to make their seed cotton purchase at the factories site. Since purchasers at each market level are oligopolysed the cotton market, there is no need to go to the site of suppliers. The selling site of lint cotton depends on the agreement between lint cotton buyers and suppliers. The recent trend of Bahir Dar textile factory is that

ginneries deliver lint cotton to factory site after the assessment of quality by the textile factory. All of these conditions indicate that purchasers at each market level as main decision-makers.

The survey indicated that no formal contractual agreements have been made between producers and purchasers. As a result, assemblers as well as ginneries purchased what is available on the markets. However, assemblers reported that based on prior knowledge of individuals or family linkage, there is an informal agreement made between assemblers and farmers that are providing credit when farmers are at critical cash shortage and providing packaging materials on credit basis. In turn, farmers supply their seed cotton to those assemblers who helped them when they faced financial problems. About 26 percent of the surveyed assemblers reported that they had provided credit to the cotton producer farmers in the 2005/06 production year.

On their part, the officials of ginneries reported that market risk (price risk of cotton) has limited them from making contractual agreement with cotton producers. This situation forced them to purchase whatever is available on the market in order to minimize the risk. They said that they adjust purchase price when there is low sells price for lint and/or cottonseed in the absence of contractual agreement. If the contractual agreement is signed and the selling price of lint and/or cottonseed is lower, then there is no room to adjust price.

Comparison of the status of cotton purchasing price among the assemblers indicated that about 28 percent of assemblers reported that they set somewhat higher purchase price to attract customers and to make big purchase when there is supply shortage. About 72 percent of assemblers reported that they tried to make purchase price as possibly the same as their competitors. About 95.23 percent of the assemblers suggested absence of uniformity in the price of cotton in a single market on the same market day at the same time.

Concerning the purchase price of seed cotton at ginneries, recently due to shortage of supply of seed cotton, the existence of some difference in purchase price (imperfect competition) between ginneries to make big purchase was reported.

Assemblers take purchase price of ginneries as a basis to determine the price with which they purchase seed cotton from farmers. The textile factories purchase price of lint cotton, and the sale price of cottonseed is used as an input to determine the purchase price of seed cotton for ginneries. The officials from textile factories reported that even though they determine the price of lint cotton purchase by negotiating with sellers of lint cotton by depending on the quality of lint cotton, they also reported presence of communication with other textile factories on general price situation. Therefore, since the number of textile factories in the country is limited and given their collusive pricing system, it is possible to say that lint cotton price is not competitively determined. Therefore, selling and buying strategies used by cotton market players and price setting behavior of market players in cotton market chain have generally deviated from competitive market norms.

4.6.3. Cotton market performance

Cotton market performance was evaluated based on the level of marketing margins by taking into consideration associated marketing costs for key marketing channels. Therefore, based on the 2005/06 production year, costs and purchase prices of the main chain actors', margins at farmers', assemblers' and ginneries' level was analyzed.

Analysis of costs and profitability of cotton production for producers in 2005/06 production year

This section focuses on activities and associated costs in producing seed cotton at small-scale farmers' level. This is to know costs associated with seed cotton production and marketing at farmers' level. This provides an insight about the performance of cotton market. The average costs and sells prices of the producers were used in this calculation (Table 24).

Table 24. Analysis of costs and profitability of cotton production in 2005/06 production year

Cost items	**Cost per hectare in Birr**	**Percent from total cost**
Land clearing and preparation	172.04	6.84
Oxen rent	240	9.54
Labor cost for plowing and seeding	185.76	7.4
Inputs/seed, chemicals, fertilizer	70.36	2.8
Labor cost for weeding	559.52	22.25
Labor cost for picking	247.38	9.84
Cost of packaging material (sisal sack)	131.78	5.24
Cost of *Jamaica(* sack sewing material)	4.70	0.19
Labor cost for packaging	40.60	1.61
Loading and unloading cost	35.78	1.42
Transport cost	84.58	3.36
Laborers food expense	113.85	4.53
Land rent	184.88	7.35
Taxes	47.80	1.9
Salary of employees	211.85	8.42
Interest payment	183.80	7.31
Total cost/ha	**2514.68**	100
Total cost/Qt	**309.70**	
Average sales price of cotton /Qt (producers price, farm gate price)	**244.35**	
Revenue/ha of cotton production	**1984.12**	
Gross profit(Loss)/ha	**(530.56)**	
Gross profit(Loss)/Qt	**(65.40)**	

Source: Own computation

As the table reveals, for cotton producers to break-even a farm gate price of at least 309.70 Birr/Qt of seed cotton would be required, but this break-even price is even greater than ginneries' average purchase price for the year that was 285.03 Birr/Qt. On average, a loss

of about 530.56 Birr/ha or 65.40 Birr/Qt incurred from cotton production in 2005/06 at an average productivity of 8.12 Qt/ha.

Labor cost in cotton production takes the lion's share. The rent of oxen, the cost of packaging materials and the cost of capital are also the costs that aggravate low profitability or loss from cotton production. In addition, the result of the analysis indicated that weeding cost is one of the costs that highly discourage farmers in cotton production. In addition, the survey revealed that there are options where farmers weed their plot of land up to four times while weeding a plot three times is a common practice.

During the survey, the researcher discussed with farmers to have some insight on the historical trends of profitability of cotton production at farmers' level. The farmers generally reported that there were times when the price of cotton was very low. They stated that during that time, the selling price for cotton in Gondar city was unable to cover the cost of transport. The farmers pointed that due to this the produce was left on open space without any value. They further reported fluctuation in price of cotton. What is more, they indicated that the recently increasing production cost is reducing the profitability of cotton production. To inquiry into this matter, the researcher analyzed gross profitability for the 2005/06 production year at the level of individual farmers. The analysis indicated that only about 42 percent of the farmers operated at positive gross profit while the remaining 58 percent of the farmers operated at loss.

Analysis of costs and profitability of cotton for assemblers for the year 2005/06

The average costs of the surveyed assemblers were taken to analyze the costs and profitability of cotton marketing at assemblers' level (Table 25).

Table 25. Analysis of costs and profitability of cotton for assemblers in 2005/06

Cost items	Cost per quintal in Birr	Percent of total marketing cost
Assemblers Purchase Price	**244.35**	
Loading and unloading cost	5.48	15.57
Transport expense	20.53	58.32
Store rent	1	2.84
Brokerage cost	1.40	3.98
Pilling cost	0.32	0.91
Tax	5	14.2
Collecting cost(at ginnery)	0.47	1.34
Overhead costs	1.00	2.84
Sub total	**35.20**	**100**
Total cost	**279.55**	
Assemblers sales price	**285.03**	
Assemblers gross profit	**5.48**	

Source: Own computation

It is evident in the table here that assemblers' gross profit for the year indicated positive figure unlike that of farmers. Even though the amount of gross profit seems small on per quintal basis, since their scale of sales is relatively large, assemblers are more advantaged when compared to the farmers who toiled immensely to come up with the production.

From marketing costs excluding purchase price of seed cotton, transport cost took the lion's share, which is about 58%. Even though there is an improvement in access to transport, cost of transport is still one of the discouraging costs in cotton marketing.

Analysis of costs and profitability of cotton for ginneries for the year 2005/06

Profitability of cotton for ginneries was analyzed using average sells' price and average costs of the two ginneries found in Gondar city. The study indicated that average purchase price of ginneries was 285.03 Birr /Qt, average sells price of lint cotton for the year was

753.3 Birr/Qt and that of cottonseed was 124.78 Birr/ Qt. Average conversion rate of seed cotton for the year was 46.80% for lint, 48.19% for cottonseed, and 5.01 for foreign materials. Based on the above information and other cost components, the profitability of ginneries was calculated as indicated in (Table 26).

Table 26. Analysis of costs and profitability of cotton for ginneries in 2005/06

Cost item	**Cost per quintal in Birr**	**% of marketing and processing costs**
Average seed cotton purchase price	**285.03**	
Cost of packaging material (Hessian cloth and wire)	2.5	2.60
Average transport cost	32.50	33.81
Loading and unloading cost	1.40	1.46
Tax	8.25	8.58
Allowance for foreign materials	14.53	15.12
Interest	21.38	22.24
Storage cost	1.5	1.56
Overhead cost	14.06	14.63
Total marketing and processing cost	**96.12**	100
Total cost	**366.62***	
Lint cotton value	352.56	
Cottonseed value	60.13	
Total value after processing	**412.69**	
Gross profit of ginneries	**46.07**	

Source: Own computation

Note* Average seed cotton purchase price + Total marketing and processing cost - Allowance for foreign materials

The sells price of the two ginneries was 636.59 Birr/Qt and 870 Birr/Qt for lint cotton and 99.56 Birr/Qt and 150 Birr/Qt for cottonseed, respectively. The higher purchase of seed cotton for the year (20,000 Qt) was made by one ginnery while that of the other performed the lower purchase (6593.73 Qt) due to the death of one of the shareholders. This problem was manifest on sells' price of the output too. The study thus indicated that the lower

average sells' price was received by this ginnery too, the range for lint cotton sales price being 233.41Birr/Qt while that of cottonseed was 50.44 Birr/Qt.

Excluding the purchase price of seed cotton, transport cost takes the largest share for ginneries from the marketing and processing costs (33.81%). The study suggested that if the gross profitability was analyzed for the ginnery that operated on normal situation, gross profitability would have been much better than the one calculated above. Hence, this indicates that the gross profit from cotton marketing was best for ginneries and worst for farmers.

Marketing Margins

By taking the average sales prices of different participants in the cotton market chain (farmers, assemblers and ginneries), the marketing margins of cotton was calculated as follows (Table 27).

Table 27. Average price of cotton at different market levels, % share from consumer price, and gross profit in 2005/06

Marketing channel participants	**Selling price (Birr/Qt)**	**% share from domestic textile factories and oil mills price (Gross marketing margin)**	**Gross profit in Birr/Qt**
Producers	244.35	59.21	-65.40
Assemblers	285.03	9.86	5.48
Ginneries	412.69*	30.93	46.07

Source: Own computation

Note* average value of sum of lint and cottonseed values which was obtained from one quintal of seed cotton

TGMM (complete distribution channel) = 40.79%

GMM (Assemblers) = 9.86%

GMM (Ginneries) = 30.93%

GMM_P (Producers participation) = 100%-40.79=59.21%

Table 27 reveals that 40.79 % total gross marketing margin was added to cotton price when it reached the final consumers (textile factories and oil mills) at domestic markets. From the total gross marketing margin, 9.86 % was gross marketing margin of assemblers (received by assembler) while 30.93% was that of ginneries. Observing the gross profit of farmers per quintal suggests that there is loss of 65.40 Birr per quintal. However, observing that of assemblers and ginneries shows that there is positive gross profit. This situation implies that there is poor performance of the cotton market chain. In this inefficient cotton market chain, assemblers and ginneries are advantaged whereas the farmers are disadvantaged.

4.7. Major Constraints and Opportunities in Cotton Marketing

There are a number of cotton marketing chain constraints. Those, which are considered as major ones, are discussed below.

4.7.1. Production constraints

Irrespective of the availability of a large area of land and a favorable climatic condition that allow cotton production, in Metema District, average production and productivity is at lower level. The survey revealed that the productivity level was about 8.12 Qt/ha in 2005/06 at small-scale farmers' level. The number of cotton producers is small as compared to the total farm households living in the district. Because of this, the marketable supply of cotton is at low level and thus unable to satisfy the demand of ginneries and oil mill found in the vicinity. The major factors for low productivity and production level are in general problems related to technical inputs, shortage of capital, lack of sound extension services and other related problems. Each of the problems is discussed in detail below.

1. Technical inputs:

Fertilizer: Even though fertilizer is not commonly used for cotton production in the district due to erratic nature of rainfall, farmers tried its use in the areas where soil fertility is declining. The farmers pointed out problems concerning fertilizer. About 50 percent of them mentioned unavailability of fertilizer as one of their problems, 65.5 percent of them complained about lack of timely delivery of fertilizer, 47.5 percent of them complained about high cost of fertilizer and about 5 percent of them mentioned lack of knowledge on application rate as a problem on fertilizer issues.

Improved seeds: Recently**,** relatively widely used type of improved cottonseed variety in the district is Gedera cottonseed variety, which was imported from Israel. Even though there are about 13 cottonseed varieties released by research centers found in the country, except Deltapine90, none are used in the district in the 2005/06 production year. Even this variety was utilized only by a few number of farmers in the production year. About the problems of improved seed, 51.8 percent of the farmers considered unavailability of the improved seed as a problem, 86.3 percent of them mentioned as problem high cost of chemically dressed improved seed, and 46.8 percent mentioned absence of timely supply of improved seed. The farmers did not appreciate the productivity difference between local and improved seed varieties at current production system of farmers (without use of fertilizer). The survey results (Appendix Table 8 and Appendix Table 9) show the same. Nevertheless, they prefer using chemically dressed improved seed variety for its being resistant to flee beetle attack. However, unaffordable price of it limited farmers from extensive use of it.

Chemicals: Concerning this issue, the farmers give main emphasis to use of pesticides. About 55 percent of them reported shortage of chemicals as a problem, 66.2 percent of them mentioned as problem high cost of chemicals, and 51.8 percent of them reported unavailability of demanded type of chemicals. During informal discussion, the farmers indicated that they lacked knowledge on type of chemical, application rate, and application system. Since flee beetle attack is a recent phenomenon (about three to four years according to respondents), farmers lack acquired knowledge, and support provided by extension service is at minimal level as they reported. Therefore, even though farmers tried

to protect pest attack through use of chemicals, they reported that they could not properly manage the problem.

Equipment: Almost all equipment (farm implements) used for cotton production in the district are locally produced. Regarding equipment, the farmers complained about chemical sprayer, which is used for spraying chemicals against pests. Unavailability of chemical sprayer in the locality was mentioned by 48.9 percent of the farmers as a problem. High cost of sprayer was also mentioned by 27.3 percent of the farmers and unavailability of equipment on demand was mentioned by 18.7 percent of respondents.

2. Capital: unavailability of credit on demand was mentioned by 54 percent of the respondents. High cost of capital (interest rate) was mentioned by 71.2 percent of the respondents and 3.6 percent of the farmers who are Muslims reported religious taboo to use credit to alleviate capital shortage.

3. Land: Scarcity of land as a problem was mentioned by 64.7 percent of the respondents. The average land holding size of the respondents from the survey was 14.41 hectares with standard deviation of 18.69. The landholding size in the district was reported as disproportional. The farmers reported that, those farmers who settled relatively earlier had more area of land than those settled in relatively recent times. About 63 percent of the respondents mentioned decrease in fertility of land as a problem. The survey made clear that Meka, Aulala and Lencha have relatively infertile soil and cotton in these areas is the major cash crop for those kebele farmers, since sesame production is limited by soil fertility problem. Water logging is the other problem, which the farmers mentioned. About 68 percent of the farmers mention water logging as one of the major problems on land issue.

4. Labor: cotton production is labor-intensive activity. Starting from land clearing to packaging, all operations need labor. In the district, use of hired labor is a common practice. About 92 percent of the households used hired labor for cotton production in the 2005/06. Out of this, 14.4 percent used only hired labor for cotton production (Appendix Table 7). Concerning labor, 43.9 percent of the respondents reported unavailability of hired labor as a problem, 85.6 percent of farmers mentioned high cost of hired labor as a

problem, and 50.4 percent of respondents reported absence of timely supply of hired labor due to high labor demand at labor peak periods.

5. Livestock smuggling: cotton production in the district is practiced in traditional plowing system. Of cotton producing farmers, about 25 percent of them have no oxen, 23 percent have one ox and about 26 percent have a pair of oxen (Appendix Table 13). The survey shows that number of oxen owned by household significantly affected farm level marketable supply of cotton. However, the major problem in the district and its surrounding areas is serious illegal cross-border livestock trade. According to informal discussion, oxen are the highly demanded animals for export through Sudan. Therefore, theft of oxen for smuggling to Sudan has become a common practice in the district. This condition has created serious problems to the farmers who have oxen as well as for those who plow their land with oxen on rental basis due to robbery. For example, it resulted in lack of confidence on farmers on their livestock property. The problem is forcing them to sell their oxen and becoming dependant on oxen rent. This in turn can result in negative effect on timely accomplishment of farm activities in general and cotton production in particular. The farmers' response on legal measures taken on robbery was the view that as such no serious measure is being taken to protect or stop the theft. They added that when robbers are released from prison, they again pave ways to revenge owners for legal actions taken against them. Therefore, the loose legal protection has frightened farmers and become an obvious menace against their normal farming activities.

4.7.2. Marketing constraints

In addition to production constraints, cotton marketing is constrained by different factors. The most prominent ones are the following:

1. Low selling price of seed cotton: cotton production is associated with high cost of production. However, sells price of seed cotton is reported as low. During RMA when the issue of cotton production and marketing constraints was raised, the farmers reported flee beetle attack (what they called *Worket)* and low sells price of seed cotton as their serious problems. Hence, 97.1 percent of them and 69.6 percent of the assemblers mentioned low sells price of cotton as one of the major problems in cotton marketing.

2. Lack of market linkage or liaison service: farmers have inadequate knowledge on marketing and have low bargaining power. Extension agents assigned in each kebele give some service on production aspects, but the farmers carry out marketing of agricultural products without significant support from any institutions. The farmers and assemblers reported that they want a supporting institution for liaising (linking) them with useful organizations for selling cotton produce. During the survey, 54 percent of farmers and 65.2 percent of assemblers considered lack of market linking institution as one of their major problems in cotton marketing. During informal discussion, the farmers reported as an example the initiative given from extension service to produce Gedera seed cotton some years ago at high cost of cottonseed (expensive price of chemically dressed Gedera cottonseed, which was sold up to 24 Birr/Kg at that time according to farmers) and lack of price incentive when seed cotton was sold. In other words, they reported that they sold this improved seed cotton at the same price as local seed cotton. Hence, they reported presence of some support on production aspects and absence of support when they want to sell their produce.

3. Collusion of buyers on price setting: few assemblers oligopolized cotton market at local markets level. Due to this, there is no serious competition for purchase of seed cotton. About 52 percent of the farmers reported collusion of buyers on price decision as one of their major problems.

4. Road and transport: even though there is an improvement on road access in the country as a whole, and in the district in particular, there is also problem in transporting inputs and outputs from sources to farm and from farm to selling sites due to absence of improved road connecting these locations. About 50 percent of the farmers mentioned the unavailability of improved road from farm to residence as one of their major problems, 58.3 percent of them reported high cost to reach main road and 27.3 percent reported quality of existing roads being poor (especially unpaved roads). On their part, 17.4 percent of the assemblers reported the unavailability of paved road as one of their problems. About 31 percent of them reported that it was costly to reach target market and 39.6 percent of the assemblers reported poor quality of unpaved road as their problems.

5. Storage: About 47 percent of the farmers considered unavailability of storage facility as a problem, 36 percent indicated it is costly for them to rent storage and 26 percent of them reported loss of products at storage as problems.

6. Quality and Standard: concerning grading of cotton, the researcher observed that it is being cotton only, which is mostly considered in the market. The farmers bring cotton and simply put it on scale. Assemblers weigh and receive it based on the weight. The only criterion partly considered is adulteration. When there is suspicion of adulteration, assemblers insert metal bar into sacks full of cotton or tear the sack. This happens when the weight exceeds beyond the normal range.

The farmers do not gain incentive when they produce better quality cotton. About 71.2 percent of them considered absence of grading as one of their serious problems that limit fetching reasonable price. On their part, about 17.4 percent of assemblers considered absence of grade in cotton marketing as a problem. The officials from ginnery said that all types of cotton that is from different varieties and different management system and, as a result, are of different qualities come to ginnery in mix loaded in a single truck. While ginning this mix of seed cotton with long and short fibers is ginned together, as a result much waste is produced due to its difference in fiber length. In addition to this problem, when low and better quality cotton is loaded together, it is too hard to select better quality cotton and to remunerate suppliers to encourage development of the sector and assure sustainable supply. Officials from ginneries reported that the bulkiness nature of cotton, which is commonly packed from 120 to 150 Kgs per pack, prohibited them from selecting and properly utilizing it. On their part, officials from textile factory raised the issue of quality as one of their major problems.

7. Packaging material: the availability, cost and quality of packaging materials were serious issues considered by farmers during the survey. About 52 percent of the farmers mentioned unavailability of packaging material (sisal sack), 86.3 percent of them reported high cost of packaging material (sisal sack), 88.5 percent of them mentioned poor quality of packaging materials (sisal as well as polythin sacks) as their major problems on packaging materials issue. On assemblers' side, 69.6 percent mentioned unavailability of sisal sacks, 91.3 percent pointed out the costliness of sisal sack and all of the assemblers reported poor quality of packaging materials, both sisal and polythin sacks, as problems.

In addition to low quality of polythin sacks, the farmers tore it vertically to make space to pack more cotton in a single pack. This and naturally being lower in quality (it is easily tattered when it is exposed to sunlight) and mixing of its fibers with cotton have negative effect on quality of cotton. In addition to the mentioned complaints above, there is high complaint form ginneries regarding polythin sacks, which are used as packaging material for seed cotton. The main complaint is that the fibers of polythin sack are easily mixed with seed cotton and then ginned together. According to ginnery officials, when polythin fibers are found in sample of lint cotton especially delivered to export markets, it results in rejection.

8. Lack of finance: about 74 percent of the assemblers reported that they lack finance for marketing cotton. They indicated that as a result, they are using late payment to farmers' as an alternative strategy. As observed during the survey, especially assemblers living in relatively remote Kebeles do not make immediate payment to farmers. The officials from ginneries also raised this issue as one of their serious problems. They said that in former days, it was not possible to collect revenue from domestic market sales of lint cotton (especially from government owned textile factories on bid basis) as soon as possible due to a number of bureaucratic procedures that had to be followed. However, recently due to privatization of most textile factories and because of the substantial reduction in bureaucratic rules, a direct purchase of the product is possible. Because of this, the problem on sales revenue collection is to some extent alleviated.

However, another factor that is causing financial shortage, according to ginnery officials, are the requirement put on them to pay value added tax (VAT) and sales tax within a month's time after sales agreement is performed. However, revenue from sales of lint cotton is partly collected within this short duration due to different factors, one of which is reservation as collateral for quality defect. Therefore, the ginneries are forced to pay the tax debt being indebted from any source and in turn have to pay the interest for credit taken to pay tax liability. Because of this, they reported that they faced financial shortage to pay to their customers on time for the seed cotton they purchased. Hence, seed cotton suppliers are forced to sell their seed to the ginneries at late payment basis or at low sells price according to the assemblers and the farmers who sold cotton to ginneries.

9. Adulteration: the fact that the price for seed cotton is based mainly on weight has resulted in some adulteration problems. For example, some farmers add water, soil, gravel, stone, prematurely dried seed cotton bolls, and other foreign materials to the seed cotton to increase weight. This is done with the ultimate intention of gaining more money from their sales. This problem was observed during survey at *Das* Farmers' Primary Cooperative found in Metema District and at ginneries found in Gondar. The ginnery officials too pointed out this issue as one of the serious problems they are facing.

10. Tax: In some developed countries, cotton producers are subsidized to assure the sustainability of production and to support the farmers. However, in Ethiopia and some other developing countries, taxation is imposed. In the study area, when the amount of tax and the number of taxing points are considered, starting from its initial point it looks like the following. There is *"Kella"*, charge at starting point (*Gende Wuha* town), which is five Birr per quintal. A- two-percent tax on seller of seed cotton at ginnery collected from sellers if they have supplied seed cotton that values more than 10,000 Birr per sale. Sales tax of two percent on ginneries is collected when they sell processed cotton products. Value added tax (VAT) of 15% from purchaser of lint cotton and cottonseed are collected by ginneries and offered to Revenue Authority. The assemblers complained about the amount of tax levied on them while ginners complained about the time interval given to collect tax.

11. High inflow of low-priced low quality new and second hand clothing into the country: regarding this problem, officials from Bahir Dar Textile Factory reported that continuous change in clothing pattern and continuous inflow of low quality and low-priced new and second-hand clothes have reduced their competitiveness in the domestic markets. This problem has forced them to stick to domestically most acknowledged and demanded products like bed sheet, market yarn and *abujedie.*

4.7.3. Opportunities for cotton production and marketing

1. Availability of vast potential area for cotton production: Metema District is a potential area for cotton production. However, the potential has not yet been utilized due to production as well as marketing constraints.

2. Availability of labor: cotton production is labor-intensive and there is available labor force in the country. From this labor force, some are migrating to Metema District in search of job opportunity. Therefore, it is possible to use this labor as major input in the production of cotton. It is possible to make labor an affordable input by increasing the productivity of cotton.

3. Availability of ginneries, an oil mill and textile factory at relatively short distance (Gondar and Bahir Dar): There are two ginneries and one oil mill found at an average distance of about 180 Kms from Metema in Gondar, and Bahir Dar Textile Factory at a distance of 360Kms from Metema. Seed cotton is raw material for producing lint cotton and cottonseed by ginneries. Lint cotton is raw material for textile products while cottonseed is raw material for oil mill that produce oil and oilseed cake. However, irrespective of the availability of the opportunity for cotton production, recently ginneries as well as the oil mill are suffering from shortage of their respective raw materials.

4. **Recent trend in GM cotton production in the world:** this option can be good for areas where flee beetle attack is serious, the cost of production is high and the level of productivity is low like in Metema District. Literature appreciates benefit of adopting this technology to protect pest attack, to increase productivity and to decrease cost of production as well as to be much competitive in world market with those subsidized producers.

5. High Population: Since clothing is one of the necessities, increase in the population in the country assures presence of sustainable demand for cotton products if the demanded type and quality of products are produced and price are competitive.

6. **Access to foreign markets:** Ethiopia has access to a number of countries to export lint cotton and textile products. The major importers of lint cotton from Ethiopia are Pakistan, India, Greece, Djibouti, Egypt, Oman, United Arab Emirates, Srilanka, Thailand, Denmark, Indonesia, Yemen, Turkey, Switzerland, Vietnam, and Italy. Despite the broader access, the country's volume of export is very small. Even Metema District 's contribution to this export market is almost nil, irrespective of the potential the district has.

5. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

In this chapter, based on the results of the study, summary and conclusion of the study are drawn. Finally, based on the results of the study, some policy implications of the findings are pointed out.

5.1. Summary

The major crops grown in Metema District are sesame, sorghum and cotton. Sesame takes the lion's share of the available cultivable land, followed by sorghum and cotton. In the area, cotton is produced mainly for market. Average size of land allocated for cotton per household in 2005/06 was 2.48 hectares with standard deviation of 2.91. The cotton produced in the district is consumed mainly by the domestic textile factories. Only an insignificant amount of the produce is exported. There was no export of lint cotton in the 2005/06 from the two ginneries found in Gondar, which are the major consumers of seed cotton from the district.

There is only an insignificant use of improved variety of cotton in the district. Fertilizers as well as chemicals are also insignificantly used. The farmers reported that there is knowledge gap on the type and rate of application of chemicals. Gedera cottonseed variety, which was imported from Israel, was the most widely used variety of cottonseed next to the local variety in 2005/06. About 66 percent of the farmers used local seed, 30.2 percent of them used Gedera seed and 3.6 percent of them used Deltapine90 in the year. The average price of the local seed was 2.03 Birr/Kg; improved seed not dressed by chemicals was 2.21 Birr/Kg while that of chemically dressed improved seed was 8.48 Birr/kg. About 86 percent of the farmers reported that the cost of the chemically dressed improved cottonseed is too high for them to buy and that they are, therefore, unable to use this variety.

According to the farmers, the major sources of improved cottonseed were cooperatives. For the local seed, the main source is traders. The majority of the farmers purchase cottonseed from cooperatives on credit basis, but gain on cash from the traders. In 2005/06, the average productivity of cotton in the district at small-scale farmers level was 8.12

Qt/ha. The average production of seed cotton per household for the year was 21.03 quintal with standard deviation of 30.04.

The study indicated that the farmers and assemblers store their cotton mostly in an open space while ginneries store in stores. About 37 percent of the farmers store their cotton around their homestead and 10.8 % of them store on an open space in their farm. ACSI, cooperatives, usurers, relatives and friends are sources of credit for the farmers. About 77 percent of them had access to credit in 2005/06. The study revealed that the farmers get market information in one way or another, but the unreliability of information and their poor bargaining power are reported as serious problems.

Although there is an improvement in access to transportation, cost of transport takes the lion's share in cotton marketing. Since farmers in Metema District have their croplands far away from their residence, they reported unavailability of improved road from farm to their residence and local markets. Those assemblers who are living in interior areas of the Woreda whose main roads are unpaved also reported that they had problems of access to road and transportation after the start of rainy season until roads dry some time after rain setting.

An improvement in access to telephone service was reported at all levels. Introduction of wireless telephones up to remote *Kebeles* is alleviating communication problems in those *Kebeles*. Mobile telephone service in some *kebeles* is also playing an important role even though still much work is required from service delivering sectors to cover more areas and to make the network service more efficient.

Out of the cotton produced by the farmers in 2005/06, 99.59 percent was supplied to market. To identify factors affecting farm level marketable supply of cotton, Robust OLS regression analysis was employed. About 13 variables were hypothesized to affect farm level marketable supply of cotton in the district. Four variables were found to be significant variables in affecting farm level marketable supply of cotton. These are land allocated to cotton in hectare at 1% significance level, the productivity of cotton per hectare at 1% significance level, number of oxen owned by households at 10% significance level, and access to credit at 5% significance level.

The study identified that the main roots through which seed cotton from producers was channeled are assemblers, primary cooperatives, and ginneries. Percentages of the marketable supply channeled along each channel in 2005/06 were 45.09% to assemblers, 15.55% to primary cooperatives, and 37.61% to ginneries. About 75.25 percent of the seed cotton from assemblers was directly channeled to Ginneries in Gondar, 8.95 percent to traders in other districts, 11.58 percent to cooperatives union, and the remaining 4.22 percent was circulated within assemblers.

Except that of Kokit Primary Farmers Cooperative, all cooperatives that are involved in cotton marketing, including the union, are weak in their marketing performance. The ginneries and the oil mill in Gondar are suffering from shortage of seed cotton and cottonseed, respectively although there is a large potential area for cotton production in Metema District and its vicinity.

The computed four-firm concentration ratio (CR4), which is the share of the largest four traders in the total volume of cotton purchased, was 49.76 percent at district level. Based on rule of thumb suggested by Kohls and Uhl (1985), this result indicates the existence of oligopolistic market structure in cotton market at district level. In Gondar, since there are only two ginneries that made large purchases of seed cotton, the existence of strong oligopolistic market structure is obvious. The purchasers of lint cotton from Gondar were limited in number as well. Only three textile factories made purchase of lint cotton from ginneries found in Gondar in 2005/06. The Bahir Dar Textile Factory is the main purchaser of lint cotton from ginneries in Gondar. This factory purchased about 52 % of the lint cotton in 2005/06. This indicates that there is a strongly oligopolistic market structure of cotton at textile factories' level too. There are different factors that prohibit free entry to cotton marketing and processing. The major ones are capital, taxations, price fluctuation and inflow of low priced low quality new and second hand clothes. However, there is no barrier to exit from cotton marketing. All these conditions indicate oligopolistic market structure of cotton at district level, both at ginneries in Gondar and at domestic textile factories.

The periods for selling seed cotton are November to May. January, February and March are decisive times and they respectively constitute 30.17%, 38% and 19.95% of the total volume of sales. The study revealed that no seed cotton sales had been performed from

June to October. The study revealed also that cotton purchasers from seed cotton to cottonseed and lint cotton at each market level have major role in price determination. Collusive pricing strategy is adopted at almost all levels of cotton market chain. This indicates that the chain of cotton market has deviated from competitive market norm. The performance of the cotton market was measured using marketing margin analysis for key market channels. In order to substantiate the evaluation of marketing margin results, gross profit and associated costs were analyzed at each market level. Gross profit analysis for 2005/06 showed that the average gross loss for the farmers was estimated at about 65.40 Birr/Qt. The assemblers' gross profit was 5.48 Birr/Qt while that of ginneries was 46.07 Birr/Qt on average.

During production, labor cost for weeding took the lion's share. This was on average about 22.25%. With regard to the marketing costs of assemblers, excluding the purchase price of seed cotton, transport cost took the lion's share. This was about 58.32 % of all marketing costs. For ginneries, from the total processing and marketing costs, excluding purchase price of seed cotton, 33.81% was found to be the cost incurred on transport. About 40.79 % of total gross marketing margin was added to seed cotton price when it reaches the final consumers of lint cotton and cottonseed at the level of the domestic market. From the total gross marketing margin, assemblers received 9.86% while 30.93% was received by ginneries. The study indicated that farmers operated at loss whereas assemblers and ginneries had profit. This result is indicating that farmers are the disadvantaged groups in the market chain whereas assemblers and ginneries are beneficiaries in the chain.

According to the current study, the major factors that adversely constrain cotton production in the area are shortage of technical inputs, inadequacy of capital, serious pest attack at seedling stage, lack of efficient extension service and low sells price of seed cotton. In addition to these, there are factors which constrain cotton marketing like poor market linkages or liaisons, collusion of buyers on price setting, high transport cost, absence of grade, unavailability and or poor quality of the packaging materials, adulteration, inconvenient taxation system, and high inflow of low priced and low quality new and second-hand clothes.

5.2. Conclusions and Recommendations

Ethiopia has great potential for cotton production. However, out of the country's total potential areas of cotton production, only about four percent is being utilized currently. Due to this, the amount of cotton produced in the country is low. A number of factors may have affected the amount of marketable supply of cotton at farm level in the country. In the case of Metema District, the identified factors are land allocated to cotton by farmers, productivity of cotton, number of oxen owned by households, and access to credit for cotton. In addition, Structure-Conduct- Performance analysis of the cotton market chain indicated poor performance of the chain. Thus, policy interventions are required to alleviate the problem. In this respect, the following recommendations are made to increase the marketable supply of cotton at the farm level in Metema District.

1. Facilitation of conditions for farmers to have their own oxen and strict legal measures on livestock robbery: oxen are one of the inputs in cotton production and the number of oxen owned by household was found to be a significant factor that affected farm level cotton marketable supply in the district. Hence, it is important to help the farmers own oxen. A serious measure must be taken against ox robbery. Conditions can also be facilitated for the farmers in the area to use tractors instead of oxen.

2. Strengthening the existing credit institutions and facilitation of others: cotton production and marketing is a capital-intensive operation. In addition, access to credit for cotton has considerably affected marketable supply of cotton at farm level significantly. Hence, it is important to facilitate friendly credit institutions for the farmers in the area as this may improve their financial strength.

3. Intervention to increase productivity of cotton per unit area of land through proper utilization of land resource in the district: the area of land allocated for cotton at the farm level affected marketable supply of cotton positively and significantly. However, increasing landholding size cannot be an option to increase cotton marketable supply since supply of land is limited by natural as well as socio-economic factors. Hence, increasing

productivity of cotton per unit area of land is better alternative to increase marketable supply of cotton. This is relying on intensive cultivation rather than on extensive one.

However, the current land utilization system in the district is leading rather to low productivity. This is because of a prevalent use of wildfire to clear land in the district. This practice can cause deforestation and loss of soil fertility in the future, as the researcher's direct observations during survey indicated. Among the kebeles currently having soil fertility problem are Aulal, Meka and Lencha. It is obvious that decrease in the fertility of land aggravates shortage of cultivable land, and decreases productivity and production of crops in general and cotton in particular. Therefore, as this district is one of the areas in the country that are largely selected for resettlement, the population pressure on land will worsen the current condition more in the near future unless and otherwise proper land utilization practice is implemented.

6. REFERENCES

Abbott, J.C and J.P. Makeham, 1981. Agricultural Economics and Marketing in the Tropics: Intermediate Tropical Agricultural Series. Longman, UK.58p.

Admasu, S., 1998. Performance Evaluation of Coffee Marketing in Sidama Zone. An MSc. Thesis Presented to the School of Graduate Studies of Alemaya University of Agriculture.105p.

Anderson, K. and E. Valenzuela, 2006. The World Trade Organization's Doha Cotton Initiative: A Tale of Two Issues. World Bank Policy Research Working Paper 3918. May 2006. Washington, DC. [Online] Available from: http://www.Spring.erlink.com/content/g2w830035p88162p.pdf. [Accessed on 13Augest 2007].

Belay, K., 2003. Agricultural Extension in Ethiopia: The Case of Participatory Demonstration and Training Extension System. *Journal of Social Development in Africa* 18 (1): 49-63.

Baffes, J., 2004. Cotton Market Setting, Trade Policies, and Issue. World Bank Policy Research Working Paper 3218. February 2004, Washington DC. [Online] Available from: http://www.wds.worldbank.org/ser/elt/WDScontentserver/pdf. [Accessed on 15 October 2006]

Branson, R.E. and D.G. Norvell, 1983. Introduction to Agricultural Marketing. McGraw-Hill, New York. 521p.

Butler, L.J., 2005. Factors Affecting the supply, Demand and Price of Alfalfa in 2006. Proceedings of California Alfalfa and Forage Symposium. UC Cooperative Extension, Agronomy Research and Extension Center, 12-14 December 2005, Visalia, CA. [Online] Available from: http://alfalfa.ucdavis.edu/symopsium/proceedings.pdf. [Accessed on 10October 2007].

Centre for International Economics and Cotton Research Development Corporation (CIECRDC), 2002. Cotton Price Distortions: Building a Case for Reform. 25 June 2002. [Online], Available from: http://www.thecie.com.au/content/publication.pdf. [Accessed on 13October 2006].

Common Fund for Commodities (CFC), 2005. Overview of the Situation of Commodities in Developing Countries. Eleventh Meeting of the Intergovernmental Follow-up and Coordination Committee on Economic Cooperation among Developing Countries (IFCC_XL). Havana, Cuba, 21-23 March 2005. [Online] Available from: http://www.merid.org/nano.pdf [Accessed on 12 November 2006].

Degnet, A., Belay, K. and Aregay, W., 2001. Adoption of High Yielding Maize Varieties in Jimma Zone: Evidence from Farm Level Data. *Journal of Agric.Eco*.5 (1 and2):41-61.

Demelash, S., 2004. Draft Report on Agricultural Commodity Marketing System Study Project: Cotton Marketing System Study. ANRS, Bahir Dar.93p.

Development Network of Indigenous Voluntary Associations (DNIVA), 2005. Report on Opportunities and Challenges in the Cotton Sector and Poverty Reduction in Kasese District. October 2005, Uganda. [Online] Available from:
http:// www.deniva.or.ug/files/programm-agriculturetrade. [Accessed on 12October 2006].

Dodag, H., S.R. Fullerton and D.R. David, 1982. Marketing Research. A Bell and Howell Company.

Ethiopian Business Development Service Network (EBDSN), undated. The Ethiopian Textile and Garment Sector. [Online] Available from: http://www.bds-ethiopia.net/sector-liberary/index.htm. [Accessed on 15 December 2006].

Edilegnaw, W., 2000. The Challenges in the Search for Efficient and Sustainable Rural Credit Institutions and Their Policy Implications in Ethiopia. PP 93-124. Proceedings of the fourth Annual Conference of Agricultural Economics Society of Ethiopia on Institutions for Rural Development. 23-24 November1999, Addis Ababa, Ethiopia.

Ethiopian Science and Technology Commission (ESTC), 2006. R and D and Innovation in the Textile Sub Sector: Training Course on R and Capacity Building in the Industry Sector. June 02, 2006, Bahir Dar, Ethiopia. 77p.

Ford Foundation, 2007. Competition in the U.S Energy Industry: Strengthen Democratic Values, Reduce Poverty, Promote International Cooperation and Advance Human Achievements. [Online] Available from: http://www.fordfound.org/eLibrary/documents/0150/toc.cfm. [Accessed on 08October 2007].

Friends of the Earth International, 2007. Agriculture and Food: Who Benefits from GM Crops? An Analysis of the Global Performance of GM Crops (1996-2006): Executive Summery. January 2007, Amsterdam, The Netherlands. [Online] Available from: http://www.foei.org/en/publications.pdf. [Accessed on 06July 2007].

Gebre-Meskel, D., T.S. Jayne and J.D. Shaffers, 1998. Market Structure, Conduct, and Performance: Constraints on Performance of Ethiopian Grain Markets. Working Paper No.8, Grain Market Research Project, MEDAC, Addis Ababa.

Goreux, L., 2003. Reforming the Cotton Sector in Sub-Saharan Africa. Second Edition. Africa Region Working Paper Series No. 62. November 2003. [Online] Available from: http://www.worldbank.org/afr//wps/wp62pdf. [Accessed on 10May 2006].

Goreux, L. and J.Macrae, 2003. Reforming the Cotton Sector in Sub Saharan Africa (SSA): Africa Region Working Paper Series No.47. March 2003. [Online] Available from: http://wwwworldbank.org/afr/wps/wp47pdf. [Accessed on 10May 2006].

Goreux, L., 2004. Cotton After Cancun: Draft Discussion paper to inform Debate. March 2004. [Online] Available from: http://www.acp-eu-trade.org/pdf. [Accessed on 17October2006].

Gujarati, D.N, 2003. Basic Econometrics. 4th Edition. United States Military Academy, West Point. McGraw-Hill Publishing Company. 1002p.

International Center for Tropical Agriculture (CIAT), 2004. Increasing the Competitiveness of Market Chains for Smallholder Producers Manual 3: Territorial Approach to Rural Agro enterprise Development. 117p.

International Cotton Advisory Committee (ICAC), 2006. Production and Trade Policies Affecting the Cotton Industry: A report by the Secretariat of the International Cotton Advisory Committee. September 2006. Washington DC USA. [Online] Available from: http://www.icac.org/govt-measures/documents/govt_measures06/pdf. . [Accessed on 06July 2007].

Improving Productivity and Market Success of Ethiopian Farmers (IPMS), 2005. Metema Pilot Learning Site Diagnosis and Program Design. July 2005. [Online] Available from: http://www.ipms.ethiopia.org/content/files/documents/pls-DPD/Metema.pdf. [Accessed on 08 December 2006].

Kaplinsky, R. and M.Morris, 2000. A Hand Book for Value Chain Research Prepared for the IDRC.113p. [Online] Available from: http://scp-guinee.org/download/valuechain-handbook.pdf.[Accessed on 10October,2007].

Kindie, A., 2007. Sesame Market Chain Analysis: The Case of Metema Woreda, North Gondar Zone, Amhara National Regional State. An MSc Thesis Presented to the School of Graduate Studies of Haramaya University.123p.

Kohls, R.L and J.N.Uhl, 1985. Marketing of Agricultural Products. 6th Edition. Macmillan Publishing Company, USA.624p.

Larsen, M.N,2006. Market Coordination and Social Differentiation: A Comparison of Cotton-Producing Households in Tanzania and Zimbabwe. *Journal of Agrarian Change* 6(1):102-131. [Online] Available from: http://login.aginternetwork.net [Accessed on 20February 2008].

Log, J.S. and L.H. Ervin, 2000. Using Heteroschedasticity Consistent Standard Errors in the Linear Regression Model. *Journal o*f *the American Statistician* 54(3): 217-224. [Online] Available from: http://links.jstar.org/sici? Statistical Computing and Graphics. [Accessed on 15October 2007].

Marra, M.C and S. W. Martin, 2007. An Assessment by U.S. Cotton Growers and Other Cotton Experts of Important Innovations in Cotton Production in the Last Decade (1996-2006). The *Journal of Cotton Science*11:259–265. [Online] Available from:http://www.cotton.org/Journal/2007-11/4/unload/jcs11-259.pdf. [Accessed on 13Feberuary 2008].

Mazula, R., undated. Commodity Chain Approach and Deal Structuring: An Agri-Business Case Study in Zimbabwe Progress Fund. PP.73-78., Zimbabwe. [Online] Available from: http://www.zoic.co.zw/documents.pdf. [Accessed on 10October 2007].

Mendoza, G., 1995. A Primer on Marketing Channels and Margins, PP. 254-275. In: Scott Gregory. J (eds.). Price Products and People. International Potato Center. Lima, Peru.

Ministry of Agriculture and Rural Development (MoARD), 2005. Towards Increasing Benefits from Cotton. PP 10-15. Managing Natural Resources Secures from Soil Erosion and Degradation (Amharic Version Publication), Second Year, No.5. October 2005.

Mulat, D.,Tewodros, N., Solomon, D., Assefa, B., and Temesgen, A., 2004. Decent Work deficits in the Ethiopian Cotton Sector. October 2004. [Online] Available from: http://www.ilo.org/public/english/regional/afpro/addisababa/sro/pub/cottoncasestudy.pdf. [Accessed on 10 October 2007].

Mulugeta, E., K. Belay,and L.Dadi, 2001. Determinants of Adoption of Physical Soil Conservation Measures in Central Highlands of Ethiopia: the Case of Three Districts on North Shewa. *Journal of Agrekon* 40(3):293-315.

Paulos, A., Belay, K. and D. Hamito, 2004. Determinants of Farmers' Willingness to Pay for Soil Conservation Practices in Southern highlands of Ethiopia. *Journal of Land Degrad. Develop.*15: 423-438.

Pomeroy, R.S. and A.C. Trinidad, 1995. Industrial Organization and Market Analysis. PP. 217-238. In: Scott Gregory. J. (eds.). Prices, Product and People. International Potato Center. Lima, Peru.

Regional Agricultural Trade Expansion Support Program (RATES), undated. Cotton–Textile-Apparel Value Chain Report for Ethiopia. Nairobi, Kenya.[Online] Available from: http://www.cotton.africa.com/downloads/Ethiopai_cottonVCA.pdf. [Accessed on 15 October 2006].

Rehima, M., 2007. Analysis of Red Pepper Marketing: The Case of Alaba and Siltie in SNNPRS Of Ethiopia**.** An MSc. Thesis Presented to the School of Graduate Studies of Haramaya University.153p.

Robbins, P., F.Bikande, S.Ferris, U.Klein, G.Okoboiand and T.Wandschneider, undated. Collective Marketing for Smallholder Farmers Manual 4: The Territorial Approach to Rural Agro-enterprise Development.104p.

Sneyd, A., 2006. Cotton and Poverty in Sub-Saharan Africa: A Review of the Factors. PhD Qualification Paper, Department of Political Science McMaster University, Hamilton. [Online] Available from: http://www.socsci.mcmaster.ca/polisci/emlibrary/cottonandpovertyinSSA.pdf. [Accessed on 15August2007].

Stringer, R., and P. Pingali, 2004. Agriculture's Contributions to Economic and Social Development. *Electronic Journal of Agricultural and Development Economic.* Agricultural and Development Economics Division (ESA) FAO. 1(1):1-5. [Online] Available from: ftp://ftp.fao.org/docrep/fao/008/ae718e/ae718e00.pdf. [Accessed on 13 February 2008].

Tesfaye, Z., and Senait, R., 2005. The Role of Research in Technology Development and in Mitigating Risk and Achieving Sustainable Development in Ethiopia. PP 85-102. Proceedings of the 7th Annual Conference of Agricultural Economics Society of Ethiopia on Reversing Vulnerability of Rural Livelihoods in Ethiopia: Options for Sustainable Development. 7-9 August 2003, Addis Ababa, Ethiopia.

Valderrama, C.A., undated. Profile of the International Cotton Advisory Committee. [Online] Available from:http://www.new-rules.org/docs/ffdconsultdocs/valderrama.Pdf. [Accessed on 10 October 2007].

Westlake, M., 2005. Addressing Marketing and Processing Constraints that Inhabit Agrifood Exports: A guide for Policy Analysts and Planners. FAO Agricultural Service Bulletin 160. Food and Agricultural Organization of the United Nations, Rome.

Wolday, A., 1994. Food Grain Marketing Development in Ethiopia after the Market Reform1990: A Case Study of Alaba Siraro District. PhD. Dissertation. Verlag Köster; Berlin. 293p.

Wolelaw, S., 2005. Factors Determining Supply of Rice: A Study in Fogera District of Ethiopia. An MSc. Thesis Presented to the School of Graduate Studies of Alemaya University.90p.

Yasin, G., undated. Road structure of Metama District. GIS department of IPMS/ILRI.

6. APPENDIX

Appendix Table 1. Area planted under cotton during1996/97-2000/01(ha)

Producer	1996/97	1997/98	1998/99	1999/2000	2000/2001	Average	%Share
Tendaho	5,450.0	5,652.0	5,955.0	5,645.0	4,117.0	5,363.8	13
Middle Awash	5,153.0	5,268.0	4,789.0	1,667.0	5,407.0	4,456.8	11
Upper Awash	1,000.0	1,000.0	1,000.0	1,000.0	1,000.0	1,000.0	2
North Omo	1,500.0	1.500.0	1,500.0	1,500.0	1,500.0	1,500.0	4
Abebo	250.0	250.0	250.0	250.0	250.0	250.0	1
Total state farms	13,353.0	13,670.0	13,494.0	1,0062.0	12,274.0	12,570.6	30
Private commercial farms	18,150.0	18,150.0	18,150.0	18,150.0	18,150.0	18,150.0	43
Small holders	11,650.0	11,650.0	11,650.0	11,650.0	11,650.0	11,650.0	27
Total	43,153.0	43,470.0	43,294.0	39,862.0	42,074.0	42,370.6	100

Source: RATES, undated

Appendix Table 2. Production of seed cotton1996/97-2000/2001(MT)

Producer	1996/97	1997/98	1998/99	1999/2000	2000/2001	Average	%Share
Tendaho	7943.7	7716.5	9512.5	11503.4	8370.4	90009.3	11
Middle Awash	15024.1	11627.5	9746.3	5763.8	15566.2	11545.6	14
Upper Awash	2100.0	2100.0	2100.0	2100.0	2100.0	2100.0	3
North Omo	3000.0	3000.0	3000.0	3000.0	3000.0	3000.0	4
Abebo	325.0	325	325.0	325.0	325.0	325.0	0
Total state farms	28392.8	24769	24683.8	22692.2	29361.6	25979.9	32
Private commercial farms	45375.0	45375.0	45375.0	45375.0	45375.0	45375.0	56
Small holders	9320.0	9320.0	9320.0	9320.0	9320.0	9320.0	12
Total	*83087.8*	*79464.0*	*79378.8*	*77387.2*	*84056.6*	*80674.9*	*100*

Source: RATES, undated

Appendix Table 3. Yield of seed cotton during 1996/97-2000/01(MT/ha)

Producer	1996/97	1997/98	1998/99	1999/2000	2000/2001	Average
Tendaho	1.5	1.4	1.6	2.0	2.0	1.7
Middle Awash	2.9	2.2	2.0	3.5	2.9	2.6
Upper Awash	2.1	2.1	2.1	2.1	2.1	2.1
North Omo	2.0	2.0	2.0	2.0	2.0	2.0
Abebo	1.3	1.3	1.3	1.3	1.3	1.3
Total state farms	2.1	1.8	1.8	2.3	2.4	2.1
Private commercial farms	2.5	2.5	2.5	2.5	2.5	2.5
Small holders	0.8	0.8	0.8	0.8	0.8	0.8
Total	1.9	1.8	1.8	1.9	2.0	1.9

Source: RATES, undated

Appendix Table 4. Amount of current working capital of assemblers (own and loan) as of February 2007

Description	Minimum	Maximum	Mean	Std. Deviation
Amount of current working capital	2000.00	80000.00	29095.2381	23185.99742

Source: Own survey, 2007

Appendix Table 5. Test for Multicollinearity for continuous variables

Variables	R_j^2	$1-R_j^2$	$VIF = \frac{1}{1-R_j^2}$
Owned oxen number	0.297	0.703	1.422475
Land allocated for cotton in ha	0.324	0.676	1.47929
Productivity of cotton in 2005/06	0.075	0.925	1.081081
Distance from main purchasers in the District	0.047	0.953	1.049318
Price of cotton for 2003/04	0.052	0.948	1.054852
Price of cotton for 2004/05	0.161	0.839	1.191895
Male family members aged 14 to 64 years	0.170	0.83	1.204819
Year of experience in cotton production	0.116	0.884	1.131222

Source: Own computation

Appendix Table 6.Contingency coefficient for dummy variables

Description	Access to extension	Access to credit	Access to market information	Ownership of corrugated Iron sheet house	Education
Access to extension	1	0.09	0.108	0.035	0.031
Access to credit		1	0.109	0.024	0.058
Access to market information			1	0.093	0.061
Ownership of corrugated Iron sheet house				1	0.088
Education					1

Source: Own computation

Appendix Table 7.Source of labor for cotton production in 2005/06 production year

Source of labor	Frequency	Percent	Cumulative Percent
Family labor	9	6.5	6.5
Family labor and pulled labor	1	.7	7.2
Hired and family labor	108	77.7	84.9
Hired labor only	20	14.4	99.3
Pulled labor	1	.7	100.0
Total	139	100.0	

Source: Own survey 2007

Appendix Table 8.Productivity of cotton using different technologies

Technology used	Number of households	Minimum productivity	Maximum productivity	Mean	Std. Deviation
Using improved seed variety without fertilizer	49	1.33	35.00	8.80	5.86
Using improved seed and fertilizer	9	4.00	32.00	10.44	8.66
Using local variety seed and fertilizer	1	16.00	16.00	16.00	.
Using local variety seed with out fertilizer	83	.17	30.00	8.35	5.81
Using local and improved mix	1	11.50	11.50	11.50	.

Source: Own survey, 2007

Appendix Table 9.Paired Samples statistics for productivity difference between improved cottonseed variety and local seed variety without use of fertilizer

Description	Paired Differences					t-value	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference			
				Lower	Upper		
Improved seed productivity Qt/Ha -Local variety productivity Qt/Ha	2.28905	5.66446	2.14097	-2.94971	7.5278	1.069	.326

Source: Own survey result, 2007

Appendix Table 10.Robust OLS regression of marketable supply of cotton

REGRESS; Lhs=COT_SOLD; Rhs=ONE,OX_NU,CRED_COT,LD_AL_CO,YLD_97,DIS_MAI_, PR_96,PR_97,ACC_MAK_,EXT,WEALTH,EDUC,MAL_14_6,YR_CO_FA;Het;HC3$

```
+-----------------------------------------------------+
| Ordinary    least squares regression                |
|  | LHS=COT_SOLD Mean                =   20.94842     |
|              Standard deviation     =   30.06963     |
| WTS=none     Number of observs.     =        139     |
| Model size   Parameters             =         14     |
|              Degrees of freedom     =        125     |
| Residuals    Sum of squares         =   18172.74     |
|              Standard error of e    =   12.05744     |
| Fit          R-squared              =   .8543584     |
|              Adjusted R-squared     =   .8392117     |
| Model test   F[ 13,   125] (prob)   =  56.41 (.0000) |
| Autocorrel   Durbin-Watson Stat.    =  1.8452109     |
|              Rho = cor[e,e(-1)]     =   .0773946     |
| White heteroscedasticity robust covariance matrix    |
| Br./Pagan LM Chi-sq [ 13]  (prob) = 327.00 (.0000)   |
+-----------------------------------------------------+
+---------+--------------+----------------+--------+---------+----------+
|Variable | Coefficient  | Standard Error |t-ratio |P[|T|>t] | Mean of X|
+---------+--------------+----------------+--------+---------+----------+
 Constant     -25.5437506     8.89927855    -2.870   .0048
 OX_NU          .00463762      .00268004     1.730   .0860   1.8920863
 CRED_COT      4.59118383     2.27938719     2.014   .0461     .45323741
 LD_AL_CO      8.43604377     1.60276366     5.263   .0000    2.48197842
 YLD_97        2.34077999      .40496564     5.780   .0000    8.11810074
 DIS_MAI_      -.05059632      .07096903     -.713   .4772    18.8882014
 PR_96          .00035107      .00201008      .175   .8616    108.410072
 PR_97          .00087011      .00279740      .311   .7563    190.611511
 ACC_MAK_      5.58931384     7.81886111      .715   .4760     .98561151
 EXT           2.24376470     2.40572017      .933   .3528     .55395683
 WEALTH         .02733316     2.77886822      .010   .9922     .35251799
 EDUC         -1.19367382     2.61692854     -.456   .6491     .27338129
 MAL_14_64       .88596028      .90338045      .981   .3286    2.03597122
 YR_CO_FA       -.11951104      .07642030    -1.564   .1204    15.5539568
```

Appendix Table 11.The Market Outlets for Lint Cotton in Ethiopia (1996/97 – 2000/01)

Year	Total Lint Cotton Output (Tons)	Supply to Domestic Market		Supply to Export Market	
		Volume (Tons)	Percent	Volume (Tons)	Percent
1996/97	30742	25746	83.7	4997	16.3
1997/98	29402	28219	95.9	1182	4.1
1998/99	29370	24335	82.8	5035	17.2
1999/2000	28633	20959	73.2	7674	26.8
2000/2001	31101	25046	80.5	6055	19.5
Average	29850	24861	83.1	4989	16.9

Source: Mulat *et al*. 2004

Appendix Table 12. Amount of lint cotton exported and revenue obtained from (1998/99 - 2004/05)

Budget year	Amount of lint cotton exported in ton	Amount of revenue obtained in 1000 Birr
1998/99	5754	46550
1999/00	5949	33723
2000/01	7528	65030
2001/02	5827	45673
2002/03	7562	66375
2003/04	8189	93776
2004/05	1579	16069
Average	6055	52457

Source MoARD, 2005

Appendix Table 13. Ownership of oxen by cotton producing farmers

Number of oxen owned	Number of farmers owned	Proportion	Cumulative Percent
0	35	25.18	
1	32	23.02	48.20
2	36	25.90	74.10
3	11	7.91	82.02
4	12	8.63	90.65
5	4	2.88	93.53
6	7	5.04	98.56
7	1	0.72	99.28
9	1	0.72	100
Total	139	100	

Source: Own computation