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**MARKET CHAIN ANALYSIS OF *TEFF* (*Eragrostistef*): THE CASE OF
DEJEN DISTRICT, EAST GOJAM ZONE,ETHIOPIA**

MSc THESIS

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HARAMAYA UNIVERSITY, HARAMAYA

**MARKET CHAIN ANALYSIS OF *TEFF (Eragrostis tef)*: THE CASE OF
DEJEN DISTRICT, EAST GOJAM ZONE, ETHIOPIA**

**A Thesis Submitted to the School of Agricultural Economics and
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DEDICATION

I dedicate this thesis manuscript to my loving mother, Yiftusira Damtie who sacrificed many things and enables me to reach up here and remaining families who have always give me moral support to study.

STATEMENT OF THE AUTHOR

I declare by my signature that this thesis is my own work and I have followed all ethical and technical principles of scholarship in the preparation, data collection, data analysis and Compilation of this thesis. All sources materials used for this thesis have been duly acknowledged. This thesis has been submitted in partial fulfillment of the requirements for M.Sc. degree at Haramaya University and is deposited at the University Library to be available to borrowers under rules of the library. I solemnly declare that this thesis is not submitted to any other institution anywhere for the award of any academic degree, diploma, or certificate.

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BIOGRAPHICAL SKETCH

The author was born in January 1992 in East Gojam Zone. She attended her elementary education in Tik Primary School at small village called Tik and her secondary education in Dejen Senior Secondary and Preparatory School at Dejen. In 2012, she joined Wollo University college of Agriculture and Veterinary Medicine and graduated with BSc .degree in Agricultural Economics in 2014. Then after, she worked as Graduate Assistant for two years in Wollo University and joined Haramaya University for her MSc. Program of Agricultural and applied economics in September 2017.

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LIST OF ACRONYMS AND ABBREVIATIONS

AIC	Akaike's Information Criteria
CSA	Central Statistical Agency
GMM	Gross Marketing Margin
S-C-P	Structure Conduct and Performance
TGMM	Total Gross Marketing Margin
ODWARD	Office of Dejen Woreda Agriculture and Rural Development
ODWIT	Office of Dejen Woreda Industry and Trade
USA	United State of America
USAID	United States Agency for International Development

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MARKET CHAIN ANALYSIS OF *TEFF*: THE CASE OF DEJEN DISTRICT, EAST GOJAM ZONE, ETHIOPIA

ABSTRACT

In Ethiopia, teff is one of most important crops in terms of number of producers and area coverage. It is the main source of cash income and food security crop for most of rural areas. Dejen district is well known in the production of teff in Amhara Region. This study was aimed to evaluate the efficiency of teff market chain and to identify factors determining farmers' teff market participation and level of participation. A multi stage sampling procedure was used to draw sample producers. first identify 14 teff producing kebeles from the district, secondly identify four teff producing kebeles purposively with their potential of production and finally 170 teff producer households were selected randomly. 49 sample traders were selected from two town markets for Structure-Conduct-Performance (SCP) analysis to evaluate efficiency of teff market. Furthermore, Double hurdle model was used to identify factors influencing decision to participate in teff market and the level of participation of producers. Producers, rural collectors, wholesalers, retailers and consumers are the major actors in teff market chain in the study area. The results of S-C-P analysis showed a strong oligopoly market structure at both Dejen and Yetnora markets with four firms' concentration ratios (CR_4) of 57.2% and 74.4%, respectively. There are also barriers to enter in to teff market like licensing procedure and lack of initial working capital. With respect to the conduct teff market in the study area, price setting strategy deviates from competitive market norms and marketing margin and cost analysis showed unreasonable cost and profit share among teff market chain actors. This indicates that teff market in the study area being inefficient. The results of the first Double Hurdle model indicated that producers' decision to participate in teff market was positively affected by being male headed household, teff farming experience, number of oxen owned and frequency of extension contact and the results of the second hurdle shows that level of market participation was positively and significantly affected by teff farming experience, number of equine owned, frequency of extension contact and yield. Hence, the study indicated a need to resolve entry barriers, strengthen market oriented extension service and improve transport facilities.

Keywords: market chain actors, concentration ratio, double hurdle, marketing margin

1. INTRODUCTION

1.1. Background of the Study

In Ethiopia, cereal production and marketing are the means of livelihood for millions of smallholder households, which accounts for 60% of rural employment, 80% of total cultivated land, more than 40% of atypical household's food expenditures, and more than 60% of total caloric intake (CSA, 2017). In the production year of 2016/2017, the total grain production reached to 290.38 million quintals, of which cereal production accounted for 87.3%. Thus, cereals including barley, maize, wheat, sorghum and *teff* are the most important crops for Ethiopian agriculture (GAIN, 2014).

According to Vavilov (1951), scientifically *teff* is called *Eragrostis tef* (Zucc.) and is believed to have originated in Ethiopia. It is comparatively resistant to many biotic and abiotic stresses and can be grown under different agro-ecological conditions ranging from lowland to highland areas (FAO, 2015). It is a major staple food crop for both rural and urban consumers (Bart *et al.*, 2013; FAO, 2015). It is used to prepare spongy flat bread called *injera* which is consumed by about 70% of the Ethiopian population (Wondmuet *al.*, 2015). Its straw is most preferred for animal feed and also used as building purpose mixed with mud (Vardercasteelenet *al.*, 2016). Because of its nutritional value and cultural preferences, demand for *teff* is very high especially in urban areas (Demeke and Marcantonio, 2013). The majority 64% of *teff* production in Ethiopia is dedicated for self-consumption or seed purpose by the farm households (Samuel, 2015).

Teff is produced mainly in Amhara and Oromiya Regions, which together accounted 84 and 86% of the total cultivated area, respectively (Demeke and Marcantonio, 2013). From the total quantities produced in the above production season 56.5% was for household consumption, 13% was for seed requirement, and 26.41% was sold for domestic market and 4% for other purposes (CSA, 2017). In Amhara region *teff* production is 19.32 million quintals and its productivity is 16.99 quintal per hectare.

Teff is the second most important cash crop at national level after coffee (Efaet *et al.*, 2016). *Teff* marketable surplus shares are 29% of the total It generates income of about 500 million USD per year for local farmers (Minten. *et al.*, 2013). The volume of *teff* export has fluctuated and relatively a larger quantity was exported in 1995-1997, 2000-2003, and 2005. Export has declined since 2006, mainly due to high domestic prices and a government ban on export (Demeke and Marcantonio, 2013).

East Gojam is the leading zone in *teff* production constituting more than 10% of the national annual *teff* production and its total production was 5.09 million quintals with a productivity of 19.23 quintal per hectare (CSA,2013). In line with this idea, Engdawork (2009) identified surplus and deficit areas in relation to *teff* production. His finding indicated that the entire Shewa and Gojjam are the major *teff* surplus producing areas of the country. On the other hand, Wollo of Amhara, Tigray region, Harari/Dire Dawa regions and the entire pastoralist areas of the country are considered as *teff* deficit areas.

Dejen district is endowed with favourable climatic and natural resource conditions for cereal crops and livestock rearing. The major crops produced in the area includes *Teff*, chickpea, sorghum, wheat, pea, vetch and beans. *Teff* is the main crop in the district mostly for consumption and market because of the high price it fetches compared with other cereals.

Since majority of households who produce *teff* are located in remote areas of Dejen district with poor transport and market infrastructures, no reliable market information to *teff* production and marketing (ODWARD, 2017). Therefore, this study is to evaluate market performance and to identify factors affecting market participation and level of participation of *teff* producers in Dejen district.

1.2. Statement of the Problem

The market creates networks among farmers, public and private agencies in buying superior technologies, and selling the produced farm outputs to expand their earning potential. It sets a legal and institutional setting of economic transactions. The importance of markets, the opportunity for farm households and other rural enterprises to sell farm output tap farmers

into a range of public and private services like credit and extension services. The more accessible the markets are, the greater the rural population capability to remain economically self-sufficient (Tigist, 2015).

Due to low investment in the market infrastructure, segmentation of markets, persistence of high margins and limited progression move African towards more complex arrangements. Because of these and other factors like inefficient and costly transport services farmers do not getting the right share of consumer price (Colman, 1999). In the absence of well-developed markets, marketing facilities, and marketing efficiency, farmers are not at profit by selling their increased marketable surplus to traders in the market as they get low prices due to insufficient time, knowledge and skills for the precise marketing of their produce (Thakur et al., 1997).

The operation of the grain marketing system in Ethiopia needs investments on both production and marketing fronts. The functioning and structure of the marketing system, especially for staple food crops like *teff* are mainly constrained by factors such as lack of grading and quality control system, inefficient market information delivery, lack of well-coordinated supply chain, underdeveloped infrastructure and high transaction costs (Shiferaw et al., 2008). Due to this and others about two-thirds of cereal production is still consumed by the producing households themselves with only just over 16% being supplied to the market. *Teff* has 29% of marketable surplus followed by maize accounted 20% in Ethiopia (Seneshaw, 2013).

According to Jema (2008), agricultural output markets in Ethiopian are characterized by inadequate transport network, limited number of traders, inadequate capital facilities, high handling costs, inadequate market information system, weak bargaining power of farmers and underdeveloped industrial sectors. Farmers in Ethiopia are more focused on the production part without having adequate market information about their products.

Researches published about *teff* in different part of Ethiopia especially in relation to its production and marketing. For example, Mebrahatom (2014), Vandercasteelen *et al.* (2016), Fantu *et al.* (2015), and Efa *et al.* (2016), conducted their research on commercialization of *teff*, its economic wide effect, market participation, amount of intensity and various problems

encountered. Another researcher Melkam (2015) also conduct research in East Gojam Zone on *teff* seed quality variation. Yet there is no such study which tries to look into the whole spectrum of market chain and determinants of market participation and level of participation in *teff* marketing in Dejen district. Even if the district is one of the potential *teff* producer district in East Gojam Zone, *teff* market participation could not reach at its required level. This is due to the existence of production and marketing problems, lack of institutional services, and shortage of agricultural inputs.

Therefore, this study is initiated to address the prevailing information gap and contribute to better understanding of the challenges and opportunities and to assist in developing improved market development strategies to benefit market chain actors.

1.3. Research Questions

- Who are the major market chain actors of *teff* market in the study area?
- How is *teff* marketing margin distributed among market chain actors in the study area?
- What does the performance of *teff* market look like in the study area?
- What are the factors affecting market participation and level of participation in *teff* marketing in the study area?

1.4. Objectives of the Study

The general objective of this study was to evaluate *teff* market chain in Dejen district.

The specific objectives of this study were:

- ❖ To identify *teff* market chain actors and their roles
- ❖ To analyze structure-conduct- performance of *teff* market in the study area; and
- ❖ To identify factors affecting *teff* producers market participation and level of participation in the study area.

1.5. Significance of the Study

Analyzing the challenges in *teff* marketing indicate the gaps to improve *teff* production and marketing and helps policy makers in the study area to fill the gap. Understanding factors that influence smallholder farmers' market participation and level of participation will assist

policy makers to develop strategies required to improve market participation and household income and will help to make proper decision by the farmers. The other anticipated significance of this study is that it will be used as a source of reference material for further researches in the area.

1.6. Scope and Limitations of the Study

The scope of the study is limited to market chain analysis of *teff* in Dejen district. In the study different market chain actors and their roles, the performance of *teff* market, and identification of factors affecting market participation and level of participation of farmers in marketing of *teff* in the study area were made. This study was limited spatially and temporarily; spatially the study was conducted only in Dejen district, temporally it was limited since this study was conducted using cross sectional data.

1.7. Organization of the Thesis

This thesis is organized into five chapters. Chapter 1 deals with the introductory part, which constitutes the background, problem statement, objectives, research questions, as well as the significance of the study. Chapter 2 presents review of theoretical and empirical literature on marketing concepts, market participation and level of participation in *teff* market from different sources. Subsequently, methodologies and description of the study area are presented in Chapter 3. Both descriptive statistics and econometric results are presented and discussed in detail in Chapter 4. Chapter 5 summarizes the main findings of the study and draws conclusion and appropriate recommendations.

2. LITERATURE REVIEW

2.1. Basic Concepts and Definitions

Market and marketing: market is an actual place where forces of buyers and sellers are interacting directly or through intermediaries to trade goods and services or instruments for money or barter (Kilingo and Kariuki, 2001). It includes mechanisms or means for determining price of the traded item, communicating the price information, deals and transactions and effecting distribution. Marketing is a social and managerial process by which individuals and groups obtain what they need and want through creating and exchanging products and values with others (Kotler, 2003). It is about establishing and maintaining long term relationships with customers. The basic components of marketing are referred to as marketing variables, marketing mix, or the four P's product, price, place and promotion (Ferris *et al*, 2006).

Marketing system: A marketing system is a network of individuals, groups, and/or entities linked directly or indirectly through sequential or shared participation in economic exchange that creates, assembles, transforms, and makes available assortments of products, both tangible and intangible, provided in response to customer demand (Roger, 2015).

Market chain: a market chain is used to describe the numerous links that connect all the actors and transactions involved in the movement of agricultural goods from the farm to the consumer, it means agricultural goods and products flow up the chain and money flows down the chain (Lundy *et al*, 2004). It is the path one good follow from their source of original production to ultimate destination for final use.

Supply chain: supply chain includes all activities associated with the flow of products and services, from raw materials to finished products. It includes all functions, processes, and activities involved in sourcing, making, and delivering the products or services to customers (Toit and Vlok, 2014). It includes suppliers that provide raw material inputs to a manufacturer as well as the wholesalers and retailers that deliver finished products to consumers.

Marketing channel: A set of interdependent organizations that help make a product or service available for use or consumption by the consumer or business user (Kotler and Armstrong, 2016). It is the way or a sequence of intermediaries in which products and services get to the end-user, the consumer; and are also known as a distribution channel.

Marketable surplus and marketed surplus: the concept of marketed and marketable surplus is important to understand the quantity available for the market. Marketable surplus represents the surplus available for disposal with which the producer is left after his genuine requirements of the family consumption, payment of wages in-kind, feed and seed have been met (NRAA, 2011). Marketed surplus refers to that portion of the marketable surplus, which is actually being disposed of (Alagh, 2014). Marketable surplus is an “ex ante” concept referring to the surplus planned to be marketed, while marketed surplus is an “ex post” concept referring to the actual amount marketed during a period (normally an agricultural year).

Market participation: refers to any market related activity that promotes the sale of produce (Key *et al.*, 2000). It is the ability of the farmers to sell their produce to formal agricultural output markets. In agricultural marketing economy, market participation occurs mainly when farmers stop being mostly subsistence and become profit oriented (Makhura *et al.*, 2001). Higher market participation can drive productivity by providing incentives, information, and cash for purchasing inputs. Higher productivity could drive market participation because farmers with high productivity have surplus to participate in the market, *ceteris paribus* (Rios *et al.*, 2008).

Level of participation: The quantity of grain sold is an indicator of the level of household market participation (Goetz, 1992) states that, in principle, variables affecting the amount to buy or sell are the same as those affecting the decision of whether to participate in the market as a buyer or seller. Proportion of agricultural produce that is not used for subsistence is sold therefore the higher the proportion of sales, the greater the market participation.

2.2. The Structure, Conduct and Performance (S-C-P) Model

The S-C-P model is an analytical approach used to know how the structure of the market and the characteristics of sellers of different commodities and services affect the performance of market, and consequently the welfare of the country as a whole (Kizito, 2008).

The application of S-C-P approach to *teff* market chain analysis in the market was applied in this study to examine whether *teff* market is efficient or not in the study area. In this approach the following are the major areas to be investigated; concentration ratio, entry barriers, price setting strategies, marketing margin and cost of market chain actors.

2.2.1. Market structure

Market structure: It is the interconnected characteristics of a market, such as the number and relative strength of buyers and sellers and degree of collusion among them, level and forms of competition, extent of product differentiation, and ease of entry into and exit from the market (Cramer and Jenson, 1982; Abbott and Makeham, 1981). Structural characteristics may be used as a basis for classifying markets. Markets may be perfectly competitive, monopolistic, or oligopolistic (Scott, 1995). Market structure can be measured by the following methods

Market concentration ratio: market concentration refers to the number and size of distribution of buyers and sellers in a market, the greater the degree of concentration, the higher the possibility of noncompetitive character, such as collusion to exist in the market. Generally, it is believed that higher market concentration indicates non-competitive behavior and thus inefficiency. Market concentration is used when smaller firms account for large percentage of the total market. It measures the extent of domination of sales by one or more firms in a particular market (Devine *et al.*, 1984). Kohls and Uhl (1985) suggested that as a rule of thumb, the four largest enterprises concentration ratio of 50% or more is an indication of the existence of a strongly oligopolistic industry, 33 to 50 % is a weak oligopoly, and less than 33% indicates that the existence of unconcentrated industry.

Hirschman Herfindahl Index (HHI): The Herfindahl Index is given as:

$$HHI = \sum_{i=1}^r s_i^2 \quad i = 1, 2, 3, \dots, r \quad (1)$$

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

The 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 share gives more weight to the shares of the larger firms which is an advantage over concentration ratio. A very small index indicates the presence of many firms of comparable size whilst an index of one or near one suggests the number of firms is small and/or that they have very unequal share in the market. The problem with this measure is that it needs more data to be collected. But lack of information about small firms may not be critical because such firms do not affect the HHI significantly (Kanyengam and Mangisoni, 2012).

Gini-coefficient: Gini-coefficient is a very convenient shorthand summary measure of concentration. Gini-coefficient is an aggregate inequality measure and can vary anywhere from zero (perfect equality) to one (perfect inequality). In actual fact, the gini-coefficient with highly unequal distributions typically lies between 0.50 and 0.70, while with relatively equitable distributions it is on the order of 0.20 to 0.35 (Kanyengam and Mangisoni, 2012). The problem associated with Gini-Coefficients is that it favors equality of market shares without regard to the number of equalized firms. In other words, the coefficient equals zero for two firms with 50 percent market shares, for three firms with 33.33 percent market shares each, and so on. From the above listed measures of market structure Herfindahl index is mostly applied to calculate the share of largest companies and industries and gini-coefficient is mostly applied to analyze income inequality between different nations. But, concentration ratio is the most commonly used method for analyzing market share of the first largest firm in the market. Due to this reason, for this study concentration ratio was used to calculate the market share of the four largest *teff* traders in the district.

2.2.2. Market conduct

Market conduct refers to the practices or strategies of traders in maximizing their profits. Among these practices are the use of regular partners, long-term relations with clients, and suppliers, the use of intermediaries, and trade within personalized networks (Wolday, 1994). It is about firm's pattern of behavior in executing its pricing and promotion strategy, and its response to the realities in the market it operates.

2.2.3. Market performance

Market performance refers to the impact of structure and conduct as a measured in terms of variables such as prices, costs, and volume of output (Scott, 1995). It refers to the end results of these policies the relationship of selling price to costs, the size of output, the efficiency of production, progressiveness in techniques and products, and so forth. Market performance can be evaluated by analyzing the costs and margins of marketing agents in different channels. A commonly used measure of system performance is the marketing margin or price spread (Wisdom *et al.*, 2014).

Marketing margin: There are several participants in the marketing chain; the margin is calculated by finding the price variations at different segments and then comparing them with the final price to the consumer (Wisdom *et al.*, 2014). The consumer price is then the base or the common denominator for all marketing margins. Computing the total gross marketing margin (TGMM) is always related to the final price or the price paid by the end consumer and expressed as a percentage.

Marketing cost: Includes all costs, which are incurred to perform marketing activities in transferring of goods from producers to consumers. Marketing cost includes handling cost (packing, loading and unloading putting inshore and taken out again), transport cost, product loss, storage costs, processing cost, capital cost (interest on loan), commission, and unofficial payments (Heltberg and Tarp, 2001).

2.3. Approaches to the Study of Agricultural Marketing

There are mainly three approaches to study agricultural marketing problems. These are; the functional approach, the system or institutional approach and the individual or commodity approach (Mendoza, 1995; Branson and Novell, 1983).

2.3.1. Functional approach

Functional approach studies marketing in terms of the various activities that are performed in getting farm product from the producer to the consumer. These activities are called functions (Crammers and Jensen, 1997). This approach involves the activities which are done by the firms in the marketing system such as physical distributions, buying, selling, processing, storage, and transportation. Marketing of agricultural product consists primarily moving products from production sites to points of final consumption. In this regard, the market performs exchange functions as well as physical and facilitating functions.

2.3.2. Institutional /system approach

Institutional approach involves various institutions, business firms and organizations that perform the marketing activities, such as operations necessary to transfer goods from the producer to consumer and inputs to the product. It covers all market participants (producer, assembler, transporter, wholesaler, retailer and consumer).

2.3.3. Commodity/ individual approach

Commodity approach restricts on what is being done to the product after its transfer from its original production place to the consumer (Kohls and Uhl, 1985). It helps to pinpoint the specific marketing problems of each commodity as well as improvement measures. In this approach, a specific commodity or groups of commodities are taken and the functions and institutions involved in the marketing process are analyzed.

2.4. Analytical Methods

Market participation is the market actors' decision on whether to be involved or not in the flow of products from producers to end users. It is both a cause and a consequence of economic development (Reardon and Timmer, 2005). It enhances the links between the input and output sides of agricultural markets (Berhanu and Moti, 2010). In developing countries, promoting smallholders market participation is an essential and important effort to bring agricultural transformation (Braun *et al.*, 1994). Higher market participation can drive productivity by providing incentives, information, and cash for purchasing inputs. Higher productivity could drive market participation because farmers with high productivity will have more marketable surplus to participate in the market, keeping other things constant (Barrett, 2008). On the contrary farmers with low market participation have low agricultural productivity and they are also the poorest (Mathenge *et al.*, 2010). So market participation should be enhanced to increase the marketable surplus (Geoffrey *et al.*, 2014).

Agricultural market participation leads farmers from subsistence production to market-oriented production that further increases their market participation (Haddad and Bouis, 1990). According to Reardon and Timmer (2005), farmers enjoy welfare gain from trade if market concentrates their prospect to specialize based on their comparative advantage. By selling the surplus of their produce on a comparative advantage households participating in markets based on theory of trade, then they can be benefit from direct welfare gains as well as opportunities that emerge from economies of large-scale production (Barrett, 2008). Most empirical studies evaluating market participation and the extent of participation using Heckman (1979) sample selection model, while some researchers used the more restrictive Tobit model to analyze market participation and extent of participation (e.g., Holloway *et al.*, 2000).

The Heckman two-step model is more appropriate (Heckman, 1979) if there is selectivity bias. Due to its ability to correct for self-selection bias, whereas, others use double hurdle model that designed to nest the most restrictive Tobit model. In this study double hurdle model and Tobit model were compared using both Akaike's information criteria (AIC) and model specification test. Whereas, Heckman sample selection model and double hurdle model were also compared based on Heckman inverse mills Ratio (IMR).

2.5. Review of Empirical Studies

A number of studies such as Efaet *al.*, (2016), Mebrahatom (2014), Girma (2015) and Firdisa (2016) investigated about factors that affect farmers' market participation and level of participation in agricultural markets.

Efaet *al.*, (2016) used Double hurdle model to identify factors affecting market participation and intensity of marketed surplus of *teff*. The author found that market participation of smallholder farmers is significantly affected by access to credit, perception of farmers on lagged market price of *teff*, family size, agro ecology, farm size and ownership of transport equipment. Whereas intensity of market participation was significantly influenced by family size, agro ecology, distance to the nearest market, farm size, perception of current price, income from other farming and off-farm activity, and livestock holding from the result of Double Hurdle model. The findings generally suggest the need to create reliable market information, provide good transport facilities for farmers through development of infrastructure, strong extension intervention and giving training to farmers on marketing.

Mebrahatom (2014) conducted a study on factors determining the extent of smallholders' participation in the output market using multiple linear regression model in Tahtay Qoraroworeda, Northwest Zone of Tigray Region, Ethiopia. Accordingly, ownership of equine, cash expenses for farming, specialization in *teff* (% of land allocated to *teff*), total factor productivity, market price of *teff* and ownership of oxen were those explaining the variation of *teff* output sale positively while distance from homestead to the nearest marketplace and distance from homestead to allweather road found negatively affected.

Girma (2015) conducted a study on determinants of marketed surplus of *teff* the case of Baku worda in South-West Shewa Zone, Oromia National Regional State, Ethiopia, using multiple linear regression models. The result indicated sex, land allocated for *teff*, market information, and frequency of contact with extension agents on *teff* production and marketing had a significant effect on the volume of *teff* marketed in his study area. Based on the above discussed empirical studies we can conclude that most of the factors that affect market participation of each commodity differ from one area to another. Hence, difference in the marketing system of the commodities, type of commodities, use of agronomic practices and

location of the study can result in differences in factors affecting market participation and level of participation.

The study by Firdisa (2016) assesses factors determining smallholders' participation in *teff* production in Horo and Jima Geneti districts, Ethiopia. Probit Model econometric estimation procedure was employed to analyze the effects of different explanatory variables on farmers' participation decision in *teff* production. The results of the probit model revealed that the coefficients of 5 variables were found to be significantly creating variation on the probability of farmers' production participation. The variables that turned out to be significant include: age of the household head, fertility of farm land, number of Oxen owned by the household, family labour and the distance of the households' residence from extension service. According to this finding both smallholder farmers and the local development agents should give attention to those significant variables with care and design a better production strategy focusing on effective supervision, training and approval of appropriate credit institution site so as to enhance the farmers' participation in *teff* production thereby raise productivity of agricultural sector. Based on the above discussed empirical studies we can conclude that most of the factors that affect the market participation of each commodity differ from one area to another. Hence, difference in the marketing system of the commodities, type of commodities, location of the study area and a type of econometric model they use can result in differences in factors affecting market participation and level of participation.

2.6. Conceptual Framework of the Study

Market chain describes different links that connect all the actors and activities involved in the movement of agricultural products from the producer to the final consumer. Market chain analysis is an investigation of marketing problems in the market systems which tackle market chain actors. There are also determinants which mainly affect market participation and level of participation of *teff* marketing. These determinants can be categorized as demographic factors like sex, family size, perception on lagged market price, level of education, *teff* production experience and socio-economic factors like number of oxen owned, numbers of equine owned, income from non-farm activity, current price of *teff*, yield and institutional factors like access to credit, frequency of extension contact and distance to nearest market.

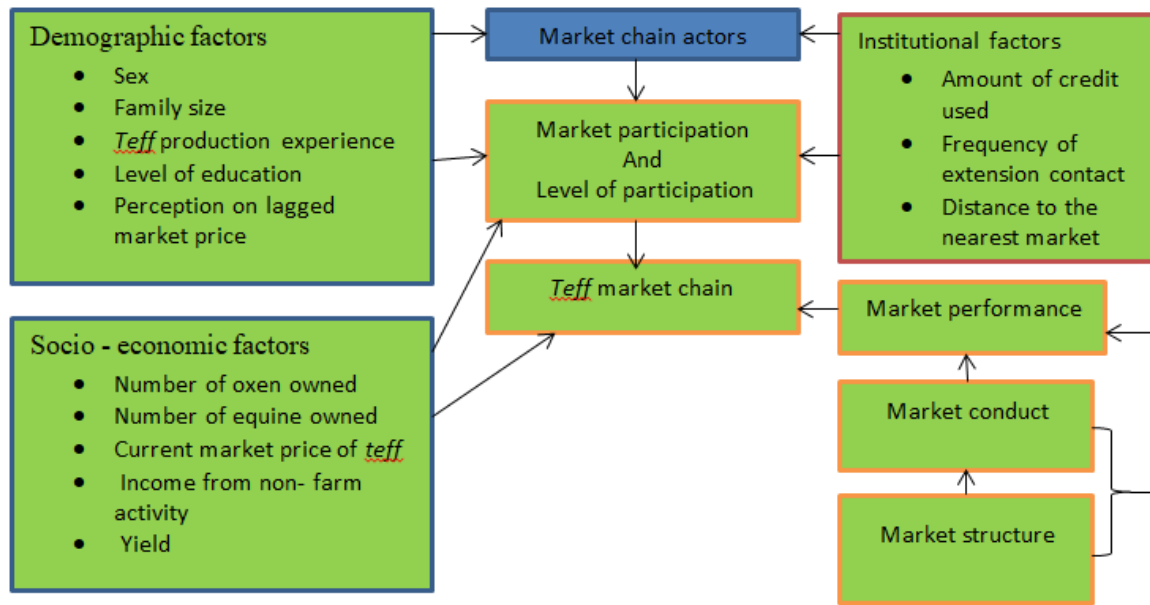


Figure 1. Conceptual framework of the study
Source: own sketch (2018)

3. RESEARCH METHODOLOGY

3.1. Description of the Study Area

Dejen woreda is located in Amhara National Regional State East Gojjam administrative Zone. It is bordered on the west by Awabel, on the east by Shebelberenta, on the north by Enemay and northwest by Debaytilatgen on the south by Abay River which separates it from Oromia Region. The main town of Dejen district is Dejen which is located at about 230 km, 335 km and 70 km far from Addis Ababa, Bahir Dar (the capital of the region) and Debre Markos (the capital of the Zone), respectively. It has a latitude and longitude of 10°10'N 38°8'E and an elevation between 2421 and 2490 meters above sea level (ODWARD, 2017).

According to CSA (2007), the total population of the District was about 123,373, of whom 59,514 are men and 63,859 women; about 15,158 are urban inhabitants. With an area of 620.97 square kilometers, Dejen has a population density of 198.68, which is greater than the Zone average of 153.8 persons per square kilometer. A total of 25,511 households were counted in this district, resulting in an average of 4.01 persons to a household, and 24,917 housing units. The majority (97.01%) of the inhabitants practiced Ethiopian Orthodox Christianity while 2.85% of the populations were Muslim.

The district has three weather conditions out of which 2% of the area is Dega, 75% and 23% of the area is weynadega and Kola, respectively. The average annual rainfall and annual temperature is estimated to be 900mm and 16.6 °C, respectively. The district had largely mono-modal rain fall distribution pattern which extends from June to August. Agriculture is the major source of living for the community in the district under study. Mixed farming, which includes crop and livestock production, is practiced in the area. The major crops grown in the area are *teff*, wheat, beans, pea, sorghum and short rain crops like chickpea and vetch (guaya). Most farmers kept livestock such as sheep, goat, cattle and poultry, of which sheep is the dominant livestock type (ODWARD, 2017).

Regarding with markets available in the district, there are only two town and four village markets which have infrastructural problems such as very poor quality of roads with long distance and lack of market information. Because of those marketing problems potential buyers are not going to those village markets and all actors are not found there so producers

cannot sell their product on time and they are not satisfied by the price of their product i.e. they sell at lower price and they are not profitable. Long distance to the market and lack of market information reduces market participation and level of participation in the study area (ODWIT, 2017).

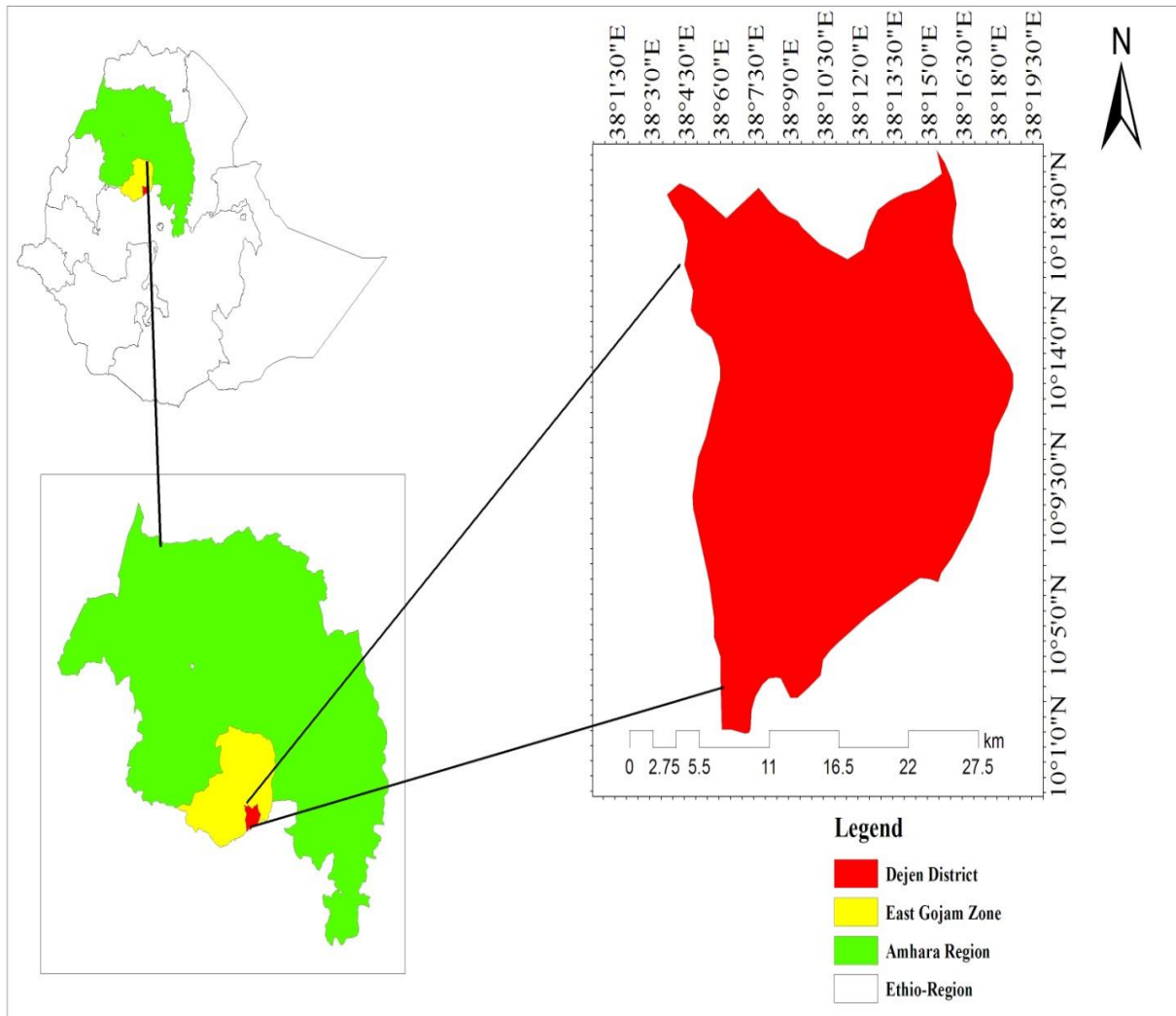


Figure 2. Geographical location of the study area
Source: GIS map (2018)

3.2. Data Type, Sources and Methods of Data Collection

In this study both primary and secondary data were used and collected from both primary and secondary data sources. The primary data were collected from two groups of samples: *teff*

producers and market chain actors which includes wholesalers, rural collectors, urban collectors and retailers using a semi-structured questionnaire.

Using sample producers the study identified major actors and their linkages from the production point to the end users. Primary data were collected using structured questionnaire, which is developed, modified, evaluated and pre-tested before the final data collected. Both qualitative and quantitative types of data were collected using primary source of data. Qualitative data like sex of household head, perception about lagged price and the like; and quantitative data are number based data collected from respondents like current year price, quantity produced, quantity sold, numbers of oxen owned, numbers of equine owned and frequency of producers contact with extension agents and the like. Secondary data both qualitative and quantitative were collected from published and unpublished documents. Secondary data on population size of the district, data on production and list of major *teff* producer *kebeles* were collected from district bureau of Agriculture. List of wholesalers, retailers, and rural collectors were collected from Trade and Industry office of Dejen district. Secondary data were also collected from different journals, books, and other published and unpublished sources.

3.3. Sampling procedure and Sample Size Determination

3.3.1. Sampling of *Teff* producers

A multi-stagesampling technique was used to draw sample *teff* producers. In the first stage, 14 *teff* producing *kebeles* were identified out of 22 *kebeles* in Dejen district. In the second stage, four producing *kebeles* namely Enajima, Mahberebirihan, Borebor and Sebishengo were selected purposively based on their potential of production. In the third stage, 170 *teff* Producer households were selected randomly using probability proportionate to the population size of the sample *kebeles*.

Table 1. Distribution of sample respondents by *kebeles*

Name of sample <i>kebeles</i>	Number of <i>teff</i> producing households	Number of Sample households
Enajima	720	47
Mahberebirihan	630	41
Borebor	810	53
Sebshengo	440	29
Total	2,600	170

Source: ODWARD, 2017

3.3.2. Sampling of *Teff* traders

The sites for the *teff* trader's survey were town markets, which were selected based on the flow of *teff* produce from the study district. It was employed in two sample markets; namely, Dejen town market and Yetnora market. The sample size of *teff* traders was determined proportional to the number of traders in the two markets. In total, 49 traders were selected from both Dejen and Yetnora markets.

Table 2. Sample size of traders in Dejen district

Types of traders	Total number of traders	Sample traders		
		Yetnora	Dejen	Total
Wholesalers	24	5	7	12
Rural collectors	38	12	7	19
Urban collectors	26	5	8	13
Retailers	10	2	3	5
Total	98	24	25	49

Source: ODWIT, 2017

3.4. Methods of Data Analysis

Both descriptive statistics and econometric model were used to analyze the data for this study. The descriptive statistics includes percentages, means, and standard deviations. It was used in the process of examining and describing structure, conduct and performance of *teff* market,

farm household and traders' characteristics, market chain actors and their roles in *teff* market. In the econometric model determinants of market participation and level of participation of *teff* market were identified using Double Hurdle model.

3.4.1. Descriptive statistics

This method of data analysis was used ratios, percentages, means, and standard deviations in the process of examining and describing marketing functions, farm household characteristics, market and traders' characteristics.

Structure- conduct- performance (s-c-p) approach was used to examine the causal relationship between market structure, conduct, and performance.

Market structure: In this study concentration ratio was used to identify whether the *teff* market is competitive or not in the study area or for classifying markets as perfectly competitive, monopolistic or oligopolistic.

The greater degree of concentration is the greater the possibility of non-competitive behavior existing in the market. For an efficient market, there should be sufficient number of firms (buyers and sellers). Concentration ratio and barrier to entry and exit was used to study the structure of the *teff* market in the study area. The formula for concentration ratio is stated as follows:

$$S_i = \frac{V_i}{\sum V_i} \quad (2)$$

Where S_i = market share of buyer i

V_i = amount of product handled by buyer i

$\sum V_i$ = Total amount of the product

$$C = \sum_{i=1}^m S_i \quad i=1, 2, 3 \dots m \quad (3)$$

Where C = concentration ratio;

S_i = is the percentage market share of i^{th} firm and

M = is the number of largest firms for which the ratio is calculated.

Kohl's and Uhl (1985) bring into play as a rule of thumb, four largest enterprises' concentration ratio of 50% or more (an indication of a strongly oligopolistic industry), 33-50% (a weak oligopoly) and less than that (competitive industry).

Barriers to entry and exit: refers to the relative ease or difficulty with which new dealers may enter into market. Technological, economic, regulatory, institutional, and other factors that inhibit firms from engaging in new businesses or entering new markets, State barriers to entry as one of the measures of market structure and indicate the study result in result and discussion part.

Market conduct: Market conduct refers to the behavior of firms or the strategies used by the firms. In this study, market conduct was used to identify sample *teff* producers and traders selling and buying strategies (price setting system, mode of payment, and source of information) used by sample chain actors.

Market performance: In this study to analyze *teff* market performance, marketing margins and marketing costs of *teff* was calculated. The total marketing margin of chain actors was calculated by using the following formulas:

Marketing margin is the percentage of the final weighted average selling price taken by each stage of the marketing chain. A wide margin means usually high prices to consumers and low prices to producers. The total marketing margin may be subdivided into different components: all the costs of marketing services and the profit margins or net returns. The cost and price information obtained from the survey was used to evaluate the gross marketing margin. The method of analysis of marketing margin was as follows.

$$\text{TGMM} = \frac{\text{consumer price} - \text{farmer price}}{\text{consumer price}} \times 100 \quad (4)$$

$$\text{GMMP} = \frac{\text{consumer price} - \text{marketing gross margin}}{\text{consumer price}} \times 100 \quad (5)$$

Where: TGMM = Total Gross Marketing Margin

GMMP = Gross Marketing Margin of Producers

3.4.2. Econometric method

According to Komarek (2010), limited dependent models like Heckman two-stage models, double-hurdle model and restrictive Tobit model have been used to study crop market participation. Since the mills lambda is insignificant that indicates there is no selectivity bias in the model. Therefore, Heckman is not appropriate for the data set of this study as indicated in econometric model output. Therefore, the most restrictive Tobit model and double hurdle model were compared, and finally double hurdle model found appropriate for the data set using model specification test also indicated in section 3.5. According to Wooldridge (2002), censored regression models applicable when the variable to be explained is partially continuous but has a positive probability mass at one or more points.

Among the models, the standard censored Tobit model is more appropriate than OLS estimates for corner solution outcomes that assume constant relative partial effects for a pair of explanatory variables. Furthermore, the Tobit model assumes that the household's decision to sale and on how much to sale if the sale occurs determined by the same mechanism. To overwhelm the restrictive assumptions of Tobit model, the current double-hurdle model come to be popular as explained above in the analytical methods part. This model was proposed by Cragg (1971) as an alternative to the selectivity model. Its name comes from the fact that there are two hurdles to be overcome before observing a non-censored observation, and to nest the general Tobit model. According to Newman *et al.* (2001), the first hurdle involves the decision of whether or not to sell *teff* (participation decision) whereas the second hurdle concerns the level of *teff* sales the producer chooses (quantity of sales decision). It indicates that a producer makes two decisions with respect to sales of an item.

In addition to this, Burke (2009) indicated that in estimating the determinants of the continuous dependent variable in the second stage double hurdle model is useful because it allows a subset of the data to crash at some value without causing bias, hence we can obtain all the data in the remaining sample for the participants. Therefore, in double hurdle model, there are no restrictions regarding the elements of explanatory variables in each decision stages. Based on Wooldridge (2002), the participation and quantity of *teff* sales equation are written as:

$$d_i^* = X_1\beta_1 + \varepsilon_{1i} \quad (6)$$

$$\varepsilon_{1i} \sim N(0, \sigma_1^2),$$

$$d_i = \begin{cases} 1 & \text{if } d_i^* > 0 \\ 0 & \text{if } d_i^* \leq 0 \end{cases}$$

$$y_i^* = X_2\beta_2 + \varepsilon_{2i},$$

$$\varepsilon_{2i} \sim N(0, \sigma_2^2),$$

$$y_i = \begin{cases} 1 & \text{if } y_i^* > 0 \text{ and } d_i = 1 \\ 0 & \text{if } y_i^* \leq 0 \end{cases}, \quad (7)$$

The subscript i refers to the i^{th} household, d_i is the observable discrete decision of whether or not to sell *teff*, while d_i^* is the latent (unobservable) variable of d_i . y_i^* is an unobserved, latent variable (desired quantity of *teff* sold), and y_i is the corresponding observed variable, quantity of *teff* sold. X_1 and X_2 represent vectors of explanatory variables. β_1 and β_2 are vectors of parameters to be estimated and ε_{1i} and ε_{2i} are random errors.

3.5. Model Specification Tests

To check which model is best from double hurdle and most restrictive Tobit model both a standard log likelihood ratio test and Akaike's Information Criteria were used, as the Tobit model nested to the double hurdle model (Humphreys, 2010).

The Tobit model can be tested against the double hurdle model, by restricting the parameters of the participation probit model equal to the parameters of the truncated regression model as well to the Tobit model. Let ll_{probit} be the log likelihood of probit model, ll_{truncreg} be the log likelihood of truncated regressions and ll_{tobit} be the log likelihood value of Tobit model. Now the likelihood ratio test (LR) can be carried out as follows:

$$\text{Tobit test (LR)} = 2 * (ll_{\text{probit}} + ll_{\text{truncreg}} - ll_{\text{tobit}}) \quad (8)$$

The test statistic has a χ^2 distribution with degrees of freedom equal to the number of parameter included in the regression (probit=truncated=Tobit) plus the intercept. Therefore, the total number of explanatory variables used to test Tobit model were 12, then 13 degree of freedom was used to get the critical values of this test.

3.6. Hypothesis and Variable Definition

This part of the study tries to hypothesize determinants that influence market participation and level of participation. In the course of identifying factors influencing *teff* market participation, the main task is to explore which factors potentially influence and how (the direction of the relationship) these factors related with the dependent variables. Hence, potential variables which are supposed to influence the market participation and level of participation of *teff* product need to be explained.

Dependent variable

Market participation : It is dummy dependent variable which represents the participation of households in *teff* marketing in the survey year. 1=if the household was participated and 0= if not

Level of participation: is a continuous dependent variable which represents the actual marketed surplus of *teff* by the farm households in 2017/2018 production year in quintals.

Independent variables

Sex of the household head (SEX HH): It is a dummy variable taking 1 for male and 0 for female *teff* farmers. Male-headed households have access to productive assets such as land, labor and capital which increases their production capabilities and hence, expected to have a positive relationship with market participation and level of participation. Dagmawit (2016) found sex of household head positively affected maize market participation. The result showed that being male household head increases the probability of market participation of the sample participant due to the reason that men contribute more labor input in the production of crops.

Level of education (EDUC): is a categorical variable, which represents education level of household expected to have a positive relationship with market participation and level of participation. The finding of Ababo (2016) showed that education level of household head affected marketed surplus of maize positively. This is because producers who have higher education level have better attitudes towards the new production technologies, input utilization, to actively being beneficiaries of services provided to them. Additionally, it is due

to the fact that as the educational level of farmers increased, farmers' ability to get, process and use information for their market supply also increases.

Family size (FAMSZ): It is a continuous variable, measured in adult equivalent of the household members. The result of Sultan (2016) showed that family size affected the supply of wheat to market negatively. When the number of household members increased more part of wheat produce will be allocated for household consumption. There is also another argument which is man equivalent; households with higher family labor supply are more likely to grow output. According to Mebrahatom, (2014) this variable was affected volume of produce sold positively. Employing higher man-days per ha is expected to affect both production and output markets participation positively. In this study family size was hypothesized to influence market participation and level of supply negatively.

Amount of credit used (CRD): It is a continuous variable which represents the amount of money in which the households were borrow from credit institutions for *teff* production. For small-scale farmers, access to credit is believed to play important role in increasing the market participation and level of participation. Consistent with this, Haymanot (2014) found the amount of credit to have positive and significant influence on volume of durum wheat marketed.

Perception on lagged market price (PLMKP): This is a dummy variable which represents the perception of households to last years' price of *teff*. Farmers whose perception on lagged market price of *teff* is low are less likely to sell *teff* when compared with farmers who perceived the lagged market price as high. We hypothesize that when farmers perceive previous prices as high, according to adaptive expectation, they are likely expect the future price will be higher. This can motivate the farmers to produce more which increases the marketable surpluses. Thus, the lagged price is hypothesized to affect farmers' decision to participate in the *teff* markets and the level of their participations positively. Adugnaw (2017) result implied that lagged price stimulate production and market supply of agricultural commodities. Therefore, in this study, it was hypothesized that farmers' perceptions of previous prices to have positive relationship with their market participation and level of participation.

Number of oxen owned (NOXW): is a continuous independent variable indicating total oxen holding of the household. According to Ababo (2016), number of oxen owned by household head influenced the farmers' decision to participate in maize market and sale volume of maize positively. This is because of the facts that as farmers have more and more number of oxen; they can easily cultivate the maize land intensively/extensively, which increases the production of maize there by increasing the market participation decision and quantity of maize sold. In addition, Adugnaw (2017) result indicated that number of oxen owned had positive and significant influence on market supply of *teff*. This is due to the fact that producers who owned oxen are more likely to till (plough) in time than producers who have not oxen. Therefore, this variable was anticipated to have a positive association with *teff* market participation and level of participation.

Frequency of extension contact (FREQEXTC): It is a continuous variable measured in number. It is expected that extension service widens the household's knowledge with regard to the use of improved *teff* production technologies and has positive impact on *teff* market participation decision. Ababo(2016) found frequency of extension contact positively influenced participation decision of framers in maize market. This suggests that access to extension service avails information regarding technology which improves production that affects market participation decision of households. Therefore, an extension service was expected to be associated with higher market participation and level of participation.

Distance to nearest market (DSNMKT): It is a continuous variable and is measured in walking time (hour).Beza (2014) found that distance to market negatively affected quantity supplied to the market of if the farmer is located in a village distant from the market, he will be weakly accessible to the market. Therefore, it was hypothesized that this variable to be negatively related to market participation and level of participation.

Number of equines owned (NEOW): is a continuous variable which represents the number of equines owned by the households which help households to transport *teff* output from area of production to market. After production farmers are constrained by transport cost and households with own means of transport would sell more because ownership of means of

transport would reduce transportation cost that constrains them. Therefore, it was expected to have positive effect on market participation and level of participation.

Teff production experience of the household (TPEXP): This variable represents the number of years a household spent in *teff* production. A farmer with higher years of farming experience may have accumulated marketing capacity and better relationship with traders. Therefore number of years of households' farming experience is expected to have a positive relationship with market participation and level of participation. Yaynabeba and Tewodros, (2013) found a positive and significant relationship between smallholder farmer's haricot bean market participation and farming experience.

Yield (q/ha): It is a continuous variable measured in quintal per hectare and expected to affect *teff* market participation and intensity of participation positively. Farmers who produce higher output per hectare expected to supply more to the market than those with the lower output per hectare of land. According to Tadele (2017), productivity of *teff* affected intensity of *teff* marketed positively and significantly.

Current price of *teff* (2017/18): It is a continuous variable measured in Ethiopian birr per quintal. It was expected to affect intensity of *teff* market participation positively, because prices stimulate volume of *teff* marketed. If the current market prices is low producers will not interested to sell *teff*, then intensity of *teff* participation will decrease until the price rises. According to Azeb and Tadele (2017), the price of *teff* positively affected the quantity of *teff* supplied to the market as the price of *teff* at market rises; the quantity of *teff* sold at the market also rises. Moreover, Beza (2014) indicated that maize market price positively affected the quantity of maize supplied to the market.

Non-farm income (log): The findings of Beza (2014) showed that non-farm income negatively affected the supply of maize to the market. This may be due to the fact that households who generate more income from nonfarm activities, tends to sell less and increase family food consumption. Moreover, Azeb and Tadele (2017) result showed that income from non-farm activities positively related to the quantity of *teff* supplied to market. This could be due to the fact that farmers who have additional income would have the chance to buy food for consumption at any time and increase their marketable crops.

Table 3. Summary of variables in market participation and level of participation

Variable	Notation	Category	Measurement	Sign
Market participation	MKTP	Dummy	1=if participate;0=otherwise	
Level of participation'	LP	Continuous	Quintal	
Independent variable				
Sex of the household head	SEXHH	Dummy	0=female 1=male	+
Family size	FAMSZ	Continuous	Number of members of households	-
Amount of credit used	CRD	Continuous	Birr	+
Current price of <i>teff</i>	CP	Continuous	Birr	+
Perception of lagged market price of <i>teff</i>	PLMKP	Dummy	0=high; 1=low	±
Number of oxen owned	NOXW	Continuous	Number	±
Frequency of extension contact	NEXTC	Continuous	Number	+
Distance to nearest market	DSNMKT	Continuous	Kilometer	-
Number of equines owned	NEOW	Continuous	Number	-
Level of education	EDUC	Categorical	0=illiterate 1=adult education 2=primary education 3=secondary education	+
Non- farm income(log)	NFI	Continuous	Birr	-
<i>Teff</i> production experience	TPEXP	Continuous	Years	+
Yield	YIELD	Continuous	Quintal	+

Source: Own computation

4. RESULTS AND DISCUSSION

In this chapter the major findings of the research work are presented. In the first part socio-demographic characteristics of the sample respondents are presented in tabular and narrative format. In the second part the Structure, Conduct and Performance of market approach was used to evaluate whether *teff* market in the study area is efficient or not. Findings regarding with factors affecting market participation and level of participation are presented from the result of econometric analysis.

4.1 Demographic Characteristics of sample *teff* producers

Table 4 depicted the difference between *teff* market participants and non-participants with regard to their sex and level of education. Out of the total market participants, 80.7% were male headed households whereas 19.3% were female headed households. Female headed non-participants were 5.9%; the rest were male headed non-participants. The two groups were statistically different in terms of sex of the household head.

Table 4. Demographic characteristics of *teff* producers in Dejen district

Items	Participants(n=119)		Non-participants(n=51)		χ^2 -value	
	N	%	N	%		
Sex	Male	96	80.7	48	94.1	4.982**
Marital status	Married	87	73.1	41	8	1.551
Level of education						
Illiterate		73	61.34	23	45	
Adult education		35	29.42	10	19.6	18.568
Primary education		8	6.72	16	31.7	
Secondary education and above		3	2.52	2	3.92	

Source: Survey result (2017)

According to categorization of educational level of respondents, the data indicated that 61.34% and 45% of participants and non-participants respectively were illiterate, 6.72% of participants and 31.7% of non-participants were found to have attended primary education, while 2.52% of participants and 3.92% of non-participants were found to have attended secondary education and above. The remaining 29.42% of participants and 19.6% of non-participants were found to have attended adult education including religious schooling. With

respect to marital status characteristics of sample producers, 73.1% of participants and 8% of non- participants were married.

4.2. Socio-Economic Characteristics of Sample *Teff* Producers

The following table (Table 5) shows about the socio-economic characteristics of *teff* market participants and non-participants in Dejen district. The mean income of *teff* market participants' from non-farm activities per month was Birr 1072.18, while it was Birr 2162.75 for non-participants. The average yield of *teff* for participants was 15.06 qt/ha, while it was 12.02qt/ha for non-participants. The two groups were statistically different at 1% significance level in terms of income from non-farm activities, numbers of equine, and numbers of oxen owned.

Table 5. Socio-economic characteristics of sample *teff* producers

Items	Participants (n=119)		Non-participants (n=51)		t-value
	Mean	Std. Dev.	Mean	Std. Dev.	
Income from non-farm activity (Eth. Birr)	1072.18	1457.89	2162.75	2524.28	3.539***
Numbers of equine owned	2.71	0.56	2.37	0.60	-3.493***
Numbers of oxen owned	3.26	1.25	2.29	0.46	-5.380***
Yield	15.06	16.73	12.02	10.58	-1.2027
Land allocated for <i>teff</i> (h)	1.63	0.57	1.51	0.54	-1.327

Source: Survey result, 2017

4.3. Institutional Factors Affecting Sample *Teff* Producers

Table 6 below depicts institutional factors affecting sample *teff* producers of Dejen. Based on this the average *teff* producers' frequency of extension contact for *teff* market participants was 25 days per year; while 20 days per year for non-participants during 2017/18 production season. The two groups were statistically significant at 1% significant level with respect to frequency of extension contact.

Table 6. Institutional factors affecting Dejen district sample *teff* producers

Items	Participants (n=119)		Non-participants (n=51)		t/ χ^2 -value
	n/mean	%/Std. Dev.	n/mean	%/Std. Dev.	
Frequency of extension contact	25.61	6.55	20.37	6.55	-4.779***
Distance to the nearest market (km)	6.85	2.49	6.89	2.23	0.093
Credit access(amount)	3196.08	3526.51	3196.08	3963.68	1.287

Source: Survey result, 2017

4.4. Market Chain Actors and Their Roles

Market chain actors are agents who are participating in transferring of agricultural commodities from the point of production to the point of consumption (Mohammed, 2011). They are involved in different activities like producing, collecting, assembling, wholesaling, and retailing. Those identified market participants in transferring of *teff* from producer to consumer and their roles are discussed below:

Producers: Producers are the first actors who perform starting from farm land preparation on their farms, procurement of the inputs from other sources to post harvest handling and marketing. They transport *teff* to the nearest markets either to village market or to the district markets by using pack animals, animal driven carts, and using human labor. Producers sell their *teff* product through different channel outlets. The main channel outlets are wholesalers (46%), rural collectors (22%), urban assemblers (16%), retailers (10%) and consumers (5%), respectively (Figure 3)

Wholesalers: Wholesalers are market actors who bought relatively high amount of *teff* than other traders. They are residing in town having their permanent store and collect *teff* brought by producers, rural collectors and urban assemblers. There were 24 licensed *teff* wholesalers in the study area who assemble *teff* from different directions and store in bulk and they sell large amount of *teff* (68%) to Addis Abeba markets (figure 3).

Rural collectors: Rural assemblers are traders who collect *teff* from producers at local markets, by waiting them on a road sides near the market during market days and even from producers' house. Rural collectors sale *teff* to wholesalers. They are the only actors who buy *teff* from producers home. They collected 22% of *teff* from producers and sold 100% amount of their *teff* to wholesalers (figure 3).

Urban assemblers: purchased *teff* from farmers and resale mostly to wholesalers and retailers. They are market chain actors who collects *teff* product at town markets from producers during market days. Based on the study result, urban assemblers sell all quantity of *teff*(100%)to wholesalers (Figure3).

Retailers: Retailers are market actors which have direct contact with consumers. They are located at the end of marketing chain, directly servicing the ultimate consumers of *teff*. In the study area there are 10 licensed retailers who purchase *teff* from wholesalers, producers and collectors and retail it in small units to consumers. Based on the study result, retailers purchased large amount of *teff* (32%) from wholesalers (figure 3).

Consumers: Consumers are individuals who buy goods and service for consumption directly or other use but not to resale it. They are the last link in the market chain. According to the study, consumers purchased large amount of *teff* from retailers and they do not perform reselling activities




4.4.1. *Teff* market Channels





The marketing channels of *teff* identified below shows how *teff* passes through five routs of intermediaries on the way from point of producers to reach final users (consumers). The main identified channels of *teff* during the survey in the study area are stated as follows

Channel I Producers  Consumers

Channel II Producers  Retailers  Consumers

Channel III Producers  Wholesalers  Retailers  consumers

Channel IV Producers  Rural collectors  Wholesalers  Retailers 
Consumers

Channel V Producers  Urban collectors  Wholesalers  Retailers 
Consumers

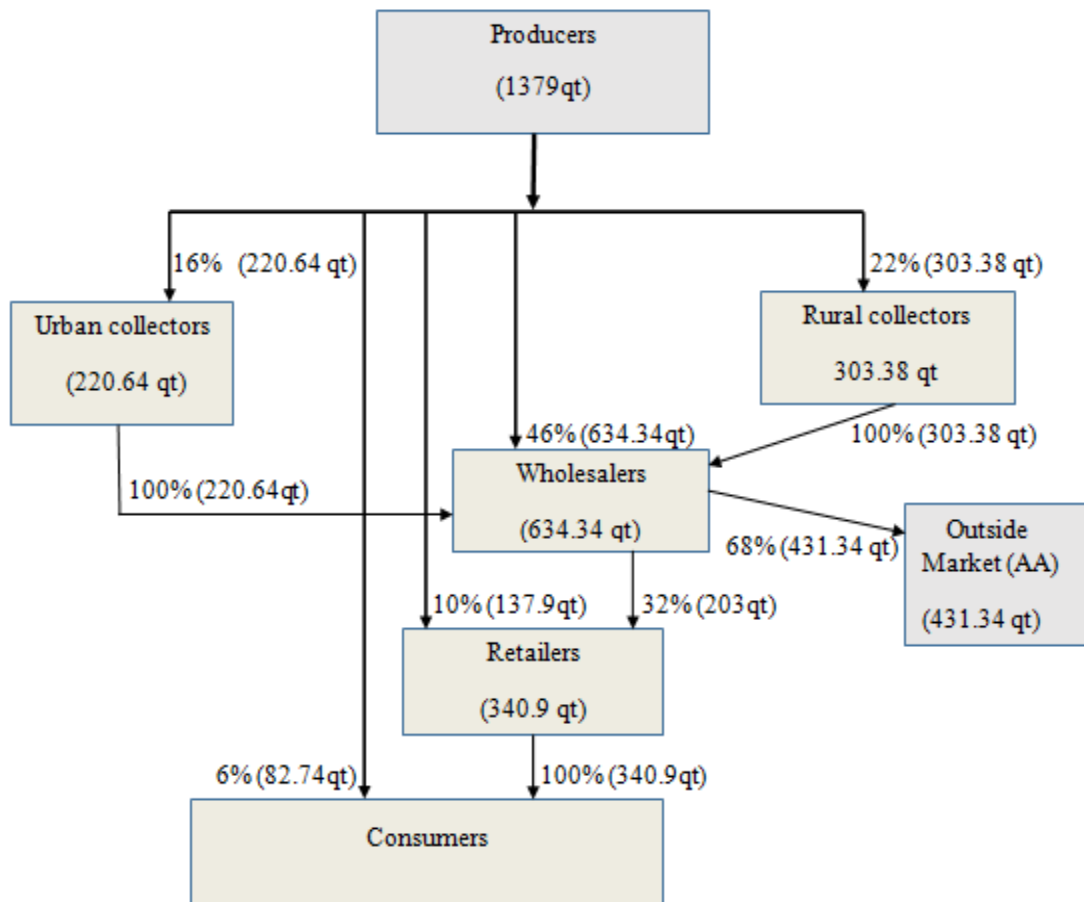


Figure 3. *Teff* market cannels for different market actors

Source: Own survey, 2018

4.4.2. Socio-economic characteristics of sample traders

The initial working capital of traders ranged from Birr 2000 to 30000 and traders’ current working capital ranged from Birr 10000 to 300,000 and the mean initial and current working capital of sample traders was Birr 7591.8 and 45073.7 with standard deviation of 6233.874 and 63001.02 , respectively.

Table 7. Size of initial and current working capital of sample traders

Variables		Occupation of traders			
		Wholesaler	Urban collector	Rural collector	Retailer
Initial working capital(Birr)	Minimum	3000	3000	2000	3000
	Maximum	30,000	10,000	10,000	9000
	Mean	17,760	6272.7	4450	4600
Current working capital(Birr)	Minimum	21,000	11,000	10,000	10,000
	Maximum	300,000	23,000	25,000	26,000
	Mean	141,720	16,691	16,450	17,600

Source: Own survey (2017)

Table(8) below depicts sample traders with respect to traders' source of working capital.wholesalers got 58.3% of their capital from their own and 16.7% fom gift and other traders. Retailers are the only traders who got their working capital 100% from their own capital. The sources of working capital for rural collectors are 73.7% from their own and 15.8% from loan. Urban collectors got higher amount of working capital (70%) from their own and minimum amount (23%) from other traders.

Table 8. Source of working capital of sample traders

Variable	Traders							
	Wholesaler		Urban collector		Rural collector		Retailer	
Source of capital	N	%	N	%	N	%	N	%
Own	7	58.3	10	76.9	14	73.7	5	100
Loan	1	8.3	3	23.1	3	15.8	0	0
Gift	2	16.7	0	0	2	10.5	0	0
other traders	2	16.7	0	0	0	5	0	0

Source: Own survey, 2017

4.5. Structure, Conduct and Performance of *Teff* Market

4.5.1. Structure of *Teff* Market

In this study the structure of the *teff* market is characterized using indicators such as, market concentration and entry conditions (licensing procedure and availability of working capital).

Market concentration ratio

Concentration ratio is interpreted as an indicator for the degree of competitiveness among *teff* traders. The first four traders with the largest volume of *teff* handled were used for the calculation of market concentration ratio of *teff* traders.

Table 9. *Teff* traders' concentration ratio for Dejen market

Traders	Cumulative frequency of traders	% share of trader	Cumulative % of traders	Quantity purchase in Qt	Cumulative quantity purchased in Qt	% share of purchase	% cumulative purchase
1	1	3.33	3.33	380	380	18	18
1	2	3.33	6.66	360	740	17.1	35.1
1	3	3.33	9.99	280	1020	13.3	48.4
1	4	3.33	13.32	185	1205	8.8	57.2
3	7	10	23.32	150	1355	7.13	64.33
1	8	3.33	26.65	120	1475	5.7	70.03
1	9	3.33	29.98	110	1575	5.23	75.26
2	11	6.66	36.64	100	1685	4.75	80.01
4	15	13.33	49.97	90	1775	4.28	84.29
7	22	23.33	73.3	80	1855	3.8	88.09
3	25	10	83.73	70	1925	3.33	91.42
2	27	6.66	89.96	60	1985	2.85	94.27
1	28	3.33	93.29	50	2035	2.38	96.65
1	29	3.33	96.67	40	2075	1.9	98.55
1	30	3.33	100	30	2105	1.45	100

Source: Survey result, 2017

Table 10. *Teff* traders' concentration ratio for Yetnora market

traders	Cumulative frequency of traders	% share of trader	Cumulative % of traders	Quantity purchase in Qt	Cumulative quantity purchased in Qt	% share of purchase	% cumulative purchase
1	1	5.26	5.26	900	900	26.8	26.8
1	2	5.26	10.52	800	1700	23.8	50.6
1	3	5.26	15.78	500	2200	14.9	65.5
1	4	5.26	21.04	300	2500	8.9	74.4
1	5	5.26	26.3	258	2758	7.7	82.1
1	6	5.26	31.56	90	2848	2.7	84.8
3	9	15.8	47.36	80	2928	2.38	87.18
1	10	5.26	52.62	75	3003	2.23	89.41
1	11	5.26	57.88	70	3073	2.08	91.69
1	12	5.26	63.14	67	3140	2	93.69
1	13	5.26	68.4	65	3205	1.94	95.63
2	15	10.52	78.92	60	3265	1.8	97.43
1	16	5.26	84.2	50	3315	1.49	98.9
3	19	15.8	100	40	3355	1.1	100

Source: Survey result, 2017

Based on the market structure criteria suggested by Kohls and Uhl (1985), as can be observed from Table 9, the four firms' market concentration ratio for Dejen *teff* market was 57.2% and this indicated that the market structure of strong oligopoly market type. Similarly on Table 10, the four firms' market concentration ratio for Yetnora *teff* market was 74.4% and this indicated that the market structure of strong oligopoly.

Barriers to entry in *teff* market: Barriers to entry is one of the indicators of market structure. Under this issue availability of working capital and licensing procedures were considered.

Lack of working Capital: Working capital refers to the amount of money required by *teff* traders to enter into the trading business. From survey result, it is observed that wholesalers

got 58.3% of their capital from their own and 16.7% from gift and other traders. Retailers are the only traders who got their working capital 100% from their own capital. The sources of working capital for rural collectors are 73.7% from their own and 15.8% from loan. Urban collectors got higher amount of working capital (70%) from their own and minimum amount (23%) from other traders. 42.62% of sample traders reported that lack of initial working capital was a main problem to enter to *teff* trading. Therefore, lack of initial working capital is the major problem of traders which discourages them to enter into *teff* trading and most of them got it from other sources rather than from their own capital.

Licensing procedures: According to the data obtained from the office of Trade and Industry in the district, there are 24 wholesalers, 38 rural collectors, 26 urban collectors and 10 retailers who have license for *teff* trading in both markets. The rule of the district office in trading is very restrictive and takes administrative measure on those who do trading activities without having license. So no one can conduct any trading activity without having license. Entry into *teff* trading is in principle free as anyone is eligible to get trading license. But in practice, the bureaucratic process is cumbersome and takes long period of time to get the license. Therefore it is one of the barriers to enter into *teff* trading. From the study result, 29.51% of sample traders reported license procedure as a problem in entry of *teff* market. Therefore, as compared to perfectly competitive markets where there is free entry and exist, *teff* market structure in Dejen district was somewhat deviated in that it showed strong oligopoly where only four or 8.2% of the traders have controlled 65.8% of the market; lack of initial working capital and license procedure were barriers to entry.

4.5.2. Conduct of *teff* market

Market conduct focuses on market actors' behavior with respect to various aspects of trading strategies such as buying and selling strategy, mode of payment and other characteristics of households and traders in *teff* market.

Producers' price setting strategy: With regarding to selling price strategy of producers, the survey result indicated that 44.1% of sample households reported that selling price is set by buyers, about 25.3% of sample producers reported that selling price is set by negotiation between them and buyers. While 18.8% and 11.8% of producers reported that selling price is set by themselves and by market respectively (Table 13). Therefore this study in the district

shows that buyers have the highest power to set selling price of produce. As producers reported they can't bargain with the buyers and sell their *teff* produce with the price what they want to sell. The buyer set a lower price which reduces income of households and households spend much time to search a better price.

Traders' price setting strategy: According to the study result from all sample wholesalers, 41.6% of wholesalers reported that selling price of *teff* set by themselves. For rural collectors, 42% of rural collectors reported that selling price set by themselves. For urban collectors, 38.5% of urban collectors reported that selling price set by themselves and 40% of retailers reported that selling price set by buyers.

Table 11. Price-setting strategy of traders and households

Price setting strategy of traders and producers	Occupation of traders								Households (producers)		
	Wholesalers		Urban collectors		Rural collectors		Retailers				
Selling strategy	price	N	%	N	%	N	%	N	%	N	%
By negotiation		2	16.6	3	23	3	15.8	2	40	43	25.3
By sellers		5	41.6	5	38.5	8	42	2	40	35	18.8
By buyers		2	16.6	1	7.7	3	15.8	0	0	83	44.1
By market		3	25	4	30.8	5	26.3	1	20	20	11.8
Buying price strategy											
By negotiation		4	33.3	2	15.4	4	21	2	40	-	-
By buyers		6	50	7	53.8	10	52.6	1	20	-	-
By sellers		0	0	1	7.7	2	10.5	2	40	-	-
By market		2	16.7	3	23	3	15.8	0	0	-	-

Source: Survey result (2017)

With respect to buying price 50% of wholesalers reported that buying price set by themselves, 53.8% of urban collectors reported that buying price set by buyers. 52.6% of rural collectors reported that buying price set by themselves and 40% of retailers reported that buying price was set by themselves (Table 13). Therefore, compared to competitive market

behavior where price is set by the interaction of market demand and supply and where both buyers and sellers are price takers, market conduct in Dejen district was deviated and producers have no bargaining power in price setting strategy, they are supposed to be price takers while most buyers /traders have the power to set buying and selling price in the study area i.e they were price makers.

4.5.3. Performance of *teff* market

Marketing margin of *teff* market actors was analyzed by considering actors' average buying and selling price in marketing channel of traders and producers to analyze performance of *teff* market in the study area.

Table (12) below depicted *teff* marketing margins and gross profits for all channels identified in Dejen district. Total gross profit was highest in channel II which was birr 287.35 per quintal of *teff* followed by channel V which had total profit of birr 236.55. Comparing traders with respect to gross profit, retailers have got highest profit than other traders which accounted for birr 287.35.

Regarding with marketing margin as indicated in the table above, total marketing margin is highest in channel IV which accounted for 16.1% and it was lowest in channel III. Out of this total gross marketing margin, retailers had taken the highest margin which is 39%. Urban collectors had lowest percentage of gross margin compared to others which is 4.6%. The remaining 5.8% and 11.9% is the gross marketing margin of rural collectors and wholesalers respectively. The above result of margin analysis implies that all actors are advantaged and there is positive profit for all *teff* market participants. Even if there is positive gross profit for *teff* traders, the profit shared between them is not comparable. The study indicated existence of big price and cost difference among actors resulted difference in benefit shares.

Generally based on the result of structure- conduct and performance analysis of *teff* market in the study area, it is impossible to say that the *teff* market is efficient. According to the study, imperfect behavior of *teff* market, existence of barriers to enter in to *teff* market, and incomparable cost and profit share among *teff* market chain actors are the indicators of market inefficiencies. Therefore, the performance of *teff* market in Dejen district is characterized as inefficient.

Table 12. *Teff* marketing margin and profitability analysis (ETB/q)

Actors	ETB per qt	Channels				
		I	II	III	IV	V
Producers	Selling price	2085	1765	1790	1750	1755
	GMM _P (%)	100	84.7	85.9	83.9	84.2
Rural collectors	Buying price				1750	
	Marketing cost				41.5	
	Selling price				1870	
	GMM _{rc}				5.8	
	GP _{rc}				78.5	
Urban collectors	Buying price					1755
	Marketing cost					17.80
	Selling price					1850
	GMM _{uc}					4.6
	GP _{uc}					77.2
Wholesalers	Buying price			1790	1870	1850
	Marketing cost			43	43	43
	Selling price			1920	1920	1920
	GMM _w			6.2	2.4	3.3
	GP _w			87	7	27
Retailers	Buying price		1765	1920	1920	1920
	Marketing cost		32.65	32.6	32.65	32.65
	Selling price		2085	2085	2085	2085
	GMM _r		15.3	7.9	7.9	7.9
	GP _r		287.35	132.35	132.35	132.35
TGMM	%		15.3	14.1	16.1	15.8
TGP	Birr		287.35	219.35	217.85	236.55

Source: Survey result (2017)

4.6. Factors Affecting Participation and Level of Participation

In this section factors that influence *teff* market participation and level of participation were analyzed and discussed. Before executing the double hurdle econometric model both Heckman selection and Tobit model were tested against double hurdle model.

Accordingly, Heckman selection model was not appropriate for this data set since inverse mills ratio is insignificant. Log-likelihood ratio test was used to check the relevance of the Tobit model. This was made by testing, the double-hurdle model against the Tobit model specification using joint decision criteria of log likelihood test and AIC.

Table 13. Factors influencing market participation and level of participation in Dejen district

Variables	1 st hurdle	Robust			
		Std. Err.	Marginal effect	2 nd hurdle	Std. Err.
Sex	1.164**	0.510	0.129	-0.743	0.742
Level of education	-0.413	0.310	-0.076	0.153	0.554
Family size(adult equivalent)	0.026	0.113	0.005	-0.067	0.209
Non-farm income(log) in birr	-0.029	0.039	-0.029	-0.036	0.209
<i>Teff</i> production experience(years)	0.193***	0.037	0.035	0.121*	0.062
Credit used(log) in birr	-0.029	0.036	-0.005	0.096	0.078
Number of equines owned	0.355	0.232	0.355	1.880***	0.535
Number of oxen owned	0.913***	0.186	0.913	0.252	0.232
Current market price(Birr)				0.477	6.272
Distance to nearest market(km)	-0.014	0.051	-0.014	0.134	0.112
Perception of lagged market price	-0.222	0.272	-0.222		
Frequency of extension contact	0.069***	0.008	0.069	0.096**	0.042
Yield(qt/ha)	0.006	0.038	0.006	0.072**	0.017
Constants	-9.014	1.690		-5.400	47.221
Pseudo R ²	0.48				
Predicted value	0.89				
Wald/LR Chi square	63.02			57.05	
Log-likelihood	-54.58			-290.46	
Observation	170			117	

***significant at 1%, ** significant at 5 %, * significant at 10%

Source: Survey result, 2017

The test statistic for log likelihood is (LR=145.26) which by far exceeds the critical χ^2 value of 27.69 at 13 degrees of freedom means that the null hypothesis that the Tobit model fits the data was rejected at 1% level of statistical significance in favor of the double-hurdle model.

4.6.1. Factors affecting market participation of *teff* in Dejen district

Sex of household head: Sex of the household head has a significant and positive effect on the participation of *teff* market at 10% level of significance. The marginal effect of this variable revealed that being male headed household would increase the likelihood of *teff* market participation by 12.9%. The result is in line with Dagmawit (2016) who found that being male headed household head positively affected the market participation of maize market.

***Teff* production experience (years):** *teff* farming experience of households positively and significantly affected the probability of *teff* market participation at 1% significance level. An increase in *teff* production experience by 1 year increases the likelihood of *teff* market participation by 3.5%. Similarly, a study done by Masokuet *al.* (2010) found a positive and significant relationship between smallholder farmers' maize market participation and experience in maize production.

Extension contact frequency: This variable affected *teff* market participation at 1% significant level. The marginal effect of the probit model of this variable showed that an extra day of extension visit would increase the probability of farmers' market participation by 6.9%. Farmers need training concerning production and marketing like what to produce, when and where to sell, and they need awareness on newly developed varieties and the like. Therefore, frequent contact with extension agents can improve methods of production which in turn can enhance production and their likelihood of increase market participation. This result is in line with Agete (2014) who found that frequent extension visit would increase the likelihood of red bean market participation in Alaba special district of Ethiopia. Moreover, Ababo (2016) showed that frequency of extension contact positively influenced participation decision of farmers in maize market.

Number of oxen owned: Number of oxen owned by households positively and significantly affected probability of *teff* market participation. This is due to the fact that households who have more oxen can hire more land and can plough in time which enables them to produce more and participate in *teff* marketing. As number of oxen increases by one, the likelihood of market participation increase by 9.1%. The result is in line with Ababo (2016), who found that number of oxen owned by household head influenced the farmers' decision to participate

in maize market and sales volume of maize positively. This is mainly due to the reason that as oxen are the main source of traction power for the farmers, the availability and increment in the number of oxen will increase the production of *teff* there by increase *teff* market participation decision.

4.6.2. Factors affecting level of *teff* market participation in Dejen district

***Teff* production experience:** as priori expectation this variable positively and significantly affected level of participation in *teff* market. The result of the study indicated that a 1 year increase in *teff* production experience increases the level of *teff* market participation by 0.12qt. This might be due to the reason that experienced *teff* producers develop skill and know how the market is, where they have to sell their produce and the like.

Number of Equines owned: Number of equines owned affected level of *teff* market participation positively and significantly at 1% significance level. This implies that an increase in equine owned by one increased level of *teff* market participation by 1.9qt.

Frequency of extension contact: Frequency of extension contact affected level of *teff* market participation positively and significantly at 5% level of significance in Dejen district. A one day increase in contact with extension agent increased level of *teff* market participation by 0.1qt. The result supported by Adugnaw (2017) who found that frequency of extension contact positively affected amount of *teff* market supply due to the fact that farmers that have frequent contact with DAs have better access to information and could adopt better technology that would increase their production and market supply of *teff*.

Yield (qt/ha): Yield positively and significantly affected level of *teff* market participation at 1% significance level. As yield increases by one quintal, level of *teff* market participation increases by 0.07qt. Households who have more yields have more opportunities of selling their produce at market place than those with relatively low yield.

5. SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1. Summary and Conclusion

In Ethiopia, cereal production and marketing are the means of livelihood for millions of smallholder households. *Teff* originated in Ethiopia and it is second most important cash crop after coffee. Dejen district where this study was conducted is potential *teff* producer and the production is meant for food and commercial purpose. However, market participation and level of participation of producers could not reach at as per its potential level due to the existence of production and marketing problems and lack of strong institutional services. Therefore, the study was conducted to identify major *teff* market chain actors and their roles, analyze performance of *teff* market and identify factors affecting *teff* producers' market participation and level of participation in the study area. For the study, both quantitative and qualitative types of data were collected from 170 *teff* producers and 49 traders.

The structure-conduct-performance approach was used to analyze performance of *teff* market in the study area. Four firms concentration ratio, barriers to entry, traders' price setting strategy, marketing margin and costs were employed to analyze *teff* market structure, conduct and performance in Dejen district. In addition, double-hurdle model was used to examine factors influencing market participation and level of participation in Dejen district.

The results of descriptive statistics showed that from the total market participants, 80.7% were male-headed households whereas 19.3% were female-headed market participant households. The chi square test statistics showed significance difference between participants and non-participants in terms of sex. With respect to marital status, 73.1% of participants and 8% of non-participants were married. The average family size of participants was 4 persons in terms of adult equivalent and also 4 persons for non-participants. The mean *teff* production experience of *teff* market participants was 15 years and that of non-participants was 12 years. Regarding age of household heads, the mean age for participants and non-participants was 45.6 and 44.6 years, respectively. With respect to socio-economic characteristics of household heads, the mean income from non-farm activities of participants was 1072.19 birr, while 2162.75 for birr among non-participants. The average yield of *teff* market participants was 15.06 qt/ha and that of nonparticipants was 12.02qt/ha in 2017/2018 production season.

The average size of land allocated to *teff* by participants was 1.63ha and 1.50ha for non-participants.

Major market chain actors such as producers, wholesalers, urban collectors, rural collectors, retailers and consumers are involved in producing; supplying, collecting, buying and retailing activities of in *teff* market chain in Dejen district and their roles were identified. The result showed that sample producers supplied 1379 quintal of *teff* to the market from which 46%, 16%, 22%, 10%, 6% were sold to wholesalers, urban collectors, rural collectors, retailers and consumers, respectively. Wholesalers bought the highest percentage from quantity of *teff* supplied by producers to the market.

Teff market performance in Dejen district was analyzed using the structure-conduct-performance approach. The structure of *teff* market in Dejen and Yetnora market were measured using top four largest traders concentration ratio and the result indicated that the structure of *teff* in both market were strong oligopoly. Also identification of barriers to entry was used to measure the structure of *teff* market in the study area. Lack of initial working capital is the major problem of traders to enter into *teff* trading and most of them got it from other sources rather than from their own capital. Moreover, licensing procedure was barrier to enter into *teff* trading as the procedure to get license is so complicated and it takes long time. The conduct of producers' shows that buyers have the highest power to set selling price of producers as producers reported they can't bargain with the buyers and sell at producers offer.

To identify factors affecting *teff* market participation and level of participation, double hurdle model result indicated being male household head, *teff* production experience, numbers of oxen owned, and frequency of extension contact affected positively and significantly. While, *teff* production experience, number of equine owned, frequency of extension contact and yield affected level of *teff* market participation positively and significantly.

Generally, the structure conduct performance of Dejen district *teff* market indicated that somewhat being inefficient. Double hurdle econometric model showed that different variables affected market participation and level of *teff* market participation. Therefore from these results the following recommendations are drawn so as to make an intervention in *teff* market channel.

5.2. Recommendations

Based on the results of this study, uncompetitive behavior of the market; existence of entry barriers in *teff* market, unequal profit and cost component among actors in the district makes *teff* market inefficient. Therefore the following recommendations are suggested to be considered in the future intervention strategies that are aimed to increase market competitiveness, and to increase *teff* producers' market participation and level of participation in Dejen district.

The structure of *Teff* market in the district is strong oligopolistic and the conduct of the market deviated from competitive market norms. As the result the market performance in the study area is inefficient. Hence, there is a need to enhance *teff* producers' bargaining power through establishment of cooperatives and resolve the barriers to entry to market so as to enable potential traders to enter into the *teff* market, which improve the competitiveness of the market. There is also a need of government or other stakeholders' intervention to strengthen the linkage of *teff* market actors through training and financial supports.

The results of econometric analysis indicated that *teff* market participation is positively and significantly affected by being male household head. This indicates male headed households are more likely to participate in *teff* market than female headed households. This may be due to female headed households have limited resources and also they are unable to plough land due to social norms and may be requirement of more energy. Therefore, there is a need to support male headed households through different policy initiatives and interventions to boost their production and increase market participation so as to improve their livelihood.

Both *teff* market participation and level of participation are positively and significantly affected by frequency of extension contact. Extension service is important for obtaining technical support to use agricultural innovations on how to use them practically for increasing production and productivity. Therefore, efforts should be made to strength the extension service and farmers training centers and also there is a need to provide market oriented extension service in addition to production services.

Both *teff* producers' participation decision and level of participation are positively and significantly affected by *teff* production experience. *Teff* producers need to be encouraged to

participate in *teff* production and subsequently to market participation. *Teff* producers need training related to production and market information for understanding of the business, so that their *teff* market participation and level of participation will increase.

Numbers of oxen owned positively and significantly affected *teff* market participation. This indicates a need to make an intervention to modernize ways of ploughing in the study area. Use of machineries like tractors, need to be encouraged by availing the technology and facilitating access to increase *teff* market participation and level of participation.

Numbers of equines owned affected level of *teff* market participation positively and significantly. The presence of equine enables producers to transport their produce to the market. Thus, there is a need to enhance rural infrastructure like road and transport facilities in the study area, which in turn help to increase level of *teff* market participation.

Yield of *teff* positively and significantly affected level of *teff* market participation at 1% significant level. As a result, there is a need to encourage innovations such as land use intensification to increase yield of agricultural inputs (like improved *teff* varieties) and input delivery mechanism can enable producers to produce more *teff* which can help to increase level of *teff* market participation in the study area.

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7. APPENDIX

7.1. Appendix Tables

Appendix 1: Heckman Two Stage Model Test

	Coef.	Std. Err.	Z	P> z	[95% Conf. Interval]	
QtTS						
Sex	-1.601214	.7777987	-2.06	0.040	-3.125672	-.0767565
Family size	-.0908117	.2252181	-0.40	0.687	-.532231	.3506077
Level of education	-.023552	.4392185	-0.05	0.957	-.8844044	.8373004
Credit used(log)	.0943598	.0830638	1.14	0.256	-.0684423	.257162
Yield(qt/h)	.066985	.0181744	3.69	0.000	.0313639	.1026062
Distance to nearest market(km)	.1442616	.1199094	1.20	0.229	-.0907565	.3792797
Teff production experience	.1252925	.0752186	1.67	0.096	-.0221333	.2727183
Non farm income(log)	-.0432539	.0828846	-0.52	0.602	-.2057047	.119197
Frequency of extention contact	.0836459	.0498832	1.68	0.094	-.0141233	.1814151
Number of equines owned	2.054475	.5803559	3.54	0.000	.9169982	3.191952
Number of oxen owned	.4029429	.269947	1.49	0.136	-.1261435	.9320293
Current price of <i>teff</i> (Birr)	-.0012726	.0018786	-0.68	0.498	-.0049545	.0024094
TSOLD						
Sex	1.01043	.5092482	1.98	0.047	.0123217	2.008538
Family size	.0129981	.1195899	0.11	0.913	-.2213938	.24739
Level of education	-.5317489	.1781906	-2.98	0.003	-.8809961	-.1825017
Credit used(log)	-.0210986	.0356415	-0.59	0.554	-.0909546	.0487575
Yield(qt/h)	.0054661	.011154	0.49	0.624	-.0163953	.0273275
Distance to nearest market(km)	-.017217	.060198	-0.29	0.775	-.1352029	.1007688
Teff production experience	.2066031	.0420838	4.91	0.000	.1241203	.2890859
Non farm income(log)	-.0430313	.0401081	-1.07	0.283	-.1216418	.0355792
Frequency of extention contact	.0767491	.0234047	3.28	0.001	.0308768	.1226215
Number of equines owned	.2284083	.2636312	0.87	0.386	-.2882994	.745116
Number of oxen owned	.8483523	.2243989	3.78	0.000	.4085384	1.288166
Perception of lagged price	-.2321548	.3103638	-0.75	0.454	-.8404566	.3761469
_cons	-8.700543	1.782086	-4.88	0.000	-12.19337	-5.207718
mills lambda	.0531807	1.134152	0.05	0.963	-2.169716	2.276078
Rho	0.01692					
Sigma	3.1428697					

Source: survey result (2017)

7.2. Questionnaires

HOUSEHOLD SURVEY QUESTIONNAIRE ON MARKET CHAIN ANALYSIS OF *TEFF*, THE CASE OF DEJEN DISTRICT, EAST GOJJAM ZONE OF AMHARA REGIONAL STATE OF ETHIOPIA

This study is conducted to find out the factors that determine market participation and level of participation among *teff* producer households in Dejen district, Ethiopia. The information provided will assist in the formulation of policies and programs that will improve *teff* marketing in the district. The information will be treated with strict confidentiality

1. General Information

1. Questionnaire number: _____
2. Name of the enumerator: _____ Signature: _____
3. Date: ____/____/____
4. Name of *Kebele* _____
5. Name of the village _____

2. Household Characteristics

1. Name of household head _____
2. Sex of household head; 1= Male 0= Female
3. Age of household head _____ years
4. Education level of household head 1.illiterate 2.adult education 3.primary 4.secondary
5. Marital status of the household head; 1. Single 2.Married 3.Divorced 4. Widows
6. Family size _____

Sex	<10 years	10 - 13 years	13-16 years	16-50 years	>50 years
Male					
Female					
Total					

7. How many of your family members do permanently work on farm? _____

3. Production

8. Total land holding owned _____ (ha)

A. Total land hired in _____ (ha)

B. Cultivated area _____ (ha)

C. Land allotted for *teff* _____ (ha)

9. What is the rental value of one timad of land? _____ Birr for ____ year(s)

10. When did you started *teff* production (*teff* farming experience) _____ (years)

11. Amount of *teff* you produced in 2017/18 E.C? _____ quintal/chinet/.

4. Access to credit services

12. Do you have access to credit? 1. Yes =1 2. No=0

13. Have you received formal credit in 2018 E.C? 1. Yes =1 2. No=0

14. If yes, how much did you take? _____

15. For what purpose you used? 1. Farm inputs purchase. 2. Livestock purchase

3. Household consumption 4. Land rent. 5. Others (Specify) _____

16. From where did you get the credit service? 1. Cooperatives 2. Micro finance 3 .NGO

4. Local money Lender 5. Saving and credit Association 6. Others (specify) _____

17. If Q# 18 is „no“, why? 1.High interest rate 2.you are self sufficient 3.Lack of Collateral

4. Fear of inability to repay 5. No service 6.others specify _____

18. What was the precondition to get credit? 1. Membership 2. Personal guarantee

3. Land holding 4. Collateral 5.Partial payment 6. Others (specify) _____

19. What problem do you perceive in taking formal credit? 1. Inadequacy of supply

2. High interest rates 3.Restrictive procedures 4. Others (specify) _____

5 Extension Services

20. Did you have an extension access in 2017/18? 1. Yes =1 2. No=0

21. If yes, how often the extension agent contacted you specifically for *teff* production and marketing purpose? 1. Weekly 2. Once in two week 3.Monthly 4. Twice in the year

5. Once in a year 6. Any time I ask those 7. Others (specify) _____

22. What type of extension service did you get?

1. Technical advice 2. Price information

3. Input use 4. Credit use-making 5. Other _____

6. Marketing aspect

23. What is the total amount of *teff* you sold in 2016/17? _____qt, in 2017/18 _____qt

24. To whom did you sold?

1. Direct to consumers 3. To rural collectors 4. To urban assemblers
2. To wholesalers 5. To retailers

25. What was the Price per kilo gram? 1. in 2016/17 _____Birr/kg. 2. In 2017/18 _____Birr/kg

26. Total quantity sold and average selling price

Total quantity sold		Average selling price	
2017	2018	2017	2018

27. Do you have your own transportation means equines (donkey, horse, and mule)?

1. Yes=1 2. No=0.

28. If yes , how many equines do you have? _____

29. How many kilometers you need to travel to get

1. The nearest market for selling *teff* _____ Km (walking minutes)
2. The district market _____ Km

30. What do you thing about last year price? 1. High, 2. low

31. Where do you sale/market place? 1. Within village 2. Outside village
3. Within district 4. Outside district

32. Did you know the market prices before you sold *teff* in 2018E.C? 1. Yes=1 2. No =0

33. If say no, who set price in the market? 1. Myself 2. Set by market 3. Buyers 4. Negotiation

Questionnaire for traders on “Market chain analysis of *teff* in Dejen district, Amhara Regional state of Ethiopia” for MSc. Research.

Date _____

Name of Market _____

I. Socio-demographic characteristics of traders

1. Name of trader _____
2. Age of trader _____ Years old.
3. Sex of trader 1. Male 2. Female
4. Marital status of trader? 1. Single 2. Married 3. Divorced 4. Widows
5. Total family size _____
6. Educational level of trader?
 1. Illiterate 2. Primary School 3. Secondary School 4. College 5. Others _____
7. Major businesses you engaged? 1. Wholesaler 2. Urban assembler 3. Rural collector
 4. Retailer 5. processor
8. For how long have you been in this business? _____ Years
9. With whom you trade *teff*? 1. Alone 2. With family 3. With partners
10. When did you do your business? 1. Year round 3. once in a week
 2. When purchasing price is low 4. During holiday only 5. Others (specify) _____

II. Capital

11. How much your initial working capital when you started the business? _____ Birr
12. How much was the amount of your working capital in 2018? _____ Birr
13. What was the source of the working capital in? 1. Own 2. Loan 3. Gift
 4. Share 5. Others (specify) _____
14. If it was loan, from whom did you borrow? 1. Relative/family 2. Other traders
 3. Friends 4. Private money lender 5. Banks
15. What was the reason behind the loan? 1. To build store 2. To purchase a car
 3. For working capital 4. Others (specify) _____

III. Purchase practice

16. How much amount of *teff* did you purchase? In 2017/18 _____ qt.
 How much was the purchased price? _____ Birr/kg
17. How much amount of *teff* did you sold? In 2017/18 _____ qt.

How much was your selling price? _____ Birr/kg

18. What was the main reason for your *teff* choice to purchase?

1. High supply
2. High demand
3. High selling price
4. Long storage life
5. Others (specify) _____

19. Who purchase *teff* for you? 1. Myself 2. Friends 3. Through brokers

4. Family members 5. Commission agent 6. Others _____

20. If you used brokers and commission men, what was the advantage of using them?

1. You could get enough quantity
3. Reduce transaction cost
5. Save your time
2. You could get quality *teff*
4. Purchased at low price
6. Other (specify) _____

21. How did you attract your supplier?

1. By giving better price relative to others
2. By fair scaling (weighing)
3. Other (specify) _____

22. How did you attract your buyers?

1. By giving better price relative to others
4. By giving credit
3. By fair scaling
2. By providing Quality *teff*
5. Other (specify) _____

23. Who were your major buyers?

1. Wholesalers
3. Retailers
5. Urban assembler
2. Millers/processors
4. Urban consumers
6. Gov't organizations
7. Others _____

24. Who were your major suppliers?

1. Wholesalers
2. Village collectors
3. Retailers
4. Urban assemblers
5. Farmers
6. Gov't organizations
7. Others _____

25. On average, how many markets did you visit in a week? _____ Markets

26. How is your usual purchasing price compared to your competitors?

1. Higher
2. Lower
3. The same

27. If it was higher in Q. 28 what was the main reason?

1. To attract more supplier
3. To get better quality *teff*
2. To buy more quantity
4. To kick out your competitor from the market
5. Others (specify) _____

28. Who set your purchasing price?

1. Myself
2. The seller
3. By market
4. Negotiation with suppliers

29. When did you set your purchasing price?
1. Early in the morning of the market day
 2. One day before the market day
 3. At the time of purchase
 4. Other (specify) _____
30. Who decided on your selling price?
1. Myself
 2. Buyers
 3. By negotiation
 4. By the market
31. When did you set selling price?
1. Early in the morning of the market day
 2. One day before the market day
 3. At the time of selling
 4. Others (specify) _____
32. How was the supply of *teff* in 2017/18 compared to the previous year?
1. Increased
 2. Decreased
 3. No change.
33. What is the reason behind your response?
1. _____
 2. _____
34. What is your mode of buying and selling strategy?
1. In cash
 2. In credit
 3. In combination of both cash and credit.
35. How was the price of *teff* in 2017/18 compared to the previous year?
1. Increased
 2. Decreased
 3. No change.
36. What is the reason behind your response?
1. _____
 2. _____
37. What was the major problem to enter *teff* trade?
1. License
 2. Lack of starting capital
 3. Government policy
 4. Trading experience
 5. Other (specify) _____
38. Are there restrictions imposed on unlicensed traders? 1. Yes 2. No
39. What are the main criterias to be licensed *teff* traders? 1. Initial capital 2. Interest
3. *Teff* trading experience
 4. Others (specify) _____
40. How do you see the procedure to get the license? 1. Complicated 2. Easy
41. How much amount Birr is required to get the license? _____ Birr.

IV. Marketing Services

42. Did you pay tax for the *teff* you purchase and sell? 1. Yes 2. No
43. if yes how many you pay per year? _____

44. Indicate your average cost incurred in *teff* trading activities in 2017/18?

Marketing cost component	Cost per quintal
Sack price (packaging materials)	
Loading unloading	
Processing	
Transportation	
Storage	
Permanent and temporary workers	
Tax	
Wage for permanent employee	
Personal travel	
Total cost	

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

From : 1. Other traders 3. Cooperatives 5. Radio

2. Brokers 4. Newspaper 6. Telephone 7. Others (specify) _____

46. What mode of transportation did you use from collection point to store?

1. Head/back load 3. Trucking/Vehicle

2. Pack animals 4. Cart 5. Others /specify _____ -

47. What problem do you have during trading?
