SCHOOL OF COMMERCE DEPARTMENT OF DEVELOPMENT ECONOMICS POSTGRADUATE STUDIES

DETERMINANTS OF COMMERCIALAIZATION OF "*ENSET*" PRODUCTS: GETA WOREDA, GURAGE ZONE, CENTERAL ETHIOPIA

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Determinants of Commercialization of *Enset* Products: the case of Gurage zone Geta district central Ethiopia

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DECLARATION

I hereby affirm that the thesis entitled "**Determinant of commercialization of *Enset* products: the case of Gurage zone Geta district central Ethiopia**" is my original work. I also state that the thesis has been written by me and that any help that I have established in doing my research work and in the preparation of the thesis itself has been properly acknowledged. In addition, I state that all information sources and literatures used are shown in the reference part of the thesis.

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ACCRONOMY

ACC	Agricultural Commercialization Clusters
CSA	Central Statics agency
DANRD	Department of Agriculture and Natural Resource Development of zone
DOFED	Department of Finance and Economy Development
GTP	Growth and Transformation Plan
NBE	National Bank of Ethiopia
OLS	Ordinary Least Squares
PA	Peasant Association

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ABSTRACT

The study was aimed to investigating the commercialization level and factor affecting the commercialization of Kocho producers. The study was essentially use primary data that was collected from 186 randomly selected farmers through structured and semi-structured questionnaire. Both descriptive statistics and econometric model was used. Tobit model were used to identify the determinants of commercialization. The result of Tobit regression model shown that educational level of household head, livestock owned, equine owned, distance from the nearest market, transport cost, access to credit, cooperative membership and non/off farm income significantly affected commercialization level of Kocho producers. The study recommends provision of zone and regional agricultural office to advertise in international and local market Ensets are drought tolerance plant and kocho is organic food. It is essential to improve commercialization.

Key words: Commercialization, *Kocho*, Tobit, Gurage zone, Geta distric

CHAPTER ONE
1. INTRODUCTION

1.1 Background of the study

A significant proportion of the populations in rural areas of sub-Saharan Africa face great poverty and deprivation. Given that agriculture is the basis of livelihood for rural households and plays a substantial role in the overall economy, it is obvious that the agricultural sector should be a key focus for development (Diao, et al.,2010). In Ethiopia, with a population of 79.3 million residing in rural areas, agriculture serves as the main source of growth and long-term food security. It adds an average of 44.18% to the GDP and 29.31% to GDP growth from the fiscal year 2007/08 to 2014/15 (NBE, 2014/15). However, the agricultural sector is highly volatile due to its reliance on rainfall and the frequent occurrence of seasonal shocks. Despite its potential, the sector has not been able to make a substantial contribution to economic development (Teshome, 2006).

Enset centered farming is homegrown farming system and more than twenty percent of Ethiopians population depends on on *Enset* for food, feed, and fiber. It is an important multiuse indigenous crop for Ethiopia that ensures all year round food and feed security, traditional medicine and fiber (Bezuneh, 1984) and (Brandt, et al., 1997). Due to its drought resistance, *Enset* plant is viewed as a major crop in Ethiopia, where it marks a major role to the food security of the country (Mohammed and Tariku, 2010). *Enset* is a multi-use and a multi-year crop with over eighty percent of its production in the country is enclosed by the central, south and south western part of the country (Mulatu, 2021).

The *Enset* farming system is carefully viable and well-adjusted to Ethiopian agricultural systems (Bezuneh, 1984). Cattle manure and household rubbishes are the leading organic amendments in *Enset* culture. Each part of the plant can be used for many purposes and another. Farmer regularly acknowledges that *Enset* is their food, cloth, house, bed; cattle feed and plate (Brandt, et al., 1997). The corm and pseudo stem of the *Enset* plant are the major important source of food, frequently harvested as *Kocho* (fermented starch obtained from the decorticated leaf sheaths and grated corm, bulla and amicho (boiled corm pieces of young *Enset* plants, prepared and consumed in similar manner to other root and tuber crops (Alemu and Sandford , 1991).

Commercialization of the smallholder farmers has been viewed by the government as a major source of agricultural growth in Ethiopia. The government of Ethiopia implemented agricultural commercialization clusters with the primary goal of commercialization of smallholder agriculture and agro-industrial development, offering a strategic entry point for private sector engagement (Pauw, 2017).

Agricultural commercialization contains making production decisions based on market signals, proposing products for sale, and operating purchased inputs (Gebremedhin and Jaleta, 2010). The advantage of agricultural commercialization includes specialization, comparative advantage, economies of scale, and the exchange of ideas complete regular interactions (Barrett, 2008).

Economic significance of *Enset* products involvement of farmers in the market and make the *Enset* products as additional source of income for producers, create favorable markets, market upgrade and spreading of market information those decrease poverties. And also drought tolerant crop that provides a steady source of food for many Ethiopians, especially during times of food scarcity (Mulatu, 2021). Overall, *Enset* play a key phenomenon in the economy of Ethiopians by providing food security, livelihood prospects, cultural value, environmental benefits and export potentials. The promotion of *Enset* cultivation and value addition could further enhance its economic significance and contribute to sustainable development in the country.

The main challenges faced by *Enset*-producing households include the inability to produce at a market scale, losses during processing, incorrect storage of the final produce, and susceptibility to diseases, insect pests, and vertebrates. Additionally, the use of obsolete and traditional methods and material in production, processing, and marketing, as well as insufficient care from existing extension services, further hinder *Enset* production (Mohammed and Tariku, 2010); (Yemataw, et al., 2017).

Hence, known the agricultural built economy of Ethiopia and the control of smallholder farmer's role to the economy this study focuses on to assess the determinant of smallholder *Enset* products commercialization in Geta district.

1.2 Statement of the problem

Commercialization in developing countries through its character as a suitable way for implementing development plans, connecting farmers to input and output markets and providing farmers with access to capacity building and innovations (Joffre, et al., 2019).

Commercialization of agriculture declines the poverty level of the small holder farmer's households due to the inverse relationship between agricultural commercialization and poverty (Amsalu, 2014).

The shift from survival agriculture to commercial-oriented production is an indispensable trail for poverty reduction, food security enrichment, and the food development of farm households (Gidelew, et al., 2022).

Commercialization and market participation implicates the combination of agricultural product or a household into a market economy. The success of product commercialization can be determined by factors external to small-scale farmers, including infrastructure, level of urbanization, technological change, and demand for the products.

And also farm-level factors such as land holding, extent of land use diversification, level of input use, and intensity of management determines the success of product commercialization. Therefore, the commercialization of the product can be encouraged or discouraged by factors ranging from household characteristics to border institutional and policy environments (Endalamaw, et al., 2013).

In Sub-Saharan Africa countries like Ethiopia, the government previously used to play in supporting farmers with sales of agricultural produce. Conversely, inadequate access of market facilities, market information problem, problem in infrastructural and transportation services is some the challenges resulting in low involvement of smallholder farmers in selling *Kocho* (Nuri & Jema, 2016).

In competing world, smallholder desires to harvest for market as they are challenging with farmers around themselves and with those producing same commodity at regional and global level (Getahun, 2018). Still, the truth shows that commercialization of smallholder farmers is no yet high abundant to assist farmers get value from the agricultural because the farmers are not yet out of the sustenance concerned with agriculture (Mahelet, 2007). Therefore, it is not imaginable for the smallholder farmers to join with the market and appreciate the benefit of

commercialization without the better condition is facilitated and existing problems are avoided.

In Ethiopia, *Enset* is vital crop throughout meher season from Ethiopian remote peasant, total of 127.3 million *Enset* crops were collected and made 34.8 million quintals of *Kocho*, 1.1 million quintals of bulla and 29.4 million quintals of amicho. In the same period, 73.6 million *Enset* plant were gathered and formed 22.08 million quintals of *Kocho*, 19.8 million quintals of amicho and 736,239 thousand quintal of bulla were produced in SNNPR. From this 8.5 million trees harvested, 2.3 million quintals of amicho, 2.5 million quintals of *Kocho* and 85,708 thousand quintal of bulla were produced in Gurage zone. On behalf of this study *Kocho* is nominated because it is mostly grown-up by most of smallholder farmer in Geta district and it is a source of food and cash for the farmers in Geta district (CSA, 2021/22). But, the supply of *Kocho* in the district still cannot cover the existing market demand and the farmers are not benefited from Kocho commercialization.

Various studies conducted on the determinant of small holder commercialization such as; (Anteneh, A., & Endalew, B., 2023); (Abate, et al., 2022); (Gidelew, et al., 2022); (Gebre, Workiye and Haile, 2021); (Endalew, et al., 2020); (Tesfaye, et al., 2019); (Erchafo, 2017) were conducted in different region of Ethiopia on teff, wheat, *Kocho* , sorghum, *Enset* products. Likewise, it is pure opinion that *Enset* treating with in traditional processing material is not easy task for women where there is no improved technology to do so (Nuri & Jema, 2016). Because of this reason, *Enset* production is apparently restricted to consumption purpose and most of farmers sold few amount. But past studies conduct on different region of Ethiopia on determinate of cereal crops, did not address determinants of commercialization of *Enset* products.

Generally commercialization of *Kocho* in the study area is varies season to season when surplus supply at the harvest time and also production and commercialization have great difference. Accordingly, considering the behavior of commercialization of *Kocho* and the variable affecting it can be great important the development of sound policy with respect to agricultural commercialization and prices, the chain coordination and total rural and national development objective of the country. Since *Enset* is the supreme economically and socially crucial crop, there is a strong need to address the privilege information gap and give to good

understanding of the demographic, socio-economic, institutional and infrastructural determinants of commercialization of farmers in Geta the district.

1.3 Objective of the study

1.3.1 General objective

The general objective of this study was to assess the determinants of commercialization of *Enset* products.

1.3.2 Specific objective

To measure the level of commercialization of *Kocho* in the study areas

To identify the determinants of commercialization of *Kocho* in the study area 2015/16 E.C

To identify challenges and opportunity of *Kocho* commercialization

1.4 Research Question

The study tried to answer the following key research questions;

What is the level of commercialization of *Kocho* in the study area?

What are the determinants of commercialization of *Kocho* in the study area 2015/16?

What are the challenges and opportunity of *Kocho* Commercialization?

1.5 Significance of the study

The study tries to provide a well understanding of the determinant of commercialization of *kocho* in Geta District, central Ethiopia.

This study will contribute to the smallholder farmers, district agricultural office, in that it conveys an accepting with favors to the determinants of *kocho* commercialization. It will be considering the determinants small holder farmers it can develop strategies to promote the growth of the *Kocho* industry in the study area while addressing challenges and opportunities for sustainable development through considering the identified problem.

1.6 Limitation of the study

The study was assessed the determinants of commercialization of *Kocho* producers in Geta district. It did not cover the whole *Enset* product producer in Ethiopia. Besides, it was used cross-sectional data and result may not reflect the time dimension of commercialization.

1.7 Scope of the study

The study is restricted on geographical, conceptual, methodological and time scope. Geographically, the study considered only Gurage zone Geta district. Conceptually, the study

was shown to assess the determinant of *Enset* products commercialization specifically *Kocho*. Methodologically, among the type of non-probability sampling the researcher was use suitability and purposive sampling technique to choice each respondent and kebele due to more *Enset* producers and agricultural commercialization have many dimensions but this study was focused only on determinant of commercialization of *Kocho* producers and cross-sectional data analysis.

1.8 Organization of the study

This study has five chapters. The remaining parts are as follows: Chapter two offers assessments of literature on theoretical and empirical indications that help and guide this study. Chapter three argues research method description of the study area, data types, sources and methods of data collection, sampling technique and sample size determination, method of data investigation and variable definitions of the study. Chapter four present outcome and thoughts descriptive and econometric results are presented and argued in detail. Chapter five reviews the main findings of the study and giving conclusion and implication.

CHAPTER TWO

2. LITERATURE REVIWES

2.1 Theoretical Literature Review

Introduction

The research problem focused on determinant of commercialization of *Enset* products specifically *Kocho*. In this part, other specialists have offered various theories in try to clarifying the concepts or variables. Also similar researchers have been done serving as empirical studies. Although most of these works had been written in different background and context, their contribution to the achievement of this study is very important.

In this chapter broadly at different major section presents review of literature on basic concepts, approach of studying agricultural market, overview of *Enset* production and its significance, theoretical and analytical framework. It also presents reviews of empirical studies. At the end, state the conceptual framework of the study.

2.1.1 Definition and Concept

Market: A get-together place of buyers and sellers, a place where a sellers and buyers encounter and exchange takes place, an area of which demand for goods and price decisive force works (Backman & Davidson, 1962).

Smallholder farmers: Smallholder farmers are well-defined as the source of land and livestock holdings, foster less than two hectares of land and have only few herds of livestock (Salami, et al., 2010). (Hazell, et al., 2007) Also define smallholders by allocating numerical values as those with less than two hectares of crop land and with few numbers of livestock.

Smallholders in Ethiopia are known for their resource constraints such as capital, inputs and technology; their full dependence on household labor; their subsistence-orientation; and their exposure to risk such as reduced yields, crop failure and low prices (Diao, et al., 2010).

Agricultural commercialization: It is well-defined as a move from household production for home-consumption to production for trade in the market. This move involves that production and input use judgments are based on profit maximization, underpinning vertical linkages between input and output markets (Olwande, et al., 2015). Agricultural commercialization is a process involving transformation of subsistence agriculture to market-oriented production that

tends to impact income, consumption and nutritional setup of the farm households (Von Braun, 1995).

2.1.2 *Enset* Production and its Significance in Ethiopia

Enset is a steady root crop cultivated dominantly as a food and fiber, mostly in southern, south western, central Ethiopia and some parts of Oromia Regional State of Ethiopia (Olango, et al., 2014). *Enset* and cassava are the high yielding potential plants, yields more than 300 and 250 quintal/hectares/year, respectively (Onyenwoke, et al., 2014).

Enset crop is gives beauty to the farmsteads and is used as a shadow for humans and domestic animals. As it farmhouses crop a good fence to protect the small grass covered farmers' houses from strong wind damage, conserves soil and moisture. The leaf can be used hitting butter, and spices (Meseret, 2016).

Enset is a multiuse crop with all plant parts being used by producers as human food, animal fed, medical and attractive uses. It has major value in day to day activity of farmers who cultivate this crop and it is a major source of food for them. The *Enset* products; *Kocho,* bulla and amicho are eaten by human. It is the most important raw material and vital fencing, wrapping and packing of every material and, keeping animals in and around the house (Refera, et al., 2023).

2.1.3 *Enset* Product Processing and its Marketing in Ethiopia

Enset products were processed mostly by women in traditional processing producers using poor and locally made material which had been circulated from generation to generation (Haile, et al., 2020). There is a little *Enset* processing technology such as *Enset* decorticator; squeezer and fermentation technology in Ethiopia due to low attention is given to *Enset* crop and its processing technology. There are tiresome steps *Enset* processing. Its processing started from selection of a matured *Enset* crop, preparation of working area and fermentation pit, removing of leaves from the plant and digging out the plant by remaining some parts corm at the place but it was a slight different in *Enset* product processing from place to place due to climate condition and processing season of the year (Refera, et al., 2023). The main *Enset* processing is pulverization and decortications, and fiber separation (fiber is a by-product).

Enset product marketing system was generally different from other agricultural products marketing as it takes a year's ready for harvesting but in most cases it depends on agro ecology, variety of *Enset* and management given for *Enset*. The other reasons are following

traditional ways of its products making and storage. Average amount of *Kocho* and bulla for subsistence in the households is less than the average amount of *Kocho* and bulla supplied to markets indicating that from the total amount of *Kocho* and bulla produced large amount of the products being supplied to market in order to cover the cash need of the households (Abebe U and Paul, J, 2015).

2.1.4 Agricultural Commercialization Measurement

The significance of quantifying the level of smallholders' commercialization is to measure to what amount a given farm household is commercialized in its total production, marketing and intake decisions, and to investigate the factors of commercialization (Jaleta, et al., 2009). There are diverse approaches are used to quantify agricultural commercialization level. Commercialization can be measured along a range from zero (total subsistence-oriented production) to unity (100% production is sold) (Govereh and Jayne, 1999).

Commercialization is quantify at household level as either in terms of gross or net sales measured as the ratio of percentage gross value of marketed output to total farm production (Jaleta, et al., 2009). These are output and input side commercialization, rural economy commercialization, and cash economy commercialization with the following ratios:

Commercialization of Agriculture (output side) = $\frac{value\ of\ sale\ in\ markets}{agricultural\ production\ value}$

Commercialization of agriculture (input side) = $\frac{value\ of\ input\ aquared\ from\ markets}{agricultural\ production\ value}$

Commercialization of rural economy = $\frac{value\ of\ good\ and\ service\ aquared\ through\ market\ transaction}{total\ income}$

Degree of integration into the cash economy = $\frac{value\ of\ good\ and\ service\ aquared\ cash\ transactions}{total\ income}$

2.1.5 Benefit of Smallholder Agricultural Commercialization

Agricultural commercialization has relative benefits above subsistence production that can create income for the smallholder farmers (Dorsey, 1999). The shift of subsistence agriculture towards market orientation or commercializing can significantly increase the income and welfare of smallholder farmers as well as contribute to economic growth and poverty alleviation (Zhou, Minde and Mtigwe). Commercialization has been advanced as a means of improving smallholder farmers' income and falling rural poverty in many developing countries (Pingali and Rosegrant, 1995); (Timmer, 1997).

2.1.6 Agricultural Commercialization in Ethiopia

Over the past time, Ethiopia dedicated an average of 14% of its national budget to agriculture sector and attained an average of 7% agricultural progress per annum. The primary goal of the agricultural commercialization clusters is the commercialization of smallholders' agriculture and agro-industrial development, contribution a strategic entry point for private sector meeting (Pauw, 2017).

Agricultural Commercialization Clusters were planned to strengthen and provide strategic platform for commercializing agriculture. During the first step of GTP-II, ATA support agricultural commercialization clusters in two major areas: increasing crop production and productivity, and improving market connections (Pauw, 2017).

2.2 Analytical framework

It has been observed that various models have been used to notice the determinants of commercialization and market participation. The Ordinary Least Squares (OLS) model is appropriate when all households participate in the market. However, in reality, not all households choose to join in a specific commodity market. Some households may choose to join in one market over another. If the OLS regression is expected without including non-participants in the analysis, it can introduce sample selectivity bias, leading to biased and inconsistent results. To address this issue, Tobit, Double Hurdle, and Heckman two-stage models are commonly used (Komarek, 2010).

The Tobit model (Tobin, 1958) is a statistical model that defines the relationship between a dependent variable and independent variables. The Tobit model assumes that participation and sales volume decisions are made simultaneously, implying that factors affecting the participation decision and the sales volume decision have the same effect and direction (Wooldridge, 2002). However, this assumption is a major limitation of the Tobit model (Reyes, et al., 2012). The Tobit model is limited in the sense that it estimates coefficient values for observations above or below a certain cutoff level, resulting in left and right censoring. Censored observations on the left side of the cutoff level pull down the regression line, leading to an underestimation of intercepts and an overestimation of slopes. Similarly, excluding censored observations can lead to an overestimation of intercepts and an underestimation of slopes (Fernando, 2011).

The Tobit model's assumption of simultaneous decision-making for participation and intensity of participation is relaxed by two-stage models. Two-stage models allow for the separation of these two decisions: the decision to commercialize and the decision regarding the extent of commercialization. According to (Barrett, 2008), households go through a two-step decision-making process when it comes to market participation.

Heckman's two-stage sample selection model was developed by (Heckman, 1979) and is widely used to address sample selection biases. This model adopts that the omitted values of the dependent variable are influenced by the decision to commercialize and the level of commercialization, which may not be jointly determined as in the Tobit model. Unlike the Tobit model, the double-hurdle model does not have any limitations on the elements of explanatory variables in each decision stage, allowing for a more comprehensive analysis of the determinants of market participation judgments and the concentration of participation judgments.

So, the Tobit model adopts that the zeros in the dependent variable are due to censoring and a univariate approach that assess a single equation with the censored dependent variable because of this fit for this study by considering the limitation.

2.3 Empirical Reviews

A research conducted by (Nuri & Jema, 2016) on the value chain analysis of *Enset* in Hadiya Zone, Southern Ethiopia. The study utilizes the Heckman selection model to detect the determinants of farmers' participation decisions in the *Kocho* and bulla markets. The study found that variable such as the age, access to market information, availability of labor, livestock holding, perception of *Kocho* price, and quantity of *Kocho* produced had a positive and significant impact on *Kocho* market participation. On the other hand, being male and having non/off-farm income had a negative and significant effect on *Kocho* market participation. Similarly, the availability of labor, perception of bulla price, access to market information, and quantity of bulla produced had a positive and significant impact on bulla market participation, while the age of the household head had a negative and significant effect. This study considered important variables, particularly market factors. However, it did not fully explore the benefits that females could derive from the crop, despite the results indicating that female-headed households were more oriented towards the *Kocho* market than men.

A study conducted by (Erchafo, 2017) on the market chain analysis of *Enset* products in Doyogena District, Southern Ethiopia. The study utilized the Heckman selection model to identify the determinants of *Kocho* and bulla market participation decisions and the level of participation at the farm level. The finding determine that the age of the household head, the number of livestock owned, and the area under *Enset* cultivation were positively and significantly related to *Kocho* market participation. On the other hand, far from the nearest market has a negative and significant relationship with *Kocho* market participation. The age of the household head and the area under *Enset* cultivation were positively and significantly related to the intensity of *Kocho* market participation, whereas family size and market distance had a negative and significant relationship. Similar patterns were observed for bulla market participation and intensity. This study identifies the variables that should be considered to benefit producers in specializing *Enset* for commercial production and addresses the challenges faced in the *Enset* market chain.

Conduct research on determinant of commercialization of teff producer by (Gidelew, et al., 2022) used Double hurdle result of probit model showed that sex of the household head, literacy status, land allocated to teff, application of chemical fertilizer, row sowing and use of improved teff seed significantly affected market involvement decision while the truncation regression model result showed that household size, literacy status, frequency of extension contact, land allotted to teff, application of chemical fertilizer and use of improved teff seed affected level of farmers market participation in teff output.

A research conducted by (Tesfaye, et al., 2019), factors affecting market outlet choice of *Kocho* producers in Cheha District, Gurage Zone, Centeral Ethiopia. The study run Multivariate probit models were used to identify factor affecting market outlet choice of *Kocho* producers and the result shown that ownership of transport facility, *Kocho* quantity produced, perception toward current price, extension service, market distance and value addition of *Kocho* were statistically influenced *Enset* producers choice of *Kocho* market outlets. The study recommended that providing timely and adequate modern production inputs to improve quantity produced, strengthening extension services to provide adequate information, and developing and improving infrastructures.

A research conducted by (Endalew, et al., 2020), determinant of wheat commercialization among smallholder farmers in Debre Elias woreda, northwestern Ethiopia. The study utilized

beta regression model to identify the determinant of wheat commercialization. The study found that factors such as educational status, number of oxen, land size allocated to wheat production, farming experience in wheat production, extension service, and market distance are key influences for smallholder farmer's wheat commercialization. Hence, this study determines that try to rise smallholder farmer's wheat commercialization should give special primacy for significant explanatory variables.

A research conducted by (Abate, et al., 2022), commercialization level and determinants of market participation of smallholder wheat farmers in northern Ethiopia. The study utilized double hurdle model to analyze the data. The study found that factors such as age, educational level, current selling price, wheat market experience, access to market/information, off/non-farm income, family size, market orientation, distance to all weather roads and land size allocated for wheat significantly affected the smallholder wheat farmer's market participation. Therefore, the study conclude that a policy on improving market access (by improving market infrastructure, marketing facilities, and encouraging contract farming), farmers awareness on market (by farmers training), and productivity of land (using the best agronomic practice and improved technology) should be designed to improve smallholder farmers commercialization level.

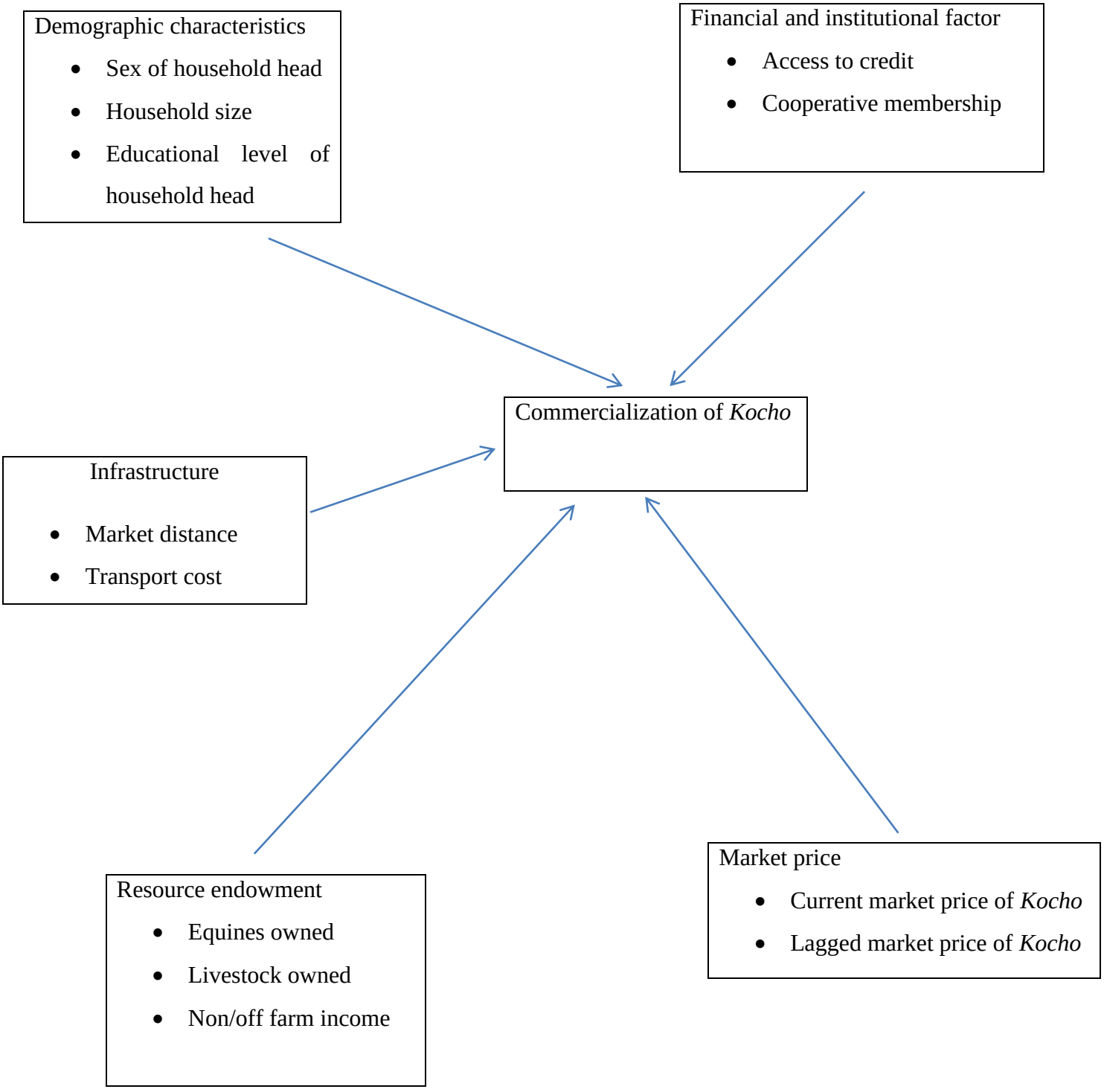
A research conducted by (Gebre, et al., 2021), determinant of sorghum commercialization among smallholder farmers in Kaffa, Sheka, and Bench Sheko Zones Southwest, Ethiopia. The study utilized Tobit model to identify the determinant of sorghum commercialization. The study initiate that factors such as sex of household head, educational level of household head, land under sorghum production, non/off-farm income, sorghum quantity produced, credit amount receive, and oxen were found to influence significantly the degree of commercialization. The implication of the study were enhancing the productivity of land, strengthening supportive institutions and improving infrastructure facilities. Supporting female-headed households through different policy initiatives and interventions can improve their market participation.

A research conducted by (Anteneh and Endalew, 2023), determinant of teff commercialization among smallholder farmers in Hulet Eju Enese woreda, Ethiopia. The study utilized an output commercialization index and a beta regression model was used to identify the determinant of teff commercialization. The study found that factors such as number of oxen, teff land size,

farming experience in teff production, market distance and agro ecology taken significant influence on teff commercialization. Those determine that source of enhanced traction power, land productivity, market infrastructure, experience sharing strategies, and new varieties that can adapt to varied agro ecology should give special important to improve smallholder farmer's commercialization.

2.4 Conceptual Framework

The major factors influencing the commercialization level can be classified into demographic; resource ownership; infrastructure and market; financial and institutional factors. The conceptual framework shows dependent variable and independent variable interconnection in case area.



Source: Adopted from Moti *et al*., 2009

Figure 1 Conceptual framework of the study

CHAPTER THREE

3. RESEARCH METHODOLOGY

In this chapter presents description of the study area where the research was conduct, data types, sources and methods of data collection, sampling procedure and sample size determination, methods of data analysis, hypothesis and variable definitions.

3.1 Description of the study area

The study area, Gurage zone, is found in the central Region of Ethiopia. It is located between 37° 28' and 38° 38' longitude and 7° 28' and 8° 27' latitude, covering an area of about 5,932 km^2. Based on the data from Gurage zone Department of Finance and Economy Development (DOFED), the zone has thirteen administrative *woreda (*districts) with 412 peasant associations (PAs) and two town administrations. The zone bounds with Oromiya regional state in the north, northeast and northwest, Silti zone in the south east, Hadiya zone in the south, and Yem special woreda in west directions. Wolkite, the capital of the zone, is 155 km away from Addis Ababa in the Addis-Jimma road (DoFED, 2015).

Geta is one of the districts in Gurage zone, central Ethiopia. It is one of the sub-groups of the Sebate Bet Gurage. Part of the gurage zone, the Geta woreda is surrounded on the south by the Silte Zone, on the southwest by Endegagne, on the west by Enemorina Eaner, on the north by Cheha, and on the northeast by Gumer.

Centered on data from the Department of Agriculture and Natural Resource Development of Gurage zone (DANRD), three different zonations with separate farming systems are recognized: First, areas with an altitude above 2200 masl and producing mainly *Enset*, Barely, Field pea and Fababean. Second, altitudinal range between 1800 and 2200 masl and growing major crops of *Enset*, *Teff*, Maize and Khat. Third, altitudinal range between 1600 to 1800 masl and growing major crops of *Teff* and Maize (DANRD, 2016).

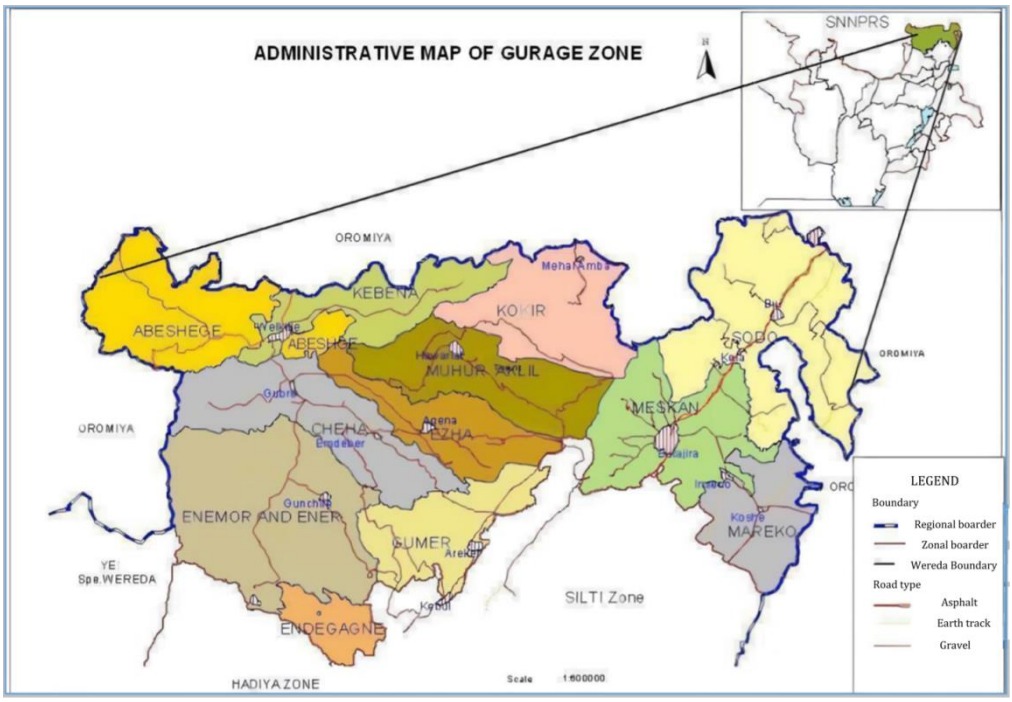


Figure 2 Location of the study area

3.2 Data type, Source and Method of Data Collection

The study implied both primary and secondary data. The primary data was gathered from randomly selected *Enset* product producer specifically *Kocho* producers in four rural kebeles, from *Kocho* producers in the district.

The primary data was gathered from farmers focus on determinant of commercialization of *Kocho* such as: demographic characteristics of the household, Equines owned, Livestock ownership, Non/off farm income, Sex of household head, Household size, Educational level of household head, Access to credit, market distance, transport cost, cooperative membership, Current market price of *Kocho* and Lagged market price of *Kocho*. The questionnaire was cover different part in order to capture relevant information related to the study objectives.

And also the secondary data was gathered from different secondary sources such as: published and unpublished document, journals and website was visited to collect relevant secondary data meeting the objective of the study.

3.3 Sampling procedure and Sample Size Determination

The target population for this study was smallholder *Kocho* producer in Geta district. So as to choice representative sample three-stage sample technique was used to select *Kocho*

commercialize household. In the first stage, within Gurage zone one major *Kocho* producing district were selected in considering agro ecological zonations with distinct farming systems. In the second stage, from selected district four *Kocho* producing kebeles; namely, Agata, Silas, Quante and Esmandir was nominated from entire of 16 *Kocho* producing kebeles of the district.

To limit the sample size, there are many attitudes; these include using a census for small populations, imitating a sample size of similar studies, using published tables, using formulas and also rule of thumb (Glenn, 1992). When population is homogeneous and population sizes are known, Yamane formula was suitable to fix sample size. Yamane formula for sample size estimation is determined at 95% confidence level with degree of changeability of 5% and level of precision equal to 7% were used to find a sample size prerequisite to represent the true population for this study. Hence, it is not possible to correct precision level, taking a total number of 2,480 household head in the study area the sample size became 188. Accordingly, the sample size was determined by equation (1) below;

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

Where n= sample size

N=population size (sampling frame)

e= level of precision

$$n = \frac{2480}{1+2480(0.07)^2}$$

$n = 188$

By using the third stage, from least of *Enset* producer households in the sample kebeles, 188 were selected randomly. But in this study the sample size was inflated in to 194, to check non-respondent. The total number of households taken from kebeles was base on, (Pandey, R. and Verma, M. R. , 2008) proportional sample allocation formula and given by equation (2) below;

$$ni = \frac{nNi}{N} \qquad (2)$$

Where: $ni = sample\ households\ from\ the\ ith\ kebele$

n = Sample size

Ni= the total household in the i^{th} kebele

N = total household in selected kebele (sum total of households in four kebele)

Table 1 Sample distribution of Kocho producer households in selected kebeles

	No Kebeles	Total household in the kebeles	Sample households
1	Agata	580	45
2	Silase	720	57
3	Quante	463	36
4	Esmandir	717	56
Total		2480	194

3.4. Approach of data Analysis

Descriptive statistics and econometric analysis was used to meet the objective of the study.

3.4.1 Descriptive statistics analysis

Descriptive statistical analysis way such as mean, proportions, percentages, and standard deviations were used in the process of tentative and describing farm households' demographic characteristics of the household, Equines owned, Livestock owned, Non/off farm income, Sex of household head, Household size, Educational level of household head, Access to credit, cooperative membership, nearest market distance, transport cost, Current market price of *Kocho* and Lagged market price of *Kocho*.

Household commercialization index (HCI) clear as the ratio of gross value of *Kocho* sold to the gross value of *Kocho* formed was used for showing household level of commercialization (Von Braun, 1995). Household commercialization index measures the level to which households' *Kocho* production is oriented towards the market. Here, the commercialization level of *Kocho* producers was investigated from the output side. Mathematically, the HCI formula adopted from (Von Braun, 1995) is expressed as:

$$HCI_i = \frac{Gross\ value\ of\ kocho\ sold}{Gross\ value\ of kocho\ produced} \times 100\% \qquad (3)$$

Where: HCI_i = Commercialization index of i^{th} household in *Kocho* sales stated as a percentage. HCI has a value found between 0 and 100, inclusive. A value nearer to 0 would show subsistence household and a value nearer to 100 indicate highly commercialized household.

3.4.2 Econometrics Analysis

A Tobit model was used to identify determinant of commercialization of *Kocho* producers.

3.4.2.1 Determinant of Commercialization of *Kocho*

Tobit model was a numerical model offered by James Tobin to describe the relationship between partially continuous variable and independent variable (Tobin, 1958). The partially continuous variable used in isolating determinant of commercialization of *Kocho* producing farmers was commercialization index. The commercialization index is partially continuous or censored because some of its variable cluster at the limit (zero for survival *Kocho* producers and one hindered for fully commercialized farmers). The censored regression model is an option for handling this limited dependent variable.

Next the value of the dependent variable, commercialization index found between zero and one hundred, the Tobit model was used to classify its determinants. The general formula essential Tobit model is specified as follows:

$$y *_{i=} \beta' xi + \varepsilon_{\ i} \qquad (4)$$

Rewrite as follows

$$COMIX = \alpha + \beta 1SEX + \beta 2\text{EDHH} + \beta 3\text{HHSI} + \beta 4\text{LIVON} + \beta 5\text{NEQW} + \beta 6\text{DMKT} + \beta 7\text{TRAC} + \beta 8\text{ACRT} + \beta 9\text{COPM} + \beta 10\text{NONFIN} + \beta 11\text{LMKTP} + \beta 12\text{CMKTP} + \varepsilon$$

Where: y_i* = is a hidden variable, which is overlooked for values less than 0 and greater than 100 that representing survival or wholly commercial index;

x_i = is path of independent variables, which includes issues moving level of commercialization;

β = is coefficient of estimate;

εi = is a disturbance term

Thus α (alpha) is a constant,

SEX=sex of household head
EDHH=education level of household head

HHSI=household size

LIVON=number of live stock owned

NEQW=number of equine owned

DMKT=market distance

TRAC=transport cost

ACRT=access to credit

COPM=cooperative member ship

NONFIN=off farm income

LMKTP=lagged market price

CMPTP=current market price

Assumed the perceived dependent variable commercialization index (y_i), the Tobit model is:-

$$y_i = \begin{cases} 0 \; if \; yi* \leq 0 \\ y* \; if \; 0 < y* < 1 \end{cases} \qquad (5)$$

The Tobit model is assessed using maximum likelihood estimations. The log likelihood (LL) of the model is

$$\ln L = \ln(\coprod_{yi>0} f(yi) \coprod_{yi=0} F(0)) = \sum_{yi>0} \ln f(yi) + \sum_{yi=0} \ln F(0) \qquad (6)$$

Conversely, the Tobit coefficients cannot be contingent directly as calculations of the magnitude of marginal effects of changes in the explanatory variables on the expected value of the dependent variable, because there are three main conditional expectations of interest in the Tobit model. These are: the conditional expectation of the underlying latent variable (y*); the conditional expectation of the observed dependent variable (*y)*; and the conditional expectations of the uncensored observed dependent variable (*y*|*y*>0). Following (Jack Johnston and John DiNardo, McGraw Hill, 1997) the marginal effects of these conditional expectations, respectively are given as:

$$\frac{\partial E(y*/x)}{\partial x} = \beta \qquad (7)$$

$$\frac{\partial E(y/x)}{\partial x} = |\beta \emptyset(x\beta|a) \qquad (8)$$

$$\frac{\partial pr\ y>0/x=}{\partial x} \emptyset \frac{x\boldsymbol{\beta}}{a} * \frac{\boldsymbol{\beta}}{a} \qquad (9)$$

The interpretations of these marginal effects depend on the point of interest based on the focus of the study (Greene, 2003). So the interest of the researcher is to understand about the determinants of average values of the dependent variable among those who have already participated, equation 7 is used.

3.5. Hypothesis, Variables Selection and Definition

So as to find factors determining commercialization of *Kocho* producers, determining which issues expressively influence and how these factors are connected with the dependent variables are essential. Hence, the following dependent and independent variables are defined and hypothesized in the study.

Dependent variables

Index of Commercialization (COMIX): It is a limited dependent variable, which is stately as the share of the gross value of *Kocho* sales to gross value of *Kocho* made by the household in 2022/23 production year, describes in percent.

Independent Variables

The independent variables hypothesized to affect commercialization level of *Kocho* producer are the following.

Sex of the Household Head (SXH): It is a dummy variable taking a value of 1 if the household head is female and 0 otherwise. It has expected to a positive or a negative effect on household's commercialization decisions.

Level of the Household Head Education (EDHH): Level of the Household Head Education is a continuous variable that denotes to the number of years of formal schooling the household head joined. Educated household heads are estimated to have better skill, better access to information and make better use of their available resources. Educated household head was found to have a positive/negative effect on the participation of market (Mulatu, 2021). Hence, this variable was expected to affect proportion of *Kocho* commercialization positively or negatively.

Size of Household (HHSI): Size of Household is a continuous variable that refers to the total number of members of the household and give value in accordance with adult equivalent. Taking more household members decreases the amount of output that going to the market because of households with great member tend to consume more of what they have produced and less is available for sales (Tura, Goshub, Demise, & Kenead, 2016). As the proportion of output consumed at home increased, the quantity of output sold decreased. (Tesfaye, Zemedu, and Ademe, 2019) Found that having large family size was less market participation or sell volume decrease. Therefore, household size is expected to affect the quantity of *Kocho* to be sold negatively or positively.

Number of Livestock Owned (LIVON): Number of Livestock Owned is a continuous variable and measured in Tropical Livestock Unit (TLU) the household. Households who have more unites of oxen can meet average cultivation rate of sorghum than there correspondent (Gebre, et al., 2021). As there is an input for farm operation and use the manure as fertilizer to increase *kocho* production. Therefore, livestock will hypothesize to expect to impact on the proportion of *Kocho* sold positively through increasing productivity.

Number of Equines Owned (NEQW): Number of Equines Owned is a continuous variable measured in Tropical Livestock Unit (TLU). Use of equines for transport has a positive impact on market participation by reducing the cost of transporting inputs from the market to the farm

and output from the farm to the market (Tura, et al., 2016). Therefore, equine ownership will hypothesize to have positive effect on the fraction of *Kocho* sold.

Market distance (DMKT): market distance is a continuous variable and measured in kilometer which the distance farmers going to sale their *Kocho* produce to the market. Farmers located in a village or distant from the market is weakly accessible to the market, the closer to the market the compact will be the transportation cost and time spent. This result is in line with (Tesfaye, et al., 2019) who confirmed that distance to the nearest market negatively affecting *Kocho* market participation. Therefore distance from the nearest market expected to affect negatively to the commercialization of *kocho*.

Transport Cost (TRAC): it is a continuous variable and measured in ETB per kilometer. The farmers who live near to the central market have an opportunity to sell more amount of *Kocho* than farmers who live far from the nearest market because long distance increase transportation cost of *Kocho* commercialization. Therefore, the high cost of transportation discourages smallholder farmers from commercializing *Kocho* product. The study by (Anteneh and Endalew, 2023) revealed that market distance adds more weight to the opposition of heavy transaction cost on most subsistence farmers and the closer the smallholder farmers to the output market, the higher its commercialization. Therefore, it will hypothesize that transport cost negatively influence quantity of *Kocho* sold.

Access to Credit Service (ACRT): It is a dummy variable that giving a value of 1 if a household head has yes to get credit service and 0 otherwise. Credit shows vital role in solving cash limits desired in production and used to buying inputs such as fertilizers, improved seed and herbicide that used to increase wheat production and productivity, which in turn has a positive effect on marketable surplus (Anteneh and Endalew, 2023). But in contrast access to credit leads to supply other cash crop because *Enset* production did not need inputs such as fertilizers and herbicides. Therefore, it will hypothesize that access to credit negatively influence quantity of *Kocho* sold.

Cooperative Membership (COPM): it is a dummy variable that taking a value of 1 if a household head is a member of cooperatives and 0 otherwise. Being a member of agricultural cooperative household have better access to output market. Therefore, being a member to cooperative is hypothesized to impact quantity of *Kocho* sold positively.

Non/off-farm income (NONFIN): off/non-farm income is a continuous variable measured in ETB and displays the amount of income found from non/off-farm activities accepted by the household members in 2015/16 E.C. (Gebre, et al., 2021) found that participation in non-farm Farmers who gain more non/off-farm income may not get cash shortage. Hence, it will hypothesize that non/off-farm income control the quantity *Kocho* sold negatively.

Lagged Market Prices of *Kocho* (LMKTP): It is a continuous variable measured in ETB) as the normal price of *Kocho* birr per quintal in the previous year in 2022/23. When opinions on lagged market price by farmers are high, it encourages the farmers to produce more and they have surpluses to supply to the market. (Tura, et al., 2016) High lagged market prices of *Kocho* will estimated to encourage farmers to produce and supply more output to the market in the consequent year. Thus, lagged market prices of *Kocho* will hypothesize to affect the amount of *Kocho* sold positively.

Current Market Price of *Kocho* (CMKTP): It is a continuous variable measured in ETB per quintal in 2022/23 production year. Market prices of *Kocho* differ among different market outlets and in the market day, farmers are motivated to sell their produce by selecting a particular market outlet that has higher price. This makes the supply to be directly related with a price offered. Therefore, current market price of *Kocho* will hypothesize to determine commercialization of *Kocho* producers either positively or negatively.

Table 2 Summary of variables will use in Tobit model

Dependent variable	Type	Measurement	
Commercialization of *Kocho*	dummy	Yes=1, No=0	
Independent variables			Expected sign
Sex of household head	dummy	female=1, 0 otherwise	+/-
Household size	continuous	adult equivalent	+/-
Educational level of HH	continuous	year of schooling	+/-
Livestock owned	continuous	TLU	+

Equine owned	continuous	TLU	+
Transport cost	continuous	ETB	-
Distance from the nearest market	continuous	kilometer	-
Access to credit	dummy	access credit=1; 0 otherwise	-
Cooperative membership	dummy	being member=1; 0 otherwise	+
Non/off farm income	continuous	ETB	-
Lagged market price of *Kocho*	continuous	ETB	+/-
Current market price of *Kocho*	continuous	ETB	+/-

CHAPTER FOUR

4. RESULT and DISCUSSION

This chapter presents the study findings and discussion in different sections. Descriptive results including demographic and socio-economic characteristics of sampled households' *Kocho* producer. Commercialization index was used to measure the extent of *Kocho* commercialization. At the end, Econometrics analysis was employed to identify factors determining commercialization of *Kocho* producers in the study area.

4.1 Sample Households Demographic and Socio-economic Characteristics

This part starts by proposing and discussing the demographic and socio-economic characteristics of sample households with regards to sex of household head and resource endowments of *Kocho* producing household. It additionally argues the financial and institutional factors, commercialization level of *Kocho* producer in the case area.

4.1.1 Demographic Characteristics of Sample households

The outcome of the study indicates that out of 194 sample households 186 questioner responded, from those responded questioner 122(66.5%) of households are *Kocho* commercialize or participant to the market and 64(34.5%) households are non-participant in *Kocho* commercialization produce 2022/23 year. The group judgments of commercialize and non-commercialize was calculated using t-test for continuous variable and chi^2 –test for dummy variable and the outcome are presented in the following tables. As specified in table 3, out of total sample respondents, 75(40.3%) were male headed and 111(59.6%) were female headed households. Take in to account, household who give assessment about *Kocho* commercialize in context of this study. Among *Kocho* commercialize household female and male headed households constitute 81 (66.4%) and 41(33.6%) respectively. Out of non-commercialize 30(46.8%) and 34(56.6%) of the respondent were female and male headed households respectively.

Concerning access to credit, 34(18%) of the sample get credit service and the remaining 154(82%) were not out of this access to credit service household 25(73.5%) were non-commercialize and 9(26.5%) were commercialize of *Kocho* products. The chi^2 result among commercialize and non- commercialize show the existence of significance difference between

the group in terms of sex of household head and access to credit (table 3). These require that commercialize participants are more in number than non-commercialize in terms of the different classes. The distribution of marital status shows that out of the total sample respondents, 11(5.9%), 153(82.3%), 16(8.6%) and 6(3.2%) were single, married, widowed and divorced household respectively. About cooperative membership out of the sample respondent 131(69.7%) were member of cooperatives and 57(30.3) were not member of cooperatives.

Table 3 Test statistics of commercialize and non-commercialize chi2 or Fisher exact test

Variable	Commercialize		non-commercialize		total		x^2
	n	%	n	%	n	%	
Sex of household head							
Male	41	54.6	34	45.4	75	40.4	6.64**
Female	81	72.9	30	27.1	111	59.6	
Access to credit							
Yes	9	26.47	25	73.53	34	18.2	28.2**
No	113	74.34	39	25.6	152	81.8	
Cooperative membership							
Yes	87	67.5	42	32.5	129	69.3	0.63
No	35	61.4	22	38.6	57	30.7	

Source: own survey result, 2024

Two group mean-comparison test of continuous variable used in the study shown there was a significant mean difference between commercialize and non-commercialize (table 4). Household size the overall mean family size in adult equivalent ratio per households was about 3.65 lower than the national average 4.6 per households (CSA, 2014). The mean family size of *Kocho* commercialize and non-commercialize were found to be 3.66 and 3.63 family

size respectively. Hence, with regards to the educational level of sample household heads, the average number of formal schooling completed was 4.56 year with a standard deviation of 3.52. Mean difference in educational level of household head among commercialize and non-commercialize household is statistically significant at 5%.

Table 4 Test statistics of commercialize and non-commercialize (t-test)

Variable	Mean			std. Dev.	t-value
	Commer	non-commer	total		
	n (122)	n (64)	n (186)		
Education level	2.71	8.17	4.56	3.52	-6.29**
Household size	3.66	3.63	3.65	1.08	-0.23
Livestock owned	5.57	3.6	4.89	1.69	2.94***
Equine owned	1.4	0.71	1.16	0.72	3.73***
Distance from nearest market	1.7	4.14	2.58	1.59	-3.08***
Transport cost	20.2	46.1	29.11	17.12	-1.73*
Non/off farm income	6110.65	10407.81	7589.24	4517.9	-3.27***
Lagged market price of *Kocho*	1866.8	1846.8	1859.9	114.4	-0.85
Current market price of *Kocho*	1949.59	1926.56	1941.66	117.5	-0.26

*,** and *** indicate significant level at 10,5 and 1% respectively

Source: own survey result, 2024

4.1.2 Resource Ownership of Sample Households

Ownership of physical resources is an important factor that determines commercialization of smallholder farmers. Land, labor, capital and other resources are the major resources that farmers used to enhance commercialization of *Kocho* that afford a better return.

Livestock Ownership

In the region, mixed farming system is dominantly used by farm households. Livestock is a source of income, food and organic fertilizer such as manure and compost was very essential for *Enset* crop production. The mean difference in livestock owned among commercialize and non-commercialize is significant at 1% in favor of commercialize. The average livestock owned by sample households excluding equines was 4.89 TLU on average with a standard deviation of 1.69 (table 4).

Equine Owned

Equines are used as a means of transport by smallholder farmers in the district. Equines give transport services for farmers for marketing of output. The mean difference in equines owned among commercialize and non-commercialize is statistically significant at 1% table 4. The average equines owned by sample households were 1.16 TLU on average with a standard deviation of 0.72 tables 4.

Off/non-farm income

In the district as table 4.3 shows that, the majority of sample household off/non-farm income generate from animal sells, remittance and petty trade. The mean cash income obtained from off/non-farm income was 7589.24ETB with standard deviation of 4517.9. The mean difference in off/non-farm income among commercialize and non-commercialize is significant at 1%.

4.1.3 Institutional and infrastructure of sample household service

Market distance

As shows table 4 above Market distance was also the factor which controls household commercialization of *Kocho*. The average distance to the nearest market place was 2.58 km for sample defendants. The mean difference in distance to the nearest market commercialize and non-commercialize is 1.7 km and 4.14 km respectively. It was significant at 1% level of significance.

Transport cost

As shows table 4 above transport cost the majority of the sample household uses their own equines and modern transport to transport *Kocho* to the nearest market. But the average transport cost per kilometer was 29.11 birr. It was statistically significant at 10% level of significance.

4.2 Level of commercialization of *Kocho* producers

According to (Samuel, G., & Kay, S., 2008) the classification of smallholder farmer level of commercialization is divided into three categories: less commercialized farmers (those who sold up to 25% of output), semi-commercialized farmers (those who sold between 25% and 50% of output they produce) and commercialized farmers (those farm households who sold more than 50% of what they have produced). The results from the study show that 34.4% of sample households' commercialization index is zero specifying that they are fully subsistent in terms of *Kocho* output, 32.2% of the sample households are less-commercialized, 24.2% of households are semi-commercialized category and 9.2% are commercialized farmers table 5 below.

Table 5 Kocho producers in 2022/23 production year commercialization level.

Level of commercialization	Frequency	Percent
Subsistence (0%)	64	34.4
Less commercialized farmers (1-25%)	60	32.2
Semi commercialized farmers (25-50%)	45	24.2
Commercialized farmers (≥50%)	17	9.2
Total	186	100

Source: own survey result, 2024

The overall average level of commercialization of *Kocho* producers in the district is 21% in terms of the gross value of *Kocho* sold. The average value of *Kocho* commercialization indicates that the level of commercialization of *Kocho* producers in the district was less-

commercial level. This degree of commercialization indicates that further improvement in access to market and price of *Kocho*.

4.3 Challenges and Opportunities of *Kocho* Commercialization

4.3.1 Challenges of *Kocho* Commercialization

The market and marketing challenge in most part of Ethiopia *Kocho* marketing are lack of self-possessed market information, price of the *Kocho* and other products are low, most of the products sold in the farm, therefore less demand of *Kocho* and its products in most part of the country, most part of the country do not have knowledge how to consume *Kocho* and its product, have high water fillings make it not easily to market and lack of enough transport access to gather product to the market (Tenaye, A., & Geta, E., 2008).

Even though there is a huge demand and potential of agro-ecology for *Enset* production in Ethiopia parts of production area, the farmers are quiet facing different challenges related to, input supply, modern *Enset* farming system, market information for selling *kocho* product in good price, access to market, access to transport and more ever the product is not known in all parts of the country. The farmers produce *Kocho* near to the town and cities was one of the most important chances for the *Kocho* producer farmers to sell their products (Amicho, *Kocho*, Bulla, Fiber and Fresh *Enset* leaf) as well.

And non-availability of infrastructure development, inadequate awareness (it think as kocko is a traditional food that may not be well-known outside of Ethiopia), a perishable product that has a relatively short shelf life compared to other processed foods and this create, the traditional process of preparing *Kocho* is complex, cultural perception (it assumes selling of *Kocho* is manifestation of poverty in the study area) and consumer preferences all of those are challenges in the study area.

4.3.2 Opportunity of *Kocho* Commercialization

Kocho offers a distinctive and culturally important food option that can differentiate the range of products available in the market. Commercialization of *Kocho* can introduce consumers to a new and distinctive food experience, contributing to food diversity and promoting cultural heritage. *Enset* plants, from which *Kocho* made, are known for their resilience to drought. It

support viable agricultural practices and promote the cultivation of *Enset* as a climate-resilient crop.

Most of the respondent responses were commercialization of *Kocho* opportunities is to get cash income (economic opportunities for farmers), promote cultural heritage, and improve nutrition, sustain food security in the study area.

4.4 Econometric Result

Before to the econometrics analysis important tests that check the model to work for the analysis was under taken on hypothesized variables. Heckman two-step is an econometric model developed to correct sample selection bias (Heckman, 1979). In this study, the result from the Heckman two-step indicated that there is no sample selection bias, because the inverse mills ratio (IMR) which (mills lambda 0.57) was statically insignificant. This suggested that there is no sample selection bias. Hence, no need to use the Heckman two-step model (appendex table 6).

Likelihood ratio test (LR test) is a statistical test used for comparing the goodness of fit of Tobit model and Double-hardle model. The test statistic for log likelihood ratio ($\Gamma = 129.01$) was lower than the chi-square distribution (279.65) at 11 degrees of freedom, statistically insignificant which is in favor of the Tobit model. The effect of the result is that for determinants of commercialization of *Kocho* producers, Tobit model feet the data. As to the survey result of this study, out of total 186 sample households 64(34.5%) of them did not commercialize *Kocho* even if they produce 2022/23 production year and the data are censored. Then the commercialization index which is commercialization of this study is censored, the maximum likelihood approximation Tobit regression model was used and the investigation of the survey data was approved out by using STATA version 14.

4.4.1 Determinant of commercialization of *Kocho* producers

The reasons control commercialization level of *Kocho* producers was analyzed by Tobit regression model. Before running and fitting the Tobit regression model necessary tests that verify the hypothesized independent variables and existence of econometric problems were performed using appropriate test statistics. Most of the time cross-sectional data were affected by heteroscedasticity, to remove heteroscedasticity used robust.

The Tobit regression model assessed results in table 6, presented that the likelihood function of commercialization index was significant at 1% level (LR chi^2 =279.65 with Prob > chi^2 = 0.0000) showing a strong explanatory power of independent variables to explain factors determining commercialization level of *Kocho* producers (goodness of fit of the model). The model result show that out of explanatory variables used in the model, education level of household head, livestock owned, number of equine owned, distance from nearest market, transport cost, access to credit, cooperative membership and non/off farm income were initiate to significantly influence the commercialization of *Kocho* producers in the study area.

Table 6 Determinant of sample household commercialization

Independent variable	Coef.	Robust Std. Err.	P>z	marginal effect
Sex of hh head	-.0302386	.0537833	0.575	-.0302386
Education level	-.0670884	.0106592	0.000	-.0670884
Household size	-.0052705	.0227254	0.817	-.0052705
Livestock owned	.0477286	.0162438	0.004	.0477286
Number equine own	.1406603	.037736	0.000	.1406603
Distance from nearest Mkt	-.1105601	.0358927	0.002	-.1105601
Transport cost	-.0059476	.0034352	0.085	-.0059476
Access to credit	-.3277152	.0816662	0.000	-.3277152
Cooperative membership	-.1444501	.0574817	0.013	-.1444501
Non/off farm income	-.0000214	6.54e-06	0.001	-.0000214
Lagged market price	-.00026	.0003049	0.395	-.00026
Current market price	-.0000807	.0003053	0.792	-.0000807
Constant	1.87919	.4803731	0.000	

64 left-censored observations at COMIX <= 0	Number of obs=186
122 uncensored observations	LR chi^2 (12) = 279.65
0 right-censored observations	Prob > chi2 = 0.0000
Log likelihood = -51.844121	Pseudo R^2 = 0.7295

Source: own survey result, 2024

Education level of the household head: as it was hypothesized educational level of the household head was found to have negative and significant effect on the level of *Kocho* commercialization at 1% level of significance. The marginal effect indicated that as the level of formal education of the household head increase by one grade; decrease the level of commercialization by 6.7%. This infers that as the level of education grade achieved by the farmer's increases, the probability to go into commercialization decreases. This indicates that as the household years of schooling increased, they would shift searching of non/off farm income and cereal crop production. This result in line with (Gebre, et al., 2021) level of education of farmers increase commercialization of sorghum decrease because change from cereal crop production into high value or cash crop farming like (coffee, tea, fruits, and others).

Livestock owned: Number of livestock owned measured in TLU was initiate to be positively and significantly contribute to the level of *Kocho* commercialization at 1% significance level. The marginal effect result specifies that increase the number of livestock by one TLU increase the level of commercialization by 4.8%. This is due to the positive impact of livestock on *Enset* production by providing inorganic fertilizer for *Kocho* production. This result is in line with (Mamo, et al., 2017) and (Getahun, 2018)found that the positive effect of livestock ownership on the probability of being commercialize and level of commercialization due to significant effect on production.

Non/off-farm income: as expected income obtained from non/off-farm activities influenced the level of commercialization negatively and statistically at 1% level of significance. The marginal effect shows that increases in the amount of non/off-farm income by one ET birr decrease the level of commercialization by 0.00214%. This outcome due to the reason that household obtained incomes from non/off-farm activities were not stimulated because there is

no cash problem and they used the amount produced for home consumption. This result is supported by the findings of (Getahun, 2018) who found that participation in non/off-farm activities negatively impacts the degree of teff commercialization.

Distance from the nearest market: Market distance is inclined the level of commercialization negatively and statistically at 1% level of significance. The marginal effect designate that increase in market distance by one kilometer the level of commercialization decrease by 11%. This result finding shows that households located far away from the nearest market face challenge in delivering *Kocho* to the market (Refera, et al., 2023), (Tesfaye, et al., 2019) and (Yohannes, 2020) found that as distance in kilometer increase from farmer's residence to *Kocho* market, the level of commercialization and probability of its market participation decision was decreased.

Access to credit: As estimated cash get from credit formal or informal service impacted the level of commercialization negatively and statistically at 1% level of significance. The marginal effect shows that the probability of getting access to credit decreases the level of commercialization by 32.7%. This result due to the reason that household expected to obtained credit were not encouraged because there is no cash problem and they used the amount produced for home consumption and use the credit for petty tread and other purpose.

Equines owned: Number of equines measured in TLU has impact level of commercialization positively and statistically at 1% level of significance. The marginal effect shows that increase the number of equines by one TLU increase the level of commercialization by 14%. This is due to the positive influence of equines on *Kocho* commercialization by providing inorganic fertilizer for *Enset* production and transporting *Kocho* product to the market. This result was similar with the finding of (Getahun, 2018) who found that the number of equines owned has positive and significant effect on commercialization of teff.

Transport Cost: farmers far from market center would acquire a high transport cost. This transportation cost impact on the level of commercialization negatively and statistically significant at 10% level of significance. The marginal effect indicates that one ET birr increase the level of commercialization decrease by 0.59476%. This studies shown that farmers living far from the nearest market center suffers high cost and difficulty to supply large amount of *Kocho* to the market.

Cooperative Membership: Being a member of cooperative has influenced the level of commercialization negatively and statistically at 5% level of significance. The marginal effect shows that the probability of being cooperative membership decreases the level of commercialization by 14.4%. This indicate that the farmers in the study area have cooperative union focus on cereal crops commercialization and production not *Enset* products commercialization.

CHAPTER FIVE

5. SUMMARY, CONCLUSION AND RECOMMENDATION

This chapter is the last chapter which presents summary of findings, conclusion and recommendation of the study. Specific policy implications emanated from the findings are also given.

5.1 Summary

Enset is one of the most indigenous root crops widely cultivated in south, south west and central part of Ethiopia. Its product specifically *Kocho* has a significant contribution to the livelihood of producers as source of food small amount of income and ensuring of food security in Geta district. Therefore the study was aimed at identifying determinant of commercialization of *Kocho* producers in Geta district of Gurage zone, Central Ethiopia. The study was conducted with the specific objectives of measuring the level of commercialization of *Kocho*, identifying the factor affecting commercialization and identifying challenge and opportunity of *Kocho* commercialization in the study area.

Primary data were collected from randomly selected 196 *Kocho* producer households in four kebele by using structured and semi-structured questioners. Descriptive and econometric models were used to evaluate the collected data. Tobit model was used to identify the factors determining commercialization of *Kocho* producers. The outcomes of the study are summarized as follows.

The descriptive statistic indicate that, out of measured sample respondents, 66.5% of sampled respondents were participating in *Kocho* commercialization and 64(34.4%) of sample households are subsistent producers, 60(32.2%) are less commercial, 45(%) sample households initiate in semi-commercialization level and 17(9.2%) are commercial farmers in *Kocho* production in 2022/23 production year. The average level of commercialization of *Kocho* producers in the study area is 21% (twenty one percent) but different across sample households with the highest 75% and the lowest were zero. This average value of *Kocho* commercialization shows the level of commercialization of *Kocho* producers in the study area was in less-commercial level.

Thus, there is a need to expressly increase smallholder's commercialization in order to qualify stable and sustainable incomes from *Kocho* commercialization.

5.2 Conclusion

The result of Tobit regression model shows that household's demographic characteristics, resource endowment, market and institutional factors influence the commercialization behavior of smallholders. Out of explanatory variables used in the model, livestock owned (TLU), equine owned (TLU) were found to be positively and significantly contribute to the commercialization of *Kocho*, whereas educational level of household head, non/off farm income, transport cost, cooperative membership, market distance were found to negatively and significantly affect commercialization of *Kocho* in the study area.

5.3 Recommendation

Depending up on the findings of the study the following implications are made.

So as to help policy appropriate involvement strategies to improve the smallholder farmers commercialization of *Kocho* and to correct marketing problem through creating conducive production and marketing environment in the study area.

The outcome of the study indicates that educational level of the household head was initiated to have negative and significant on the level of commercialization. Because of the reason that in the study area educated person assumes that kocho commercialization is the work or income generation of uneducated person and commercialization of kocho assumed that they are poor. The researcher recommend that further improvement on education to create appropriate value improved technology and not always search non/off farm income focus on *kocho* commercialization.

Livestock owned in TLU donate to the level of *Kocho* commercialization positively and significantly. Thus efforts are crucial in improving number of livestock ownership is essential for smallholder farmers as a source of inorganic fertilizers. Number of equine owned in TLU contributes to the level of *Kocho* commercialization positively and significantly. Thus struggles are required in increase number of equines ownership is important for smallholders farmers are used as transport service supply to the market and it decrease transport cost.

Cooperative membership is negative effect on commercialization of *Kocho* in the study area. It gives technical support and awareness creation only for cereal crop commercialization. But in the study area cooperative membership not supports *Kocho* commercialization. The researcher recommends that cooperative membership should give strong emphasis through giving market

information, technical support, collect the product and delivering to central market. Income earned from non/off-farm activities including access to credit negative impact on commercialization of *Kocho* producers. This was due to the fact that households obtained income from non/off-farm activities were not encourage sell more *Kocho*, consume at home and deliver to central town to support their child. Therefore, involvements proposed at raising the efficiency of farmers to reduce farmer's involvement in non/off-farm activities and changing the attitudes of farmers to use cash income obtained from non/off-farm activities to strengthen their agricultural production, value adding and market orientation is essential. Later, regional and zonal agricultural bureau create awareness through local and international market about the nutritional value of kocho product and drought tolerance of enset plants.

Joint effort of development agent, agricultural experts, researchers and other stakeholders on identifying and solving problems, availing of new *Kocho* processing technology, value adding, advertise in international and local market, and information to farmers are necessary to increase commercialization.

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APPENDIX

Appendix table 1 Conversion factor used to compute household size in adult equivalent

Age group (years)	Male	Female
<10	0.6	0.6
10-13	0.9	0.8
14-16	1	0.75
17-50	1	0.75
>50	1	0.75

Source: (Samuel, G., & Kay, S., 2008)

Appendix table 2 Conversion factors used to Estimate Tropical Livestock unit equivalent

Livestock category	Tropical livestock unit
Camel	1.25
Horse	1.1
Ox and Caw	1
Weaned Calf	0.34
Heifer	0.75
Calf	0.25
Donkey (adult)	0.70
Donkey (young)	0.35
Sheep and Got (adult)	0.13
Sheep and Got (young)	0.06
Chicken	0.013

Source: Storck *et al*, 1991

Appendix table 3 Tobit Regression Result

Number of obs = 186 64 left-censored observations at COMIX <= 0

122 uncensored observations 0 right-censored observations

LR chi2(12) = 279.65 Prob > chi2 = 0.0000

Log likelihood = -51.844121 Pseudo R2 = 0.7295

COMIX	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
SEXHH	-.0302386	.0537833	-0.56	0.575	-.1363902	.075913
EDHH	-.0670884	.0106592	-6.29	0.000	-.0881264	-.0460503
HHSI	-.0052705	.0227254	-0.23	0.817	-.0501234	.0395824
LIVON	.0477286	.0162438	2.94	0.004	.0156683	.0797889
NEQW	.1406603	.037736	3.73	0.000	.0661811	.2151395
DMKT	-.1105601	.0358927	-3.08	0.002	-.1814013	-.0397189
TRAC	-.0059476	.0034352	-1.73	0.085	-.0127277	.0008324
ACRT	-.3277152	.0816662	-4.01	0.000	-.4888992	-.1665312
COPM	-.1444501	.0574817	-2.51	0.013	-.2579013	-.0309988
NOFIN	-.0000214	6.54e-06	-3.27	0.001	-.0000343	-8.50e-06
LMKTP	-.00026	.0003049	-0.85	0.395	-.0008618	.0003419
CMKTP	-.0000807	.0003053	-0.26	0.792	-.0006832	.0005218
_cons	1.87919	.4803731	3.91	0.000	.9310818	2.827298
/sigma	.2913262	.0198435			.2521613	.3304911

Appendix table 4 Marginal effect result

```
. margins,dydx( SEXHH EDHH HHSI LIVON NEQW DMKT TRAC ACRT COPM NOFIN LMKTP CMKTP)

Average marginal effects                        Number of obs     =        186
Model VCE    : OIM

Expression   : Linear prediction, predict()
dy/dx w.r.t. : SEXHH EDHH HHSI LIVON NEQW DMKT TRAC ACRT COPM NOFIN LMKTP CMKTP
```

	dy/dx	Delta-method Std. Err.	z	P>|z|	[95% Conf.	Interval]
SEXHH	-.0302386	.0537833	-0.56	0.574	-.1356518	.0751747
EDHH	-.0670884	.0106592	-6.29	0.000	-.0879801	-.0461967
HHSI	-.0052705	.0227254	-0.23	0.817	-.0498114	.0392704
LIVON	.0477286	.0162438	2.94	0.003	.0158913	.0795659
NEQW	.1406603	.037736	3.73	0.000	.0666991	.2146215
DMKT	-.1105601	.0358927	-3.08	0.002	-.1809085	-.0402116
TRAC	-.0059476	.0034352	-1.73	0.083	-.0126805	.0007852
ACRT	-.3277152	.0816662	-4.01	0.000	-.4877781	-.1676523
COPM	-.1444501	.0574817	-2.51	0.012	-.2571122	-.0317879
NOFIN	-.0000214	6.54e-06	-3.27	0.001	-.0000342	-8.59e-06
LMKTP	-.00026	.0003049	-0.85	0.394	-.0008576	.0003377
CMKTP	-.0000807	.0003053	-0.26	0.792	-.000679	.0005176

Appendix table 5 Heteroscedasticity test

Linear regression Number of obs = 186

F(12, 173) = 83.85 Prob > F = 0.0000

R-squared = 0.7682 Root MSE = .23718

| Robust

COMIX | Coef. Std. Err. t P>|t| [95% Conf. Interval]

SEXHH | -.0172425 .0378839 -0.46 0.650 -.0920167 .0575318

EDHH | -.0412897 .0087381 -4.73 0.000 -.0585366 -.0240428

HHSI | -.0057476 .0168237 -0.34 0.733 -.0389538 .0274585

LIVON | .0433448 .0124442 3.48 0.001 .0187827 .0679069

NEQW | .1004505 .0286742 3.50 0.001 .0438541 .1570468

DMKT | -.0709393 .0290971 -2.44 0.016 -.1283703 -.0135083

TRAC | -.0041686 .0026725 -1.56 0.121 -.0094435 .0011062

ACRT | -.1597921 .0505093 -3.16 0.002 -.2594859 -.0600982

COPM | -.0620439 .0421823 -1.47 0.143 -.1453022 .0212144

NOFIN | -.0000148 4.51e-06 -3.29 0.001 -.0000237 -5.93e-06

LMKTP | -.000048 .0002052 -0.23 0.815 -.000453 .000357

CMKTP | -.0000594 .0002096 -0.28 0.777 -.0004731 .0003543

_cons | 1.237997 .3402248 3.64 0.000 .5664714 1.909523

Appendix table 6 Heckman selection model -- two-step estimates

Number of obs = 186

(Regression model with sample selection) Censored obs = 64

Uncensored obs = 122

Wald chi2(2) = 1467.46 Prob > chi2 = 0.0000

	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]
COMIX					
EDHH	.0578593	.0124804	4.64	0.000	.0333982 .0823204
HHSI	.2157226	.0098424	21.92	0.000	.196432 .2350133
EDHH	-.3889061	.1103487	-3.52	0.000	-.6051855 -.1726266
HHSI	.2173381	.2447876	0.89	0.375	-.2624369 .697113
LIVON	.5227788	.2217172	2.36	0.018	.0882211 .9573365
NEQW	2.233084	.6973753	3.20	0.001	.8662539 3.599915
DMKT	-.9155386	.4791132	-1.91	0.056	-1.854583 .023506
TRAC	-.0275682	.0391983	-0.70	0.482	-.1043954 .0492589
NOFIN	-.0001098	.0000557	-1.97	0.049	-.000219 -6.96e-07
LMKTP	-.0018768	.0037796	-0.50	0.619	-.0092847 .0055311
CMKTP	-.0013276	.0034775	-0.38	0.703	-.0081434 .0054881
_cons	7.492115	5.36204	1.40	0.162	-3.01729 18.00152
mills					
lambda	-.1923118	.1012052	-1.90	0.57	-.3906703 .0060467

Addis Ababa University

Development Economics

Survey questioners of *Kocho* producers

Graduate studies

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Research title: - Determinant of commercialization of *Enset* products: the case of smallholder farmer Gurage zone, Geta district, central Ethiopia

Dear respondents;

These questioners were prepared for only *Enset* products producer specifically kocho.

Part one: Demographic information of household head

Please select or tick which expresses your self

1. Gender of household head A, male B, female
2. Keble? 1= Agata 2= Silase 3= Esmandir 4= Quante
3. Marital status of household head. A, Married B, unmarried C, widowed D, divorced
4. Educational status of household head (year of schooling) ----------.
5. How many families do you have? ----------

Age group	Male	Female
0-9		
10-13		
14-16		
17-50		
>50		

6. Livestock and equine owned in 2015/16 E.C

No	Kind of livestock and equines	How many in 2015/16 E.C
1	Ox	
2	Dray caw	
3	Caw with milk	
4	Heifer	
5	Bull	
6	Calves	
7	Donkey	
8	Horse	
9	Mule	

7. Did you get any income from off/non-farm activates in 2015/16?

   1= Yes 2= No

8. If the answer in question 7 is yes how much and from which activity?

No	**Other income generating activity in 2014/15 E.C**	Amount get per year
1	Petty tread	
2	Gift from child (remittance)	
3	Salary	
4	Wage	
5	Fating of oxen	
6	Sheep trading	
7	Other	

9. Are you a member of any cooperatives?

   1= Yes 2= No

10. Question 9 answer is yes, what benefit do you get?

    1=credit 2= market information 3= other specify----------

11. Did you get credit service in 2015/16?

1= yes 2=no

12. Did you get credit for *Enset* production purpose in 2015/16?

    1=yes 2= no

13. What are a means of transport to use transporting *Kocho* to market?

    1= man power 2= animal chart 3= transport

14. How long from home to nearest market?.....in km

15. How much kg of *Kocho* produced in 2014/15? ----------

16. How much kg of *Kocho* sold in 2014/15?

17. When did you sold large amount of *Kocho* in production year 2015/16?

    Please specify the month …….

18. If you sales immediately after harvest why?

    1= cash constraint 2= better price 3= storage problem 4= other ----------

19. What was the trend of *Kocho* price?

    1= increasing 2= decreasing 3= the same

20. What is the main reason for this fluctuation?

    A, small production B, price c, other specify --------

21. What were the prices of 100 kg *Kocho* last years?

    1=2014----------in birr

22. What is the price of 100 kg *Kocho* in 2015 E.C? ---------

23. Is there any benefit get from commercialization of *Kocho* product?

    1= yes 2= no

24. If yes, please specify----------

25. Is there any challenge to commercialization of *Kocho* products?

    1= yes 2= no

26. If yes, please specify ----------

Thank you