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ADDIS ABABA UNIVERSITY
COLLEGE OF DEVELOPMENT STUDIES
CENTER FOR RURAL DEVELOPMENT

**Small-scale Farmers' Fruits Value Chain in the Upper-Blue Nile Basin
of Ethiopia: Participation, Market Performance, Welfare and Food
Security Effects**

A Dissertation:

**In Partial Fulfillment of the Requirements for the Degree of Doctor of
Philosophy in Development Studies (Rural Development)**

Mengistie Mossie

Research Advisors:

Alemseged Gerezgiher (Ph.D)..... Major advisor

Zemen Ayalew (Ph.D)..... Co-advisor

Addis Ababa University

Addis Ababa, Ethiopia

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Center for Rural Development Studies

College of Development Studies

Addis Ababa University

DECLARATION 1 – PLAGIARISM

This Dissertation is my original work and no material in this document has previously been submitted to another university for any degree, and all the sources of the material used have been duly acknowledged.

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This Dissertation has been submitted for examination with my approval as university supervisor.

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DECLARATION 2 – PUBLICATIONS AND/OR CONFERENCES

The publications and/or conferences listed below are part of the research reported in this dissertation.

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Addis Ababa University
School of Graduate Studies

This is to certify that the Dissertation prepared by Mengistie Mossie entitled: “Small-scale Farmers’ Fruits Value Chain in the Upper-Blue Nile Basin of Ethiopia: Participation, Market Performance, Welfare and Food Security Effects” and submitted in fulfilment of the requirements for the degree of Philosophy (Rural Development) complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

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ABSTRACT

Agri-food value chains appear to be the buzzword in recent development debates, frequently in conjunction with rural development promotion. A value chain analysis is required to gain an understanding that can be used to upgrade value chain activities. In spite of the policy options provided by the government of Ethiopia, empirical study on the fruit value chain to design appropriate policies for improvements of the sector specifically, in the study areas is scanty. Cognizant of this gap, the present study is initiated with the objectives of characterizing (mapping) actors involved in the fruits value chain; analyzing the market performance along the value chain; exploring the determinants of farmers' participation in the fruits value chain; and examining the welfare and food security effects of farmers' participation in the value chain in the Upper-Blue Nile Basin, North-Western Ethiopia, focusing on apple and mango crops. A random sampling technique was used in selecting survey respondents. The sample includes producers, collectors, processors, traders, and consumers. A pre-tested survey questionnaire was used for data collection. Descriptive statistics, mapping, and market margins were used to achieve the first and second objectives. For the third objective, the double-hurdle model was applied. The fourth and fifth objectives were addressed using endogenous switching regression and propensity score matching, respectively. The study revealed that seedling suppliers, farmers, collectors, wholesalers, retailers, processors, and consumers are among the key mango value chain actors. Seedling suppliers, farmers, collectors, retailers, and consumers are among the main apple value chain participants. In terms of large sales volumes, a channel connecting mango producers to wholesalers via collectors was more efficient, whereas a channel connecting apple producers to retailers via collectors was more efficient. For value chain participants, margin analysis showed that the majority of gross marketing margin goes to traders in both value chains. This implies that the value chain for both apples and mangoes was ineffective due to poor integration and coordination, as well as insufficient support from institutions in the study area. The governance structure of the apple and mango value chain is buyer-driven, with little trust among different actors. Unlike other studies, this dissertation attempted to propose a third type of value chain for developing countries such as Ethiopia known as the "middlemen-driven value chain" in addition to the producer and buyer-driven value chains. The study reveals that the likelihood of a household being participating in the apple value chain goes up with household head education level, frequency of extension contacts, experience, and membership in local cooperatives, while it goes down with disease and insect pest incidence and household size. Additionally, mango plot size and membership in local cooperatives were found to increase the likelihood of mango value chain participation decisions. Similarly, level of participation in the apple value chain increases with education, mobile phone ownership, and extension contacts, whereas level of participation in the mango value chain decreases with distance to nearest market and age squared. Furthermore, the study investigates that as more apple and mango farmers join the value chain, their consumption expenditure rises while other factors remain constant. Similarly, the more apple and mango households that participate in the fruit value chain, the higher the household food intake and food security. In essence, policies and programs that support household capacity to produce surplus output, as well as the inclusion of small-scale farmers in more profitable value chains, could increase their participation and improve household welfare and food security. Overall, this dissertation believes that having such first-hand knowledge of the apple and mango value chains is essential to establishing better fruit development initiatives in Ethiopia.

KEYWORDS: Consumption expenditure, double hurdle model, endogenous switching regression, Ethiopia, fruit value chain, household food intake, welfare, instrumental variable, mapping, marketing margin, participation, small-scale farmer

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LIST OF ABBREVIATIONS

ATA	Agricultural Transformation Agency
ATT	Average Treatment Effect on the Treated
ATU	Average Treatment on the Untreated
BoA	Bureau of Agriculture
CSA	Central Statistical Agency of Ethiopia
CVAD	Conventional View of Agricultural Development
ESR	Endogenous Switching Regression
FAO	Food and Agriculture Organization of the United Nations
FGDs	Focused Group Discussion
FIML	Full Information Maximum Likelihood
GAIN	Global Agricultural Information Network
GMM	Producers Marketing Margin
GVC	Global Value Chain
GoE	Government of Ethiopia
IBC	Institute of Biodiversity Conservation
IFPRI	International Food Policy Research Institute
IYFV	International Year of Fruits and Vegetables
KII	Key Informant Interview
NIE	New Institutional Economics
NPC	National Planning Commission of Ethiopia
SDGs	Sustainable Development Goals
SNV	SNV Netherlands Development Organization
SSA	Sub-Saharan Africa
TCE	Transaction Cost Economics
TGMM	Total Gross Marketing Margin
TLU	Tropical Livestock Unit
UNIDO	United Nations Industrial Development Organization
VIF	Variance Inflation Factor

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Value-added agriculture has received attention recently as a means of stabilizing household income and revitalizing the rural economy in developing countries (FAO, 2020). Every business is part of a value chain (Webber & Labaste, 2009). Over the last several decades, the steady liberalization of international trade, fierce competition in global markets, and the emergence of products with short life cycles have prompted business enterprises to invest in and put the focus on their value chain (Barrett, Reardon, Swinnen, & Zilberman, 2020; Kano, Tsang, & Yeung, 2020). The above drivers together with rapid population growth, access to new information communication technologies, and dietary changes, has driven the continuous evolution of the value chain and the techniques used to manage it (Barrett et al., 2020; Quisumbing et al., 2015). The well-known definition of value chain offered by (Kaplinsky & Morris, 2000) was adapted to the specific field of agri-food products by (FAO, 2014), which provided the following explanation: “value chain is the full range of farms and firms and their subsequent coordinated value-adding tasks that produce specific raw agricultural materials and transform them into specific products that are sold to final consumers...and has broad-based societal benefits” (FAO, 2014). The scope of this Dissertation paper is limited to fruit crops, with a focus on small-scale farmers. As a result, the appropriate description of a fruit-specific value chain could be: ‘The entire range of individuals and organizations, as well as their coherent value-added practices, that produce and transform fruit products for sale to end users in a cost-effective manner with broad-based societal benefits’.

In many Sub-Saharan African (SSA) countries, the agricultural sector remains dominated by small-scale production (Carletto, Corral, & Guelfi, 2017). In these countries, value chain participation among small-scale farmers is growing (Gómez et al., 2020). Nevertheless, the level of participation often becomes low and most farm households deliver agricultural products seasonally on local markets, coupled with relatively small gross margin shares (Carletto et al., 2017). Indeed, numerous rural people in SSA countries are trapped in a vicious

cycle of poverty i.e., small income due to the small marketable surpluses and scarce resources to purchase inputs. This vicious cycle could be hard to break, particularly in the face of market distortions due to inadequate roads and infrastructure, limited access to information and extension services, and limited credit and insurance markets (Devaux, Torero, Donovan, & Horton, 2018). However, it is argued that value chains linking agricultural production with marketing are of major relevance in addressing these constraints (Lie, 2017). For policy makers interested in promoting agricultural growth in SSA, an interesting aspect of research concerns the extent upon which small-scale farmers engage in and/or benefit from growing new markets (Barrett et al., 2020; Gómez et al., 2020).

In SSA, the issue of income, food security and welfare gains to farm households from participation in agricultural markets and value chains has acquired much significance in recent times (Barrett, Reardon, Swinnen, & Zilberman, 2019; Joosten, Boselie, Wolde, & Desalegn, 2011). According to Barrett et al. (2019), there is a high potential for farm households to derive livelihoods from value chain-oriented agriculture. Literature argues that in many SSA countries, where around 70% of the population relied heavily on subsistence farming, poor local producers could even convert one's surplus into earnings if only they get the capacity to access value chains (Bokelmann & Adamseged, 2016; Liu, 2018). Indeed, participation in improved value chains may provide disadvantaged small-scale farmers with the possibility to produce and distribute high-value products (e.g., fruits), allowing them to translate their vertically-coordinated connections into higher price and obtain a greater share of the amount paid by end users (De Janvry & Sadoulet, 2020; Hussein & Suttie, 2016; Kilelu et al., 2017). To date, most agricultural value chain studies look at market ties and pay little attention to business environment (i.e., the process of upgrading) wherein the chain players perform (FAO, 2019). In relation, markets and value chains are highly context-specific; it is imperative to understand which value chains to target and in what circumstances actors are participating (Lie, 2017).

The fruit sub-sector is vital in providing fresh and nutritious food to consumers worldwide. The sector provides income to producers as well as the actors involved in the value chain that connects farms to consumers (FAO., 2018). The United Nations General Assembly declared 2021 the “International Year of Fruits and Vegetables (IYFV)” at its 74th session, with the

slogan “Fruits and vegetables, your dietary essentials”. The objectives are to: (1) increase awareness of the nutritional benefits of eating more vegetables and fruit as part of a healthy balanced diet, as well as to direct attention especially to reducing waste of these perishable products; and (2) to begin reducing the rising prevalence of malnutrition (wasting, stunting, and obesity), which is aggravated by the current COVID-19 pandemic (Cullen, 2020). The products are perishable nature, which can result in significant food wastage at every stage of the value chain, beginning with the farms. In this way, the IYFV is a once-in-a-lifetime opportunity to promote about the role of these products in food and nutrition security, health, and to contribute to achieving of Agenda 2030 and its Sustainable Development Goals (SDGs) by promoting carefully selected agricultural value chains. Among the 17 Sustainable Development Goals (SDGs), three of them (SDG 02, 03, and 12) promote sustainability. This has resulted in the development of sustainable value chains. In this regard, sustainable value chains can significantly increase production as well as improve availability, affordability, safety, and equal distribution to fruits and vegetables in order to promote socio-economic, and environmental sustainability (FAO, 2020a).

Ethiopia has an enormous potential for fruit production and marketing, mainly due to fertile farmland, abundant working population, a favorable policy and its geographical location for the international market to the different locations (Ashinie & Tefera, 2019; Wiersinga & De Jager, 2009). Despite the potential that exists, the sector has not contributed as it should have done. The government has devised a Ten-Year Development Plan (2021-2030) to transform the horticulture sector into a viable and profitable enterprise through value addition (NPC, 2021). These days, the majority of the fruits grown in Ethiopia are consumed locally and are grown by small-scale farmers. Fruits are accessible in Ethiopia depending on the season. During the same period, most growers in the agro-climatic belt produce similar crops which result to excess supply on the market. Farmers, therefore, experience greater marketing risks that could affect their earnings and are discouraged from producing such perishable crops. The problems are low productivity, lack of storage facilities during the oversupply period, inadequate market access and distribution, high post-harvest losses, diseases and pests, impoverished access to transport and strong competition between producers (Ashinie & Tefera, 2019; Tinzaara et al., 2018). The country produces a diverse range of fruits in various regions. Tropical and subtropical fruit crops such as mango, bananas, citrus, avocado, and others are

grown at low to medium altitudes, whereas temperate fruit crops such as plums, apples, pears, and peaches can be grown in the highlands (Gebre Mariam, 2003; Joosten et al., 2011). During the 2018/19 cropping season in Ethiopia, approximately 114,421.81 hectares were allotted to fruit production, with a total of 7,924,306.92 quintals produced locally. Over 24,000 quintals of fruit were exported to Somalia, Sudan, and Djibouti (CSA, 2019). Figure 1 depicts the volume of production (metric ton), cultivated area coverage (hectare), and yield (metric ton per hectare) of major fruits such as mangoes, avocados, pineapples, bananas, papayas, apples, oranges, and strawberries from 2008/09 to 2018/19. During this time, the total volume of production and cultivated area coverage increased by 125 percent and 138 percent, respectively. The observed fluctuations are directly linked to erratic weather patterns, disease and insect pests, and inefficient harvesting and management (CSA, 2019).

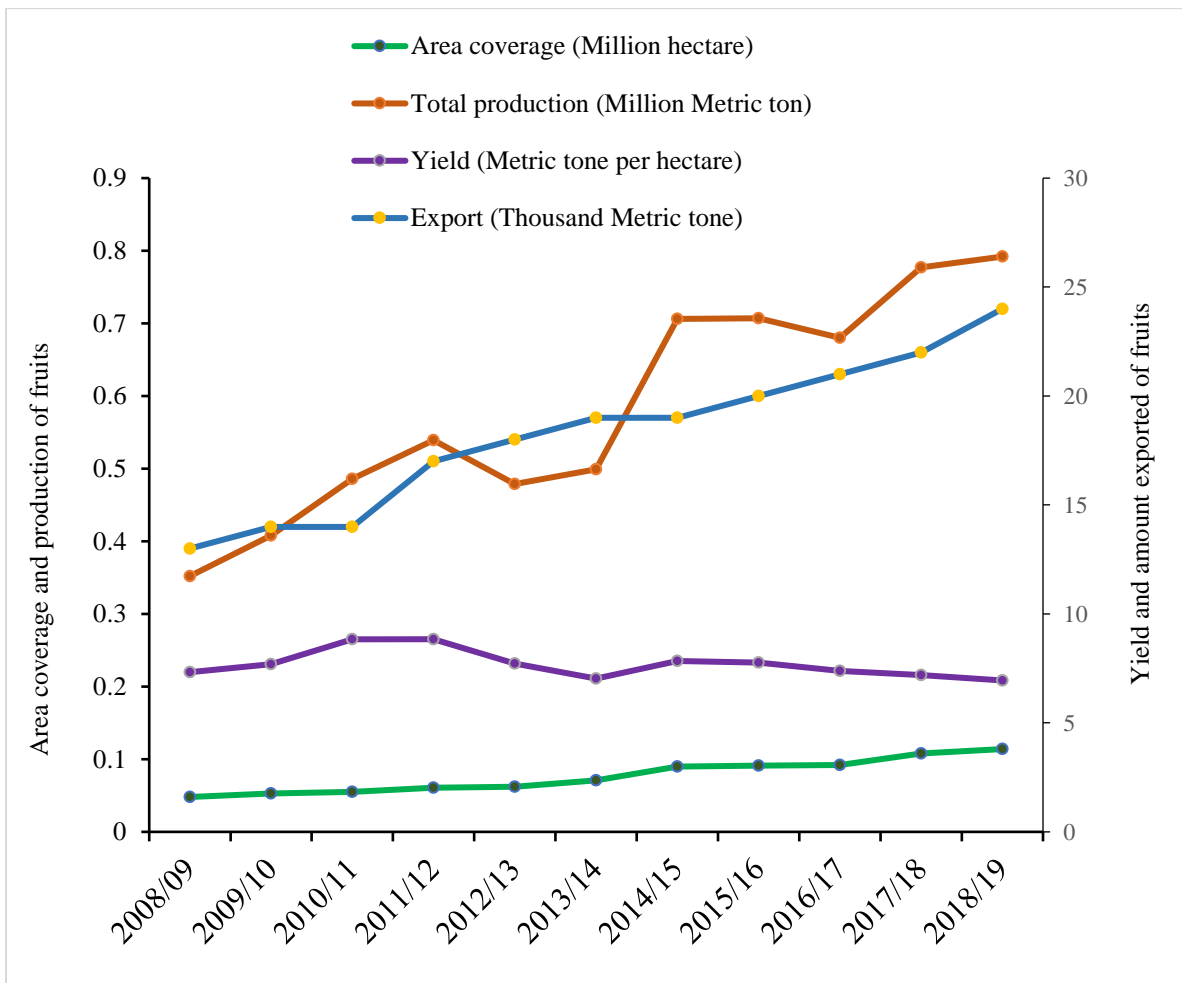


Figure 1. Trends in major fruit crops land area, production and export in Ethiopia (CSA, 2019).

Mango (*Mangifera Indica*) is known as the “king of the fruits” (Ullah, Ahmad, Thompson, Ahmad, & Nawaz, 2010), which makes the crop valuable for food security, particularly in developing countries such as Ethiopia, where achieving food security remains a challenge. Its production in Ethiopia increased by 45 percent from 70,000 metric tons in 2014 to 105,000 metric tons in 2018 (GAIN, 2018). The primary cultivars grown in the country include Kent, Tommy Atkins, Apple mango, and Keitt (Bekele, Satheesh, & Jemal, 2020). Mango, an evergreen fruit crop, is the most important fruit produced by small-scale farmers in the Upper Blue Nile Basin's midland and lowland areas. With the assistance of government and non-governmental organizations, as well as private producers, including small-scale farmers, apple (*Malus domestica*) production has also been expanded across several highlands in Ethiopia, including the Upper Blue Nile Basin. Aside from their nutritional value, apple trees in the highlands of Ethiopia can help with soil conservation (Fetena & Lemma, 2014). British missionaries were the first to introduce apple tree seedlings for planting in Chench town, southern Ethiopia (Behailu & Kebede, 2018; Hayesso, 2008). In 2017, the Chench district produced approximately 154 tons of apple fruit per year (Tamirat & Muluken, 2018a). The total area of apple trees in the Amhara region, where this study was conducted, is 818 hectares, with over 45,000 quintals produced in the 2019/20 production season (BoA, 2020). Both apples and mangoes were selected (with the assistance of district experts-focus group discussions) as the two most important crops to be considered for this study because they are high-value cash-commodities and are mainly produced in the Upper-Blue Nile Basin, Ethiopia.

1.2 Statement of the Problem

Agribusinesses operate in a rapidly changing world (Haggblade, 2011; Webber & Labaste, 2009). With the global population approaching eight billion, the role of food value chains is becoming progressively essential in promoting equitable and inclusive food production (Calicioglu, Flammini, Bracco, Bellù, & Sims, 2019; FAO, 2017a). Nevertheless, unregulated markets in developing nations can discourage smallholder farmers from actively participating in domestic and international value chains (Barrett et al., 2020; Gómez et al., 2020) as well as issues pertaining to weak institutions (Minten, Tamru, Engida, & Kuma, 2016) and bad infrastructure (Osti et al., 2015) can increase transaction costs, and the durability of product lines (Mignouna, Abdoulaye, Alene, Akinola, & Manyong, 2015), limited access to training

coordination of farmers (Danso-Abbeam, Ehiakpor, & Aidoo, 2018; Ferris et al., 2014), lack of institutional commitment (Lutz & Tadesse, 2017), lack of information on quality standards (Nigel Poole, 2017), limited access to technology (Awotide, Karimov, & Diagne, 2016; Devaux et al., 2018; Kilelu et al., 2017), and low management and logistic skills (Barrett et al., 2020) create further challenges. Traditional methods of consumption and trade also create market inefficiencies (Arias, Hallam, Krivonos, & Morrison, 2013; Ntakyo & van den Berg, 2019).

As a consequence of these and other constraints, several smallholder farmers in rural areas may have poor understanding and limited contact with integrated agri-food value chains. Such absenteeism may make small-scale farmers retain their produce at home, this again may reduce their inspiration to increase production and participation in the chain. Particularly, in Sub-Saharan Africa, farmers lack sufficient information about the market (Barrett et al., 2020; Quisumbing et al., 2015). They may not, for instance, recognize how much their farm produce is worth. They may not understand who the other market participants are (Bokelmann & Adamseged, 2016). To these realities, Ethiopia is no exception. In particular, the perishable nature of fruits and unpredictable seasonal prices pose a specific marketing challenge for producers (due to the long-supply chain of many market intermediaries) that significantly affect their farm income, and household welfare and food security. In Ethiopia, the fruit sector has not achieved its potential in terms of production, processing, sales and improving the quality of life of actors along the value chain (Ashinie & Tefera, 2019). As a result, the inability to add value to fruit from domestic harvest to distribution indicates that it has often suffered from a number of problems with production and distribution.

In SSA, there is a demand for high-value crops such as fruit and vegetable commodities, particularly in Ethiopia, where farmers appear to be hesitant about growing high-value crops (Worako, 2015). Understanding the disorganized marketing and value chain coordination system of actors is essential to harness the potential of the fruit sector in Ethiopia and to encourage small-scale farmers to take advantage of opportunities emerging from higher value chain agriculture (Mateows, Amanuel, & Asfaw, 2015). The intention of promoting fruit value chains is to create maximum additional value and to enhance the competitiveness of locally produced fruit on domestic markets. Only a few studies have been conducted in Ethiopia to

examine fruit crop value chains that include all chain actors. The fruit value chain has received little attention and needs to be better understood. This study argues that establishing more cost-effective value chains can contribute to enhanced market links between sellers and buyers and can minimize transaction costs. Similarly, market distortions are usual in Ethiopia as a result of middlemen's price-setting activities (Hailegiorgis & Hagos, 2016). Because of their perishability, most fruit products do not generate time value. This allows actors, particularly middlemen, to reduce prices, reducing producers' negotiating power to sell their products at a price that is convenient for them. In such cases, a study focusing on the value chains and market performance of these products could play a significant role in improving the current market situation and reducing market distortion (Ashinie & Tefera, 2019; Haile, 2016).

In the literature, there is an increasing number of empirical studies on the value chain of fruit crops: globally (e.g., Ao, Vu, Le, Jirakiattikul, & Techato, 2019; Chang, Brattlof, & Ghukasyan, 2014; Jaji, Man, & Nawi, 2018; Slamet, Nakayasu, & Ichikawa, 2017); in Africa (e.g., Adepoju, Owoeye, & Adeoye, 2015; Ngenoh, Kurgat, Bett, Kebede, & Bokelmann, 2019; Sigei, Bett, & Kibet, 2014); and in Ethiopia (e.g., Girmalem et al., 2019; Kassa et al., 2017; Mengesha et al., 2019; Tamirat & Muluken, 2018a; Tarekegn et al., 2020; Tufa, Bekele, & Zemedu, 2014) are among others. The results of these studies, however, vary depending on the product under consideration, as well as the technical, institutional, socioeconomic contexts, number and organization of available channels, and agro-ecologies in which the farmers operate (Fonseca, Coelho, Soares, & Correia, 2019). For example, in Ethiopia, Legesse, Hassana, Gudisa, and Koji (2014) and Mengesha et al. (2019) found the same result and concluded that wholesalers have the highest marketing margins than other actors in the fruit and vegetable value chains. This is because the chain is governed by wholesalers, who have a capital advantage over the other actors in the chain. In contrast to these studies, Getahun, Tesfaye, Mamo, and Ferede (2018) contended that street vendors and collectors had higher marketing margins in fruit and vegetable value chains than farmers, retailers and wholesalers.

Correspondingly, Honja, Geta, and Mitiku (2015) revealed a different result that growers have a higher marketing margin than collectors, retailers, and wholesalers; the reason is that growers' marketing cost structure is minimum. Overall, these studies provided mixed results, and none of them demonstrated the implications of fruit crops on household welfare and food security.

As a result, more research is needed to better understand the marketing performance of small-scale farmers and other actors. More recently, Tarekegn et al. (2020) in their study reported that adequacy of extension services promotes fruit farmers participation decision in the value chain, whereas distance from market deters their participation; Girmalem et al. (2019) got the same result and concluded that area allocated for fruit production endorses farmers intensity of participation in the value chain. Similarly, proximity to road and asset ownership (e.g., Tarekegn, Haji, & Tegegne, 2017), improved fruit variety utilization (e.g., Tarekegn et al., 2020), irrigation and gender (e.g., Tufa et al., 2014), access to credit and off-farm income (e.g., Girmalem et al., 2019; Kassa et al., 2017), and perishability (e.g., Regasa, Negash, Eneyew, & Bane, 2019) influence fruit farmers participation decision in the fruits value chain.

While these studies add to the growing body of knowledge about the fruit value chain, they are limited in a number of ways. To begin, some researchers claimed that some of these factors had a significant impact on participation decision and level of participation, while others claimed that these factors had no impact on participation decision or level of participation. This could be due to spatial variation as well as the crop type used in the study. Second, such studies place a greater emphasis on Southern Ethiopia (e.g., Kassa et al., 2017; Mengesha et al., 2019; Tarekegn et al., 2020), Eastern Ethiopia (e.g., Tufa et al., 2014), Northern Ethiopia (e.g., Girmalem et al., 2019), and Central Ethiopia (e.g., Getahun et al., 2018), and thus may have limited contextual relevance (e.g., social-economic and environmental conditions) to north-western Ethiopia. Third, the majority of studies failed to take into account both the decision to participate and the intensity of participation options available to small-scale fruit farmers. In contrast to Kassa et al. (2017) and others, this study used the Double Hurdle model proposed by Cragg (1971) to find out the factors impacting farmer participation. This is because in this model, non-participants are treated as a corner solution utility model, whereas in the Heckman two-stage model, non-participants would never participate even under situations (Beshir, Eman, Kassa, & Haji, 2012; Kahenge, Kavoi, & Nhamo, 2020; Musah, 2013; Yami, Tesfaye, & Bekele, 2013).

Furthermore, Herrmann, Nkonya, and Faße (2018); Kissoly, Faße, and Grote (2017); Martey, Etwire, Wiredu, and Ahiabor (2017) used a Propensity Score Matching (PSM) framework to examine the implications of value chain participation on farm household welfare. Fortunately,

one well-known weakness of the PSM approach is that it fails to account for unobserved heterogeneity, likely to result in biased results. The Endogenous Switching Regression (ESR) model predicts the counterfactual effect of choice regimes when selectivity bias occurs (Alene & Manyong, 2007; Lokshin & Sajaia, 2004). Besides that, household income has been used as an indicator of household welfare in various studies. While family income can also be used to evaluate household welfare in developing nations, expenditure is strongly advised. This is due to the fact that household expenditure is less prone to measurement errors and seasonal fluctuations, making it more reliable (Dercon, Gilligan, Hoddinott, & Woldehanna, 2009). Even so, due to the limitations of the household income approach, this study used a household expenditure strategy, which is rare in the same study. This dissertation work aims to fill these gaps by utilizing recent cross-sectional first-hand data.

Overall, despite some useful empirical findings, the current study is unique in the following ways: (i) The study is primarily agro-ecological based and covers highland, midland, and lowland areas in the country's largest basin with a representative sample size. This has allowed to include several policy-relevant variables that were not included in previous studies. (ii) The study tried to use recent empirical studies found in the literature. (iii) To the best of my knowledge, this is the first paper on the relationship between household welfare, food security and fruit value chain participation specifically in North-western Ethiopia, (iv) It will provide robust empirical results on links between characterization of chain actors, market performance, participation determinants, welfare and food security effects to make policy interventions more effective in improving chain actors' income, welfare and/or food security. This motivates and inspires the researcher to carry out the study by focusing on the following research objectives.

1.3 Objectives of the Study

In the context of Upper-Blue Nile Basin of Ethiopia, the main objective of the study is to generate empirical evidence on participation in the fruits value chain and its determinants, market performance, and household welfare and food security effects.

Specifically, this study seeks to:

- (i) identify and characterize (mapping) actors involved in the fruits value chain;

- (ii) analyse the market performance of fruits along the value chain;
- (iii) explain the determinants of farmers' participation in the fruits value chain;
- (iv) examine the welfare effects of farmers' participation in the fruits value chain.
- (v) investigate the food security effects of farmers' participation in the fruits value chain.

1.4 Research Questions

- 1) What do the value chains of apples and mango fruits look like, and who benefits more from these chains?
- 2) What does the value chain map look like in the study areas?
- 3) Who are the main players in the apple and mango value chain?
- 4) Who received the highest market margin as a result of the benefit distribution among actors in the apple and mango value chain?
- 5) What does the market performance of both fruit markets look like at the study sites?
- 6) What are the driving forces behind the participation of apple and mango farmers in the value chain?
- 7) To what extent does participation in the apple and mango value chain contribute to the well-being and food security of small-scale farmers?
- 8) What are the opportunities and constraints of apple and mango value chains in the study areas?

1.5 Relevance of the Study to Science, Policy, and Local Practices

Scholars in rural development advocate for greater use of the value chain approach in the development of market-driven agricultural projects such as the expansion of high-value crop commodities. Apple and mango are categorized as the most economically important crops cultivated and widely consumed worldwide. Characterizing actors, their activities and established links in the value chain will ensure that actors work together and recognize their core roles and how their tasks affect each other along the chain. This will help to advance academic understanding of the agricultural value chain concept in Ethiopia. Costs and returns on production, assembling, wholesale and retail to final user will lead policy makers to upgrade the sector to benefit actors across the chain. This includes the analysis of profit margins as well

as value added within the chain. This will help determine who profits from participating in the chain and who needs assistance. This dissertation work will contribute to theoretical knowledge in the literature related to the domains of those apple and mango fruit value chains and their effects on the welfare and food security of local producers in the study areas. The research provided evidence on the mixed implications of small-scale farmers' fruit marketing performance.

From a policy standpoint, the findings from this study would be used to notify policy debates just at regional and national levels aimed at increasing the production efficiency of the fruits sector. In other words, it seeks to shed some light on the ongoing debate over whether fruit farming can be a pro-poor growth driver in developing countries such as Ethiopia. Overall, the study findings will help to expand theoretical and practical knowledge regarding fruit value chains in emerging regions. Moreover, knowledge on the drivers of small-scale farmers' participation in the apple and mango value chain will provide a platform for the policy makers to develop strategies which will curb the factors and turn it into an opportunity for the greater good of the actors. Furthermore, stakeholders such as the private sector, non-governmental organizations (NGOs), industrial organizations, local governments, and others can pertain the study results to their actions in the fruits sector. Methodologically, this study attempted to use the recommended welfare indicator and econometric models that control for sample selection bias and endogeneity issues in order to produce a robust result. From practical point of view, this work will benefit farmers by highlighting critical areas where they have not participated in value chain activities and also by providing knowledge to all stakeholders in the value chain and marketing system to improve their day-to-day activities through the findings of this study. The notion of evaluating and strategically making investments in agriculture related value chains becomes the main strategy that the Ethiopian government could use to continue driving a supply response from its agricultural production. Furthermore, this dissertation may serve as a reference for academics who intend to conduct research in the area under investigation. Overall, this value chain analysis of apple and mango offers an overview of the current situation.

1.6 Scope and Limitations of the Study

Conceptually, characterization of actors involved in the value chain, the market performance of farmers along the value chain, determinants of farmer's participation in the value chain and effects of value chain participation on farmers' welfare and food security were the central themes of this study. Geographic area coverage of this study was focused on the Upper Blue-Nile Basin, north-western Ethiopia paying attention to apple and mango products value chain and agro-ecological differentiations (highland, mid-land and low land). These fruits account for the major proportion of production in the study areas. Methodologically, the study was a descriptive and analytical study in which a representative sample size was selected by using probability and non-probability sampling techniques. Participant households were selected using a simple random sampling method from the study areas to provide both quantitative and qualitative data. The survey was carried out from November 2019 to January 2020 by trained data collectors. Study participants (i.e., household heads) in four districts were interviewed using a structured survey questionnaire. The data for this study was analyzed using descriptive statistics and an econometric model.

Due to the lack of *time series* data on the fruit subsector in Ethiopia, this study used a cross-sectional research design (based on one-year data). The study is limited to two most economically important fruit (apple and mango) crops. Congruently, lack of record keeping by chain actors was a challenging to collect relevant information in the channel. Most of the time traders are reluctant to give appropriate information as they link it with tax fees. Thus, key informants and secondary sources are widely used to complement preliminary information and to understand rationality behind the status of the market chains. In particular, the COVID-19 outbreak and the country's complete lockdown have had a severe psychological impact on the researcher's ability to complete unfinished tasks such as qualitative data collection. Despite these limitations, the findings of this research provide important basis for relevant interventions for the study area.

1.7 Research Ethics

Ethical consideration for this study ranges from data collection to results reporting. Getting permission from the Center for Rural Development, Addis Ababa University to participate in

the study was also done prior to data collection. That means letter of cooperation was written to the concerned bodies. Consent was also acquired from survey participants by explaining the research objectives, the positive advantages of their cooperation and ensuring confidentiality i.e., first, the researcher explained to the respondents about the research and that the study can be used for academic purposes only. Study participants were offered the option to withdraw from the interviews at any time. In order to avoid conflicts over working hours, efforts were made to contact study participants after work time. To avoid plagiarism, the researcher ensured that all authors of the materials reviewed in this study, such as journals, books, and reports, were properly acknowledged.

1.8 Organization of the Dissertation

This monograph is structured into seven chapters including the introductory part. Figure 2 illustrates how the monograph was structured and the accompanying chapters. Chapter two discusses the relevant literature. This Chapter has three sub-sections. The first sub-section critically examines existing theories in order to explain the topic at hand. The second sub-section deals with the relevant empirical literature. The conceptual framework of the study is final sub-section of this chapter. Chapter three elaborates the study setting and research methodology. The results and discussion sections are found in Chapters four, five, six, seven, and eight. The final Chapter draws conclusions and recommendations from the research findings.

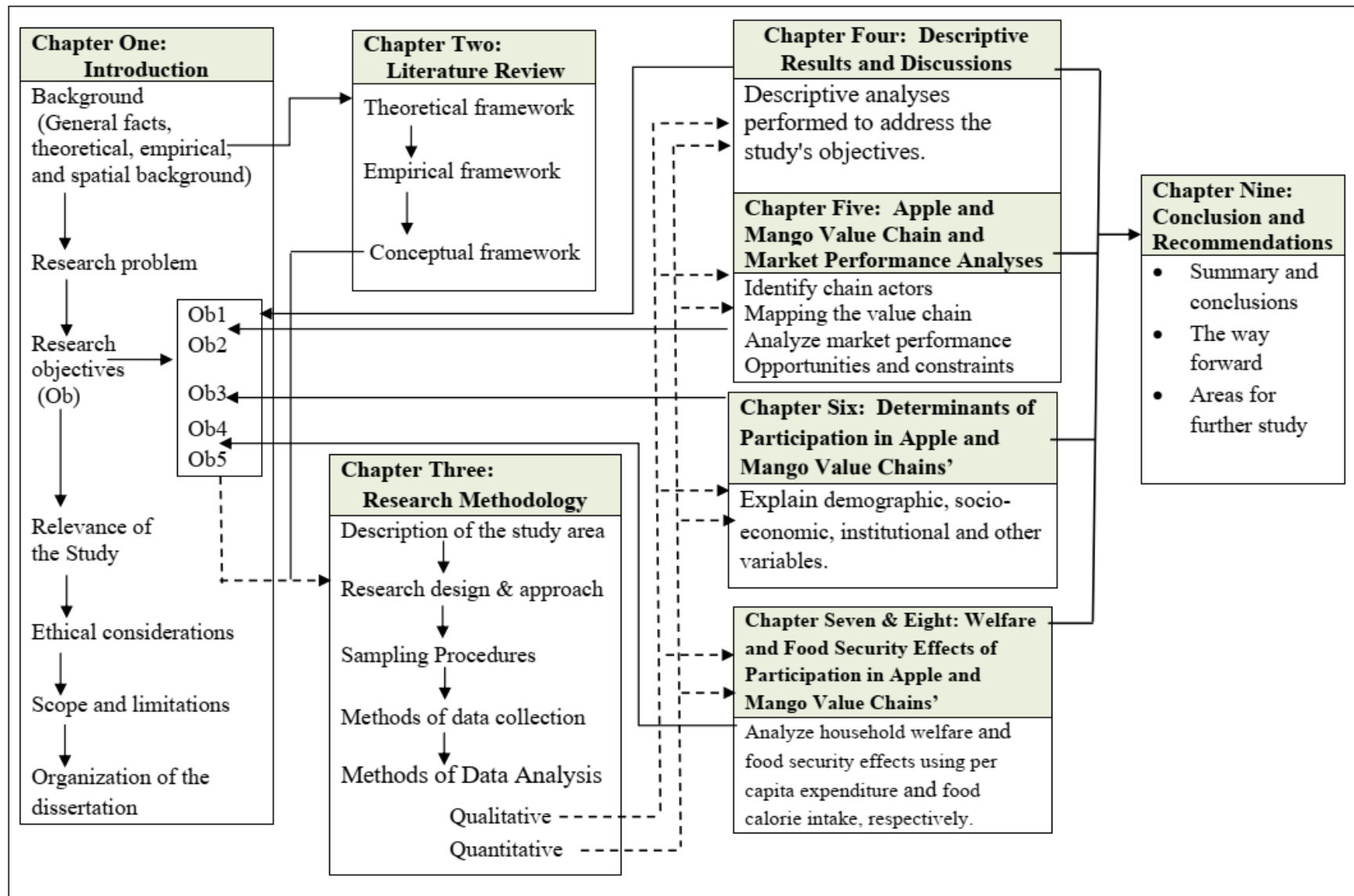


Figure 2. Organization of the Dissertation (Own design, 2019/20)

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

As shown in Figure 2, this Chapter reviews existing literature pertaining to agricultural (fruit) value chains in order to provide a clear understanding of this study. The Chapter starts by reviewing some concepts related to conventional and emerging paradigms of agricultural development. An exact understanding of these concepts is important in explaining worldwide agricultural development contexts. The second section is devoted to theoretical literature, where theoretical underpinnings of value chain analysis from the 1960s to contemporary value chain approaches (i.e., global value chain) are discussed in detail. This Chapter also discussed literature on empirical studies conducted so far that are relevant to the aim of this research in terms of fruit value chains, market performance, determinants of small-scale farmers participation, and its effect on household's welfare and food security. It also reviews empirical evidence on agricultural market participation and its significance, the contributions of fruit farming to rural livelihoods, fruit crop production and marketing in Ethiopia, and the potential for fruit tree development in the study areas. This is preceded by a presentation on the conceptual genesis of the value chain approach, which has been thoroughly conceptualized. Finally, the review leads to a conclusion regarding the existence of knowledge gap which has to be bridged with additional research.

2.1 Conventional and New Paradigms of Agricultural Development

Agriculture's important role in development has long been recognized (Byerlee, De Janvry, & Sadoulet, 2009). A number of developing nations have attained food self-sufficiency as a result of the Green Revolution. Between 1943 and the late 1970s, Mexico experienced the Green Revolution, that further enhanced industrialized agricultural productivity in several developing countries. The initiatives included the expansion of high-yielding grains, the delivery of modified seeds, the development of irrigation facilities, and the provision of growers with chemical fertilizers and pesticides (Ameen & Raza, 2017; Davies, 2003; Kendall & Pimentel,

1994). During the last 50 years, the agricultural (green) revolution increased global food production by 145 percent, resulting in 5 percent more food per capita (Pretty & Bharucha, 2014). The conventional view of agricultural development (CVAD) considers agriculture as the primary driver of poverty reduction in developing countries (Goletti, 2005). The Green Revolution's success in ensuring food security for huge populations, particularly in Asia, has provided significant support for the CVAD (World Bank, 2007). The Green Revolution was not a success in many other regions, including vast majority Africa and developing nations' marginalized areas. The CVAD's underlying assumption is that agricultural development should indeed be centred on increased productivity of smallholder farmers producing staple foods (Goletti, 2005).

The global economy, and particularly the organization of worldwide output and global trade, has changed dramatically over the last three decades as a result of globalization. The global economy is increasingly being organized around geographically dispersed and highly fragmented value chains (Jaworek & Kuzel, 2015). Many developing countries have shifted from import substitution to export-oriented industrial development since the early 1980s (Adewale, 2017; Flentø & Ponte, 2017). Many developing countries have coined the term "new international division of labor" as a result of the emergence of export-oriented manufacturing. The growing export share of large emerging economies such as India and China has made external markets extremely competitive, complicating less developed countries' export-led development (Cui & Liu, 2018). Despite the fact that several developing nations have made the shift to export earnings, they have been plagued by persistently low trade terms. With the emergence of global value chains (GVCs), the problem is no longer mostly about the nature of products, but also about trading relationships in general (Coe & Yeung, 2019; Ponte, 2019). Low-value-added activities are usually distinguished by low barriers to entry and fierce competition, finding it challenging to obtain rents and enhance value-added, earnings, and salaries (Mayer & Milberg, 2013; Morris & Staritz, 2019).

Agriculture, according to conventional wisdom in development economics, is a source of product, exchange rates, and market earnings that all contributed to industrialisation and a decrease in agriculture's share of the economy. Today's context, however, is quite different, accompanied by a rapid technological and institutional advancements, integrated value chains,

as well as environmental factors. In this scenario, a new paradigm is required that realizes agriculture's numerous roles for development, including provoking Gross Domestic Product (GDP) growth early on, lowering income inequality, alleviating poverty, offering ecological benefits, and supplying food security. These changes imply that perhaps the way agricultural sector is used for growth must be adapted to the new strategies and situation, that are quite distinct from those that existed when the traditional paradigm was in place. This generally requires a new paradigm in which agricultural sector serves as a development tool due to its multidimensional nature of tasks and in the context of the current opportunities and challenges (Byerlee et al., 2009; De Janvry, 2010).

World agricultural production is transitioning to a modern technological paradigm that is quite distinct from the green revolution. The green revolution was a significant step forward for humanity, mainly in developing nations. Likewise, the new agricultural development philosophies allow someone to be extremely hopeful that we will be capable of producing enough high-quality food to feed the world's nine billion people by 2050. Nevertheless, how different countries and groups access food is determined by how globalization is structured, i.e., effective agricultural value chains are required. Several global trends necessitate a reconsideration of the traditional belief of agricultural development as well as its accompanying prescriptions (Barrera, 2011; Goletti, 2005; Horlings & Marsden, 2011; Naylor, 2011). Global trends regarding the role of international trade in agriculture and food industry will improve, and buyers will consume a more diverse diet, higher quality food, fewer home prepared foods, and place a greater emphasis on attributes such as organic, safety, and fair trade. Small-scale commercial agriculture will be progressively marginalised only if they start organizing and connect within value chains (Vellema, Ton, de Roo, & van Wijk, 2013; Webber & Labaste, 2009).

The current global agricultural context faces challenges such as rising commodity demand, rising and rapidly changing inflationary pressure, greater environmental degradation, and climate change (Devaux et al., 2018). Smallholder farmers may be quite efficient on the farm, but they may be losing out due to their small scale in processing and marketing, in which important integration and supervising issues arise (Nigel Poole, 2017; Shepherd, 2007). To compete with the national agri-food system, small-scale farmers will need to develop new systematic

approaches that will allow them to profit from inclusion in agri-food chains. The value chain approach can be used to address these issues (Fischer & Qaim, 2012; Kissoly et al., 2017; Ramirez, Bernal, Clarke, & Hernandez, 2018).

2.2 Theoretical Underpinnings of Value Chain Analysis

The “value chain” concept has evolved, within academics from a variety of “ideological” schools influencing it along the way (Fonseca et al., 2019). The francophone concept of *filière* and the anglophone concept of commodity chain underpin value chain theory, analysis, and methodologies (Raikes, Friis Jensen, & Ponte, 2000). Beginning in the late 1990s, the term "commodity chain" was gradually replaced in the literature by “value chain” (Stoian & Donovan, 2020). Many researchers appear to agree on the concept of value chains, but their explanations and abstractions of empirical results differ (Rutgers, 2010). The two key concepts in the study of value chains are the words 'value' and 'chain'. In the analysis of the value chain, value is a synonym for “value-added” (Haq, 2012), whereas “chain” refers to the processes and parties involved (from conception to disposal) in the lifespan of a product (Hawkes & Ruel, 2011). The term "value chain" has been defined in a variety of ways in the literature. Kaplinsky and Morris (2000) define it as: “the entire set of activities necessary to take a product or service from conception to various stages of production, consumer delivery, and final disposal after use”. This definition recently was adapted to the specific field of agri-food products by (FAO, 2014), which provided the following explanation:

“the entire range of farms and firms, as well as their consecutive coordinated value-adding practices, that yield various raw agricultural items and convert them into specific food products sold to end users and disposed of after usages in a way that is cost effective all around, has wide societal benefits, and does not perpetually deplete resources” (FAO, 2014 p.6).

This concept has been widely used to understand the effects of market relationships and upgrading processes on smallholders in developing economies. The fundamental feature of a value chain is market-focused collaboration: various business enterprises collaborate to produce and market products and services in an efficient and effective manner (Barnes, 2004; Gereffi & Fernandez-Stark, 2011). The promotion of value chains in agricultural sector aims

to increase product competitiveness in international and domestic markets, as well as to generate more value added within the region or country (IFPRI, 2020; Webber & Labaste, 2009). The value chain approach has gained attention in development practice and policy, primarily as a lens for developing poverty-reduction initiatives with private sector participation. This has resulted in the development of a widely used analytical approach in development fields known as 'value chain analysis' (Devaux et al., 2018; Elliot, Gibson, & Hitchins, 2008).

Value chain analysis is a reformulation of the Orthodox theory of trade, which is based on Ricardo's (1817) law of comparative advantage. In comparison to Orthodox trade theory, the value chain approach is more feasible and is now more commonly used to address poverty reduction and food security efforts, primarily by assisting the poor in gaining access to markets (Brewer, 2011; Mitchell, Keane, & Coles, 2009). In explaining why, the poor may face trade barriers and how to overcome them, value chain analysis is more useful than traditional theory. This is because orthodox trade theory assumptions, such as the link between trade and poverty reduction on the one hand and economic growth on the other, have never been the main focus. It also fails to deliver feasible intervention strategies for policymakers and practitioners with more reasonable goals: how and when to assist a recognized target group in accessing (or, in better terms, accessing) specific effective value chains. Recognizing these flaws, trade theory is being amended and, in many important ways, is converging with value chain analysis (Lin & Chang, 2009; Neary, 2009).

Basically, the origin of value chain analysis is discussed from two distinct traditions: the French '*filière* concept' and Wallerstein's (1974) concept of a commodity chain (Raikes et al., 2000). From these, a couple of derivatives have emerged, such as Porter's concept of the value chain; Gereffi's global commodity chain approach; Humphrey's world economic triangle, and Humphrey and Schmitz's Global value chain. The following paragraphs show the brief discussions on the development of the concept of value chain as a new paradigm.

The 'Filliere' approach was developed in the 1960s to gain a more detailed understanding of the economic processes that underpin agricultural commodity production and supply chains (Faße, Grote, & Winter, 2009). In Francophone countries, the approach is used to analyze agri-

food supply chains. It incorporates various schools of thought, including system analysis, Marxist economics, industrial organization, management science, and neoclassical welfare analysis (Raikes et al., 2000). It was soon utilized in the research of agriculture in developing countries, emphasizing growing exports of products such as cocoa, cotton, and coffee from French colonies. This theory is then used to shape French industrial policies. However, the “filliere” idea failed in its analysis of the global world economy because it is a static model with non-changing participants. Rising or falling commodity or information flows, as well as stakeholder increases and decreases, are not taken into account (Gereffi & Fernandez-Stark, 2011). Overall, the Filière can be used to describe the flow of physical inputs and services in the production of a finished product, and is conceptually similar to the modern value chain concept (Van Melle, Coulibaly, & Hell, 2008). Wallerstein (1974) developed the concept of commodity chains in the 1970s, which is based on the principles of world systems theory¹ (Faße et al., 2009). World systems theory, in turn, is an extension of ‘dependency theory’² (Raikes et al., 2000). The main driver is the international division of labor between various regions (the core, semi-periphery, and periphery regions) due to the various labour force of manufacturing and production activities within a chain. Both world systems and dependency theory have had a significant impact on one strand of value chains. This strand began with commodity chains, then evolved into global commodity chains, and finally global value chains (Rutgers, 2010).

The other concept to consider is Porter’s value chain (Porter, 1985). In the mid-1980s, Michael Porter developed a modern value chain analysis. According to Porter, value chain analysis is the ultimate technique for evaluating the profits generated at each point of production. Porter distinguished various stages of the supply process (inbound logistics, operations, outbound logistics, marketing and sales, and after-sales service), the transformation of these inputs into outputs (production, logistics, quality, and continual improvement operations), and the support services the firm marshals to accomplish this task. Porter's approach failed to focus on the

¹ World systems theory introduced the semi-periphery to break the dichotomy between core and periphery.

² One of the founding fathers of the “dependency” concept is A. G. Frank who wrote in 1969: “The development of underdevelopment” (Frank, 2000) .

interconnections and relationships among vertically grouped participants in the creation of value within a company (Roduner, 2004).

Gereffi developed the “Global Commodity Chain (GCC)” approach in the mid-1990s, which is based on Wallerstein's commodity chain (Bair, 2005). This perspective is used to investigate the origins, nature, and consequences of global technological and industrial integration. The approach builds on the world systems perspective. Gereffi's contribution has supported significant advances in the empirical and normative application of the value chain framework, especially for its emphasis on the power structures embedded in value chain analysis. The approach focuses on the power relations embedded in value chain analysis and connects the concept of value-added chain to global industry organization (Gereffi & Lee, 2016). Moreover, in 2002, Messner developed the theory of the “world economic triangle” where actors, governance and regulation systems are influential factors for regions (developing countries) scope of action in the global commodity chains. The six major characteristics in all economic triangles are: group of actors, their interests, trust, power relations, action-orientation and mind sets (Messner, 2004). World economic triangle approach focuses on the upgrading of whole regions or clusters through their integration in value chains which might bring up grading perspectives for regions in developing countries. Therefore, this theory links horizontal (cluster development) and vertical approaches (value chain) (Kaplinsky, Morris, & Readman, 2002).

In the mid-1990s, the growing fragmentation of supply chains in the global arena led to the development of the literature launched by Gereffi's (1994) work on Global Value Chains (GVC). This literature added an explicitly international perspective and centered on worldwide power dynamics and rule-setting processes (governance) across the chain (Gereffi, 2014). Humphrey and Schmitz, 2000) introduced the “Global Value Chain” concept. In 2000, a team of researchers with considerable expertise met to establish a theory of ‘global value chains’ (Sturgeon, 2007) in a series of seminars. Its goal was to construct an exact theoretical model appropriate to real-world scenarios, robust, and applicable (Faße et al., 2009). Major retailers play a crucial role in managing the entire system in “buyer-driven” value chains instead of “producer-driven” chains, whereby producers define the standards for the system to operate. The advantages of Porters’ single firm orientation are recognized by this new school of thinking (GVC), while at the same time scrutinizing relations between the various stakeholders. A global

value chain approach enables social influences to be incorporated and provides a structure that connects constraints, governance structure, and upgrading strategies (Raikes et al., 2000).

Governance structure

The governance structure is a crucial step to understand the nature of coordination and relationship mechanisms that exist between stakeholders in the chain (Gereffi & Lee, 2016). Governance involves coordination and related positions in finding vibrant cost advantages and allocating key players' roles (Kaplinsky & Morris, 2000). Governance's central premise is the realization that encounters between businesses in a value chain reveal organizational forms rather than merely random interactions (Kaplinsky & Morris, 2000), which implies that governance guarantees that the organization is represented by interactions among entities across a value chain (Gereffi & Lee, 2016). It is noted that management and coordination often function in literature as interchangeable or synonymous terms (Ponte & Sturgeon, 2014). The term governance was used by Williamson (1979) in the 1980s to describe the collection of hierarchical frameworks in which a transaction is organized. Based on governance structures, value chains can be classified into producer-driven and buyer-driven value chains (Gereffi & Lee, 2016). However, in developing countries, where food chains still have many stages, most transactions are carried out with the assistance of middlemen. They may be able to address information asymmetries that are prevalent in developing countries, but they may also take a greater share of the market share in the value chain, limiting upgrading possibilities for farm households (Lee, Gereffi, & Beauvais, 2012; Maertens & Barrett, 2013).

Most empirical findings (e.g., Bardhan, Mookherjee, & Tsumagari, 2009; Ganesh Kumar, Murugaiyan, & Madanmohan, 2017) in developing economies reveal that middlemen take the lion's share of the margin shares and are more influential in the chain. The hegemony of these middlemen in the value chain can be explained in part by the terrestrial dispersion of actors and the scarcity of price information. Because of the chain's extreme geographical dispersion, the actors require an assistant who can act on their behalf in other markets and provide price information (Abebe, Bijman, & Royer, 2016). Due to a lack of valuable market information and a lack of well-organized producers in developing countries, producers rely heavily on middlemen. Most of the time, middlemen purposefully create a communication chasm among

both buyers and sellers (producers) and arbitrate them in their preferred manner. As a result, middlemen are viewed as market impediments by both buyers and sellers. The price is also set by the middlemen. In such cases, neither the producer nor the buyer has the power to determine exact product prices (Giziew, Negatu, Wale, & Ayele, 2014). Middlemen's actions have an impact on customer prices since they often collect and manipulate selling prices. Ignoring middlemen and believing that producers could be tied directly to purchasers without some sort of middle, value-added function is generally ill-informed and contributes towards further market imperfections and decreased competitive advantage. As a result, middle actors in value chains should be enticed with incentive schemes to drive better business operations based on effective competitive environment and compliance with laws and regulations. (Munshi, 2014) argues that middlemen are not only an economic institution but also a social network structure that facilitates trade in developing countries. In addition to the two types of value chains described above, unlike developed countries value chains, this dissertation proposes a third type of value chain for developing countries such as Ethiopia known as the "middlemen-driven value chain." This means that three types of governance are distinguished based on the coordination role of 'governance': those where producers have dominance ('producers-driven value chain'), those where middlemen have hegemony ('middlemen-driven value chain'), and those where buyers have a key role ('buyers-driven value chain').

Long marketing channels benefited middlemen while negatively impacting both producers and consumers. This meant that a long marketing channel was one of the main causes of increased transaction costs as well as crop marketing inefficiency. As a result, the government should devote sufficient attention to improving the imperfect market chain as well as long distribution channel by establishing institutions such as cooperative-unions. Brokers should be formalized into legal venture for the benefit of producers, wholesalers, retailers, and consumers by recognized financial institutions. This situation clearly necessitates fierce government interference. This is because unregulated middlemen are demolishing a considerable amount of value (Abebe et al., 2016; Crona, Nyström, Folke, & Jiddawi, 2010). In general, the governance structure provides information concerning farm households' positions in the value chain as well as the relationships among farmers and buyers.

Upgrading

Upgrading is another concept of analysis within value chain research and referred to as strategies for adding value, which is the intervention step of value chain analysis (Ponte, Kelling, Jespersen, & Kruijssen, 2014). Upgrading is defined by Mitchell et al. (2009) as the “means of acquiring the technical, institutional, and market capabilities that enable poor communities to enhance their competitiveness and shift towards higher-value activities”. Value chain players are said to upgrade as they gain new skills by creating more value-added commodities or improving existing ones. Upgrading options could be specified by assessing profitability inside the chain and defining its constraints. Improving strategies that include interventions such as improving product quality and moving towards more creative market segments, redesigning the production line or investing in new process upgrade techniques, improving the chain’s performance, and introducing innovative features to increase the quality of activities to gain deeper importance throughout chain (Ponte & Ewert, 2009). In various countries and businesses, empirical research (e.g., Humphrey, 2004) offers information about the benefits of upgrading agriculture enterprises.

Various scholars have identified four upgrading opportunities namely: process upgrading, product upgrading, functional upgrading and inter-chain upgrading (Ponte & Ewert, 2009). Process upgrading: focuses on enhancing the efficiency of external and internal processes within the value chain. For instance: processes that ensure timely deliveries, collection of quality products, or improved marketing of a product, organizational restructuring, collaborations, and/or capability buildings are ways to achieve process upgrading (Kaplinsky & Morris, 2000). Product upgrading: refers to improving existing products and/or developing new ones. It is closely linked to process upgrading because changes in products often lead to changes in processes (Mitchell et al., 2009). Functional upgrading: It is achieved when a firm changes one’s position within the chain to add value. An example of this can be farmers who start processing in addition to producing fruits. On the other hand, upgrading of the chain involves moving to a new chain. If participating in one chain is not profitable, farmers may look for other options, since they have a diversified livelihood strategy. But high barriers of entry into new value chains might limit their options (Kaplinsky & Morris, 2000).

2.3 Transaction Costs Theory

An additional concept is required for a clear or in-depth assessment of the value chain and, in specific, of the agri-food chain, in addition to those provided by GVC analysis (governance and upgrading). Rather than analyzing market interaction from a strictly neoclassical perspective, this Dissertation follows the transaction costs theory. The transaction cost theory is classified as a branch of New Institutional Economics (NIE) (David & Han, 2004; Williamson, 1996). Transaction costs are expenses incurred when activities such as information gathering, negotiation, bargaining, enforcing, and monitoring are carried out (Williamson & Masten, 1999). The costs of identifying markets and trading partners, as well as the costs of obtaining price and product information, are referred to as information costs. The expenses of physically negotiating, bargaining, and formally drafting the terms of exchange are referred to as negotiation costs. Monitoring and enforcement costs are the expenses of making sure that the transaction's terms, like quality standards or payment methods, are followed by the trade agreements (Stavins, 1995).

The business relationships between suppliers and purchasers produce “transaction costs” in addition to the costs of manufacturing and marketing at each phase of the value chain. Market inefficiencies, like low market consistency, lack of grades and specifications, or weaknesses in the business environment, often result from high transaction costs. The basis for governance decisions about inter-company organizational relationships is explored by Transaction Cost Economics (TCE). Inter-organizational relationships are agreements that bring together organizations with the goal of producing joint added value (Bachmann & Witteloostuijn, 2006). In TCE, the fundamental unit of analysis is transactions among firms (Williamson, 1991). Under the conditions of stakeholders’ opportunistic actions, businesses choose a governance form that significantly reduces transaction costs. Through mutual investment, control mechanisms, and complex organizational structures such as contracts, value chain actors safeguard against the risk of opportunity. The majority of small and marginal farmers in underdeveloped nations live in remote areas with inadequate infrastructure, and they frequently miss out on market opportunities due to high transaction costs (Dorward, Poole, Morrison, Kydd, & Urey, 2003). According to Arega et al. (2008) transaction costs negatively impact market participation, whilst better market information triggers it. Barrett (2008) argues that

distance to market is a proxy for transaction costs and has a negative impact on market participation. Overall, the idea of transaction costs aims to clarify what kind of governance system is empirically defined (Ruben, Boselie, & Lu, 2007).

2.4 Innovation Systems Perspective

Innovation refers to something new that has been implemented successfully into an economic or social system (Baregheh, Rowley, & Sambrook, 2009; Popadiuk & Choo, 2006). Designs involve value-creating improvements in product, method, organization, management, business, and marketing. The theory of innovation focuses on the various kinds of technologies that can help improve a value chain's productivity. Innovative production and distribution may produce efficiency gains and service improvements that result in higher profits or more efficient pricing. Innovation becomes crucial for maintaining the competitive position of the value chain by extracting more value. One core factor in the upgrading of value chains is the production factor of "knowledge". In fact, a value chain's access to information may also be a competitive advantage. Therefore, innovation is a crucial factor for improving value chains in developing nations (Trienekens, 2011a). As a result, in developing nations, innovation is a critical factor in upgrading value chains (Lema, Rabellotti, & Sampath, 2018; Morrison, Pietrobelli, & Rabellotti, 2008). In conclusion, the value chain analysis and insights on agricultural development innovation processes are related and share a range of central characteristics. These include socioeconomic and environmental value additions that focus on the development of new techniques; an emphasis on collaboration, an emphasis on institutions, interactive learning, and practitioner networking (Anandajayasekeram & Gebremedhin, 2009; Devaux et al., 2018).

2.5 Social Network Theory

Social network theory is another relevant theoretical stream for developing world value chain research. It relies on the interdependence of social and economic interactions in (production) networks consisting of multiple vertical and horizontal relationship issues among stakeholders in the supply chain (Chen, Daugherty, & Landry, 2009; Trienekens, 2011b). According to the social network framework, businesses are integrated in a dynamic of vertical, horizontal, and business development relationship issues with several other institutions that provide inputs such as credit coordinators, advisory services, and transportation services (Kilelu, Klerkx, &

Leeuwis, 2017). The supply chain demonstrates vertical connections among market participants in order to co-produce for a market, whereas network theory combines vertical and horizontal interactions between actors (Berti & Mulligan, 2016). Network linkages can boost a company's "social capital" by making it easier to obtain information, necessary knowledge, and financial assistance, as well as by empowering information sharing among key stakeholders lowering transaction costs and enhancing access to markets (Humphrey & Schmitz, 2002). When the value chain is more described by a network than by a single vertical chain, social network analysis is used. To summarize, social networks are an important factor in the development countries for both intervening and upgrading value chains, and they serve as a basis for analyzing and mapping relations and flows among people and organizations.(Kim, Choi, Yan, & Dooley, 2011).

2.6 Theory of Change and Value Chain Analysis Nexus

Theory of change, which was developed in the 1990s, is a method for designing business strategies that brings together community development partners and addresses proposed way of achieving impact (Douthwaite & Hoffecker, 2017). In the case of smallholder value chains, theory of change was used to develop business modelling techniques aimed specifically at integrating smallholder farmers into market-oriented value chains (Chamberlain, 2019; Rajala et al., 2021). It's a good place to start when it comes to understanding and clarifying smallholder commercialization transactions. It demonstrates how well the various interventions and tasks will interact to produce the desired market changes and, ultimately, the planned impacts on smallholder farmers for each value chain. It is based on the idea that by supplying farmers with the appropriate inputs, they will be able to expand their farming production, resulting in higher earnings and therefore more sustainable farmer practices (Chamberlain, 2019). The main goal of such assistance programs should be to enable smallholder farmers to make appropriate, well-informed decisions about how to manage their agriculture and which markets to pursue (McKague & Siddiquee, 2014).

Consider an intervention designed to enhance household food security and welfare as an example (i.e., final impacts). Inputs could include fertilizer, pesticides, seeds, and pest management (Figure 3). However, inputs include not only production techniques, but also

expertise, such that poor and disadvantaged farm households can use the accessible information for personal gain. Connecting smallholder farmers to well-functioning markets ranging from local markets to structured value chains is critical in long-term rural poverty reduction strategies. Comprehending how to successfully connect disadvantaged producers to markets, as well as recognizing that markets can profit which types of producers, are important steps in community development (Bokelmann & Adamseged, 2016; Singh, 2016).

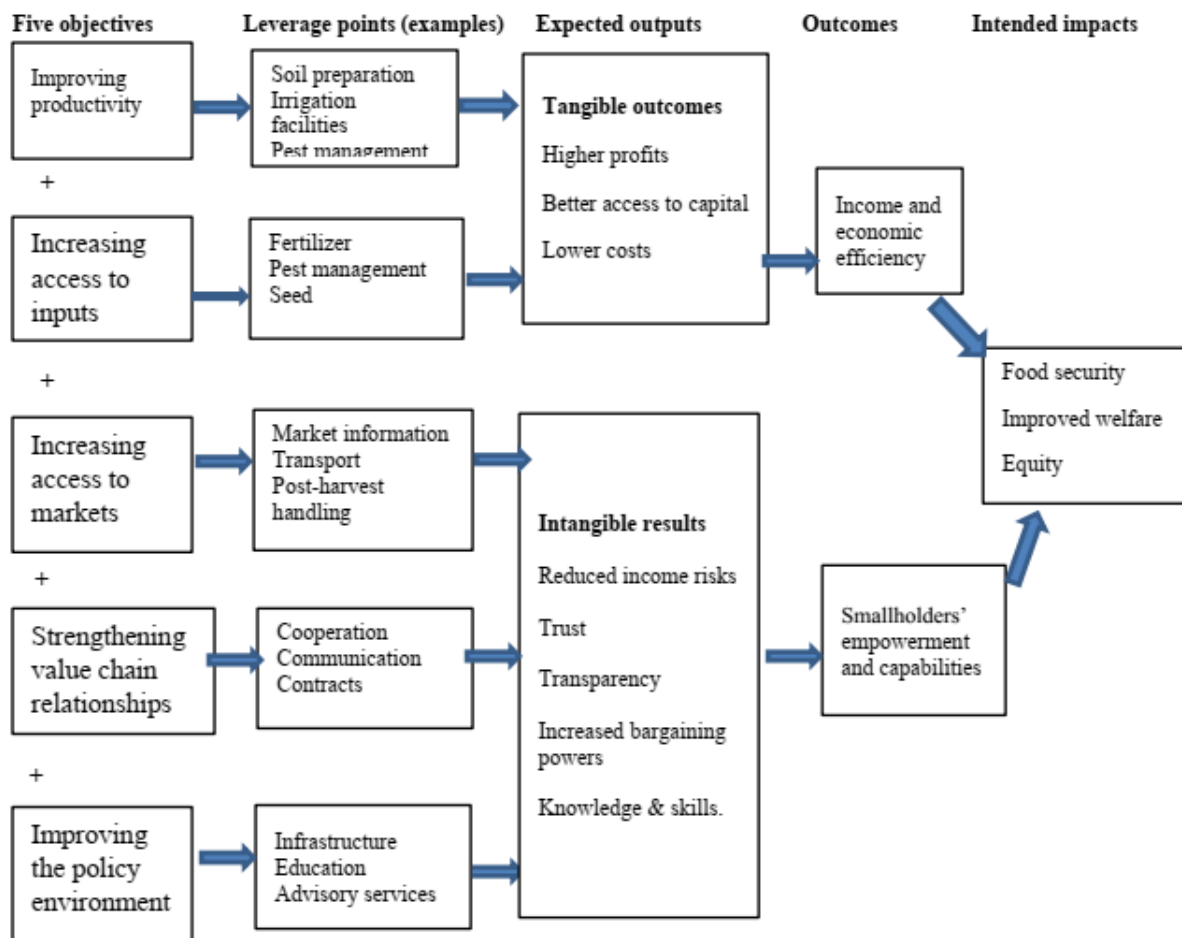


Figure 3. Value chain theory of change, objectives, outputs, and outcomes
Adopted from McKague and Siddiquee (2014)

The theory of change depicted in Figure 3 illustrates a procedure that helps to identify critical steps and components when forming stakeholder partnerships. Some of the strategies to increase profits for farm households include going to invest in upgrading the value chain to

meet production and distribution requisites, making investments in wider sustainable livelihood strategies, as well as trying to adapt trade relations and value chain formation for smallholder sourcing. The intervention logic (theory of change) for a value chain method is depicted in Figure 3. These strategies include expanding input access, increasing productivity, enhancing value chain connections, expanding access to markets, and getting better a supportive framework (an enabling environment). Increased access to productive resources such as agricultural inputs, land, pest management, irrigation, as well as other extension services can help disadvantaged farmers increase their productivity. Similarly, it is critical that they cultivate their relationships with other actors in the chain.

As a result, building strong value chain partnerships among farm owners as well as other actors in the chain through coordination, communication, and contracts is as significant as the other strategy elements. Finally, an enabling environment should be developed and enhanced through education and advisory services. These schemes would produce both tangible (higher profits, better access to capital, and lower costs) and intangible results (reduced income risks, trust, transparency, increased bargaining powers, and knowledge and skills). Smallholders would benefit from food security, as well as a reasonable income and environment. Despite efforts to incorporate value chain expansion into developing nations' poverty reduction strategies, initiatives are frequently ineffective. One reason for this is a lack of coordination efforts throughout the entire value chain. (Bokelmann & Adamseged, 2016; McKague & Siddiquee, 2014).

To summarize, all of the theories discussed above were developed over time and reflect development when compared to one another. Certain aspects of each theory are used to explain: (1) characterizing the value chain (e.g., social network theories, global value chain approach, innovation systems perspective, and transaction costs theories), (2) factors that determine the decision and intensity of participation (e.g., transaction costs theories, innovation systems perspective), and (3) household welfare and food security effects (e.g., innovation systems perspective, theory of change). Hence, it is difficult, from the smallholder's perspective to adopt one value chain theory even though the latest one seems to be more advanced than its predecessors. Therefore, this study is based on the integration of the different theoretical concepts of value chain discussed above.

2.7 Review of Empirical Studies

2.7.1 Value chain analysis and actors mapping

Nowadays, the majority of agricultural output in both developed and developing countries is marketed through multi-level marketing systems rather than directly to consumers. As a result, many farm workers are increasingly being integrated into value chains that have both backward (input supply) and forward (marketing) links (Bokelmann & Adamseged, 2016; FAO, 2019). Value chain analysis enables practitioners to comprehend the market systems throughout the value chain, as well as the opportunities and market mechanisms that affect competitive position and inclusive growth. Based on the predetermined aim and objectives of intervention, the chosen value chain is characterized and mapped (DFID, 2008; FAO, 2019). There are three major sets of rationales why value chain analysis is important these days of rapid globalization, according to the literature. They are as follows: 1. pervasive competition in the market has grown in importance, 2. Production efficiency is only a necessary requirement for successfully entering international markets, and 3. Entry into international markets necessitates an awareness of factors involved throughout the entire value chain (UNIDO, 2009). According to Rota and Sperandini (2010) value chain analysis is important for understanding market relationships, actor participation, and the constraints that limit agricultural production growth and, as a result, farmer competitiveness. Currently, these farmers receive only a small portion of the total value of their output.

The value chain map is a tool that enables us address development challenges that may impede or improve the operation of a value chain, as well as the organizations that provide the services that the various value chain actors need to make better decisions (Purcell, Gniel, & van Gent, 2008). The value chain map, according to Bammann (2019), is composed of three interconnected components. These are the actors in the value chain, the enabling environment (infrastructure, institutions, policies, and processes), and the service providers. The value chain includes direct actors who are commercially involved in the chain (primary producers also known as farmers, traders, retailers, and consumers) as well as indirect actors who provide services or support the value chain's operation. Service providers such as governing bodies, banks and credit agencies, researchers, and extension agents are among them (Emana & Nigussie, 2011). The first step of a value chain analysis is the so-called mapping (Rutgers,

2010; UNIDO, 2009). The main idea is to first 'map' and 'characterize' actors in order to identify the traced product flows within the chain, which includes input supply, production, processing, and marketing activities. This is a mapping of the value chain in terms of core processes and linkages, product quantities and prices, product geographical flow, and value at different levels of the chain. The procedure allows for the assessment and description of the comparative importance of the various value chain segments (Faße et al., 2009).

In other words, mapping a chain entails creating a graphic illustration of the linkages between businesses in value chains as well as other market participants (Ponte et al., 2014). Developing a value chain map is a technique for making what is seen and experienced more understandable (Altenburg, 2007): "A picture is worth a thousand words" (Purcell et al., 2008). The purpose is to comprehend the actors and their interrelationships in order to determine entry points for improving value chain performance (Lundy et al., 2012; Tschirley, Reardon, Dolislager, & Snyder, 2015). This gives a visual representation of the actors and transaction structure in the value chain. Maps identify chain operators and their linkages, business operations (functions), and chain supporters within the value chain (Jones, 2012; Ruffer & Wach, 2013).

2.7.2 Marketing performance analysis

Marketing, according to Kotler and Armstrong (2004) is a socioeconomic process in which people obtain what they require and desire by producing, providing, and easily exchanging products, facilities, and valuation with each other. Marketing performance is defined as "...the effectiveness and efficiency of an organization's marketing activities in relation to market-related goals, such as revenues, growth, and market share..."(Homburg, Grozdanovic, & Klarmann, 2007). Next to mapping the chain, another useful component in the value chain studies is the market performance analysis (Webber & Labaste, 2009), which is one of the standard methods used to study how a given value chain performance looks like (Mensi & Zouari, 2010). The procedure enables allocating benefits that focus on who gains and who loses in the value chains in terms of margins and profits within the chain to be evaluated and described (Mendoza, 1995). Market performance can be determined by examining the expenses (costs) and margins of marketing actors across various channels. Marketing costs are the expenses incurred in the movement of goods from production to consumption. The marketing

margin or price spread is a commonly used measure for system performance. Margin can be a helpful descriptive analysis when used to demonstrate how well the consumer's food price is distributed among participants at differing stages of the marketing system (Beshargo, 2002; Mussema, 2006). The difference between price paid to first seller (farm-gate price) and the price paid by the ultimate consumer (purchase price) is referred to as the marketing margin (Abankwah, Aidoo, & Tweneboah-Koduah, 2010).

Surveys for margin determination should be carried out in tandem with channel surveys. To determine the channel, ask oneself, "From whom did you purchase?" and "To whom did you sell?". According to Scott (1995) in order to acquire data about margins, agents must answer the question "what price did you pay?" as well as "what was the sale price?" Thus, profits in this form indicate the number of services added to a product once it escapes the farm and sits on a shelf in a retail outlet in a reasonable, beneficial, and attractive type to buyers (Goetz & Weber, 1986). In other words, the relative size of respective market players' gross margins can imply at which value is created and/or profits come in the chain. Overall, benefit distribution focuses on who gains and who loses in value chains. Following the implementation of upgrading strategies, the benefits in the value chain can be assessed. Marketing margins are typically higher for highly perishable agricultural products such as fruits (Zulfiqar, Khan, & Bashir, 2005). It can be measured by evaluating marketing margins across various networks/marketing channels. In its simplified meaning, a marketing margin can be described as the difference between the prices paid for a commodity by retail consumers and the prices received by producers when they sell their product to buyers. All along the market chain, margins can be measured and each margin represents the value added at that market chain level (Mendoza, 1995). On the other hand, a market is one of a number of different systems, organizations, processes, social ties, and infrastructural facilities through which trade in people and commodities/services are traded (John, 2002).

2.7.3 Agricultural market participation and its importance

Olukosi, Isitor, and Ode (1990) and Idem (1999) defined agricultural marketing as the process by which food commodities flow physically and economically from production to consumption in order to shape the economic exchange that meets the needs of customers, organizations, or

the entire community. Buyers and sellers are linked together in the marketing process and can respond to current production and consumption situations. As a result, participants generate an income, which improves their well-being. The transition from subsistence farming to increased market-oriented production is referred to as agricultural commercialization. Jones Govereh and Nyoro (1999) observe the upsides of commercialization from the standpoint of comparative advantage. Commercialization, according to them, boosts productivity and profitability.

Market participation refers to farmers' integration into agricultural product input and output markets with the goal of increasing their income and thus alleviating poverty (Holloway & Ehui, 2002). As the marketed share of agricultural output grows, input usage decisions and output combinations are increasingly influenced by profit maximization goals (Omiti et al., 2006). Participation of farm households in agricultural markets is critical because farming provides humans with benefits such as earnings and employment generation (Ngqangweni, 2001). However, farm household participation in marketing, in addition to production activities, enables the transformation from subsistence to commercial farming (Makhura, Kirsten, & Delgado, 2001). Based on their market participation, agricultural households can be divided into three categories: autarkic (non-participants), net buyers, and net sellers (Boughton et al., 2007; William Jerome Burke, 2009; Reyes, Donovan, Bernsten, & Maredia, 2012). Figure 4 shows how this classification is done.

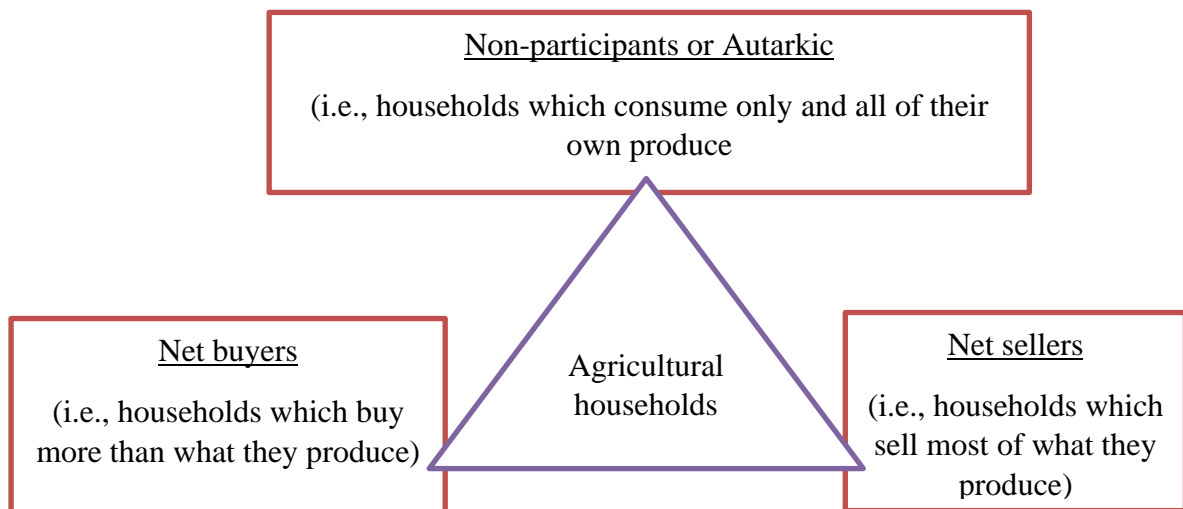


Figure 4. Participation of agricultural households according to their participation

Adapted from Boughton et al. (2007); Burke (2009); Reyes et al. (2012).

Market participation has a promising importance for activating the appropriate opportunity sets required for farm households to earn higher earnings and maintain sustainable livelihoods. Furthermore, market participation helps to ensure that as household incomes rise, so does demand for their products and services, improving their development (Barrett, 2008; Gebremedhin, 2010; Omiti, Otieno, Nyanamba, & McCullough, 2009). Farm households that sell their produce more frequently are more likely to progress from lower scale, i.e., small-scale farmers, to larger scale producers. This marketing and selling environment is critical for incentivizing increased production and, as a result, improving the welfare and food security of emerging and smallholder growers (Jaleta, Gebremedhin, & Hoekstra, 2009). According to Jari and Fraser (2009) farmer market participation is critical both for long-term growth in the economy and the reduction of inequality and poverty. In conclusion, agricultural marketing is essential to achieving the overall goals of food security, sustainable farming, and poverty reduction, especially among small-scale farmers in developing countries like Ethiopia. In this context, an empirical study to gain a better understanding of smallholders' participation in food markets could be useful for development strategies aimed at accelerating the expansion of economically significant value chains, as well as a significant contribution to the existing literature.

2.7.4 Fruit crops in Ethiopia

Agriculture is widely acknowledged to be the basis of the Ethiopian economy, accounting for nearly 32.8% of GDP and 73% of labor force participation (NPC, 2021). Despite the fact that agriculture supports many economic activities, it is characterized by inefficient production technologies as well as limited access to markets for both inputs and outputs (Bachewe, Berhane, Minten, & Taffesse, 2018). Agriculture continues to be the most promising resource for grain self-sufficiency and livestock, vegetable, and fruit export development. As a result, the shift from subsistence to commercial agriculture is the primary driver of economic growth (Carletto et al., 2017). To capitalize on these opportunities, the Ethiopian government has created an enabling environment to promote chain actors in the fruit sector (NPC, 2021).

The country's diverse agro-climatic conditions allow for the production of a wide range of fruits, vegetables, and herbs. The wide range of altitude, from sea level to over 3000 m above

sea level, provides a wide range of agro-ecological diversity, ranging from humid tropics to alpine climates, where most types of fruits and vegetables can be grown successfully (Wiersinga & Jager, 2009). Ethiopia has a variety of fruit crops grown by small-scale farmers in various agro-ecological zones, primarily as a source of income as well as home food consumption. There are nearly 38 fruit species currently grown in Ethiopia. Avocado (*Persea americana*), mango (*Mangifera indica*), pineapple (*Ananas comosus*), apple (*Malus domestica*), banana (*Musa paradisca*), papaya (*Carica papaya*), and orange (*Citrus sinensis*) are naturalized to the Ethiopian agro-ecologies and have many landraces. Most of these fruit crops are grown in farmers' home gardens (IBC, 2012). The cultivation of these fruits ranges from a few plants in back gardens for household consumption to production for domestic markets (Worako, 2015). The total acreage and production volume of fruits represent is very small when compared to grains production (CSA, 2019). Fruit production and exports in the nation play a major role in the national economy, providing a living for nearly five million farmers, creating jobs, and producing foreign currency earnings. The contribution of fresh fruits to Ethiopia's export earnings is small, but it is steadily growing (GAIN, 2018).

Currently, there is a growing interest in high-value agricultural commodities (which include fruits, vegetables, dairy, fish, and spices) as a diversification strategy for increasing the incomes of Ethiopian small-scale farmers and, as a result, achieving sustained economic growth and poverty reduction (Woldehanna, 2014). Ethiopia's government has made agricultural transformation a top priority, establishing a new agency, the Agricultural Transformation Agency (ATA), to catalyze the process (Järnberg, 2016). The government has put in place an emphasis on the horticulture sector in general and the fruits sub-sector in particular (Wiersinga & Jager, 2009). This is evidenced by indicators such as (a) the development of integrated agro-industrial parks in major agriculture potential areas of the country (e.g., Burie Integrated Agro-Industry) to make the sector globally competitive. The government also plans to build an apple processing plant in Debre Tabor, which will contribute to minimize the marketing risk of apples cultivated in the area surrounding; (b) expansion of rural transformation centers that are to act as collection points for fresh farm feed and agricultural produce to be transported to these agro-industrial parks where the processing and distributing activities are to take place, (c) the government assigns approximately three extension workers to each kebele (the smallest administrative unit below the district) to assist farmers in the various sub-sectors of agriculture,

and (d) farmers' organizations can be used to help the country's fruit sector develop by addressing constraints such as late delivery of inputs and a lack of value chains for fruit products.

Mango: Mango (*Mangifera Indica*) is known as the “king of the fruits” (Ullah et al., 2010), which makes the crop valued for food security, particularly for developing countries such as Ethiopia, where the realization of food security is still a problem. It is one of the 73 genera of the *Anacardiaceae* family, one of the most versatile and widely cultivated fruit crops in the tropical and subtropical regions, and ranks fifth among the world’s fruit crops following citrus, banana, grape, and apple (Jahurul et al., 2015). Because of its excellent flavor and high nutritional values, mango is known as the king of the fruits (Ullah et al., 2010), making the crop valued for food security, particularly for developing countries such as Ethiopia, the realization of food security is still a problem. Mango is the second most widely cultivated fruit crop in Ethiopia, after bananas. Mango fruit production increased by 45 percent from 70,000 metric tons in 2013/14 to 105,000 metric tons in 2017/18 (GAIN, 2018). Among the most common cultivars grown in Ethiopia are Kent, Tommy Atkins Keitt, and apple mango (Bekele et al., 2020). Mango, an evergreen fruit crop, is the leading fruit crop produced by small-scale farmers in the Upper Blue Nile Basin's midland and lowland areas.

Apple:

Apple (*Malus domestica*) production accounts for half of the globe's deciduous fruit production. China is the leading apple-growing country, currently producing 41% of the globe's apples, followed by the US and India. South Africa is the largest supplier in Africa, accompanied by Egypt (Gayak, Pandey, & Bhatta, 2020). It is among the *pome* deciduous fruits. Apples are high in calcium, vitamins, phosphorus, potassium, and organic acids. In addition to its dietary importance, apple trees in the Ethiopian highlands can improve soil conservation. An exogenous crop expanded through government and non-government institutions’ support, and private growers, including farmers (Fetena & Lemma, 2014). In their home compound in Chenchu town, southern Ethiopia, British missionaries first introduced apple seedlings to be planted (Behailu & Kebede, 2018; Hayesso, 2008). Consequently, its production has indeed been expanded across several highlands of Ethiopia, including Upper Blue Nile Basin, with the help of government and non-governmental organizations and private producers, including

small-scale farmers. In 2017, the production of apple fruit in Chenchu was about 154 tons per year (Tamirat & Muluken, 2018a). There is, however, no actual information on the current national level of apple crop yield in Ethiopia. Apple production has been expanded in the Upper Blue Nile Basin, especially in several Awi-Zone highland areas. It serves as the main cash crop for small-scales in supplementing their livelihoods (Fetena & Lemma, 2014).

2.7.5 The contributions of fruits farming to household welfare and food security

Cash crop production such as fruits has a considerable effect on increasing earnings and motivating rural growth, diversifying food production, and potentially improving food consumption (Jaleta et al., 2009; Jones Govereh & Nyoro, 1999). In Sub-Saharan Africa, the issue of income, food security and welfare gains to farm households from participation in agricultural markets and value chains has acquired much significance in recent times (Barrett et al., 2019; Joosten et al., 2011). According to Barrett et al. (2019), there is a high potential for farm households to derive livelihoods from value chain-oriented agriculture. That is, increased profitability for those small-scale farmers from the value chain may lead them to change their production and improve household welfare and food security (Jensen, 2010).

Fruit farming, in addition to maintaining an ecological balance, plays an important role in generating income and nutritional improvement and in achieving household welfare and food security. Several studies have observed that participation in the fruit business raises farmers' income, food supply, and consumption (Achterbosch, van Berkum, Meijerink, Asbreuk, & Oudendag, 2014; Muriithi & Matz, 2015). A study in Senegal, for instance, showed the important role of export-oriented fruit in income and food security, leading to increased domestic female bargaining power (Maertens & Verhofstadt, 2013). Arguments against the growing of cash crops such as fruits and vegetables still exist. One statement questions the participation process with arguments that small-scale farmers are exempted from agri-food value chains due to efficient resource constraints (Tobin, Glenna, & Devaux, 2016).

A number of factors that operate on different scales are influencing participation in such schemes, which facilitate the shift from subsistence to market-oriented production less simple (Rabbi et al., 2019). For example, case studies in India revealed that institutional factors, such as access to market information and distance from the market, were important aspects affecting

the decision of farmers to participate in the supply chains of supermarkets (Nandi, Gowdru, & Bokelmann, 2017). The accessibility to inputs and the finance needed to purchase these inputs is often lacking for small-scale farmers (Likoko & Kini, 2017). Moreover, some studies pointed to the significance of socio-economic characteristics, education, and social networks in households when deciding on farmers' involvement in commercial farming (Rabbi et al., 2019). Furthermore, the literature shows that there are substantial variations in the association between cash crop cultivation and household welfare and food security across crop choice, geographic regions, and social structures (Donovan & Poole, 2014; Jha et al., 2014).

2.7.6 Opportunities of fruit trees development in the study areas

The current research areas are located in the Upper-Blue Nile Basin (North-western Ethiopia), which are agrarian regions with approximately 83% of the population living in rural areas and relying on crop production for a living. The region's diverse agro-ecologies and fertile soil make it ideal for growing a wide range of fruits and vegetables. Fruit production is typically practiced by small-scale farmers throughout the country's regions. Fruit production is primarily done through traditional farming systems for the local market as cash crops. The basin is endowed with favorable environmental conditions and an abundance of natural resources needed for agricultural production, including fruit crops. Onion, potato, cabbage, garlic, apple, and plum are among the major horticultural crops grown in high land areas. Carrot, cabbage, tomato, pepper, potato, beetroot, garlic, green beans, onion, mango, papaya, banana, avocado, coffee, guava, black cumin, white cumin, ginger, and Korerima are among the major horticultural crops grown in mid-altitude areas, while tomato, pepper, citrus, beetroot, mango, banana, avocado, and guava are the most important crops in the basin's lowlands (Alemayehu, Tessafa, Bizuayehu, & Ayele, 2015).

Using irrigation potentials to increase crop production and productivity in general, and horticultural crop productivity in particular, is an appropriate consideration. The country has abundant water resources, with 12 river basins providing an estimated annual runoff of 125 billion m³ (Makombe et al., 2011). Ethiopia has an irrigation potential of at least 5.3 million hectares. This basin contains the largest inland body of water in the country (Lake Tana). The Amhara region, for example, has 0.7 million hectares of potentially irrigable land, of which

only 5% has been developed (Awulachew & Ayana, 2011). Another opportunity for fruit farming in the study areas is societal consumption habits. The consumption habits of both urban and rural people for fruit products have significantly improved in recent years, though the case of urban people is more significant. Furthermore, Ethiopia, including the study areas, is experiencing rapid urbanization. This implies that urbanization will increase demand for horticultural products in the future, which could be one of the potential domestic markets for fruit products (Wiersinga & Jager, 2009). Furthermore, the establishment of Integrated Agro-Industrial Parks is part of the government strategy to make Ethiopia's agricultural sector more competitive on a global scale. The idea behind Integrated Agro-Industrial Parks (IAIP) is to combine different value chain components using a cluster approach. Associated Rural Transformation Centres will serve as collection centre for fresh agricultural produce to be transported to the IAIP for processing and distribution. The specific goals are to support the establishment of modern agro-processing environments in Ethiopia in order to facilitate a significant increase in agricultural value-addition and maximize productivity (JOTE, 2020).

Access to various assisting institutions is also a significant opportunity for fruit farming in and around the study areas. In the Amhara region, for example, there are several organizations that support the development of the horticulture industry. Non-Governmental Organizations such as Agricultural Growth Program, International Fund for Agricultural Development (IFAD), World Vision (supplies water pumps & improved seeds), Sustainable Land Management project, Agro-BIG (supplies apple seedlings and improved seeds; promises them to supply small scale fruit juice processing machines), universities (provide training, improved seeds, ...). The government assigns approximately three agriculture experts (DAs) to each of the total kebeles found in the study areas to assist farmers in the various sub-sectors of agriculture. One of them is a plant science professional who is also in charge of the fruits and vegetables sub-sector. The government allows one additional irrigation expert to be assigned at the kebele level in some of the irrigation potential districts, with the goal of promoting irrigation-oriented horticulture production. Farmers' organizations can be used to help the country's fruit development by ensuring timely delivery of inputs and addressing a lack of markets for fruit products, provided their capacity is strengthened further (MoA, 2014). Furthermore, cooperatives can assemble fruit products from local farmers during harvest periods when prices are very low, and then sell these products at higher prices by seeking potential buyers. Overall,

using these organizations will increase farmers' income from fruit products while lowering transaction costs for product sales (Alemayehu et al., 2015).

In relation to “land use certification scheme” for fruit crops production, many studies shown that people's incentives to participate in long-term investment are hampered by their perceived insecurity of tenure. According to economic theory, tenure security is a major determinant in agricultural investment (Dalrymple, 2005). The land certification program was implemented in four Ethiopian regions: Oromia, Amhara, Tigray, and the Southern Nations and Nationalities. Currently, nearly 90% of farm households have received land use certificates (Bezu & Holden, 2014). Access to land is a critical issue for the majority of Ethiopians who rely on agriculture for earnings and livelihood. Fruits, unlike some other horticultural crops, are perennial plants that require more time to reap the rewards/benefits of their investment. As a result, it is critical to motivate farmers to invest in fruit farming by guaranteeing longer-term land use certificates. The current effort to improve tenure rights includes focusing on land certification, with regional governments issuing certificates to individual farmers (Melesse & Bulte, 2015).

2.7.7 Major constraints of fruits production in the study areas

Many weaknesses and threats exist along the various stages of the agricultural sector's value chains, from on-farm productivity to post-harvest damages as it reaches consumers, limiting the sector's capabilities to achieve its full potential. The basin's major constraints include disease and pest outbreaks, as well as an insufficient skill in many aspects of horticultural crop production. Postharvest management and pest management techniques are a constraining factor for the production of high-quality fruits, owing to a lack with attention in extension services and research, as well as the constant rise of global standards. Furthermore, farmers faced a shortage of improved seeds, pesticides, proper storage facilities, irrigation equipment, and planting materials for fruits that were not delivered on time. Pesticides are often procured to growers by private traders. These traders occasionally supplied farmers with expired pesticides, which severely damaged their fruit crops. Donor organizations and district agriculture offices provided various irrigation equipment, such as motor pumps, to farmers. The main constraints, however, are a lack of spare parts and a nearby local workshop for repair and maintenance.

Infrastructures such as rural roads and communication channels for the efficient flow of market information are scarce. The products are transported to the roadside using donkeys, horses, and people. This mode of transportation takes longer to reach the market and has an impact on product quality. There is no communication between farmers, traders, and consumers. Farmers have little negotiating power and most are price takers, which affects their earnings. Because the majority of fruits are cultivated at the same time, supply increases and prices fall (Alemayehu et al., 2015).

2.7.8 Related studies on value chain of agricultural (fruit) products

The value chain concept is widely used by development practitioners in the design of market-driven poverty alleviation approaches and initiatives (Barrett et al., 2020). A number of empirical studies, both globally and locally, used the value chain approach to agricultural commodities, including fruit crops. To mention some (locally): Tarekegn et al. (2020) conducted research on the value chain analysis of bananas in Southern Ethiopia. The researchers used a Heckman two-stage econometric model to reach the conclusion that improved varieties, extension contact, area allocated for banana production, total income, distance to the nearest market, and educational attainment all are crucial predictors of banana market participation. Furthermore, low demand during the production season, an absence of an organized market, disease, and the high cost of production technologies were the top problems found by banana producers. The researchers recommended that the government and concerned stakeholders work on improving access to better banana cultivars and attempting to improve producers' practical knowledge and expertise by organizing cross-country visits and field trips to locations with best banana production techniques. However, the authors did not use the double hurdle model, which is recommended in the literature for this type of study. This is because in this model, non-participants are considered to be a corner solution utility framework (i.e., the characteristics of non-participants can be considered), whereas in the Heckman two-stage model, non-participants will never participate under any circumstances (Beshir et al., 2012; Kahenge et al., 2020; Musah, 2013; Yami et al., 2013).

In their use of value chain analysis to promote Ethiopian potatoes, Emanu and Nigussie (2011) observed that the major potato value chain actors include input suppliers, producers, wholesalers, brokers, retailers, and consumers. They also stated that wholesalers are the value

chain regulators, with producers playing a minor role in value chain management. Honja et al. (2015) investigated the mango value chain and found that direct actors include input suppliers, producers, collectors, wholesalers, retailers, processors, and consumers, as well as indirect actors such as service providers, cooperative offices, and non-governmental organizations. To analyze the distribution of benefits among value chain actors, descriptive statistics and margin analysis methods were used for data analysis. The study, however, is limited to a small number of samples and only one district.

Importantly, a study conducted by Mengesha et al. (2019) on mango and avocado market supply in a selected area of southern Ethiopia using the gross marketing margin approach of market analysis revealed that producers received the lowest marketing margins (15.17 percent), while wholesalers got the highest marketing margin (34.62 percent) and profit share (36.75 percent), from mango and avocado trade. Using a multiple linear regression model, they identified that the gender of the household, market distance, land allocated to mango, farming experience, extension service, family labor, and market price influenced mango market supply, whereas educational attainment of the household, farm experience, market distance, family labor, and extension service affected avocado market supply. As a result, market performance analysis revealed that smallholders were comparatively disadvantaged, and a variety of factors contributed to a decrease in mango and avocado market supply. Farmers' education and extension services should be strengthened, farmers' experience should be improved, family labor should be used more efficiently, and infrastructure should be developed, according to the researchers. However, they did not clearly show appropriate model specifications and results in their report. Kassa et al. (2017) identified determinants of banana farmers' market participation in Southwest Ethiopia using the Heckman two-step selection model. They revealed that age, livestock ownership, and distance to the nearest market were all negatively related to market participation, whereas household size, income, landholding, and extension service were all positively related.

Tufa et al. (2014) investigated the factors influencing smallholder commercialization of horticultural crops in Ethiopia. They observed that household gender and cultivated land increased farmers' participation in the horticultural crops market. They also found that farmers' likelihood to participate in horticultural crops was negatively influenced by distance to the

nearest market. In addition, household education, farm size, irrigation, and livestock all had a positive impact on the level of horticultural crop commercialization. The availability of household labor and the distance to the nearest market were found to have a negative impact on horticultural crop sales value. Habtamu (2015) and Tola and Ketema (2014) identified a positive and significant relationship between the volumes of potato and tomato marketed excess supply and land size, respectively. Furthermore, Bekele, Jema, and Belaineh (2017) revealed that membership in cooperatives risen marketed supply of potato by 18.4 percent. Woldesenbet (2013) identified that obtaining price information increases the marketable supply of tomato and potato growers.

Globally, according to a recent study by Hassan, Bhattacharjee, and Wani (2020) on value-chain analysis of horticultural crops-regional analysis in Indian horticultural scenario, high perishability and lower marketing infrastructure investment capacity hampered the actual progress of the sector in the country. Furthermore, they found that a lack of marketing potentials, insufficient processing facilities, and insufficient agricultural information dissemination at regular intervals all have an impact on the value of the produce. This reduces the overall remuneration received by farmers. Moreover, Opondo, Owuor, Mshenga, Louw, and Jordan (2020) conducted a study on the effect of cassava commercialization on Kenyan farm household income using a two-stage endogenous switching regression model. According to their findings, farmers who engaged in cassava commercialization earned significantly more than their counterparts. Age of the household head, off-farm income, and distance to market all had a negative significant influence on income estimation, whereas group membership had a positive significant influence on income. According to the findings, it is critical to promote policies that will increase cassava commercialization. The researchers are applauded for their model selection, but the outcome indicator variable is not recommended by the literature for such a developing country.

Besides, Romo (2016) studied the “value chain for the mango sector in Vietnam”. The overall goal was to create a picture of the relationship and mutual understanding between the actors and operational procedures of the mango fruit value chain in Vietnam. His study's strengths are that he calculates the added value, efficiency, and income distribution among actors in the mango value chain. Although the research takes a participatory approach, there is no emphasis

on including small-scale farmers. Chagomoka, Afari-Sefa, and Pitoro (2014) conducted a study on “value chain analysis of traditional vegetables from Malawi and Mozambique”. Their research identified potential outlets and target crops, as well as value chain processes such as market outlet selection and mode of farmer-buyer linkages. Their study focused on household income and concluded that traditional vegetable sales contributed approximately 30% and 35% of small-scale farmers income in Mozambique and Malawi, respectively. The researchers also concluded that the linkages between value chain actors were found to be weak; most were based on spot market transactions, with the exception of those between retailers and supermarkets, which were based on relationship marketing. The authors, however, did not use the recommended impact indicators, such as consumption expenditures for developing countries, and they did not clearly explain the factors influencing fruit and vegetable producers' participation in the value chain.

In their study on rural and peri-urban areas of Kenya, Omiti et al. (2009) confirmed that selling price, yield, and being a male-head of a household were significantly and positively related to vegetable level of participation. Distance to market and household size, on the other hand, were negatively related to the volume of vegetables sold by rural farmers. The level of market participation increased for peri-urban farmers with higher educational levels and access to formal market information sources. Non-farm income, on the other hand, is negatively and significantly related to the amount of vegetables sold. Ohen, Umeze, and Cobham (2014) conducted a study on vegetable market participation in Nigeria, finding that distance to market, market information, and quantity harvested all have an impact on a household's ability to participate in the market. Distance to the market and market information are found to be negative and have a significant impact on the household's ability to participate in the market. In contrast, the amount harvested has a significant positive impact on farmers' ability to participate in the vegetable market.

To summarize, the majority of the determinants of participation decision are also determinants of level of participation. Some investigations show that some of these factors had a significant impact on participation decision and level of participation, whereas others discovered that these factors had no impact on participation decision and level of participation. This could be attributed to the study's spatial variation and crop type.

2.8 Conceptual Framework of the Study

Developing a conceptual framework gives a better understanding of what happens in the fruits value chain. This provides a link between what happens when fruit products leave the farm and when they get also on plate. The conceptual framework in Figure 5 below views as a network of various actors that are jointly aimed toward providing products to a market, and then to final consumers. The value chain in the preceding framework (Figure 5) begins with input suppliers and ends with consumer consumption. Such that, the left side depicts various stages of the fruit value chain, while the right side depicts the various interlinks within the chain at each stage. The input supply stage is made up of input suppliers who provide inputs such as apple and mango seedlings, credit, and extension services. The production stage, on the other hand, is composed of small-scale farmers who cultivate apple and mango fruit crops. Factors influencing a household's participation in value chains were identified in the study. As a result, the framework illustrates the interrelationships and interdependence of the key variables involved. These variables include demographic, institutional, and socioeconomic variables. These factors had an impact on small-scale producers' participation in the value chain.

Furthermore, these farmers can participate in value chains in a variety of ways. They prepare the land, plant the seeds, apply fertilizer, control pests and weeds, and harvest the crop. They may also be involved in other activities such as sorting and grading, processing, and marketing. Working to improve these farmers' participation in the value chain is critical for improving household welfare, food security, and poverty reduction. Rural households' inability to market their produce, on the other hand, implies a lack of income for the purchase of production inputs and agricultural technologies to increase productivity and purchase consumer goods. As a result, they are unable to progress beyond subsistence production and become impoverished (Namulindwa, 2018).

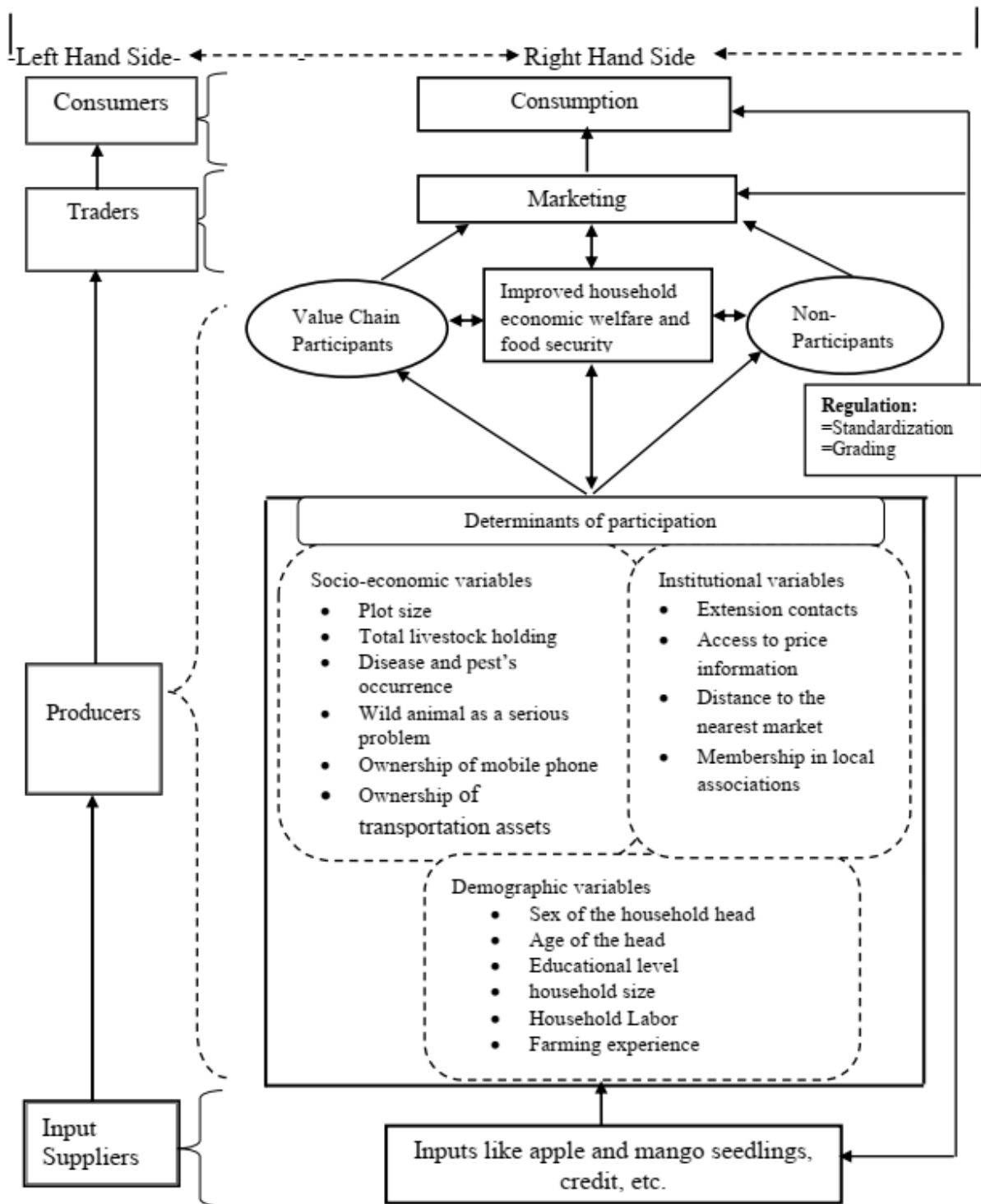


Figure 5. Conceptual Framework of the Study

Source: Own conceptualization based on empirical and theoretical reviews (2019)

The marketing stage, on the other hand, included collectors (people who collect products from farmers), wholesalers (people who buy in large quantities from farmers, store them, as well as deliver them to retailers and consumers), and retailers (they mostly buy from wholesalers and sell to urban consumers; they are also the last link between producers and consumers). Traders can be a valuable source of information about prices, quality standards, and potential markets. At the end, consumers eat, drink, and use the final products. Consumers are those who buy a product to consume it. Furthermore, value chains have various interconnections that are governed by quality assurance bodies such as government or other agencies, among others (Gereffi & Lee, 2016). In Ethiopia, governmental regulatory intermediaries (such as the Ethiopian standardization agency) would play a role in regulating the fruits value chain.

2.9 Chapter Conclusion

In this chapter, the value chain concept is explained in detail in terms of its potential application in the study context. The various theories for understanding the value chain analysis are discussed in this chapter. The chapter rigorously discusses the empirical literature, which offers insight and required context for other people's studies. Reviewed empirical evidences shows that value chain analysis and the marketed performance approach have evolved into an important tool for explaining agricultural market participants. Several scholars carried out research on the profit margins of agricultural commodities. Profits received by value chain actors varied, according to the findings. Most studies on the profitability of perishable agricultural production in the literature lack a specific focus on small-scale farmers. As a result, future research should focus on determining the profitability of perishable agricultural products like fruits from the standpoint of small-scale farmers.

Despite the fact that some studies on fruit farmers' participation decisions and levels of participation, as well as welfare and food security effects in both outside and inside Ethiopia, have been conducted by various scholars, only a few studies on these issues have been conducted. According to the related literature review, the major factors influencing participation decisions and levels of participation are situational, institutional, economic, and demographic. The review explicitly demonstrates that there is an information gap on the determinants of participation and level of participation in the fruits value chain, with a specific

focus on small-scale farmers in Ethiopia. Identifying such determinants allows policymakers to implement subsequent interventions aimed at increasing agricultural productivity. This formed the foundation for the conceptual framework as well as the study's goal.

The review also indicates that integrating smallholder farmers' participation in the agri-food value chain is important for boosting the country's economic growth. To implement this, the country should promote and invest in research. This could help to solve problems and fill a knowledge, technology, and information gap by providing innovative solutions for agricultural production and marketing. Furthermore, this could play a significant role in small-scale farmer empowerment, sustainable development, and poverty and hunger alleviation. The advancement of the fruits sector has a significant impact on the lives of small-scale farmers. It has the potential to boost national economic growth by encouraging small-scale farmers to participate more actively and increase the quality and quantity of fruit production.

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

This Chapter discusses the research methodology used to answer the questions posed in Chapter One. The Chapter covers the research area, the study's design, and the research strategy used to collect and analyze data for each of the objectives specified in Chapter One. Furthermore, the research philosophy that this study adhered to is presented in this Chapter.

3.1 Description of the Study Area

The present study was carried out in the Dibatie district from the Metekel Zone, the Fagita Lekoma and Banja districts from the Awi-Zone, and Bahir Dar Zuria district from the West Gojjam Zone, four districts in the Upper-Blue Nile Basin, Ethiopia (Figure 6). This Basin is found in the north-western highlands of Ethiopia, which is a source of about 86% of the Nile River (Swain, 1997). Its source, the Gish Abay, is on the Ethiopian plateau, and it flows north into Lake Tana. It emerges from Lake Tana's southeastern corner, carving a deep gorge south and then westwards. This basin is one of 12 Ethiopian basins (i.e., Mereb-Gash, Tekeze, Denakil, Ayisha, Awash, Ogaden, Wabi-shebele, Genale Dawa, Rift-valley, Omo-gibe, and Baro-akobo basins). The Blue Nile's headwaters emerge from the outlet of Lake Tana in the Highlands of Ethiopia, as shown in Figure 6. Many important tributaries join it, draining the Ethiopian highlands and transforming it into a river bank long until it enters the lowlands as well as crosses into Sudan. It extends approximately 850 kms between Lake Tana and the Sudan-Ethiopian boundary (Block, 2006).

In terms of study area selection, the researcher's experience of the problem under study, as well as his overall affiliation with the survey area, were critical. Apple producing districts (Banja and FagitaLekoma) are adjacent to each other while the distance between mango producing districts (Dibatie and Bahir Dar Zuria) is about 230 kms. The livelihood of the communities in these districts is mainly comprised of a rain-fed mixed subsistence crop production-livestock

farming system (Nigussie et al., 2017). Fruit crops such as apple and mango are also the most important contributors to agricultural activity and, hence, a focus for the development in the north-western highlands of Ethiopia. The basin has a high potential for fruit farming and, generally, it is considered among the important fruit growing corridors in the country (EIAR, 2013). The majority of farmers in these districts are subsistence farmers who supplement their income with non-farm and off-farm work. The majority of farmers in the Banja and Fagita Lekoma districts have shifted from growing food crops to growing *Acacia decurrens*) (Ebabu et al., 2018; Sultan et al., 2018). Table 1 summarizes the study districts' biophysical characteristics as high, mid, and low elevations as per their elevation order.

Table 1. Description of the study districts

Features (unit)	Study districts			
	Dibatie	Fagita Lekoma	Bahir Dar Zuria	Banja
Altitude (m a.s.l.)	1479-1709	1800-2900	1922-2250	1850-2925
Annual rainfall (mm)	850-1200	1951-3424	895-2037	1958-3465
Temperature (°C)	25-32	9-25	15-28	9-26
Soil type	Vertisols and Nitosols	Nitosols and Acrisols	Nitosols and Leptosols	Acrisols and Nitosols
Agro-ecological zone	Tropical hot humid	Moist subtropical	Humid subtropical	Moist subtropical
Dominant cash crops	Mango, groundnut and coffee	Apple, Potatoes, and garlic,	Khat, mango, papaya, avocado	Potatoes, apple, and garlic,
Dominant livestock	Cattle, goats, and donkeys	Cattle, horses, and sheep	Cattle, goats, sheep, and donkeys	Cattle, horses, and sheep
Dominant staple crops	Maize and millet	Barley and teff	Millet, teff, wheat, maize	Teff and barley
Population size (no.)	90, 577	161, 002	222, 304	112, 640

Source: Socio-economic profiles of respective districts (2019)

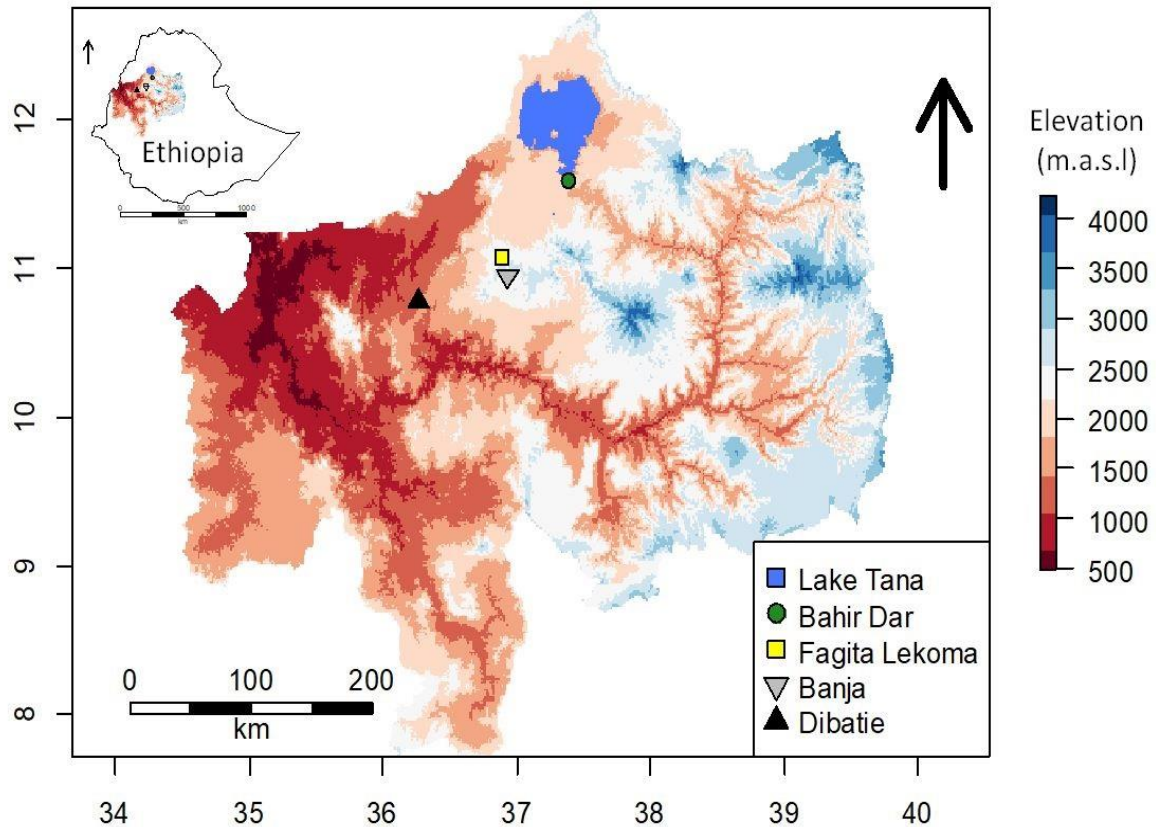


Figure 6. Location map of the study districts

3.2 Research Design and Approach

Research must be conducted within the framework of some sort of research philosophy, because it shows the way the research is conducted (Saunders, Lewis, & Thornhill, 2007). However, no one research philosophy is more superior to the other and not suitable to all situations, but it is rather a matter of which paradigm or, research philosophy is a ‘good fit’ for research objectives (Nørgaard, 2008). The dominant research philosophies found in the literature are: positivism, interpretivism and pragmatism (Creswell & Creswell, 2017; Saunders, Lewis, & Thornhill, 2009; Lawrence, 2014). While positivism is associated with quantitative research and interpretivism with qualitative research, and pragmatism is associated with mixed methods research (Creswell & Clark, 2017). This study relied on pragmatism (mixed methods research) as the research philosophy because both qualitative and quantitative data were required, and supplement each other, for a richer understanding and analysis of the

study (Ashley & Hussein, 2000; Degefa, 2006; Johnson, Onwuegbuzie, & Turner, 2007). It also helps in better triangulation and/or qualitative explanations of quantitative data and relationships (Modell, 2010). The use of this approach is very common in recent research studies.

There are various kinds of mixed-methods research designs (Creswell, 2012). This study follows an explanatory-sequential mixed method. A supporting data set can be collected in the sequential embedded mixed method pre- and post-data collection and analysis of the actual data type of a specific study (Doherty, Ramsey, Ibbotson, Carcary, & Conway, 2018). Usually, a supporting data set (e.g., qualitative data) is first used to evaluate the research background and respondents and to develop survey tools. This design maintains that one type of information is not sufficient due to the various research questions that need to be answered and that each type of study issue requires various types of data set (Creswell & Creswell, 2017).

This research paper mainly relied on quantitative data with a supporting role in qualitative data. Quantitative data were based on 'one-round cross-section surveys. Qualitative data were gathered as part of the initial investigation and tools for data collection were developed prior to the actual survey. This stage of data gathering was centered on a visit to all study kebeles (i.e., for deep-understanding the areas) with general questions. This has contributed to the development of even more critical questions needed for the actual collection of data. Following the design of the data collection tools, the instruments were piloted to determine whether the questions were easy to understand. Data obtained through a pilot questionnaire survey was used to verify entry and analysis. The final survey was conducted between November 2019 and January 2020 followed by the qualitative data collection in the ten kebeles of the study.

3.3 Sampling Procedures

The survey participants (i.e., sampling units) in this study were small-scale apple and mango fruit producers', assemblers, wholesalers, retailers, processors, and consumers.

i) Producer's sampling

For producers sampling, a three-stage sampling technique that involved both purposive and random sampling methods were applied. In the first stage, four districts (i.e., Banja and Fagita

Lekoma from the apple-producing districts; Dibatie and Bahir Dar Zuria from the mango producing districts) were purposively selected. These districts were chosen in such a way that they are capable of capturing the variations between the agro-climate zones, the socio-economic conditions, and their fruit production experiences. In the second stage, ten kebeles were randomly selected (Table 2). A list of rural households was compiled from the respective kebele agricultural offices as a sampling frame with community informants' help and then stratified them into participants and non-participants in the fruit value chain. Fruit value chain participants are defined as those who used to sell a part of her/his apple and mango output in the market during the 2019/20 production year. Non-participant households are defined as farmers who have not used to sell a part of her/his apple and mango output within the same period while they are located in the same kebele. In the third stage, Using the Mugenda and Mugenda (2003) table, the sample size was determined by considering the confidence level, degree of variability, and precision level. Consequently, n was calculated as follows:

$$n = \frac{Z^2 p(1-p)}{d^2} = \frac{(1.96)^2(0.5)(0.5)}{(0.05)^2} = 384 \quad (1)$$

where n is the required sample size when the population is greater than 10,000; Z is the normal standard deviation (1.96) corresponding to 95% confidence level; p is the predicted target population characteristic assumed by the researcher (is equal to 0.5 where the occurrence level is not known), and d^2 is the desired level precision (0.05). A sample (n) of 384 fruit-growing households was then set on. Accordingly, among the selected kebeles, 161 apple producers and 223 mango producers were proportionally allocated.

Table 2. Distribution of households and sample intensity along all study districts

Study districts	Sample kebeles	No. of kebeles (in the district)	The district's households	Total fruit producers (In the district)	Total fruit producers (In each kebele)	Samples from each kebele
Dibatie	Gallessa	35	13806	6290	820	39
	Dibatie 01				505	24
	Dibatie 02				420	20
Banja	Basanguna	25	16233	7678	188	15

	Bata				263	21
	Chewusa				665	53
Bahir Dar	Wonjeta	36	31304	8689	928	80
Zuria	Laguna				696	60
Fagita	Gafera	23	17556	3137	316	26
Lekoma	Endewuha				560	46
Total			78889	25794	5361	384

Source: Own design based on information from district agricultural offices (2019/20)

ii) Traders, processors, and consumers sampling

First, it is noticed that researchers do not agree on sample size and procedure that should be used in each segment of the marketing chain (Mendoza, 1995). The decisions involved will partly a function of information currently known, time and resources available, accessibility to and openness of the marketing participants as well as the estimated size of the trading population. For this study, the sites for the trader surveys were market towns in which a good sample of fruit traders existed. Accordingly, based on the flow of apple and mango fruits, three markets (*Chagini & Dibatie, Enjibara, and Bahir Dar*) were selected as the main fruit marketing sites for the study areas. Here sampling is a very difficult task due to the absence of a recorded list of the population of traders and the opportunistic behavior of the traders. Therefore, a snowball sampling (Magigi, 2015) method was used to interview the available number of collectors, wholesalers, and retailers, and processors from specified markets. The consumers' survey was taken from the customers of major retail shops, and wholesalers (of ETFRUIT shops) from specified towns by distributing questionnaires at the time of purchase. Table 3 summarizes the number of fruit value chain actor interviewed per study market towns.

Table 3. Number of fruit value chain traders interviewed per market town

Actors	Market towns			Total
	Chagini and Dibatie	Enjibara	Bahir Dar	
Rural collectors	4	3	6	13
Retailers	6	8	10	24
Juice processors (mango)	2	3	5	10
Wholesalers (mango)	1	3	7	11
Consumers	12	12	12	36
Total	25	29	40	94

Source: Own construction (2019/20)

3.4 Sources and Methods of Data Collection

In this study, both quantitative and qualitative data were collected through face-to-face interviews from primary sources. Primary data were collected from different sources through a combination of various instruments such as structured interview guides (for quantitative data), focused group discussion guides (FGDs), key informant interview guides (KIIs), and direct observation (for qualitative data). As support for primary data, secondary data were gathered from different official data sources. This helped the researcher to cross-check the problem that occurred during primary data collection. Secondary data sources were the District Bureaus of Agriculture, District Trade and Market Development Office, Central Statistical Agency (CSA), published reports, bulletins, and journals. Study participants (i.e., household heads) in four districts were interviewed using a structured survey questionnaire. Due to the lack of panel data on the fruit subsector in Ethiopia, this study used a cross-sectional research design that is best for exploring a phenomenon, problem, attitude or issue (Kumar, 2018), but may not fully account for endogeneity biases. However, researchers have made efforts, such as quality data collection and close supervision, to minimize endogeneity problem. The following paragraphs briefly discussing the data collection tools employed in this study.

I) Structured Interview Schedule

Structured interview was the main instrument used to obtain the primary quantitative data. The interview schedule prepared for producers contains six parts. The first part dealt with

respondents' household and farm characteristics. The second part was meant to generate asset ownership information including livestock possession, and household income during 2019/20 cropping year. The third part of the instrument was used to collect information about apple and mango production from both participant and non-participant households. The fourth part was agricultural extension services and the fifth part was designed to collect marketing aspects. The fifth part of the instrument was administered to collect constraints/ opportunities of apple production and marketing. The sixth section of the tool was issues related to household expenditure. Further, the instrument prepared for traders contains respondent's socio-demographics, their purchase and selling practices.

The instrument was translated into Amharic, the local language, and then pre-tested on a random sample of 35 non-sample households prior to the actual survey. This was done to evaluate the appropriateness of the design, clarity, and interpretation of the questions, the relevance of the questions and to estimate the time required for an interview. Subsequently, appropriate modifications and corrections were made on the interview schedule. Data were gathered under the continuous supervision of the researcher. For the sake of conducting a household survey, 26 enumerators were assigned in the data collection process. Those enumerators were oriented and trained by the researcher before handling the survey to make them informed about the purpose of the study as well as to familiarize them with the questionnaire.

II) Focus Group Discussion (FGD)

In addition to household surveys, focus group discussion was used as one of the main sources of primary qualitative data. Because we are using a mixed method research approach, it is also important to mention the sample size and methods used to pick focused group discussants. However, there is no adjusted sample size formula in qualitative studies; rather, it is based on how adequate the investigator assumed the data was to obtain the necessary information. Only one FGD was held here as a result of the COVID-19 pandemic. The FGD participants came from the four districts. This was done in the run-up to the COVID-19 pandemic. The leading questions in the checklist were prepared by giving high emphasis on specific issues like major value chain actors, major activities carried out in the value chain by each actor, factors that

affect producer's decision to participate in apple and mango market, what type of relationship exist between actors, and upgrading possibilities.

III) Key Informant Interview (KII)

A key informant interview is particularly important in obtaining information relevant to policy and institutional aspects. Valuable information on the views of experts from the Zonal and District Agriculture and Rural Development Offices, experts from the Trade and Industry Offices, development officers from the respective sample of kebeles was collected through key informant interview guides. Key informant interviews were also used to obtain information relevant to a specific topic (local leaders, elders, etc, who are knowledgeable about the issue and communicative). In this research, 24 Key Informant Discussants were used to collect valuable qualitative data.

IV) Field observation

Based on non-participatory observations, the research was using this approach to analyse more detailed information that could promote data gathered through some other methods. Observation with different actors in the value chain was also arranged. According to Kothari (2004) we all observe things around us, but this sort of observation is not scientific unless we will keep certain issues in mind like (1) what should be observed; (2) how best the accuracy of the observation can be ensured; and (3) how the observation is to be recorded. Besides, under this method, the researcher himself was seek information on his direct observation without asking from the respondent. The information obtained were related to what is currently happening. The rationale for using this method is that subjective bias was also eliminated as long as the observation is accurate.

V) Secondary data sources

Secondary data sources for this study included journal articles, photographs, books, NGO reports, workshop proceedings and other records from relevant stakeholders. Various secondary sources were used primarily to validate and supplement the information collected from the primary sources of data and to recognize the macro (local and international) and micro (local) situations connected to the purpose of this research.

3.5 Methods of Data Analysis

Both qualitative and quantitative analysis techniques were used in this study. As a result, the details are mentioned in the following sub-sections. This study used descriptive and inferential statistics, and an econometric model to analyze data. Descriptive statistics, such as percentage, frequency, mean, and standard deviation were used to present summary statistics of quantitative data pertaining to socio-demographic, economic, and institutional characteristics of sample households. Inferential statistics, such as t-test and Chi-Square (χ^2) test, were used to assess the existence of statistically significant differences in observations between fruits value chain participant and non-participant groups of respondents. For the econometric analysis, the double-hurdle model was attempted to investigate the determinants of small-scale farmers' participation decision and intensity of participation in the fruits (apple and mango) value chain. On the other hand, the endogenous switching regression and the propensity score matching procedures were used to examine the welfare and food security effects of farmers' participation in the fruits value chain, respectively. The analysis was implemented on STATA 14.0 platform.

Qualitative data analysis was primarily used to comprehend actors and their respective functions, support services aligned along the value chain, marketing situation, socio-economic characteristics of apple and mango actors, production systems, mango distribution pattern, value additions, market outlets available in the area, and so on. The analysis was based on 'tape-based analyses,' in which the investigator made a brief transcript after repeated listening into tape recordings of individual interviews and focus groups. This type of analysis helped the investigator to concentrate on the survey questions and decode the sections that help the researcher understand better the topic at hand (Onwuegbuzie, Dickinson, Leech, & Zoran, 2009). The researcher also used notes taken during focus group discussions. Following data summarization and grouping in accordance with research questions, analysis was performed by triangulating various sources of qualitative data. In this study, 'mapping' and 'characterization' of actors were applied to describe and characterize the value chain map, the actors and the processes, and product flows along the chain.

CHAPTER FOUR

DESCRIPTIVE RESULTS AND DISCUSSIONS

4.0 Introduction

This Chapter presents and discusses the results of the descriptive analyses performed to address the study's objectives. It begins with a description of the demographic characteristics of the survey participants. It is primarily based on information gathered from a survey of 384 farm households. It also serves as the foundation for the analyses in the dissertation's subsequent sections. The second section offers a glimpse into the study participants' farming systems, asset endowments, and livelihood activities. The third section of this Chapter discusses the findings related to extension services and farmer organizations. The fourth section discusses marketing, access, and participation. Finally, Chapter summary has been made in the last section.

4.1 Demographic Characteristics of Study Participants

The demographic profile of household heads is thought to be relevant in providing insight as well as a hunch about general characteristics of a specific area under study. This subsection investigates the important demographic data from the sample households in order to gain an overview of the images of the research site in relation to their participation status. Age is one of the demographic characteristics that can be used to describe households and provide insight into the sample's age structure and population. The age of the household's head decides that whether household can benefit from the experience of the elderly or must base its decision on the willingness of younger farmers to take risks. In this study, non-participants were slightly older than participant households in both apple and mango households in terms of participation categories. This result is consistent with Regasa et al. (2019), who revealed that young households participated in vegetable selling more than old farm households. However, it contradicts Woldesenbet's (2013) finding that farmers involved in the vegetable value chain are older than non-participants. An independent-sample t-test shows that mean differences for apple households are statistically significant, but not for mango households. (Regasa et al.,

2019) found a positive and significant relationship between household vegetable market participation and the age of the household heads.

In terms of household head gender, 78.9 percent of apple households are headed by men, while 21.1 percent are headed by women. In the case of mango households, 81.1 percent are headed by men, while 18.9 percent are headed by women. This low percentage of women is well acknowledged by Emana and Gebremedhin (2007), who reported less opportunity for females in Eastern Ethiopia, where only two female households out of a total of 141 respondents participated. Furthermore, the Pearson chi-square test revealed that participation in the mango value chain and gender are statistically significant, indicating that male households who participate in the mango value chain outnumber those who do not. This is because women in Sub-Saharan Africa face a marketing disadvantage as a result of unequal resource allocation and cultural barriers (Nyakudya et al., 2006). This finding is consistent with the results of Tafesse, Megerssa, and Gebeyehu (2020), who revealed that household head gender differs significantly between agricultural output market participants and non-participants. Furthermore, the results show that nearly equal proportions of male-headed households were in the apple farmer participant and non-participant categories (Table 4).

Table 4. Description summary statistics of the study participants

Variable	Apple producers (N = 161)				Mango producers (N = 223)			
	Participants (78)	Non- participants (83)	<i>t</i> -test test	(χ^2)	Participants (133)	Non- participants (90)	<i>t</i> -test test	(χ^2)
<i>Outcome variable</i>								
Consumption expenditure (‘000 ETB)	21.727	17.639	-4.088***		27.947	22.924	-5.023***	
Household food intake (kcal)	2868.32	2079.79	-788.5*		4096.31	2870.42	-1225.8*	
<i>Explanatory variables</i>								
Gender of the household head; Male (1 = male; 0 = female)	39.80	39.10	0.91		52.00	29.10	7.89***	
Average age of the head (years)	48.80	50.50	-4.49***		46.00	47.00	-0.89	
Average household size (number)	5.70	5.90	0.66		5.20	5.68	-1.78*	
Average educational level of the head (years of schooling)	4.46	1.25	3.21***		4.18	0.70	-3.48***	

Average working labor (Man equivalent)	4.70	3.27	-1.43**	3.70	3.60	-0.07
Fruit farming experience (years)	9.10	7.10	-4.67***	13.00	6.30	-6.89***
Apple/ mango plot size (ha)	0.11	0.06	-4.69***	0.26	0.14	-5.52***
Perceived wild animals as a serious problem; Yes (1 = yes; 0 = no)	13.70	23.60	5.31***	7.60	34.50	116.58**
Incidence of disease and insect pests; Yes (1 = yes; 0 = no)	9.90	24.20	12.53***	12.60	28.30	53.24***
Average production (quintals)	2.47	0.84	1.59***	39.11	5.03	-34.08***
Per capita income (ETB)	36858.17	30221.20	-6636.97	59837.48	42416.09	-17421.39*
Average income from off-farm activities (ETB)	5951.92	4323.07	-1628.85	6416.70	5674.42	-742.28
Average livestock size (TLU)	4.90	5.98	3.04**	6.20	5.70	-0.72
Average frequency of extension contacts per year (no. of days)	10.90	3.70	-6.64***	6.00	2.50	-4.06***
Membership in local cooperatives Yes (1 = yes; 0 = no)	45.30	26.70	34.86***	44.80	17.00	24.73***
Average distance to the nearest market (minutes of walking)	37.60	41.50	3.99*	33.10	46.20	13.14***
Access to price information; Yes (1 = yes; 0 = no)	36.00	16.10	29.84***	42.20	7.20	60.09***
Ownership of transportation asset Yes (1 = yes; 0 = no)	24.80	9.90	18.16***	46.20	6.70	79.58***
Ownership of mobile phone Yes (1 = yes; 0 = no)	38.50	25.50	20.14***	44.80	14.30	34.90***

***, ** and * represents 1%, 5% and 10% level of significance, respectively.

ETB (Ethiopian Birr) is the Ethiopian currency, and 1 \$US was approximately 29.00 ETB during the survey period. Source: Own field survey data (2019/20)

Furthermore, the results show that there was a significant variation in the education level of respondents. For both apple and mango, on average, participants had approximately three years more education than non-participants. This is a statistically significant and theoretically sound result. This implies that literate household heads have better sympathies and better access to price information (Makhura et al., 2001). This is also consistent with previous research by Astewel (2010) and Tadesse (2011), who explored that educating paddy and avocado producers increases the amount of paddy and avocado supplied to the market, respectively. In their study

of small-holder farmers' participation in markets in Tanzania and Ethiopia, Asfaw, Amare, Lipper, and Davis (2011) revealed that education level, measured in years of schooling, had a positive relationship with marketed surplus.

In this study, non-participants had more household members than participants for both apple and mango. This could be because the number of consumers in non-participants was higher than in market participants. This finding is consistent with the findings of Regasa et al. (2019), who revealed that vegetable market participants had smaller families than non-participants. The number of total family members in a household is referred to as the household size. A larger household size also meant that more food was required to feed the members of the household (Goetz, 1992). According to Lapar, Holloway, and Ehui (2003), the propensity to participate in the market economy decreases with increasing household size. Asfaw, Shiferaw, Simtowe, and Lipper (2012) also found that household size negatively affects market participation, as larger families consumed much of farm output. Household size reflects access to family labor supply for production, but it also increases domestic consumption requirements, lowering market participation (Makhura et al., 2001). As a result, when labor supply is controlled for, larger households are associated with decreasing market participation. Whereas, by controlling the dependency ratio, larger families are required to contribute to the supply of labor during mango harvesting and transportation, thereby increasing market participation.

According to the findings, mean labor in man equivalent was significantly higher for apple value chain participants than for non-participants. Nevertheless, there is no statistical difference between mango growers who participate and those who do not. The first result highlighted that there is a strong association between small-scale farmers' participation decisions and active labour availability. This finding is significant because labor is essential in the production and marketing of cash crops such as apples. The result is in line with previous study by Amare, Mariara, Oostendorp, and Pradhan (2019), who found that that avocado sellers have a larger labour force than non-sellers. Mengesha et al. (2019) observed, on the contrary, that labor force was negatively related with mango marketed supply. Martey, Al-Hassan, and Kuwornu (2012) revealed that local farmers in Ghana had large family sizes for agriculture purpose, which inspired them to participate in the cassava market. Due to the labor-intensive nature of agricultural activities in developing countries, households with a larger workforce can cultivate

wider areas of land and begin producing more food surplus for market (Amaza, Bila, & Iheanacho, 2006; Asefa, 2011).

The analysis of field data shows that the difference in fruit farming experience between the treatment and control groups was highly significant in both apple and mango. Non-participants have less experience than participating households on average. This suggests that experienced participants were more involved in the apple and mango value chains than less experienced households. This is consistent with the findings of Woldesenbet (2013) and Mahlet, Bezabih, Mengistu, Jeffreyson, and Jemal (2015), who showed that farmer experience has a positive relationship with the volume of tomatoes and potatoes delivered to the market. The result is theoretically acceptable because more experienced producers may have better production and marketing links and information.

4.2 Farming Systems, Asset Endowments and Livelihood Activities

Access to assets (such as land, livestock, transportation, and communication assets), according to Asfaw et al. (2012) improves small and marginal farmers market participation. The sample respondents' landholding ranges from 0.25ha to 4ha, with an average of 1.20ha per household in apple districts and from 0.13ha to 12ha, with an average of 2.32 ha per household in mango districts. In terms of fruit land allocation, an average of 0.09ha was allocated to apple cultivation and an average of 0.21ha was allocated to mango cultivation. In this study, statistically, the plot size of participants in the apple and mango value chains was significantly larger than that of non-participants in the respective crop. This result strongly supports the literature (Tesfay, 2008) that landholding size has important implications for the production of market-oriented crops like apple and mango. In addition, Gebremedhin, Jaleta, and Hoekstra (2009) showed that cultivable land size to be important factor in persuading farmers to supply their produce to the market.

Non-participants in the apple value chain outperformed participant households in terms of livestock assets measured in Tropical Livestock Unit (TLU). Mango value chain participants, on the other hand, had more livestock than non-participants. TLUs are livestock numbers that have been converted to a standardized unit. Conversion factors can be found in Storck,

Adenew, Emanu, Begander, and Hailu (1997). In rural Ethiopia, livestock is a good indicator of wealth and the availability of cash income. Livestock ownership is a proxy for wealth, providing diversification benefits and rising household labour productivity (Kalinda, Filson, & Shute, 2000). Heierli and Gass (2001) claimed that livestock assets motivate rural communities by increasing income and making a family less vulnerable to crises that have a negative impact on household market participation. This means that due to a lack of assets, farmers may be excluded from new and lucrative market opportunities. Assets improve small-scale farmers' ability to access and take advantage on market opportunities (Asfaw et al., 2012).

Rahut, Velásquez Castellanos, and Sahoo (2010) revealed that farmers with greater livestock endowments offered for sale more crop produce. They explained that it was because the households used manures from the livestock to enhance crop yields. In addition, it is the source of traction power and used as a means of transpiration. On the contrary, Jaleta et al. (2009) stated that a household's ownership of livestock has a negative impact on its involvement in the crop market as it diverts the farmer's attention away from the crop market. When households own a great number of livestock, this might imply a specialization in livestock farming, and participation in fruit production may be less likely (Meshesha & Fufa, 2006).

This study also indicated that diseases and insect pests were more prevalent in non-participant apple and mango farms than in participant farms. Similarly, wild animals as a serious problem (e.g., baboons, apes, and birds) were more prevalent in non-participant farms than in participant farms. These variables had a negative relationship with apple and mango value chain participation. According to Gebru, Leung, Rammelt, Zoomers, and Westen (2019), perceived production risks such as disease and wild animals deterred households from participating in the vegetables and fruits business. According to Dessalegn, Assefa, Derso, and Tefera (2014), powdery mildew and anthracnose are the two most common fungal diseases of mango trees in the Bahir Dar Zuria district (one of my study area). Similarly, the main insect pests hindering orchard production are aphid, scale borer, and caterpillar. Diseases like twig blight, powdery mildew, and apple scab have significantly reduced apple production (Atreya & Kafle, 2016).

In terms of apple and mango production (quintals), participants in the mango value chain produced more than non-participants. Likewise, participants in the apple value chain produced

more than non-participants. The result is consistent with the findings of Tadesse (2011) and Worako (2015), who indicated that improving the amount of production increases market participation. According to the findings of studies conducted in Vietnam, Tanzania, and Guatemala, households with higher productivity are more likely to participate in agricultural markets, regardless of market access determinants (Rios, Masters, & Shively, 2008). In terms of household per capita income, the study found that respondents who participated in the apple and mango value chains received more annual income than non-participants.

Furthermore, the study results show that participants in the apple and mango value chains owned more transportation assets (carts and equines) and communication assets (mobile phones) than non-participants. The chi-square test for both variables reveals a significant difference in apple and mango value chain participation between the two groups. This meant that households with transportation and communication assets were more likely to participate in the apple and mango value chain than households without these assets. Similar findings were reported by Gebremedhin and Jaleta (2010), as well as Mmbando, Wale, and Baiyegunhi (2015a). Ownership of transportation assets increases opportunities for marketing alternatives and encourages participation in the value chain. Similarly, owning a mobile phone as an important piece of information communication equipment allows growers to stay up to date on production and marketing activities. According to this study, approximately 34.8 percent and 52.9 percent of apple and mango households have their own transportation, respectively. About 42.2 percent and 59.1 percent of apple and mango households, respectively, own a mobile phone.

4.3 Extension Services and Farmer Organizations

Personal social networks that promote market participation, such as extension groups, farmer organizations and/or cooperatives, are examples of household social capital (Sharp & Smith, 2003). In this study, the most likely institutions hypothesized to influence farmers' participation in the apple and mango value chain include the frequency of extension contacts and membership in local cooperatives. Participants in the apple value chain had a higher average number of extension contacts per year (10.90 days/year) than non-participants (3.70 days/year).

Similarly, participants in the mango value chain had a larger number of extension contacts (6.00 days/year) than non-participants (2.50 days/year).

Active involvement in agricultural schemes such as farmers' groups, cooperative groups, and contact with extension systems all have an effect on small and marginal farmers participation in crop markets (Masuku, Makhura, & Rwelarmira, 2001). Membership in a local cooperative was statistically significant in both groups. According to the findings, the proportion of respondents who belong to local associations and cooperatives is significantly higher among apple and mango value chain participants than among non-participants. This finding supports the literature (e.g., Mojo, Fischer, & Degefa, 2017; Wossen et al., 2017) that cooperative membership has significant implications for growers in terms of exposure to information and awareness of better agronomic practices.

4.4 Marketing, Access and Participation

Marketing is critical to achieving food security and alleviating poverty, particularly among small and marginal farmers in developing countries (Poole, 2017). Several rural producers frequently face significant challenges in gaining market access to sell their products. Among the major constraints are the producers' remote location and limited access to price information. According to this study, the average distance between apple farmers' homes and the nearest market is greater (39.55 minutes of walking) than the distance between mango farmers' homes and the nearest market (36.65 minutes of walking on foot). Participants in the value chain are generally closer to the market than non-participants. Sigei et al. (2014) realized that a greater distance to the market increases transportation and marketing costs, limiting market participation.

This study's findings also show that, on average, 46.15 and 31.73 percent of apple and mango value chain participants had access to price information, compared to 19.39 and 8.00 percent of non-participants. Djalalou et al. (2012) discovered that having up-to-date market/price information could enhance pineapple farmers' participation along the value chain. In terms of access to price information, the results show that there was a statistically significant difference between the two groups. Furthermore, nearly equal proportions of participant households have

access to price information on apple mango produce. According to the Sigei et al. (2014) results, 55 percent of market participants had price information, while 45 percent did not. Price information is critical in informing farmers about pricing conditions (Djalalou et al., 2012; Shepherd, 1997).

4.5 Chapter Summary

This Chapter briefly discussed the socio-demographic profile of household heads, farming systems, asset endowments and livelihood activities, extension services and farmer organizations, marketing, access and participation that are relevant in giving insight as well as a hunch about general characteristics of a specific area under study. This Chapter has therefore tried to look into the description of factors which determine participation of farmers in the fruit value chain. Descriptive survey results show that from the total sample of 384 households, 211 of which are fruit value chain participants and the rest are non-participants. The descriptive survey results show that non-participants were slightly older than participant households in both apple and mango households in terms of participation categories. Regarding to household head gender, 78.9% of apple households are headed by men, while 21.1 percent are headed by women. In the case of mango households, 81.1 percent are headed by men, while 18.9 percent are headed by women. For both apple and mango, participants had approximately three years more education than non-participants. Regarding household size, non-participants had more household members than participants for both apple and mango.

The analysis highlighted that, mean labour in man equivalent was significantly greater for apple value chain participants than non-participants. However, there is no statistically significant difference between participant and non-participant mango growers. The analysis of field data further underscores that fruit farming experience between the treatment and control groups was highly significant at a significance for both apple and mango. In this study, statistically, the plot size of both apple and mango value chain participants were significantly larger than that of non-participants in respective the crop. Non-participants in the apple value chain fared better than participant households when it came to livestock assets. Mango value chain participants, on the other hand, had more livestock than non-participants. The results also revealed that diseases and insect pests were higher in non-participants' apple and mango farms than those of

participants. Similarly, perceived wild animals as a serious problem were higher in non-participant farms than those of participants. Participants in the mango value chain produced more than non-participants on average. Similarly, participants in the apple value chain produced more than non-participants. According to the study, respondents who participated in the apple and mango value chains earned more annual income than those who did not. Furthermore, the findings revealed that apple and mango value chain participants owned more communication and transportation assets than non-participants. Institutional variables such as farmer cooperatives and extension services have a significant relationship on farmers' willingness to participate in the apple and mango value chain.

CHAPTER FIVE

CHARACTERIZATION AND THE DISTRIBUTION OF BENEFITS AMONG ACTORS IN THE APPLE AND MANGO VALUE CHAINS

5.0 Introduction

This Chapter characterizes actors involved in the apple and mango value chain and examine the distribution of benefits among actors along the value chains. The Chapter starts by reviewing problems associated with fruits value chain. An exact understanding of these problems is important in explaining apple and mango value chains in the study areas. The second section is devoted to explain data analysis approaches such as value chain analysis market performance analysis. The third section presents the study's findings and discussions, such as the distribution of respondents based on their production and marketing activities; the agronomic and value-addition systems adopted; distribution of respondents based on their fertilizer application; quantity measurement tools used during selling; apple and mango value chain actors (actor-mapping), and market performance analysis results. This is followed by explaining on the constraints, initiatives and possibilities of the value chain of apple and mango, and finally the Chapter Summary is set on.

5.1 Fruit Value Chain and Problems

Globally, the share of high-value agri-food products such as fruits and vegetables are rapidly increasing in consumers' diets. Most of these products do not come directly from production to end-users, but are marketed by inbound marketing systems (Barrett et al., 2019; Nájera, 2017). Likewise, one of the most likely pathways towards improving rural households' livelihoods and food security is integrating them into lucrative agricultural markets (Orr, Donovan, & Stoian, 2018). This again demands system thinking to overcome barriers that limit smallholders' participation in international and local lucrative markets (Lundy et al., 2012; Tschirley et al., 2015). Of particular interest are agricultural value chains that link producers with traders and consumers of agricultural products (Lie, 2017). In agriculture, the value chain

is simply described as a market-oriented approach that encompasses the entire range of activities that are undertaken to bring a product to end-users passing through the various stages of production, processing, distribution, and marketing (Devaux et al., 2018). A value chain analysis is required to gain understanding that can be used to upgrade value chain activities (Poole, 2017). Several scholars have noted that more attention is needed to upgrade agricultural value chains in order to increase the quality-based competitiveness of domestic agriculture products, thereby enhancing food security and reduction of poverty (FAO, 2014).

Particularly, in Sub-Saharan Africa, farmers lack sufficient information about the market (Barrett et al., 2020; Quisumbing et al., 2015). They may not, for instance, recognize how much their farm produce is worth. They may not understand who the other market participants are (Bokelmann & Adamseged, 2016). To these realities, Ethiopia is no exception. In Ethiopia, value chain analysis was mostly done for commodity exports like coffee, hides and skin, dairy, and sesame. As a result, value chain analysis for commodities like fruits is critical for meeting demand by increasing competitiveness and efficiency. Specifically, undertaking value chain analysis for fruit products, such as apple and mango, offers a complete insight into the chain to identify who the actors are, what their roles are; how the actors and roles are interconnected, where there are inefficiencies in the chain and the current opportunities that could be used to enhance the profit.

However, in various parts of Ethiopia, some empirical research on the agri-food value chain is carried out; still, it was limited in a number of ways. First, these studies concentrate on Southern and Central Ethiopia in particular (e.g., Gebre, Rik, & Kijne, 2020; Getahun et al., 2018; Honja, 2014a; Mengesha et al., 2019; Tarekegn et al., 2020), and therefore the contextual relevance (e.g., infrastructural and institutional) to North-Western Ethiopia may be limited. This means that no prior research focused on a value chain approach has investigated the Upper Blue Nile Basin. Secondly, most of the country's studies concentrate on cereal crop value chains, such as *Teff* (e.g., Bachewe et al., 2019; Minten, Tamru, Engida, & Kuma, 2013; Minten et al., 2016), wheat (e.g., Amentae, Hamo, Gebresenbet, & Ljungberg, 2017; Anteneh & Asrat, 2020), sorghum (e.g., Deribe & Kassa, 2020), sesame (e.g., Gebremedhn, Tessema, Gebre, Mawcha, & Assefa, 2019; Kedir, 2017). In particular, the perishable nature of fruits and unpredictable seasonal prices poses a specific marketing challenge for producers (due to the long-chain of

many market intermediaries) that significantly affect their farm income. For example, seasonally, market price varies according to the quality and quantity of the fruit products on the markets. Even during one day, prices often fluctuate, especially in the retail and wholesale markets. The low availability of storage is also why traders want to sell all of their items by the end of one day even if they only get a cheap price.

Overall, yet key stakeholders in Ethiopia's fruit value chains have not been clearly identified and characterized. Few studies in Ethiopia were undertaken to investigate fruit crop value chains that include all chain actors. As a result, the fruit value chain is under-researched and needs to be better understood. Thus, using data from fruit value chain participants, this study investigates the fruit value chain and market performance in the Upper Blue Nile Basin, Ethiopia, focusing on apple and mango crops. Specifically, the paper characterizes actors participating in the value chain of apples and mangoes and quantifies marketing costs and margins.

The Upper-Blue Nile Basin, is agro-ecologically suitable and known for its production potential of different types of fruits. In the basin context, fruit crops gradually transform from subsistence to cash crops (such as mango and apple) for smallholder growers (Nigussie et al., 2017). In the midland and lowland areas of the Upper-Blue Nile Basin, mango-an evergreen fruit crop is the leading fruit produced by smallholder farmers. Apple production has been expanded in the Upper-Blue Nile Basin, especially in several Awi-Zone highland areas, where it is serving as the main cash crop for smallholders in supplementing their livelihoods (Fetena & Lemma, 2014).

5.2 Data Analysis Approaches

5.2.1 Value chain analysis

As mentioned before, value chain analysis is a technique which systematically maps the stakeholders involved in a particular product's production, distribution, marketing and sales (Norton, 2014). The first step in the study of a value chain is the so-called mapping (Ponte et al., 2014). Making a value chain map is a way of making it easier to grasp what is seen and encountered: "A picture is worth a thousand words" (M4P, 2008). As commodities (e.g., fruit)

pass sequentially through the different levels, transactions occur among key players in the chain. Information and money are transferred, and value is gradually added (Kaplinsky & Morris, 2000). For this study, the following four phases of value chain analysis were implemented. The basic idea is to identify the traced flows of commodities within the process, such as the supply of inputs, production, processing and marketing operations, initially ‘map’ and ‘characterization’ of actors. Thus, a descriptive analysis was applied to describe and characterize the value chain map, the actors and the processes, and product flows along the chain. The second step is to define the upgrades within the chain required. A final step is to accentuate the role of governance.

5.2.2 Market performance analysis

Next to mapping the chain, another useful component in the value chain studies is the market performance analysis (Webber & Labaste, 2009), which is one of the standard methods used to study how a given value chain performance looks like (Mensi & Zouari, 2010). The procedure enables allocating benefits that focus on who gains and who loses in the value chains in terms of margins and profits within the chain to be evaluated and described (Mendoza, 1995) Market performance can be measured by evaluating marketing margins across various networks/ marketing channels. In its simplified meaning, a marketing margin can be described as the difference between the prices paid for a commodity by retail consumers and the prices received by producers when they sell their product to buyers. All along the market chain, margins can be measured and each margin represents the value added at that market chain level (Mendoza, 1995). On the other hand, a market is one of a number of different systems, organizations, processes, social ties, and infrastructural facilities through which trade in people and commodities/services are traded (John, 2002). The estimation of the total marketing margin was performed employing the formula given below (Mendoza, 1995).

$$Total\ Gross\ Marketing\ Margin = \left(\frac{Consumer\ price - Producer\ price}{Consumer\ price} \right) 100 \quad (2)$$

The proportion of the price paid by the end-user/consumer which belongs to the farmer is the share of the producer in the consumer price or the gross margin of the producers.

$$\text{Producers Gross Margin (GMM}_p) = \left(\frac{\text{Consumer Price} - \text{Total Gross Marketing Margin}}{\text{Consumer Price}} \right) 100 \quad (3)$$

$$(NMM) = \left(\frac{\text{Total Gross Marketing Margin} - \text{Marketing cost}}{\text{Consumer Price}} \right) 100 \quad (4)$$

The formula shows how a greater marketing margin (NMM or profit) reduces the share of the producer and vice versa. It also offers an indicator of the distribution of benefits among the agents of production and marketing.

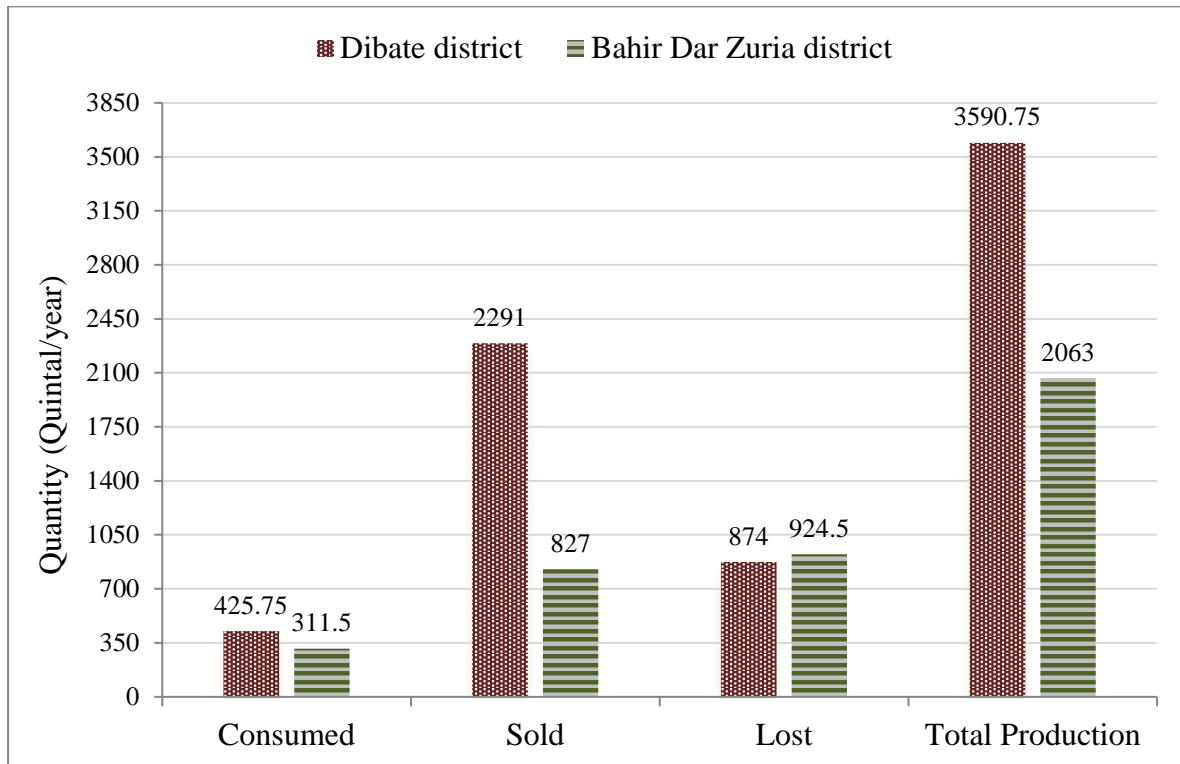
5.3 Results and Discussion

5.3.1 Distribution of respondents based on their production and marketing activities

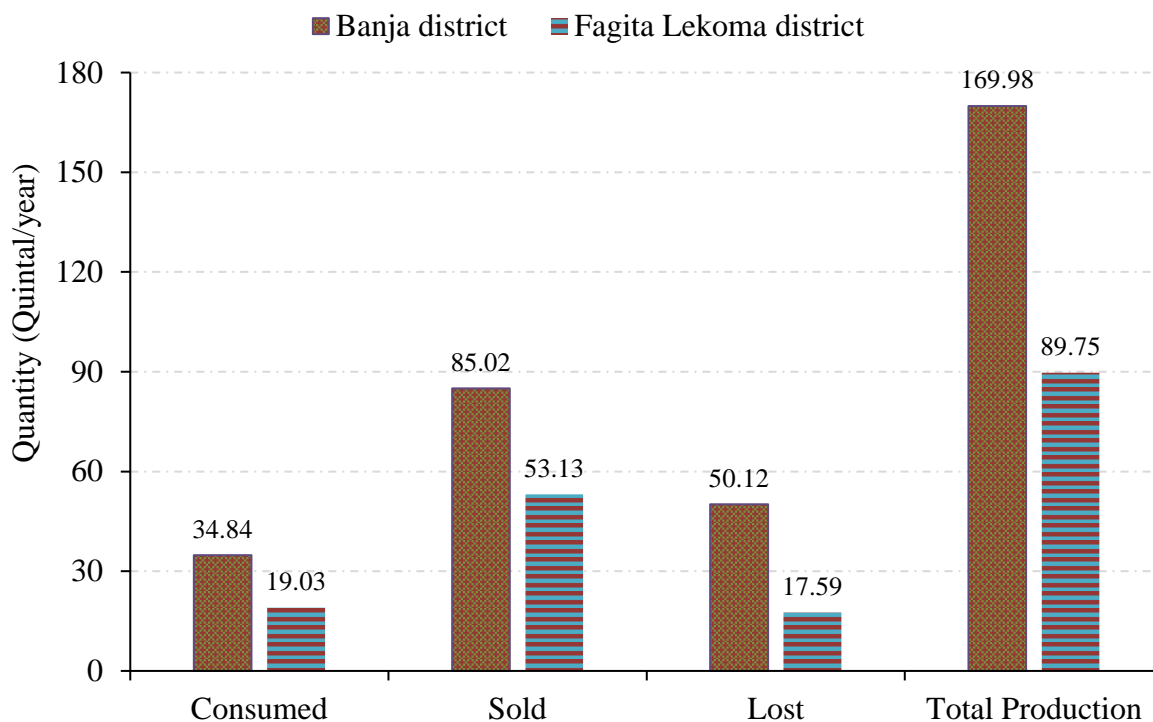
The diverse agro-climatic conditions can make growing fruit crops such as apple and mango very profitable and competitive, as well as provide opportunities in the current study. Unfortunately, due to low prices they earn for their fruit in markets, as well as the cost of post-harvest losses, apple and mango small-scale farmers have not taken advantage of these opportunities. For instance, post-harvest wastage is preventing farmers from receiving anticipated revenue, implying that approximately 31.8 percent of total mango produce was lost. Most of us are unaware that such a large amount of food is wasted in value chain activities (i.e., from harvesting to consumption). According to empirical findings, post-harvest losses in fruit and vegetables are approximated to be 20-40% in underdeveloped nations and 5-20% in developed nations (Mashav, 2010). Wind, microorganisms, birds, severely injuring, and maturity stage are the primary causes of mango produce losses in Ethiopia (Hussen & Yimer, 2013).

Figure 7 depicts the descriptive result, which shows that there are quite a substantial number of apple and mango small farmers in the study districts, with varying levels of production and marketing intensity. A significant proportion of mango is brought to market in both mango districts (Bahir Dar Zuria and Dibatie) (Figure 7a). This supports the belief that products like mango are cash crops or are grown primarily for the market. This dissertation paper also demonstrates that the proportion of total mango production in Dibatie district was greater than in Bahir Dar Zuria. It is important to note that the size of wasted mango produce should not be

overlooked. According to the study, approximately 13% of the produce was consumed at home. There was a significant amount of fruit loss due to diseases, birds, physical injury, insects as well as due to poor road transport and loading. This observation is consistent with the findings of Fetena and Lemma (2014), who identified on the challenge of disease and associated losses, as well as the study results of Honja (2014a), which conducted a review of the mango value chain in Ethiopia.



(a) Mango producers



(b) Apple producers

Figure 7. Households based on their consumption, total production, post-harvest loss and marketing practices.

Source: Own survey data (2019/20)

Furthermore, there are growers with significant amounts of production levels in apple-growing districts. The total production in the *Banja* district is more than that of the *Fagita Lekoma* district. This could be attributed to the proper application of prevalent farming techniques such as thinning and pruning, manure, fencing, composting, pest control, and others. Post-harvest wastage is also hampering apple farmers from getting planned revenue, indicating that about 26.1% of the total apple produce was lost (Figure 7b). In general, there is a significant district-based difference between total production, consumption, selling, and loss of apple produce.

5.3.2 Agronomic systems, value-addition and irrigation use

Table 5 shows some of the major agronomic and value-addition techniques adopted by apple and mango growers in the respective study districts. Regarding cropping systems practiced, the

information obtained from the respondents shows that apple and mango trees are planted haphazardly without proper spacing and intercropped with other crops such as coffee, maize, and groundnut, khat, root crops, and legumes, and vegetable crops. There is no cost that is directly associated with mango production because the crop husbandry practices such as land preparation, weeding, and pruning are indirectly done during the cultivation of other targeted annual crops. In all study districts, more than 50 % of respondents support the intercropping of their apple and mango with other crops. This result is supported by Dapaah, Asafu-Agyei, Ennin, and Yamoah (2003), who revealed that intercropping as compared to monocropping is a common practice applied worldwide as it improves the use of land efficiently, minimizes crop failure risks, reduces soil erosion, and increases yield stability. As described in section 3.1, about 34.10% and 40.90% of the respondents observed disease and insect pest problems in their apple and mango orchard, respectively. However, the majority of the respondents (60.54%) not used any controlling method in their production. However, only 2.84% of the total respondents spraying pesticide chemicals.

Results of field observation by researchers show that anthracnose and powdery mildew as the two most common and widespread fungal diseases of mango in the study areas. Diseases such as apple scab, powdery mildew, and twig blight are the major ones that contributed to the reduction of apple production and productivity. Likewise, aphid, scale borer, and caterpillar are the major insect pests affecting apple production. Value-addition as a core component of value chain study results from activities such as cleaning, sorting/grading, packaging, storing, transporting, and processing. In developing countries, low agro-industrial expansion has mainly been the major cause of stagnation for the value-addition of market-oriented crops (Punjabi, 2007). In this study, sorting, cleaning, and packing are reported to be the major adopted value-addition practices. Note, however, that a significant number (24.08%) of both apple and mango growers supplied their products to the market without any value-addition activities (Table 5). Results of this study further indicate that almost more than 90% of respondents irrigate their apple farms from both apple-growing districts. The variation is, however, recorded from mango growing districts. This means that less than half of respondents in Dibatie did not practice in their mango farm, while the majority (91.4%) of respondents used irrigation in Bahir Dar Zuria.

Table 5. Characteristics of fruit production and value-addition practices among study districts

Items (%)	Districts				Total
	Banja	Fagita Lekoma	Bahir Dar Zuria	Dibatie	
(1) Cropping systems practiced					
Intercropping	73.00	66.69	93.56	84.30	79.39
Monocropping	27.00	33.31	6.44	15.70	20.61
(2) Reasons for using intercropping					
To increase soil fertility	25.40	4.41	22.40	21.10	18.33
To use the farmland efficiently	37.10	52.20	57.75	56.07	50.78
Protects from disease and pests	0.60	3.26	1.31	2.22	1.85
For shading purpose	9.90	6.82	12.10	4.91	8.43
(3) Diseases and insect management methods adopted					
Weeding and hoeing	7.90	14.60	2.93	3.64	7.27
Spraying pesticide chemicals	1.11	2.80	5.00	2.43	2.84
Removing dead trees/cutting	0.00	4.22	2.16	1.20	1.89
Cultural methods	5.61	5.54	6.44	4.84	5.61
Intercropping	13.93	12.62	14.30	12.00	13.21
All of the above methods applied	4.04	6.90	16.41	7.22	8.64
No any controlling method used	67.41	53.32	52.76	68.67	60.54
(4) Value-addition activities applied					
Sorting	56.20	31.90	32.10	39.80	40
Cleaning	12.44	29.20	34.32	55.40	32.84
Packing	2.26	1.46	5.00	3.60	3.08
No value-addition practiced	29.10	37.44	28.58	1.20	24.08
(5) Irrigation practice					
No irrigation	5.55	2.80	8.58	80.64	20.39
Practice irrigation	94.45	97.20	91.42	19.36	79.61

Source: Own survey data (2019/20)

5.3.3 Distribution of respondents based on their fertilizer application

In terms of fertilizer use, no apple or mango growers used inorganic fertilizer (Urea and DAP) on fruit-growing land, whereas the majority of growers used organic fertilizer (compost and manure). Figure 8 shows that the majority of the sampled apple producers (40.4 percent) used

compost as a fertilizer, whereas 70.4 percent of mango producers used animal manure on their mango farm. As per the research results, 26.1 percent and 21.1 percent of apple and mango producers, respectively, did not use fertilizer on their farms. Alene (2017) highlighted that for highland fruit production, organic fertilizers such as compost and well-decomposed dung are preferable to chemical fertilizers. Compost is an organic matter that has been aerobically decomposed. Composting enhances soil biodiversity, which is fundamental for soil health (Kennedy, 1999). Composting the soil improved its fertility, bulk density, water-holding capacity, and biological properties. Organic composts added to apple orchard soils have been shown to keep improving the flowering and growth of planting trees (Alalaf, 2020; Flavel & Murphy, 2006; Reganold, Glover, Andrews, & Hinman, 2001).

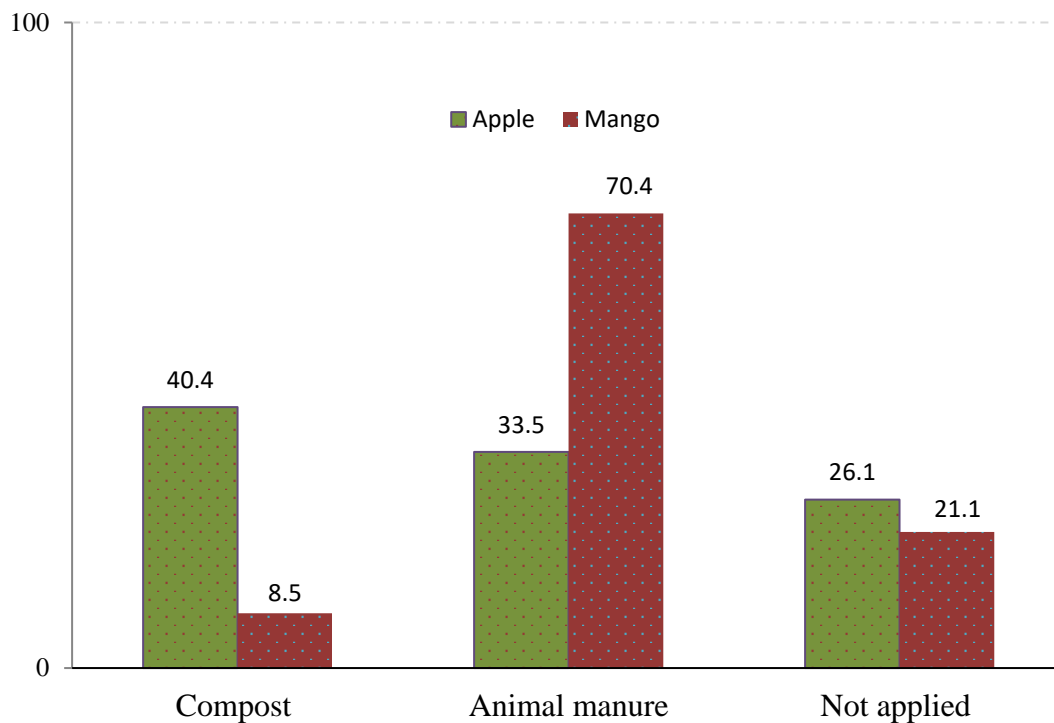


Figure 8. Distribution of respondents based on their fertilizer application

5.3.4 Quantity measurement tools used during selling

In Ethiopia, the district level marketplace is a well-known trading hub for a wide range of agricultural products. Nevertheless, the vast majority of economic agents exchange agricultural products in local markets using multiple, non-uniform units of measurement. The local units of measurement for fruits range from volumetric (basket, bowl) to weight measures (sack) and

weight balance (kilogram) and counting. Overall, measurement system heterogeneity leads to significant measurement costs, market disintegration and exchange inequity (Abebe et al., 2018; Capéau & Dercon, 2006). The main cause of measurement problems at the transactional level stem from measurement error. The assumption of this viewpoint would be that measurement costs are caused by measuring instrument biases (Zhou, Etea, Sedebo, & Muktar, 2019).

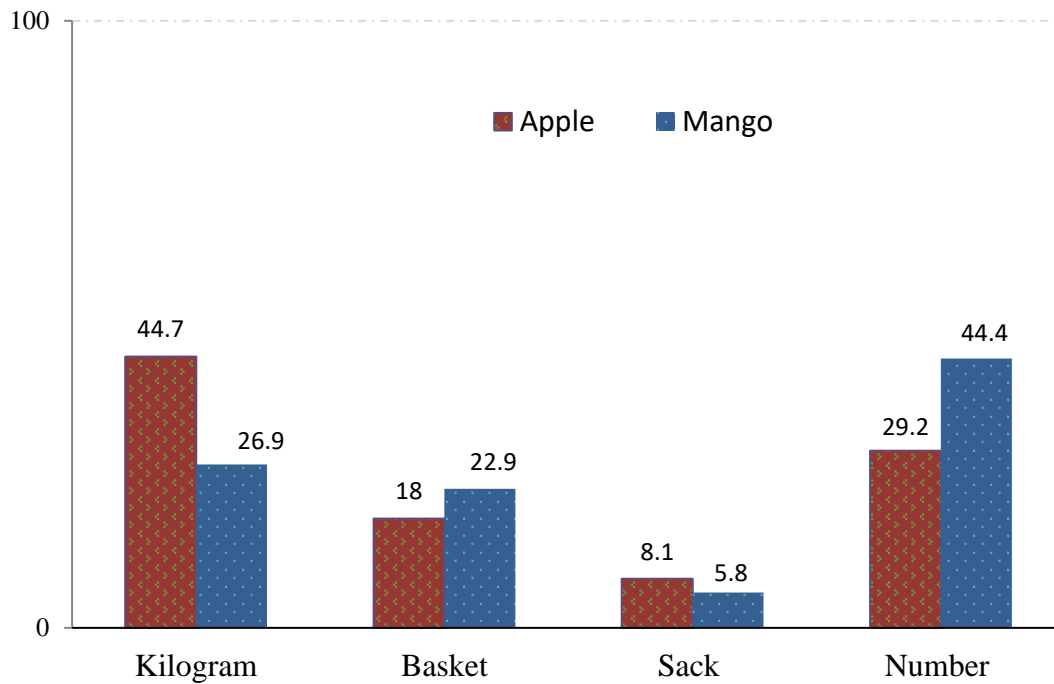


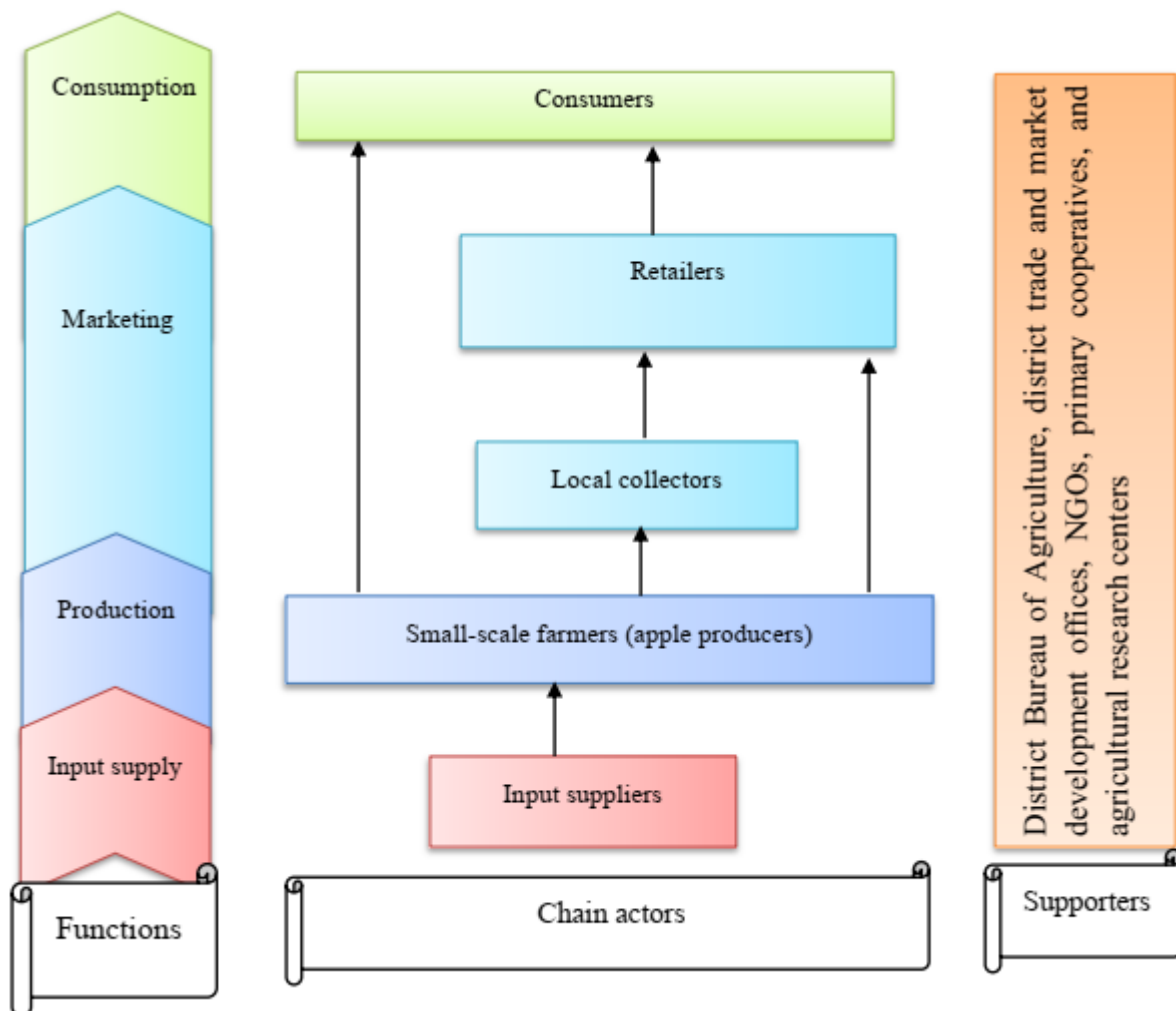
Figure 9. Quantity measurement tools used during selling

Out of the total interviewed apple households, 44.7 percent used kilogram, 18 percent used basket, 8.1 percent used sack, and 29.2 percent used numbering (Figure 9). About 29.9 percent of farmers measured mango sales in kilograms. Out of the total interviewed households, 22.9 percent used basket, 5.8 percent used sack, and 44.4 percent used numbering. According to the survey results, there was really no measurement consistency among farmers, local collectors, and small retailers. In another case, farmers and local traders may lose a significant amount of money, particularly if the level of measurement costs is forecasted for the total number of transaction days made per year. In this way, the effects of a non-uniform system of measurement on the local economy are massive. Based on these realities, the study concluded that government initiatives and institutions are important for regulating the measurement actions of marketplace actors.

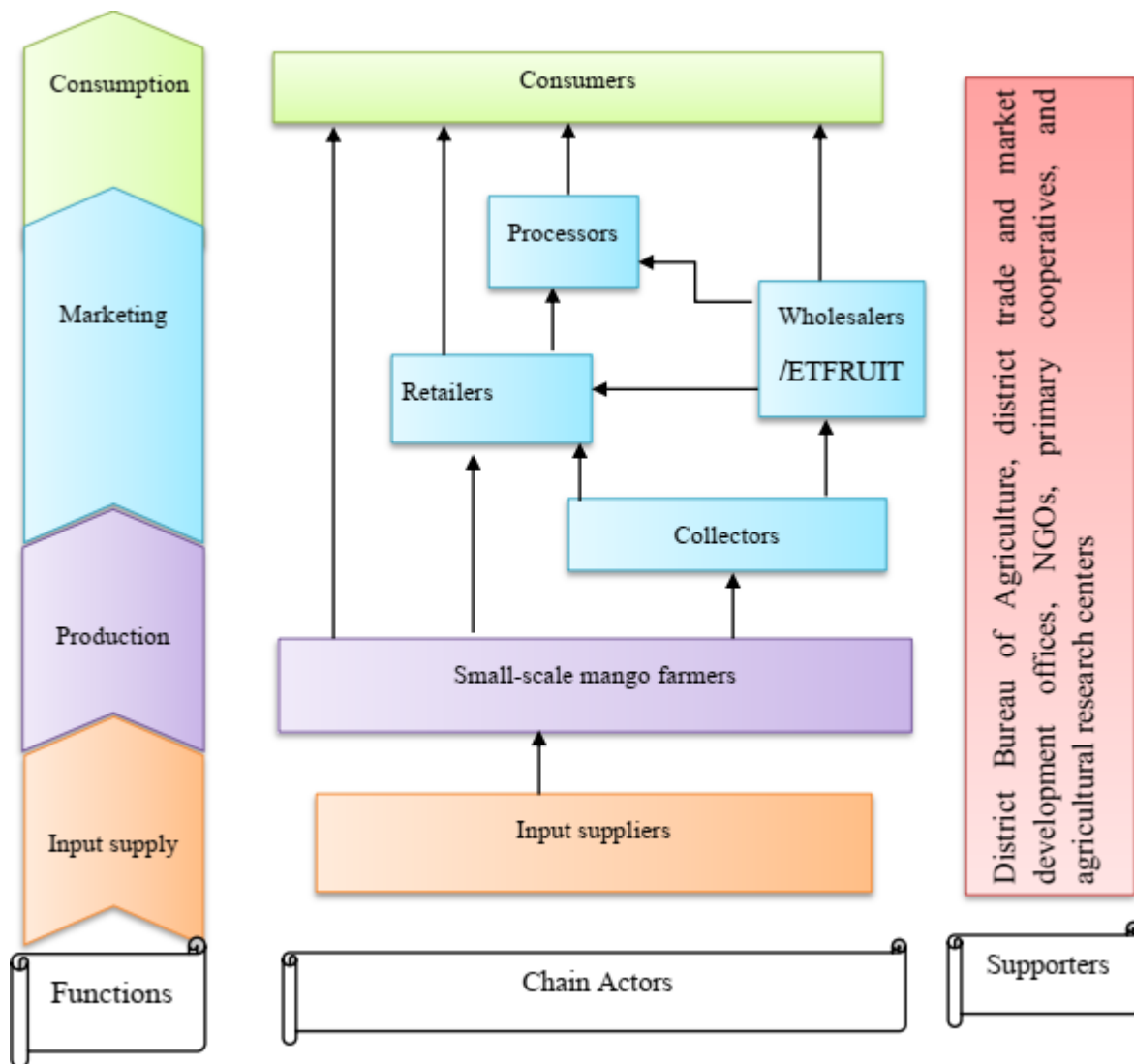
5.3.5 Apple and mango value chain actors (actor-mapping)

The use of value chain mapping allows you to visualize the flow of a commodity from conception to end user via various stakeholders (M4P, 2008). It also emphasized the participation of various actors who are involved in the value chain. Value chain participants can be both direct and indirect actors, participating in all stages of the commodity chain.

In the agriculture sector, value chain stakeholders are categorized as either direct (commercially involved) (input providers, growers, traders, processors, and customers) or indirect (financial and technical services) (Faida, 2006). The participants in the apple and mango value chains in the study districts are depicted in Figures 10 (a) and (b), from input suppliers to final product purchasers.



(a) Apple value chain map of actors



(b) Mango value chain map of actors

Figure 10. Apple and mango value chain map of actors in the districts

Source: Own sketch based on field data, 2019/20

5.3.5.1 Input suppliers

Agri-based value chain analysis starts with input supply. At first, input suppliers could provide inputs to apple and mango growers, which are critical inputs during the production process. According to the study, the district office of agriculture, non-governmental organizations (such as Japan International Cooperation Agency/JICA, sustainable land management project, and Agri-service Ethiopia), and private seedling suppliers are currently the main input supply

sources. According to Figure 11, approximately 59 percent and 48.9 percent of respondents obtained apple and mango planting materials from district agricultural offices, respectively. According to Honja (2014a) and Mengesha et al. (2019), the primary sources of inputs for apple and mango production in Ethiopia are farm households' own efforts, agriculture sector offices, and marketplaces. According to the survey, none of the apple and mango producers in the districts used inorganic fertilizer for apple and mango production. This finding is consistent with the findings of Tadesse (2011), who stated that no chemical inputs were used for fertilization or pest control of mango production.

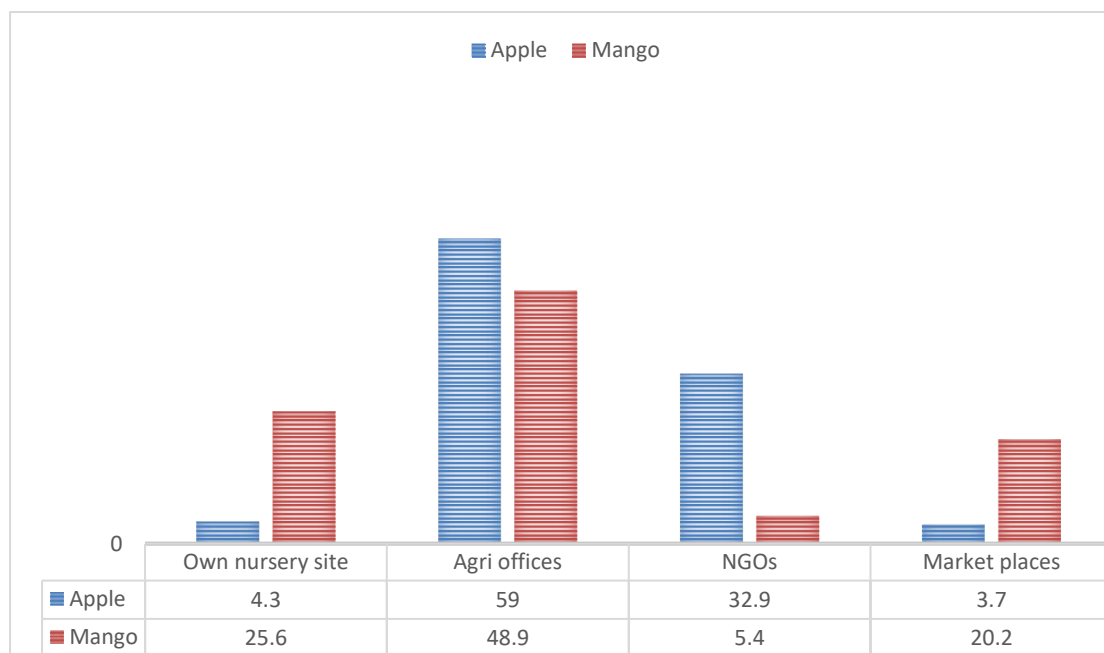


Figure 11. Sources of apple and mango seedlings (%)

5.3.5.2 Small-scale producers

Apples and mango growers are the major actors who perform most of the value chain functions right from farm inputs preparation on their farms or procurement of the inputs from other sources to post harvest handling and marketing. They are a major player in the production and distribution of surpluses. Producers decide what input to use, when and how to seed and harvest, how much to use and sell based on available resources. They handle the majority of the value chain functions on their farms, from agricultural inputs preparation to post-harvest handling and marketing. Land preparation (ploughing), growing/planting, fertilizer application,

irrigating, weed control (weeding), pest/disease control, harvesting and marketing are the main value chain functions performed by fruit producers.

According to the study, 87 percent of apple respondents sold their produce on the farm field through collectors, while 32 percent of mango producers sold their produce on the nearest local market roadsides. The remainder were sold in the towns of Bahir Dar, Enjibara, and Chagini. The results of the key informant interview (KII) indicated that there are a few actions in the mango selling process. "First, farmers told a rural collector to buy their produce. A collector returned to make other arrangements to locate and negotiate with a retail outlet and vendors. The buyer then proceeds to check the product and negotiate prices. This time there was the mischief (weighing cheating)." Because the products are perishable, they must be sold as soon as they are harvested. Farmers used baskets and wooden boxes for product collection and distribution (containers made from bamboo trees). The price discovery was accompanied by no scientific measurement, but rather an amount (basket pricing). The average weight of the basket was estimated to be around 25 kg, and the wooden box weighed nearly 50 kg for both apple and mango". Farmers interviewed also stated that "no set of arrangements to make the marketing case of a contract is accessible for both fruits." There was no technique to allow farmers to gradually gain a pricing advantage.

5.3.5.3 Local collectors/Assemblers

Collectors are assembly market traders who collect fruits from farmers in market places and farmlands using small trucks and pack animals in order to resell them to wholesalers or retailers. Their activities involve purchasing and assembling, sorting, and selling to wholesalers, who are usually transported on donkeys or carts to nearby towns like Chagini, Enjibara, or Bahir Dar. In the case of mango, they collect unripe mangos at the farm gate for 5-7 days before selling them at the assembly point to wholesalers from Enjibara and Bahir Dar. They utilize dry grass at the assembly point to either ripen mango or to prevent mango from contact with the earth's surface and also from fog. Apple collectors in the Enjibara area sell to Zengena Lake visitors and street vendors. On the other hand, retailers organize 'collectors' groups to assemble mangoes from growers and afterwards load them into vehicles that leave immediately for marketing. Mango collectors in the study area started gathering mangos before

the peak maturity period. Farmers' utility is reduced as a result of being forced to sell unripe mango at a low price after it has been harvested. Some farmers and concerned bodies who are aware of the situation are criticizing collectors' actions.

5.3.5.4 Wholesalers

Wholesalers purchase mango products directly from farmers as well as collectors, usually in surplus areas, for resale to retailers and larger market centers with better financial capacity. They are actively focused in purchasing mango from growers and collectors in greater quantities than any other actor and providing them to retailers as well as consumers. Purchasing, repacking by mango size are specific practices conducted by wholesalers along the mango value chain. They also sell to customers. They have better storage, transportation, and communication links than most other traders. Ethiopia's largest wholesaler is ETFRUIT. Fruit wholesalers, according to Mengesha et al. (2019), are those who purchase fruits from other players such as growers and sell it back them to retailers and consumers.

5.3.5.5 Retailers

Mango retailers can buy directly from producers, assemblers, and wholesalers (except for Apple). Mango retailers largely buy from wholesalers and sell to consumers, whereas apple retailers primarily purchase from collectors. Retailers sell apples and mangoes, as well as many other fruit and vegetables like bananas and oranges. Their sales points are located in city markets, village centers, and along major roads. The retail stands were bad; they were made of wood and plastic and were mostly used for sun protection. Sewerage was in short supply, it was inconvenient for displaying/showing products, it was susceptible to rain and severe sunlight, and it was polluted. Furthermore, there were almost no structured institutions to help them fix their problems.

5.3.5.6 Processors

In the study areas, fruit processing in the context of preserving and adding value is not common. Cafés, juice houses, restaurants, and hotels handle mango processing, which is then sold to customers. Processors buy fully ripe mangoes from growers, wholesalers, and retailers in order

to make juice. Fully ripe mango, processing equipment, sugar, lemon, and cup are the primary inputs used by juice processors. Better storage, packing, and freezing are the primary value-added actions taken by mango processors in the study area.

5.3.5.7 Consumers

Consumers are the final buyers of apples and mango products, primarily from retailers for consumption. Individual households (both urban and rural), hotels, and institutions are the primary consumers of apples and mangoes. Apples and mangos are typically purchased by private consumers from growers, wholesalers, and retailers. Consumers purchase apple and mango fruits based on quality criteria like smell, color, weight, form, and size. For immediate consumption, consumers prefer physically unscratched, unbruised, less fibrous, and red apples and mango products. Consumption is significantly higher during fasting periods. Consumers believe that if the chain is cut shorter, the price of apples and mangoes will decline.

5.3.5.8 Support service providers

Several institutions in the study areas provide support services to the fruit value chain. They play a critical role in providing supportive services and expanding opportunities for key apple and mango value chain actors. The success of value chain actors is determined by their access to knowledge, information, technology, and finance (Greijmans, Oudomvilay, & Banzon, 2007). NGOs (for example, Japan International Cooperation Agency/JICA and Agri-service Ethiopia) and agricultural research centers work with the district's Bureau of Agriculture to provide services. They offer technical assistance and training in seedbed preparation, fertilizer application, crop cultivation, and post-harvest management. They are looking for mutual assistance in delivering programs. There is, however, no enhanced platform where they can all meet on a regular basis to address existing tasks and activities at each stage of the value chain. Nonetheless, value chain supporters are poorly linked to key actors, putting the entire value chain operation at risk. The evaluations also indicated that, while agricultural extension provides expert advice in the fruit sector, extension services are not available to all smallholders in the study districts.

Table 6. Access to services among the survey participants

Variables		Apple producer districts (N = 161)			Mango producer districts (N = 223)		
		N	%	χ^2 test	N	%	χ^2 test
Extension	Yes	84	52.20	9.53***	127	57.00	52.38***
	No	77	47.80		96	43.00	
Training	Yes	110	68.30	.06	137	61.40	2.20*
	No	51	31.70		86	38.60	

***, ** and * represents 1%, 5% and 10% level of significance, respectively.

Source: Own field survey data (2019/20)

Fruit training is primarily provided by development agents and district agricultural offices in all study districts. According to the survey results, 68.3 percent and 61.4 percent of apple and mango survey participants, respectively, participated in fruits training that were organized in the respective districts over the last three years (Table 6). In terms of extension services, 52.2 percent and 57 percent of the total apple and mango survey growers, respectively, have received extension services on the fruits value chain in their respective districts. District agriculture offices, supported by district subject matter specialists (SMS), are the main actors in providing information and advice on fruit production and management practices. Furthermore, survey farmers demonstrated that they obtain information about input availability and prices, in particular, from primary cooperatives and kebele development agents.

Overall, mapping actors and their operations enables us to comprehend how business owners interact to form a unified system (Lundy et al., 2014). It is considered to demonstrate the integrations of the activities and processes carried out along the fruits value chain. As a result, the above-mentioned apple and mango value chain actors are the major components of these fruits' value chain maps, as depicted in Figures 10 (a) and (b). The value chain of apples was long, passing through input suppliers, producers, collectors, and retailers before reaching consumers. Input providers, growers, local collectors, wholesalers, retailers, processors, consumers, and other supporters were reported as the main mango value chain actors in the study areas. The research by Tarekegn et al. (2020) support this finding that the main actors in

the banana value chain were input suppliers, producers, local collectors, wholesalers, retailers, processors, and consumers.

5.3.6 Market performance analysis

Marketing margin is a useful technique for assessing the performance of a marketing system. Marketing margins are made up of costs and profit margins, which can be indicators of marketing system efficiency and inefficiency (Nzima, Dzanja, & Kamwana, 2014). The gross marketing margin was calculated using the cost and price data collected from the respondents. In this study, marketing margin and channel comparison are the methods used for analysis of the performance of the apple and mango value chain. A marketing channel is a market network of interdependent entities that meet the customer from the source of origins of the commodity in order to transfer products to their target of final consumption (Kotler and Armstrong, 2004). Based on the amount of apple and mango produce that passed through each network, the channel comparison is made. The purpose of the analysis of distribution channels is to provide a systematic understanding of the movement of products from their source (producer) to the end destination (consumer).

5.3.6.1 Marketing channel comparison

Apple marketing channel: The flow of products starts with the producer and finishes with the consumer. Marketing of apples in the study area begins at the local farms, travelling towards the storage area to the terminal markets. Output passes progressively through a variety of market players in such marketing chains, suggesting a sequence of ties in the value chain once it reaches the end-users. In fact, the number and form of market participants vary even between the final destinations of the commodities. The marketing participants were apple growers, local collectors, street and shop sellers, and users. This study identified three major marketing networks (market channels) for apple production and moving to the different terminal markets. These are:

Channel I: Producers \longrightarrow Consumers = 9.7 Quintals (7%)

Channel II: Producers \longrightarrow Retailers \longrightarrow Consumers = 16.5 Quintals (12%)

Channel III: Producers \longrightarrow Collectors \longrightarrow Retailers \longrightarrow Consumers = 112 Quintals (81%)

Due to the consistency and product quality aspect of the product, wholesalers are not willing to purchase apples. The marketing channel for apples is short because of this. A total of 138.15 quintals of apple were sold by farm respondents during the study year. About 81% of the overall volume sold by farmers passes via channel III (Farmers \Rightarrow Collectors \Rightarrow Retailers \Rightarrow Consumers) with the largest share. This suggests that channel three is also more efficient at distributing large amount of sales. This simply proves that a collector-created link was preferred in terms of absorbing enormous amount of apple products. The lowest apple quantity (7%) passes across channel I (Farmers \Rightarrow Consumers). Unlike this result, Tamirat & Muluken (2018b) found that the greatest volume of apple fruit was marketed through channel II (48.41 tons): Farmers \Rightarrow Collectors \Rightarrow Retailers \Rightarrow Consumers).

Mango market channel: It was reported that 3118 quintals of mango were delivered to the marketplace by small-scale producers in the study year. This study identified seven major marketing networks (market channels) for mango production and moving to the different terminal markets. These are:

Channel I: Producers \longrightarrow Consumers = 174.61 Quintals (5.6%)

Channel II: Producers \longrightarrow Retailers \longrightarrow Consumers = 1016.92 Quintals (32.61%)

Channel III: Producers \longrightarrow Retailers \longrightarrow Processors \longrightarrow Consumers = 162.60 Quintals (5.21%)

Channel IV: Producers \longrightarrow Collectors \longrightarrow Wholesalers \longrightarrow Consumers = 52.50 Quintals (1.70%)

Channel V: Producers \longrightarrow Collectors \longrightarrow Wholesalers \longrightarrow Processors \longrightarrow Consumers = 103.40 Quintals (3.3%)

Channel VI: Producers \longrightarrow Collectors \longrightarrow Wholesalers \longrightarrow Retailers \longrightarrow Consumers = 1576 Quintals (50.55%)

Channel VII: Producers \longrightarrow Collectors \longrightarrow Wholesalers \longrightarrow Retailers \longrightarrow Processors \longrightarrow Consumers = 32.00 Quintals (1.03%)

The lowest mango quantity (1.03%) passes across channel seven (Producers \Rightarrow Collectors \Rightarrow Wholesalers \Rightarrow Retailers \Rightarrow Processors \Rightarrow Consumers). About 50.55% of the overall volume sold by farmers passes via channel six with the largest share. This implies that channel 6 is

more effective in terms of distributing large amount of mango sales. Kassa et al. (2017) identified the same result: the avocado and banana market chain, channel IV, which connected growers to wholesalers via local collectors, was more effective in terms of supplying large volumes to terminal markets.

5.3.6.2 Margin analysis

Parallel to channel surveys, margin analysis can be performed and helps to assess how poor or superior a value chain is. The marketing margins for apples and mango were determined as followed by taking the estimated sales prices of the respective actors in the value chain (producers, collectors, wholesalers, and retailers). The findings in Tables 7 and 8 showed that the cultivation of apples and mango and local marketing is beneficial for all economic actors. But the distribution of benefits along the value chain is inequitable.

Apple margin analysis: The structure of selling prices, margins, and price shares in each of the chain divisions is presented in Table 7. The findings showed that local collectors take the lion's share of the final price (42.66%), suggesting that the price spreads vary during the process which means that growers ought to be connected to fruit markets such as central urban markets and supermarkets. For value chain participants, margin analysis showed that about 66.66% of the apple value chain's gross marketing margin belongs to apple traders, and farmers receive approximately 33.34% of the gross marketing margin. In fact, the size of the gross margin, according to KIT (2008), shows the amount of expenses, labor, loss of competitive markets, and transparent information. Even so, the market for apples was monopolized by a small number of traders, and price information was also not transparent in the study areas. The results of marketing and profit margin calculations for actors in the apple value chain in the study area revealed that local collectors got the highest profit margins. In general, district level collectors received a higher profit share than other actors in the chain, which was unjustified given their contribution to the value chain. This disproportionate share of advantages is a result of the interaction of power amongst actors. This statement suggests that apple value chain performance is poor. Collectors are more favoured than producers in this inefficient value chain. According to KIT (2008), this is common in Africa during peak season, when there is a sufficient supply.

Table 7. Marketing margin and gross profit along actors in the domestic apple value chain

Items (ETB/kg)	Apple producers	Local collector	Retailer	Horizontal sum
Purchase price	-	20	38	95.00
Cost of production	8.00	-	-	8.00
Cost of marketing:				
Transportation	1.50	2.00	-	3.50
Loading/unloading	-	-	-	-
Sorting/grading costs	-	2.50	-	2.50
Spoilage/loss	2.50	3.50	3.50	10.00
Other costs	3.50	2.00	5.00	10.50
Total cost of marketing	7.50	9.00	8.50	26.50
Total cost	15.50	9.00	8.50	31.50
Selling price (Revenue)	28	36	45	101.00
Marketing margin	12.50	16.00	9.00	37.50
(%) share of margin	33.34	42.66	24.00	100.00
Profit margin	5.00	7.00	6.50	18.50
(%) share of profit	27.02	37.84	35.14	100.00

Source: Own survey data computations, 2019/20

Mango margin analysis: With regard to mango, local collectors take the highest (40.18%) in terms of margin share, followed by wholesalers (19.30%). Margin analysis showed that about 84.92% of the chain's gross marketing margin belongs to mango traders, while farmers receive approximately 15.08% of the gross marketing margin. That is, while farmers doing all the work of producing the mango crop and bearing the associated risks, took only 15.08% of the profit, respectively (Table 8). All market players were usually operating at a profitable pace, but producers were comparatively hampered by the market since they earned the lowest share of consumer prices. This disproportionate share of advantages is a result of the interaction of power amongst actors. This statement suggests that mango value chain performance is poor. Collectors are more favoured than producers in this inefficient mango value chain. In general, as compared to small-scale farmers, intermediaries had high profits. When the channel has more intermediaries, product prices will be higher and the share of the producer will be lower,

implies that the shorter the channel, the lesser the marketing costs and low-priced the commodity to the end-user.

Table 8. Marketing margin and profit along actors in the mango value chain

Items (ETB/ Qt)	Producer	Local collector	Wholesaler	Retailer	Processor	Horizontal sum
Purchase price	-	455	1600	2150	2400	6605.00
Cost of production	25	-	-	-	-	25.00
Cost of marketing:						
Transportation	4.50	10.00	18.00	5.00	4.50	42.50
Loading/unloading	-	3.00	4.00	1.50	5.00	13.50
Sorting/grading costs	-	-	5.00	-	5.00	10.00
Spoilage/loss	8.50	12.00	7.00	11.50	3.50	42.50
Cost of processing	-	-	-	-	160.00	160.00
Other costs	-	10.00	25.00	15.00	5.00	55.00
Total cost of marketing	13.00	35.00	59.00	33.00	183.00	323.00
Total cost	38.00	35.00	59.00	33.00	183.00	348.00
Selling price (Revenue)	455.00	1600.00	2150.00	2550.00	2900.00	9955.00
Marketing margin	430	1145	550.00	400.00	500	3525.00
(%) share of margin	15.08	40.18	19.30	13.22	16.53	100
Profit margin	392.00	1110.00	491.00	367.00	317.00	2994.00
(%) share of profit	14.64	41.46	18.34	13.71	11.84	100

ETB (Ethiopian Birr) is the Ethiopian currency, and during the survey period 1 USD was about 29 ETB. Qt (quintal) = 100 kilograms

Source: Own field survey data (2019/20)

The results of marketing and profit margin calculations for actors in the mango value chain in the study area revealed that local collectors got the highest profit margins. This suggests that local collectors in the mango value chain can make a reasonable profit on their sales if they can minimize operating expenses such as labor costs. The investigation by Woldu, Mohammed, Belew, Shumeta, and Bekele (2015) verified that poorly regulated marketing practices tends to result in marketing margin discrepancies across Ethiopian banana channels. They stated that organizing growers improves the efficiency of value chains. A large portion of farmers' profit in consumer prices goes to local collectors, implying that the involvement of mediators lowers the producer's profit share.

In general, in this study all market participants were profitable, but small-scale farmers were comparatively disadvantaged by the market because they received the smallest share of the price paid by consumers. As a result, small-scale farmers were comparably disadvantaged in the apple and mango markets, and their value chains did not fare well. This implies that the apple and mango value chains were less effective due to poor vertical/horizontal integration and coordination, as well as insufficient support from institutions in the study areas. Literatures such as Kilelu et al. (2017); and Mmari (2015) argued that effective intermediary institutional forms are intended to support combined vertical and horizontal value chain collaboration in order to properly connect farm households into agri-food chains.

5.3.7 Governance structure

This section of the study presents relations among all the actors who operate within the range of activities taken to deliver apple and mango fruits from inception to end use. Regarding the governance structure, small-scale producers' bargaining position in apple and mango negotiations is poor in the study areas. Because of a lack of well-organized producers and a shortage of valuable price information, producers rely heavily on traders. As a result, they are price takers who rarely bargain the market value due to the risk of post-harvest loss if the product is not sold. Participants in the focus group discussion reported that coordination among the apple and mango chain actors was low, and that information sharing among the chain was complex. According to the findings of this study, the governance structure in place benefits collectors and retailers while leaving apple and mango growers in a vulnerable position.

Generally speaking, the governance structure of the apple and mango value chain is buyer-driven, with little trust among different actors. Traders are complaining bitterly that growers are not providing high-quality products, while growers blame the traders for charging cheap prices. Small-scale growers are just not organized and do not have control over the value chain. As a result, they are price takers who rarely bargain the price because they are afraid of incurring post-harvest losses if the commodity is not sold. Fitzpatrick (2019) concluded that the Cashew value chain in Africa is a buyer-driven chain governed by traders who set rules for others to follow, which supports these findings.

5.3.8 Constraints, initiatives and possibilities of the value chain of apple and mango

One of the benefits of value chain analysis would be that it allows to properly identify inefficiencies in the chain's development from input supply all the way up to consumption. That means, one of the specific aims of any analysis of the value chain is to define constraints, interventions, and opportunities, and possibilities. Since the study of the value chain helps in determining restrictions in an extreme and concise way in each of the value chain components. Although there were several studies which focused on identification of constraints and opportunities in the fruits value chain, no known study was found to determine the socio-economic, demographic and institutional fruits value chain constraints separately depending on the essential value chain functions: (the input supply stage, the production stage, the marketing stage, and the consumption stage) in Ethiopia. As a result, apple and mango value chain actors clarify a variety of constraints and opportunities via focus group discussion and questionnaire. According to this study finding, the major constraints currently impeding the expansion of the apple and mango value chain can be divided into four essential functions: the input supply stage, the production stage, the marketing stage, and the consumption stage. Table 9 provides a description of the opportunities/initiatives and constraints for each of the players in the apple and mango value chains and highlights potential areas of action to address the constraints. The participatory research strategy was used as a way of understanding value chain constraints and jointly identifying value chain upgrading strategies (the lists are presented in rank order from highly significant to low).

Table 9. Major constraints, initiatives and possibilities of the fruits value chain

Functions	Constraints	Opportunities	Suggested solutions
Input supply	<ul style="list-style-type: none"> • Lack of improved supplies of seedling quality (scion and rootstock), • Lack of skilled workers • Lack of farming instruments and chemicals, • Low quality seedling smuggling 	<ul style="list-style-type: none"> • Conducive climatic conditions • High seedling demand • Inexpensive human labor 	<ul style="list-style-type: none"> • Establish model nurseries as sources of seedling and information • Organize cooperative societies to provide farm supplies

Production	<ul style="list-style-type: none"> • Disease (mango anthracnose and stem-end rot, apple scab and downy mildew) and pest occurrence, • Low yield, bird attacks, ineffective agronomic practices, • The commodity's perishable and unpredictable condition and insufficient storage facilities, • Unorganized markets and information 	<ul style="list-style-type: none"> • Capacity for generating rural income • Diversification and nutrition • Enabling policy environments • Expansion of agro-industries 	<ul style="list-style-type: none"> • Increase production by management of agronomy and pests • The use of modern breeding methods • Enhance quality and decrease waste • Build innovation in the value chain
Trading/marketing	<ul style="list-style-type: none"> • Perishability of the produce • Lack of a structured market, • High transport costs, bad roads, • The absence of alternative markets, • Weight balance measurement cheating, 	<ul style="list-style-type: none"> • Strong demand for fruits on the market • Domestic fruit availability • Lifestyle change/increased consumption patterns • Increased urbanizations 	<ul style="list-style-type: none"> • Establishing collection centers with systems for grading) • Offer suitable transport and packaging facilities • Boost production
Consumption	<ul style="list-style-type: none"> • Limited supply, • Financial constraints, • Affordability, inflated costs, • Lack of nutritional knowledge and information, and • Poor domestic fruit quality, 	<ul style="list-style-type: none"> • Improved revenue • Lifestyle change 	<ul style="list-style-type: none"> • Improve the supply • Provide knowledge on price and nutrition • Boost efficiency

Source: Own survey result, 2019/20

5.4 Chapter Summary

This Chapter characterize actors involved in the fruit value chains and quantify the distribution of the benefits among the economic agents in the Upper Blue Nile Basin, Ethiopia, focusing on apple and mango crops. The apple and mango sub-sector is a good starting point for addressing poverty, and it is important and growing in Ethiopia's apple and mango market. Apple and mango are both potential fruit crops that could significantly improve the livelihoods of small-scale farmers while also providing market and job opportunities for the many commercial agents in the study area. A random sampling approach was used for producers and

snowball sampling for traders when selecting survey participants. Descriptive statistics, mapping, and market margins were used for data analysis. In line with the aim of the research, value chain analysis showed that there are direct and indirect agents who can participate in each stage of the apple and mango chain in the study sites. Seedling suppliers, farmers, collectors, wholesalers, retailers, processors, and consumers are among the key mango value chain actors. Seedling suppliers, farmers, collectors, retailers, and consumers are among the main apple value chain participants. In terms of large sales volumes, a channel connecting mango producers to wholesalers via collectors was more efficient, whereas a channel connecting apple producers to retailers via collectors was more efficient. For value chain participants, margin analysis showed that the majority of gross marketing margin goes to traders in both value chains. The governance structure of the apple and mango value chain is buyer-driven, with little trust among different actors.

As demonstrated in the gross margin, for all value chain actors in the studied area, mango and apple production was generally profitable. Thus, it acts as a source of income, survival, and jobs for economic actors in general and in particular, for small-scale farmers. Therefore, particular attention should be paid to production and marketing techniques. Although the production of apples and mango in the study area was profitable, it is clear that farmers did not completely benefit from the production and marketing of apples and mango. As a consequence, farmers have not received fair sales volumes and have been forced to sell their products at low prices. These all deter farmers from producing in large quantities, quality, and also uncertainty (fair failure in the mind of farmers) in the marketing of apples and mangoes. Further to that, the study identified potential constraints and opportunities, as well as suggested solutions related to the value chains of mango and apples in the study areas.

CHAPTER SIX

DETERMINANTS OF SMALL-SCALE FARMERS' PARTICIPATION IN THE FRUIT'S VALUE CHAIN IN THE UPPER BLUE NILE BASIN, ETHIOPIA.

6.0 Introduction

This chapter attempted to investigate the determinants of small-scale farmers' participation decision and intensity of participation in the fruits (apple and mango) value chains in Ethiopia's Upper Blue Nile Basin. The Chapter begins by establishing the problem's context. The second section is devoted to discussing the conceptual framework. Section three discusses analytical model specifications. The fourth section presents the results and discussions. This is followed by the chapter summary.

6.1 Context for the Problem

New consumption patterns and preferences for high-value agricultural products (e.g., fruits) are emerging in developing countries due to rapid urbanization, improved incomes, and increased awareness of their nutritional values (Tschirley et al., 2015; Wiggins, 2014). This has further triggered changes in dynamism and transformation processes of the local agri-food systems with positive implications on small-scale farmers' integration into market-oriented value chains (Blandon, Henson, & Cranfield, 2009; Lowitt, Hickey, Ganpat, & Phillip, 2015; Reardon, 2015). Participation in improved local agri-food chains may offer small-scale farmers the opportunity to produce and sell high-value products, translating their vertically-coordinated relationships into premium prices and letting them capture a bigger share of the price paid by final consumers (de Janvry & Sadoulet, 2020; Hussein & Suttie, 2016; C. Kilelu et al., 2017). Indeed, there is evidence in Ethiopia, as is elsewhere in sub-Saharan Africa, increased access and participation of small-scale farmers in high-value markets present opportunities to improve their productivity, income, food security, and reduce poverty (Belay, 2018; Sharp, Ludi, & Gebreselassie, 2007).

In rural areas of Ethiopia, as such, high-value markets (e.g., fruits) play an important role in the social and economic development of small-scale farmers' due to poorly functioning markets with high transaction costs; this often deters their market participation and promotes mainly own consumption (Worako, 2015). Realizing the underexploited opportunities that could be offered by the fruit sector, the Ethiopian government has been facilitating fruit development as one of the main development strategies for poverty reduction and improvement in social and economic growth, and several measures have been put in place to enhance small-scale farmers' access to such markets. For instances, as part of its commercialization support programs, the government of Ethiopia in collaboration with non-governmental organizations (e.g., German Development Cooperation, MASHAV) has been supporting the fruit sector through various ways: (a) targeting major growth corridors and providing necessary technical, budgetary, and facilitation assistance, (b) strengthening extension system to improve small-scale farmers adoption of improved technologies (e.g., irrigation expansion, grafted seedling supply, agronomic management activities), and market-oriented production systems, and (c) development of agro-industrial parks (e.g., Burie agro-industrial park constructing around study areas) (ATA, 2017).

Due to these efforts, despite fluctuations in the area planted with fruits and their production in recent years, significant growth has occurred in both. In 2019, close to 114,421.81 hectares of land was covered under fruit crop production and, more than 7,924,306.92 quintals of fruits were produced in the country. The area under fruits cultivation and volume of fruits production increased during 2008-2019 by 138% and 125%, respectively. Observed production fluctuations are attributed to erratic weather conditions, shortage of water, an infestation of pests and disease, and poor post-harvest management (CSA, 2019).

North-western Ethiopia, particularly the Upper Blue Nile Basin, is agro-ecologically suitable and known for its production potential of different types of fruits (EIAR, 2013). Currently, apple and mango productions are expanding across the basin (MoA, 2014). In the basin context, fruit crops are gradually transforming from subsistence to cash crops for small-scale farmers. However, small-scale producers are usually forced to sell their produce at lower prices (Girmay, Menza, Mada, & Abebe, 2014). Given the weak organization of fruit markets, most

small-scale producers market their produce through collectors and street vendors, who may retain the highest marketing margin than producers (Getahun et al., 2018).

Evidence suggests that participation of small-scale farmers in fruits value chain varies with respect to a range of social, economic, infrastructural, and institutional factors: Globally (e.g., Ao et al., 2019; Chang et al., 2014; Jaji et al., 2018; Slamet et al., 2017); in Africa (e.g., Adepoju et al., 2015; Ngenoh et al., 2019; Sigei et al., 2014); and in Ethiopia (e.g., Girmalem et al., 2019; Kassa et al., 2017; Mengesha et al., 2019; Tamirat & Muluken, 2018a; Tarekegn et al., 2020; Tufa et al., 2014). However, the evidence vis-à-vis the importance of these factors in determining small-scale farmers' participation in the fruits value chain activities is mixed. In other words, results from these studies vary depending on the product being considered, number and organization of available channels, and the institutional, technical, social and economic environment the farmers operate in. For example, a study by Temesgen and Hiwot (2017) asserted that age and level of education “were factors which negatively and significantly influenced participation of farmers in the fruit value chains”, whereas Chala (2010) found that both variables have positive and significant effect on the participation of farmers in the fruit value chain activities which shows a mixed result. In addition, Tadesse and Temesgen (2019) reported that farming experience negatively and significantly influenced participation of farmers in the fruit value chains, whereas Mengesha et al. (2019) indicated that the variable has positive and significant effect on the participation of farmers in the fruit value chain activities which also shows a mixed result. Further Kassa et al. (2017) reported that household size was positively and significantly influenced participation of farmers in the fruit value chains, whereas Girmalem et al. (2019) indicated that the variable has negative and significant effect on the participation of farmers in the fruit value chain activities which as well shows a mixed result.

Moreover Tarekegn et al. (2020) in their study reported that adequacy of extension services promotes fruit farmers participation decision in the value chain, whereas distance from market deters their participation; Girmalem et al. (2019) got the same result and concluded that area allocated for mango fruit production indorses farmers intensity of participation in the output market. Likewise, proximity to road and asset ownership (e.g., Tarekegn et al., 2017), improved fruit variety utilization (e.g., Tarekegn et al., 2020), irrigation (e.g., Tufa et al., 2014), access

to credit and off-farm income (e.g., Abafita, Atkinson, & Kim, 2016; Girmalem et al., 2019; Kassa et al., 2017), gender (e.g., Tufa et al., 2014), and perishability (e.g., Regasa et al., 2019) influence fruit farmers participation decision and intensity of participation in the fruits value chain. Most of these studies in Ethiopia however, did not consider both participation decision and intensity of participation possibilities among small-scale fruit farmers.

While these studies offer useful insights into identifying production potentials and constraints, marketing supply channels, and distribution of margins and potential factors influencing value chain participation, they are limited in a number of ways. Firstly, these studies focus on Eastern Ethiopia (e.g., Tufa et al., 2014), Central Ethiopia (e.g., Getahun et al., 2018), Northern Ethiopia (e.g., Girmalem et al., 2019), and Southern Ethiopia (e.g., Kassa et al., 2017; Mengesha et al., 2019; Tarekegn et al., 2020), and thus may have limited contextual relevance (e.g., social, cultural, environmental) to north-western Ethiopia. Secondly, most of the studies mainly focus on value chains of cereal crops like rice, *teff*, sesame, and wheat (e.g., Abate, Mekie, & Dessie, 2019; Biggeri, Burchi, Ciani, & Herrmann, 2018; Gebremedhn et al., 2019; Habtewold, Challa, & Latha, 2017; Kyaw, Ahn, & Lee, 2018; Warsanga & Evans, 2018). Thirdly, unlike Kassa et al. (2017) and others, this study relied on the double hurdle model proposed by Cragg (1971). This is because in this model non-participants are considered to a corner solution utility model (i.e., allows considering the characteristics of non-participants) whereas in the Heckman two-stage model non-participants will never participate under any circumstances (Beshir et al., 2012; Kahenge et al., 2020; Musah, 2013; Yami et al., 2013).

To this end, this study envisages investigating factors that affect small-scale farmers' decisions to participate in the respective value chain, on the one hand, and the extent of participation (volume supplied), on the other hand, using a sequential market participation model. By doing so, the study contributes to the evolving literature on farm households' participation in fruit value chains. The rest of the chapter is organized as follows. Section 2 elaborates on the conceptual framework of the study, while section 3 presents the analytical model and section 4 discusses the estimated results. Section 5 summaries the chapter.

6.2 Conceptual Framework

This study conceptualizes farmers' decisions about whether to participate in the fruits' value chain was reflected under the framework of utility maximization. The key assumption of this model is the decision of farm households is based on the principle of utility maximization (Norris & Batie, 1987). Specifically, in this study, a farmer is said to participate in the fruits' value chain if s/he sells a part of her/his fruits output in the market. According to McFadden (1974), a household's utility function from using alternative j then expressed as follows:

$$U_{ij} = f(D_{ij}, C_{ij}, I_{ij}) + \varepsilon_{ij}, j = 1, 0; i = 1, \dots, n; U_{ij} = V_{ij} + \varepsilon_{ij} \quad (5)$$

where; U_{ij} - is the perceived utility attained by the i^{th} small-scale apple/mango producer from participating in the respective value chain, V_{ij} - is explainable part of U_{ij} that depends on socio-economic attributes (D_{ij}), farm characteristics (C_{ij}), infrastructural and institutional factors (I_{ij}), and the random error term (ε_{ij}). Hence, subject to these attributes, farmers are expected to maximize their utility through participating in a given market chain only if participation is expected to be profitable (De Janvry, Dustan, & Sadoulet, 2010). That is, each farm household choose to partake in the value chain (if $Y_i^* = U_{ij} - U_{ik} > 0$); Y_i^* - is the farm household's net benefit, U_{ij} and U_{ik} are utility from participation and non-participation, respectively, of the i^{th} small-scale fruit producer. Since these utilities are unobservable, they can be expressed in Eq. (6) as a function of observable elements:

$$Y_i^* = X_i\beta + u_i, \text{ with } Y_i = \begin{cases} 1, & \text{if } Y_i^* > 0 \\ 0, & \text{if } Y_i^* \leq 0 \end{cases} \quad (6)$$

where, Y_i - is the observed dependent variable, X_i - is a vector of explanatory variables, β - is a vector of parameters to be estimated, and u_i - is an independent normally distributed error term with zero mean and constant variance. In general, this conceptual understanding leads us to select an appropriate model for analysis and it is presented as follows.

6.3 Analytical Model

A two-step analytical approach is followed to determine small-scale farmers' participation in the fruits value chain. The main reason for the adoption of such methods is that value chain participation involved two-way decisions: the decision to participate and the actual degree of participation. The two well-known models are the Heckman two-stage selection model and

Cragg's Double hurdle model (Komarek, 2010). Both regression models recognize that discrete outcomes are expressed by the selection and degree of participation decisions. Normally, in this study, not all farmers participated in apple and mango markets. Meaning: the farmers do not have fruit produce to supply to market or farmers have the product but not supply it to market. Hence, following Kahenge et al. (2020) Tufa et al. (2014) this study relied on the double hurdle model proposed by Cragg (1971). This is because in the double hurdle model non-participants are considered to a corner solution utility model (i.e. allows considering the characteristics of non-participants) whereas in the Heckman two-stage selection model (Heckman, 1979) non-participants will never participate under any circumstances (Yami et al., 2013). The double hurdle model takes all the zero observations as corner solutions where a small-scale farmer assumed to be a seller of apple and mango with zero sales. By employing *craggit* command (William J Burke, 2009) in Stata software, the model combines a probit estimation in the first stage with a truncated regression in the second stage.

The participation equation is specified as:

$$D_i^* = \beta X_i + \varepsilon_i, \text{ with } D_i = \begin{cases} 1, & \text{if } D_i^* > 0 \\ 0, & \text{if } D_i^* \leq 0 \end{cases} \quad (\varepsilon_i \sim \text{Normal}(0, 1)) \quad (7)$$

where; D_i^* - is a latent variable that takes 1 if the respondent participates in fruits value chain activity and, 0 otherwise; X - is a vector of independent variables; β - is a vector of parameters; ε_i - is the disturbance term which captures all unmeasured variables. The dependent variable used in this participation equation is: farm households participation decision in the fruits value chain (dichotomous; 1= participant; else = 0).

The second hurdle (truncated regression), which closely resembles the Tobit model is specified according to (Wooldridge, 2010) as:

$$Z_i^* = \beta X_i + u_i; u_i \sim N(0, \sigma^2) \quad Z_i = \begin{cases} Y_i^*, & \text{if } D_i = 1 \text{ and } Z_i^* > 0 \\ 0, & \text{if } D_i = 0 \end{cases} \quad (8)$$

Where, Z_i^* - represents the volume of mango and apple sold in quintal/year; X_i - is the independent variables; β_i - is a vector of parameters; and u_i - is the disturbance term. The dependent variable in this case is: intensity of farmers' participation (continuous; quantity of mango and apple sold in quintal/year).

Data management was performed in SPSS ver. 24. Descriptive, inferential, and econometric techniques were employed to analyse the data collected from the respondents, using the Stata ver. 14.0. Descriptive statistics including percentage, frequency, mean, and standard deviation and inferential statistics comprising of t-test and chi-square tests were employed to analyse the data. For the econometric analysis, the double hurdle model was used to examine the factors influencing small-scale farmers' participation in fruit value chains.

6.4 Results and Discussion

6.4.1 Description and summary statistics of variables

Description of variables and summary statistics for all dependent and explanatory variables included in the model as well as their level of significance for each variable for participants and non-participants are presented in Table 4. The decision to participate in the apple and mango value chains is a dichotomous dependent variable that takes the value one for households who participated in these fruits value chain whereas it takes the value zero otherwise. Likewise, the volume of apple and mango sales is a continuous dependent variable in the supply equation is measured in quintal (100kg) and represents the actual supply by apple and mango farm households to the market in the survey year. With regard to participation categories, about 48.5% and 59.5% of apple and mango growers participated in the value chain as sellers of their produce, respectively. Households who participated in the apple and mango market sold an average of 2.0 and 18.2 quintals of apple and mango produce, respectively.

In the course of identifying determinants influencing apple and mango value chain participation decision and level of participation by small-scale farmers, the main task is to examine which determinant influences and how? Therefore, the potential explanatory variables were categorized into the household characteristics, farm characteristics, transaction costs variables, and institutional support variables which are supposed to influence value chain participation decision and quantity of apple and mango fruit supply to the market.

Age is one of the demographic variables that are useful for describing households and providing insight into the sample's age structure and population. The age of the head of the household, who is usually the decision-maker, is considered to be a crucial factor in influencing the decision of the household in agricultural activities, as it determines whether the household

benefits from the experience of the elderly or has to base its decision on the attitudes of younger farmers to take risks. In this study, for those cultivating apples, the majority of the households (78.9%) were male-headed. The average age was about 49.6 years. Likewise, for those cultivating mangoes, the majority of the households (81.1%) were male-headed. The average age was about 46.5 years. With regard to participation categories, on average, non-participants were somewhat older than that of participant households in both apple and mango households. The result of an independent-sample t-test indicates that mean differences for apple households are statistically significant but insignificant for mango households.

Of the total sample of apple households, 78.9% were headed by men, while only 21.1% were headed by women, while 81.1% of mango households were headed by men, while only 18.9% were headed by women (Table 4). Moreover, the Pearson chi-square test result indicated that participation in the mango value chain and gender is statistically significant. But there is no relationship between participation in the apple value chain and gender of the household. In addition, almost equal proportions of male-headed households were in the participants and non-participants categories of apple growers, whereas more than half male-headed household mango growers were non-participants. In addition, education is important both in the management of the business and decision-making (Kadigi, 2013). About 44.1% of apple respondents had attained the primary level of education, and about 14.2% had a secondary level of education. About 45.3% of mango respondents had attained the primary level of education, and about 17.4 % had a secondary level of education. Furthermore, the result of the chi-square test showed that there was a significant variation among respondents' education levels. The average household size for the apple household was 5.8, whereas the average household size for the mango producer was 5.45.

The descriptive analysis highlighted that mean family labor (in man equivalent) was significantly greater for apple value chain participants than non-participants. However, there is no statistically significant difference between participant and non-participant mango growers. For the sample respondents, the man equivalent of the economically active labor of 15-64 years was calculated. The study also finds that the average working labor (in man equivalent) of both apple and mango farmers was found to be 3.99 and 3.65, respectively. The result indicated that the average fruit farming experience for apple farmers was 8.1 years. The average age was

about 46.5 years, with an average fruit farming experience of 9.65 years. The analysis of field data further underscores both apple and mango farming experience between the two groups was highly significant at a 1% level of significance.

The land is perhaps the most valuable resource, as it provides the basis for any economic activity, particularly in the agricultural sectors. In this study, the average cultivated apple and mango landholding of respondents was found to be 0.09 ha and 0.21 ha, respectively. Statistically, the plot size of both apple and mango value chain participants were significantly larger than that of non-participants in respective the crop. With regard to livestock holdings, the average livestock size of apple farmers was 5.44 TLU, while that of mango farmers was 5.95 TLU. The mean differences in total livestock size between mango participants and non-participants were highly significant. But the reverse is true for apple value chain participants and non-participants. Moreover, about 37.3% of apple farmers and 42.1% of mango farmers reported that their fruits produce was damaged by wild animals (e.g., apes, baboons, and birds). The descriptive findings further indicate that both disease and insect pests' incidence and perceived wild animals as a serious problem are statistically significant.

In terms of willingness to participate in the apple and mango value chain, institutional variables have a significant effect on the observed status of farmers. In this study, the most likely institutions hypothesized to affect farmers' participation in the apple and mango value chain include the frequency of extension contacts, membership to local cooperatives, and access to price information. Accordingly, the average frequency of extension contacts per year for apple farmers was 7.30, while that of mango farmers was 4.25. The differences in the average frequency of extension contacts per year between participants and non-participants were also statistically significant at the 1% level. Membership in local cooperatives was statistically significant for both groups. Further, the survey result indicated that 52.0% of apple farmers and 49.0% mango farmers had access to price information. The result portrays that there was a statistically significant difference between both groups in terms of access to price information. Besides, almost equal proportions of participant households' access to price information on their apple mango produce.

The survey result showed that the average distance of apple farmers' residence from the nearest market is greater (39.55 minutes of walking) than mango farmers' residence (36.65 minutes of

walking on foot). The t-test result indicates that the variable had a strong association with participation decisions in mango value chain participants than apple farmers. On average, value chain participants are closer to the market than non-participants. Ownership of mobile phones as important information communication equipment helps growers become aware of up-to-date information regarding production and marketing activities. About 42.2% and 59.1% of apple and mango households have their own mobile phone, respectively. The differences in the ownership of mobile phones between participants and non-participants were statistically significant. Finally, ownership of transportation assets (equines and cart) offers more chances in finding marketing alternatives and encourages participating in the value chain. In this study, about 34.8% and 52.9% of apple and mango households have their own transport facility, respectively. The differences in ownership of transportation assets between participants and non-participants were statistically significant at the 1% level.

6.4.2 Econometric model results and discussion

In section 4.1 (in Chapter 4), the study presented the description of the sample respondent characteristics and test of association among the dependent and independent variables to determine factors influencing apple and mango growers' participation in the value chain. Nevertheless, the identification of these determinants alone is not enough to inspire appropriate policy interventions. Hence, analysing the relative influence of variables helps for priority-based policy interventions. In this section, the double hurdle model results are presented to comprehend the relationships of variables.

6.5.2.1 Specification tests

Prior to operating the model, all explanatory variables were checked for the assumptions of regression analysis. Thus, it is vital to test the existence of multicollinearity of the data among the variables that determine the farm household's participation in the apple and mango value chain. The data was checked for multicollinearity problems by employing the variance inflation factor (VIF) and correlation matrix. The *estat vif* command displayed an average result of 1.32 and 1.55 in apple and mango data, respectively. The mean VIF results for both apple and mango commodities were less than the critical value of ten (10) indicates that there is no multicollinearity problem among explanatory variables. Gujarati and Porter (1999) recommend

that variables with high VIF value (10) should be excluded since it is an indication of problems of multicollinearity.

6.5.2.2 Factors affecting participation decision and intensity of participation

Table 10 presents the probit model results on the decision to participate in apple and mango value chains and truncated regression results on the intensity of participation. The probit model results confirm that out of thirty (13) covariates, nine and eight were found to significantly influence the probability of apple and mango household's participation decision, respectively. Likewise, truncated regression results indicate that four and eight covariates significantly affect the intensity of participation among apple and mango households, respectively.

The age of the household head exhibits a significant and positive relationship ($p < 0.05$) with respondents' intensity of participation in the mango value chain but insignificant relationships with the intensity of apple value chain participation. The positive effect of age on the intensity of mango value chain reflects that as farmers get older, they could acquire skills and hence produce more and develop skills to participate in the value chain activities. An increase in the age of respondents by a year increases the intensity of participating in the mango value chain by 12%. The result contrasted the findings held by Azam, Gaiha, and Imai (2012) and Tafesse et al. (2020), who found the negative relationship of age with farmers' participation. On the other hand, the age-square of the respondent had a negative (non-linear) relationship on both apple and mango value chain participation decisions. The variable had also a significant relationship with the intensity of farmers participating in the mango value chain but insignificant relationships with the intensity of apple. The Age-square of the respondent had a negative (non-linear) relationship on the mango value chain level of participation. On the other hand, the negative effect of age-square indicates that, as the farmer gets older, the probability of participation decision and intensity of participation declines. A similar finding was reported by Somano (2008).

The educational level of the household head was found to be a positive and significant factor in explaining both apple and mango farmers' participation decisions and intensity of participation in the value chain. The variable 'illiterate' was left out of the regression model to avoid the variable trap and used as a reference. The study finds that a household with the

education level of high school and above increases the probability of apple and mango value chain participation decisions by 1.43% and 3.35%, respectively, compared to the reference variable. Randela, Alemu, and Groenewald (2008) revealed that highly educated farmers were more likely to participate in the agri-food market due to their better production, marketing, and managerial skills. However, this finding is contrary to Ouma, Jagwe, Obare, and Abele (2010), who reported that banana farmers' education level negatively affects their market participation in Burundi and Rwanda.

Table 10. Results of double hurdle model of determinants influencing participation decision and intensity of participation

Variables	Apple producers		Mango producers	
	Coefficient	Z-value	Coefficient	Z-value
First Hurdle (Participation decision)				
Age of the household head	-0.436 (0.277)	-1.57	0.358 (0.241)	1.48
Age squared of the head	6.640* (3.860)	1.72	-5.414 (3.357)	-1.61
Gender of the household head	0.464 (0.455)	1.02	0.0515 (0.536)	0.10
Educational level of the head: illiterate (reference)				
Educational level of the head: 1-8 grade	0.536 (0.366)	1.47	1.673*** (0.422)	3.96
Educational level: high school and above	1.426* (0.652)	2.19	3.353** (1.217)	2.75
Total household size	-0.255* (0.106)	-2.40	-0.205* (0.110)	-1.86
Apple/mango plot size	4.109 (3.145)	1.31	6.669** (2.708)	2.46
Fruit farming experience	0.205*** (0.0572)	3.59	0.0673* (0.0349)	1.93
Perceived wild animals as a serious problem	-0.136 (0.363)	-0.38	-2.108*** (0.423)	-4.99
Incidence of disease and insect pests	-0.796** (0.375)	-2.12	-1.194** (0.432)	-2.76
Frequency of extension contacts per year	0.0843*** (0.0287)	2.93	0.0389 (0.0486)	0.80
Access to price information	0.650* (0.332)	1.96	0.515 (0.412)	1.25
Membership in local cooperatives	1.661*** (0.425)	3.91	0.996** (0.376)	2.65
Total livestock size	-0.160* (0.0863)	-1.85	0.000564 (0.0512)	0.01
Constant	-27.06* (13.25)	-2.04	17.27 (11.38)	1.52
Second Hurdle (Level of participation)				
Age of the household head	0.0266 (0.0586)	0.45	0.120** (0.0561)	2.14

Age squared of the head	-0.323 (0.844)	-0.38	-1.715 (0.772)	-1.22
Gender of the household head	-0.0602 (0.0841)	-0.72	0.0786 (0.140)	0.56
Educational level of the head: illiterate (reference)				
Educational level of the head: 1-8 grade	0.151* (0.0762)	1.98	0.0782 (0.173)	0.45
Educational level: high school and above	0.428*** (0.0904)	4.73	0.775*** (0.208)	3.72
Available working labor	0.0235 (0.0253)	0.93	0.0153 (0.0309)	0.49
Fruit farming experience	0.00418 (0.00847)	0.49	0.0176** (0.00645)	2.72
Distance to the nearest market	-0.00233 (0.00228)	-1.02	-0.00959*** (0.00317)	-3.02
Frequency of extension contacts per year	0.0188*** (0.00435)	4.32	0.0242*** (0.00633)	3.83
Access to price information	0.104 (0.0689)	1.51	0.0434 (0.116)	0.37
Ownership of transportation asset	0.0948 (0.0602)	1.57	0.756*** (0.131)	5.76
Membership in local cooperatives	0.226* (0.132)	1.71	0.290** (0.123)	2.36
Ownership of mobile phone	0.119* (0.0621)	1.91	0.307** (0.138)	2.22
Constant	0.996 (3.011)	0.33	6.781* (2.659)	2.55
Sigma	0.245***	11.89	0.507***	15.86
Number of observations	161		223	
Wald chi ² (14)	42.13***		46.26***	
Log likelihood	-40.68		-130.48	

Note: Standard errors in parentheses. ***, ** and * represents 1%, 5% and 10% significance levels, respectively

Source: Own survey data (2019/20)

Household size had a significant and negative relationship with the probability of participation decisions in both apple and mango value chains. The negative coefficient of household size with the probability of participation in both apple and mango value chains, perhaps because larger family size had more dependents and increased consumption. The more the household consumption requirement, the less a farmer could decide to participate in the fruits value chain. However, the literature by Masuku et al. (2001) revealed that even though large family size reduces the probability of participating in the market economy, it also signifies access to active labor for production and marketing activities. The result of the current study contradicts the findings held by Kassa et al. (2017), whereas it is a similar finding with Girmalem et al. (2019; Megerssa, Negash, Bekele, and Namera (2020).

Plot size: Unlike apple value chain participation, plot size had a positive significant influence on the decision to participate in the mango value chain. In an agrarian society like Ethiopia, the land is the most essential means because of its role in any economic activity including farming. A study by (Tarekegn et al., 2020; Tufa et al., 2014) supported this finding that the plot size allocated for fruit crops positively and significantly influences growers' participation decisions in production and marketing. This result also supports the literature (Tesfay, 2008) that landholding size has important implications for the production of market-oriented crops like apple and mango. Also, Jaleta et al. (2009) showed that cultivable land size to be an important factor in persuading farmers to supply their produce to the market.

Farming experience is another crucial factor in influencing growers' production and marketing capabilities. The variable is highly significant and positively associated with both apple and mango growers' probability to participate in value chains. In addition, it had a positive significant effect on mango farmers' intensity of value chain participation, but an insignificant effect on apple farmers' intensity of value chain participation. Other things being constant, the coefficients showed that as experience increases by a year, the probability of participating in value chain increases by 20% and 7% for apple and mango households, respectively. The finding is theoretically acceptable as more experienced growers may have more production and marketing linkage and information. This finding was consistent with the findings of Tadesse (2011) and Hailu (2016), who demonstrated that as farmer experience grew, so did the volume of avocado and onion crops supplied to the market.

The incidence of disease and insect pests had a statistically negative relationship and highly significant with both apple and mango growers' participation decisions. The negative relationship with both apple and mango growers' participation decision reaffirms how the variable is becoming a major challenge influencing the grower's participation. This result is in agreement with the study results by Nigussie, Fisseha, Alemayehu, and Abele (2019). However, in terms of relationships, their finding was unexpectedly a positive relationship with apple growers. A study by Dessalegn et al. (2014) revealed that powdery mildew and anthracnose are the two most common fungal diseases of mango trees in one of my study area (Bahir Dar Zuria district). Similarly, scale borer, aphid, and caterpillar are the major insect

pests affecting apple tree production. Diseases such as twig blight, apple scab, and powdery mildew are the major ones that contributed to the reduction of apple production and productivity (Atreya & Kafle, 2016).

Perceived wild animals as a serious problem had a negative significant effect on growers' probability of participation in the mango value chain, but insignificant relationship with apple farmers' value chain participation decision. This variable decreases the probability of value chain participation for mango by 2.108%, indicates how much this variable deters mango farmers from participation in the value chain. In the areas, mango farmers reported that the major wild animals damaged their fruits produce includes apes, baboons, and birds.

Distance to the nearest market had a statistically negative influence on sales volume for mango, but an insignificant effect for apple. The variable was specified in walking time on foot in minutes from respondents' residence to the market. The negative effect of distance to the nearest market implies that farmers closer to the market have access to better market facilities and buyers. As the distance to the nearest market from farmers' residences increases by a minute, mango produce supplied for sale is decreased by 0.0096 quintals. Besides, the shorter the market distance would be the reduced transportation costs and reduced walking time. Previous findings by Habtamu (2015); and Tufa et al. (2014) supports this result.

The frequency of extension contact had a positive and significant effect on the decision to participate in the apple value chain, but an insignificant effect on mango value chain participation. The variable had a positive and significant effect ($p < 0.01$) on the intensity of participation in both the apple and mango value chain. The positive significant effect of frequency of extension contact is theoretically acceptable, implies that frequent visit by extension agents' makes growers aware of current information regarding new agricultural practices that might enhance production and marketing and therefore increase their decision and intensity of participation in the value chain. The finding is similar to that of Abrha, Emanna, and Gebre (2020); Tarekegn et al. (2020); and Tufa et al. (2014). This result is quite relevant as extension service plays an important role in the production and marketing of cash crops like apple and mango.

Ownership of transportation asset: the findings further underscore that ownership of transportation assets (e.g., equines and cart) had a positive and significant effect ($p < 0.01$) on sales volume for mango, but an insignificant effect on apple. Ownership of transportation assets plays an important role in reducing transportation costs. It also offers more chances of finding marketing alternatives and encourages participating in the value chain. The positive effect of the finding is consistent with the study of Kassaw, Birhane, and Alemayehu (2019); and Regasa et al. (2019).

Membership in local cooperatives: the coefficient of membership in local cooperatives is statistically significant and positively related to value chain participation for both apple and mango households. The positive effect of membership in local cooperatives on the decision to and intensity of participation in both apple and mango value chains suggests that farmers' cooperatives and associations can be a good information exchange platform enabling growers to share experiences to increase production and marketing decisions. This result supports the literature (e.g., Asfaw, Gunjal, Mwangi, & Seboka, 1997) that membership in cooperatives has important implications for producers to be exposed to information and aware of improved agricultural practices.

Access to price information had a positive and significant effect on the decision to participate in apple, but an insignificant effect for mango. Moreover, access to price information was another key variable that positively influences the decision to participate in the apple value chain. This result is also quite relevant as information plays an important role in the marketing of cash crops like apple and mango. The result is in line with economic theory by Alene et al. (2008), who revealed the presence of a positive association between price and sales proportion and approve price to be an inducement to supply for sale. The result is also consistent with the findings of Mbapila, Lazaro, and Karantininis (2019).

Ownership of mobile phones: the coefficient of ownership of mobile phones is statistically significant and positively related to the intensity of participation for both apple and mango growers. The positive coefficient of ownership of mobile phone suggests that mobile phone is important information communication equipment and helps growers become aware of up-to-

date information regarding production and marketing activities and therefore increase their motivation to participate in the value chain. This result supports the literature by Hoang (2020).

Total livestock size measured in tropical livestock unit (TLU) had a statistically negative influence on the decision to participate for apple, but an insignificant effect for mango. Finally, though not significant, the household labor force in man equivalent had a positive relationship with both apple and mango growers' intensity of participation in the value chain. In rural Ethiopia, livestock holding might indicate a specialization in livestock farming, in which involvement in fruits production like mango may be less likely. However, the reason for a negative relationship with apple growers might be ownership of such assets diverts the household into an alternative source of earnings. The result is consistent with the findings of Jaleta et al. (2009) but contradicts the findings of Temesgen and Hiwot (2017), who reported that total livestock holding improves small-scales' decision to participate in cash crops like apple and mango. Likewise, the study of Hagos, Dibaba, Bekele, and Alemu (2020) confirmed that the income from livestock sales had a negative effect on the quantity of mangoes sold. This implies that farm households with more livestock resources will participate in the mango market less.

6.5 Chapter Summary

Using household-level data, this chapter emphasized examining the determinants of small-scale farmers' participation decision and intensity of participation in apple and mango value chains in the Upper Blue Nile Basin, Ethiopia. Employing combinations of descriptive statistics (Chapter five) and the double hurdle model, the study has tried to look into the socio-economic, institutional, demographic, and other non-price constraints. The result shows that the probability of a farmer being participating in the apple value chain increases with household head education level, extension contacts, fruit farming experience, and membership in local cooperatives, while decreases with household size and incidence of disease and insect pests. Moreover, mango plot size and membership in local cooperatives increase the probability of participation decisions in the mango value chain. Furthermore, households' intensity of participation in the apple value chain increases with education level and extension contacts, whereas age squared and distance to the nearest market decrease their intensity of participation in the mango value chain.

CHAPTER SEVEN

WELFARE EFFECTS OF SMALL-SCALE FARMERS’ PARTICIPATION IN APPLE AND MANGO VALUE CHAINS IN ETHIOPIA

7.0 Introduction

The purpose of this chapter was to examine the effects of apple and mango farmers participating in the value chain on household economic welfare as measured by the expenditure approach in Ethiopia's Upper Blue Nile Basin. The Chapter starts by introducing context for the problem. The second section explains the analytical model specifications. The third section goes over how to evaluate household economic well-being. The fourth section contains the findings and discussions. This is followed by a summary of the chapter.

7.1 Context for the Problem

The demand for high-value agricultural products such as fruits and vegetables is growing worldwide (Barrett et al., 2020; Quisumbing et al., 2015). From the year 2000 to 2017, these products’ demand has increased by 21% and 15% in both international and local markets, respectively (Gheri, 2020). Within the developing countries, significant shifts in food baskets towards high-value agricultural products are evident, leading to diversification of agricultural production (Reardon et al., 2019). The increase in demand, particularly in developing nations, was triggered by rapid population growth, increasing urbanization, rising incomes, access to new information communication technologies, and dietary changes (Barrett et al., 2012; Reardon, 2015; Wiggins, 2014). Moreover, the growing transformation of agri-food systems in developing countries promises new business opportunities to overcome the problem of integrating smallholders into international and local markets (Devaux et al., 2018; Lundy et al., 2012; Tschirley et al., 2015). Of particular interest are value chains that link producers with traders and consumers of agricultural products (Lie, 2017).

Modernizing agri-food systems is a relatively recent trend in Sub-Saharan Africa (SSA) (C. B. Barrett et al., 2020; Gómez et al., 2020). In SSA, the issue of economic welfare gains to farm

households from participation in agri-food value chains has acquired much significance in recent times (Barrett et al., 2019; Joosten et al., 2011). According to (Barrett et al., 2019), farm households have a high potential to derive livelihoods from value chain-oriented agriculture. The participation of small-scale farmers in agricultural value chains is seen as an essential way of improving their household welfare (Bernard & Taffesse, 2012; Herrmann et al., 2018; Kissoly et al., 2017; Martey et al., 2017; Mojo et al., 2017) and thus promoting rural development and poverty reduction (Bellemare, 2012; Mitchell et al., 2009). In many SSA countries, where about 70% of the population relies on agriculture for their livelihoods, poor small-scale farmers can transform their surplus into earnings if only they get the capacity to engage in agri-food value chains (Herrmann et al., 2018; Kissoly et al., 2017). There is a demand for high-value agricultural products in SSA, and especially in Ethiopia where farmers still seem averse to engaging in high-value crops. This was observed in the fruits sub-sector (Worako, 2015).

Most of the reviewed empirical studies revealed that agri-food value chains increased farm household income and food security. These effects have been attributed to: improved access to value chains (Bernard & Taffesse, 2012; Herrmann et al., 2018; Kissoly et al., 2017), stimulating innovation via facilitating the flow of information exchange (Fischer & Qaim, 2012), and increasing household income (e.g., Aku, Mshenga, Afari-Sefa, & Ochieng, 2018; Amare et al., 2019; Hoken & Su, 2015; Krause, Faße, & Grote, 2019; Mulatu, Haji, Legesse, & Ketema, 2017; Muriithi & Matz, 2015; Olounlade et al., 2020; Verhofstadt & Maertens, 2015). However, investigation of value chain participation effect on each household's economic welfare is not yet adequately studied. Even the one recently studied by Herrmann et al. (2018); Kissoly et al. (2017); Martey et al. (2017) assessed the effects of value chain participation on farm households' welfare used a propensity score matching (PSM) approach. However, the PSM technique is known for its limitation to account for unobserved heterogeneity, resulting in bias estimates. The endogenous switching regression (ESR) model is a robust empirical approach that predicts the counterfactual effect of choice regimes when selectivity bias arises (Alene & Manyong, 2007). The ESR model used to estimate counterfactual outcomes based on conditional expectation assumptions while controlling observed and unobserved heterogeneity. The model also controls the potential systematic differences between treatment and control groups regarding welfare functions (Deb & Trivedi,

2006). This study seeks to bridge this gap and handle the problem of endogeneity using recent cross-sectional data.

Moreover, most of the locally existing empirical studies (e.g., Gebre et al., 2020; Getahun et al., 2018; Honja, 2014b; Mengesha et al., 2019; Tarekegn et al., 2020) concentrate mostly on southern and central parts of Ethiopia. They thus may have limited contextual relevance to north-western Ethiopia. That means, results from these studies vary depending on the product being considered, the number and organization of available channels, and the institutional, technical, social, and economic environments the farmers operate in. Despite their significant contributions to the livelihood of millions of people in the Upper-Blue Nile Basin of Ethiopia, apple and mango fruits have not been given research attention. Therefore, this study examines the effects of participation in the fruit value chain on small-scale farmers' economic welfare in Ethiopia's Upper Blue Nile Basin, focusing on mango and apple crops.

Overall, this paper aims to contribute to the existing literature on the effect of fruit value chain participation. First, this study is primarily agro-ecological based and covers highland, midland, and lowland areas. It also covered a largest basin of the country with a representative sample size. This has allowed us to include several policy-relevant variables that were not included in previous studies. Second, to the best of my knowledge, this is the first rigorous paper on the relationship between household welfare and fruit value chain participation in North-western Ethiopia. Third, many studies have used household income as an indicator of household welfare. However, given the limitations of this indicator (Dercon et al., 2009), this study used consumption expenditure approach, which is rarely carried out in the same study. This research utilized the ESR model to control for selection bias and unobservable farmers' heterogeneity since self-motivation and other individual skills of farmers are likely to impact their decision to participate.

Ethiopia has nearly 38 fruit species grown by small-scale farmers within various agro-ecologies, mainly for income generation and home consumption (Worako, 2015). Avocado (*Persea americana*), mango (*Mangifera indica*), pineapple (*Ananas comosus*), apple (*Malus domestica*), banana (*Musa paradisca*), papaya (*Carica papaya*), and orange (*Citrus sinensis*) are naturalized to the Ethiopian agro-ecologies. Most of these fruit crops are grown in farmers'

home gardens (IBC, 2012). The majority of Ethiopia's fruits are produced by small-scale farmers on small plots of land, accounting for 94% of total fruit production (Alemayehu et al., 2015; Gebre-Selassie & Bekele, 2012). There is great potential for the fruit industry to improve living conditions for the poor in Ethiopia (Wiersinga & Jager, 2009). A total of 114,421.81 hectares of land was covered under fruit production, while 7,924,30.692 metric tonnes of fruit have been produced locally in the 2018/19 cropping calendar. Furthermore, 2,400 metric tonnes of fruit have been exported to Djibouti, Sudan, and Somalia (CSA, 2019).

Mango is one of the most widely planted fruit crops in Ethiopia. Its production increased from 70,000 metric tons in 2013/14 to 105,000 metric tons in 2017/18, which has increased by 45% (GAIN, 2018). Kent, Keitt, Tommy Atkins, and Apple mango are among the main cultivars grown in the country (Bekele et al., 2020). In the midland and lowland areas of the Upper Blue Nile Basin, mango-an an evergreen fruit crop is the leading fruit produced by small-scale farmers. On the other hand, apple production has been expanded across several highlands of Ethiopia, including Upper-Blue Nile Basin, with the help of government and non-governmental organizations and private producers, including small-scale farmers. In addition to its dietary importance, apple trees in the Ethiopian highlands can improve soil conservation (Fetena & Lemma, 2014). In their home compound in Chenchu town, southern Ethiopia, British missionaries first introduced apple seedlings to be planted (Behailu & Kebede, 2018; Hayesso, 2008). Both apples and mangoes were selected as the two most important crops to be considered for this study because they are high-value cash-commodities and are mainly produced in the Upper Blue Nile Basin.

7.2 Analytical Model

As already mentioned, this study is concerned with estimating the effect of farmers' participation in the fruit value chain on their household economic welfare indicators, such as consumption expenditure. This can be specified as:

$$y = \beta X + \delta M_i + \eta \quad (9)$$

where y represents consumption expenditure. X is a vector of explanatory variables for household participation that impacts the outcome variable. The coefficient δ measures the effect of farmers' participation on household economic welfare. M_i is a dummy for household

participation. This variable is potentially endogenous, as participation is not assigned randomly, and households may decide whether to participate or not (Lokshin & Sajaia, 2004). In other words, farmers who participated may have different characteristics from non-participating farmers, and these variations may vague the real effect of participation on household economic welfare effects (Smale, Diakité, & Keita, 2012). Thus, the use of the Ordinary Least Square (OLS) regression technique to estimate the parameters of Equation (9) would result in biased estimates (Lee, 1978; Wooldridge, 2010).

In the OLS, the coefficients on the control variables would be the same for participants and non-participants. Due to this limitation of OLS, most documented empirical studies applied the PSM model to examine household welfare effects. Although PSM addresses the above problem by preventing functional form assumptions, it assumes that selection is based on observable variables. Still, there is likely to be unobserved heterogeneity because self-motivation and other individual skills of farmers are likely to impact their decision to participate (Lee, 1978; Wooldridge, 2010). Therefore, PSM generates a bias when there are unobserved heterogeneity factors that affect farmers' participation and the outcome indicators. The ESR model is used to address these issues. In the ESR method, separate outcome equations are specified for each regime, subject to a selection equation. Thus, in this case, this study estimate separate household economic welfare indicators for both participants and non-participants, subject to a decision on participation (Alene & Manyong, 2007; Lokshin & Sajaia, 2004).

In applying the ESR model, the study followed two requisite steps. Step one focuses on the selection equation's definition, whereby farmers' decision to participate in the value chain was determined. In this case, it was assumed that small-scale farmers' participation in the fruits value chain is a binary choice in which the returns from participation are greater than those of non-participants. The difference between the returns from participation in the apple and mango fruits value chain may be denoted as M^* , such that $M^* > 0$, suggesting the returns from participation in the apple and mango value chain exceeds that of non-participation. Even though M^* is not observable, it can be stated as a function of observable element:

$$M_i^* = \alpha Z_i + \eta_i \text{ with } M_i = \begin{cases} 1, & \text{if } M_i^* > 0 \\ 0, & \text{otherwise} \end{cases} \quad (10)$$

where M_i^* = the latent binary variable; M_i = its observable counterpart; Z_i = set of covariates such as the age of the household head, education level, household size, farming experience, frequency of extension contacts, access to price information, plot size, the incidence of disease and insect pests, which determine household's participation; α is a vector of parameters to be estimated; η_i is the disturbance term that captures all unmeasured variables. In this stage, the probit model is used for estimation purposes.

Step two focuses on specifying two main outcome equations based on farmers' participation in the apple and mango value chains. This is done based on the following models as suggested by Di Falco, Veronesi, and Yesuf (2011); Ma and Abdulai (2016).

$$\text{Regime 1 (Participants): } Y_{1i} = \beta_1 X_{1i} + \varepsilon_{1i} \text{ if } M_i = 1 \quad (11a)$$

$$\text{Regime 2 (Non-participants): } Y_{2i} = \beta_2 X_{2i} + \varepsilon_{2i} \text{ if } M_i = 0 \quad (11b)$$

where Y_i is the per capita household consumption expenditure in each regime; X_i represents explanatory variable influencing the outcome variable, and β is a vector of parameters; ε_i are random disturbances. The error terms in equations (10) and (11) assumed to be jointly normally distributed with zero mean vector and covariance matrix are described as:

$$\text{cov}(\eta_i, \varepsilon_{1i}, \varepsilon_{2i}) = \begin{bmatrix} \sigma_\eta^2 & \sigma_{\eta\varepsilon1} & \sigma_{\eta\varepsilon2} \\ \sigma_{\varepsilon1\eta} & \sigma_{\varepsilon1}^2 & \sigma_{\varepsilon1\varepsilon2} \\ \sigma_{\varepsilon2\eta} & \sigma_{\varepsilon2\varepsilon1} & \sigma_{\varepsilon2}^2 \end{bmatrix} \quad (12)$$

where σ_η^2 is the variance of the error term (η) in the selection Eq. (10), $\sigma_{\varepsilon1}^2$ and $\sigma_{\varepsilon2}^2$ are the variances of the error terms in the consumption functions equation (11a) and (11b). Besides, $\sigma_{\varepsilon1\eta}$ and $\sigma_{\varepsilon2\eta}$ represent the covariances between η_i and ε_{1i} , and between η_i and ε_{2i} , respectively. Therefore, conditional on the sample selection, the expected values of the error terms ε_{1i} and ε_{2i} are given by:

$$E[\varepsilon_{1i}|M_i = 1] = \sigma_{\varepsilon1\eta} \frac{\varphi(\alpha Z_i)}{\Phi(\alpha Z_i)} = \sigma_{\varepsilon1\eta} \lambda_{1i} \quad (13a)$$

$$E[\varepsilon_{2i}|M_i = 0] = -\sigma_{\varepsilon2\eta} \frac{\varphi(\alpha Z_i)}{1-\Phi(\alpha Z_i)} = \sigma_{\varepsilon2\eta} \lambda_{2i} \quad (13b)$$

where $\varphi(\cdot)$ is the standard normal probability density function, $\Phi(\cdot)$ is the standard normal cumulative density function, $\lambda_{1i} = \frac{\varphi(\alpha Z_i)}{\Phi(\alpha Z_i)}$ and $\lambda_{2i} = \frac{\varphi(\alpha Z_i)}{1-\Phi(\alpha Z_i)}$. λ_{1i} and λ_{2i} represent the inverse

of Mill's ratio (Mills, 1926) computed from Eq. (10) and included in (11a) and (11b) to correct for selection bias.

In this study, the identification of the ESR model enhanced by including the instrumental variables in Z, thus avoiding the potential overlap between Z and X. Referring to empirical procedures from Di Falco et al. (2011), the instrument variable used in this study is the variable related to the price information source (i.e., access to price information via neighbourhood farmer and government extension workers) in the apple and mango fruits value chain that affects participation decision without influencing the outcome variable (household consumption expenditure). The study established the admissibility of the selection instrument by conducting a simple falsification test based on the equation by (Di Falco et al. (2011). Results show that the identification variable in both apple and mango specifications are jointly significant in explaining participation decision ($\chi^2 = 64.14, p = 0.000$, for apple; and $\chi^2 = 72.80, p = 0.000$, for mango) but insignificant relationship with the outcome variable (by households that did not participate) ($F = 1.48, p = 0.131$, for apple; and $F = 1.49, p = 0.124$, for mango).

The Full Information Maximum Likelihood (FIML) technique is efficient for the ESR, simultaneously estimating both the selection (decision to participate) and outcome equations to yield consistent standard errors (Clougherty & Duso, 2015; Lokshin & Sajaia, 2004). The FIML technique estimates the ESR model parameters using the *movestay* command in STATA software (Lokshin & Sajaia, 2004). A thorough explanation of the FIML's log-likelihood Function for switching regression technique is offered by Lokshin and Sajaia (2004). Following Di Falco et al. (2011); Ma and Abdulai (2016), the ESR model can be employed to compare the expected outcome (i.e., consumption expenditure) of fruit households that participated in the apple and mango value chain (a) with respect to households that did not participate (b), and to investigate the expected outcome (i.e., consumption expenditure) in the counterfactual hypothetical cases (c) that the participated apple and mango households did not participate, and (d) that the non-participant apple and mango households participated (Table 11). This can be described as follows:

$$E(Y_{1i}|M_i = 1) = X_{1i}\beta_1 + \sigma_{\varepsilon_1\eta}\lambda_{1i} \quad (14a)$$

$$E(Y_{2i}|M_i = 0) = X_{2i}\beta_2 + \sigma_{\varepsilon_2\eta}\lambda_{2i} \quad (14b)$$

$$E(Y_{2i}|M_i = 1) = X_{1i}\beta_2 + \sigma_{\varepsilon_2\eta}\lambda_{1i} \quad (14c)$$

$$E(Y_{1i}|M_i = 0) = X_{2i}\beta_1 + \sigma_{\varepsilon_1\eta}\lambda_{2i} \quad (14d)$$

Accordingly, the average treatment effect on the treated (ATT), which represents the economic welfare effect of fruit households' participation in the value chain (based on their households' consumption expenditure), is computed as the difference between (14a) and (14c);

$$\begin{aligned} \text{ATT} &= E(Y_{1i}|M_i = 1) - E(Y_{2i}|M_i = 1) \\ &= X_{1i}(\beta_1 - \beta_2) + \lambda_{1i}(\sigma_{\varepsilon_1\eta} - \sigma_{\varepsilon_2\eta}) \end{aligned} \quad (15)$$

Besides, the study computed the expected change in non-participant's economic welfare. Hence, the effect of the treatment on the untreated (ATU) for the fruit households that did not participate in the value chain is hereby expressed as the difference between (14d) and (14b).

$$\begin{aligned} \text{ATU} &= E(Y_{1i}|M_i = 0) - E(Y_{2i}|M_i = 0) \\ &= X_{2i}(\beta_1 - \beta_2) + \lambda_{2i}(\sigma_{\varepsilon_1\eta} - \sigma_{\varepsilon_2\eta}) \end{aligned} \quad (16)$$

The selection term (λ) adjusts the problems due to unobserved variables.

Furthermore, using conditional expected outcomes in Eq. (14a) to (14d), this study computed heterogeneity effects (HE), because participants may have had higher consumption expenditures than non-participants even if they did not participate in the fruits value chain, due to unobserved factors. Hence, a base HE is described as the difference between Eq. (14a) and (14d) for participants, whereas for non-participants as the difference between Eq. (14c) to (14b). Finally, to examine whether the effect of participating in the fruits value chain is higher or lower for households that participated had they not participated, or for households that did not participate had they participated requires calculations of transitional heterogeneity effects (TH). This is computed from the differences between HE₁ and HE₂ or ATT and ATU. This can be summarized in a table format, according to Di Falco et al. (2011), as follows.

Table 11. Conditional Expectations, Treatment, and Heterogeneity Effects

Subsamples	Decision stage		Treatment Effects (ATE)
	Participate (ATT)	Not participate (ATU)	
Participants	$E(Y_{1i} M_i = 1)$ (7a)	$E(Y_{2i} M_i = 1)$ (7c)	TT

Non-participants	$E(Y_{1i} M_i = 0)$ (7d)	$E(Y_{2i} M_i = 0)$ (7b)	TU
Heterogeneity effects	$HE_1 = (7a-7d)$	$HE_2 = (7c-7b)$	TH

Notes: (a) and (b) are the observed expected consumption expenditure outcome; (c) & (d) are counterfactual expected outcomes

$M_i = 1$ if the respondent participated in the fruits value chain; $M_i = 0$ if the respondents did not participate

Y_{1i} - represents consumption expenditure outcome if participated

Y_{2i} - represents consumption expenditure outcome if they did not participate

TT - represents the effect of the treatment (i.e., participation) on the treated (i.e., participated farmers)

TU - represents the effect of the treatment on the untreated (i.e., farmers didn't participate)

HE_1 - represents heterogeneity effects for participated farmers, and HE_2 – for farmers who did not participate

TH is the difference between TT and TU, i.e., transitional heterogeneity

Source: Adapted from Di Falco et al. (2011)

7.3 Measuring Household Welfare

In this study, the term ‘welfare’ is defined as the meaning conveyed by the concept of ‘well-being’ widely used in economics and frequently defined by certain economic indicators (Deaton & Zaidi, 2002). In developing nations, while household income could be used to measure household welfare, consumption expenditure is sometimes recommended. Consumption expenditure is less prone to measurement errors and seasonal fluctuations and, therefore, more reliable (Dercon et al., 2009). Consumption expenditure data also reflect a household’s decision on nutrition and health (Atkinson, 1992). Thus, in this study, consumption expenditure adjusted by the number of adult equivalents was used as a measure for the household economic welfare indicator. Household consumption expenditure data for the preceding year were obtained for 12 months. This was collected utilizing purchased items, and the amount of money spent each month and aggregated to the annual level. The per capita consumption indicator of household economic welfare is centred on food (home-produced + purchased + gift or aid food) and non-food expenditures. Previous studies that employed consumption expenditure to measure farm household welfare in Ethiopia include (Abro, Alemu, & Hanjra, 2014; Ahmed, Geleta, Tazeze, & Andualem, 2017).

7.4 Results and Discussion

7.4.1 Descriptive Results

Table 4 presents the descriptive results of variables used in the regression model, disaggregated by participation status. The respondents' characteristics comprised household characteristics, farm characteristics, institutional support variables, transaction cost variables, and per capita consumption expenditure. Most of these variables have been used elsewhere in evaluating program/treatment effects (e.g., Bahta, Owusu-Sekyere, & Tlalang, 2018; Manda, Khonje, Alene, & Gondwe, 2017; Mmbando, Wale, & Baiyegunhi, 2015b; Musara & Musemwa, 2020; Seng, 2016; Warinda, M. Nyariki, Wambua, & Muasya, 2020). The study reveals that about 48.45% and 59.64% of apple and mango households, respectively, participated in the fruit value chain. This shows that participants and non-participants are systematically different. The treatment group exhibits higher consumption expenditure than the control group by a factor of 4.088 and 5.023 Ethiopian Birr (ETB) for apple and mango households, respectively. About 56.67% of apple participants had access to price information via neighbourhood farmer, whereas 37.44% of apple participants had access to price information via government extension workers. Similarly, about 34.36 and 39.47% of mango participants had access to price information through neighbourhood farmers and government extension workers, respectively.

7.4.2 Empirical Results

Table 12 presents the results of estimations from the two-stage ESR model. In the first-stage of ESR (i.e., selection Eq. of participation), the chapter only briefly discussed the results as the aim is to examine the effects of apple and mango value chain participation on the economic welfare of households. Columns 2 and 5 present results for apple and mango fruits value chain participation decision from the selection equation of the ESR model, respectively. Results (column 2) indicate that among 17 covariates, seven of them (i.e., gender of the household head, education level, household size, farming experience, total production, access to price information, and frequency of extension contacts) are significantly associated with apple farmers' value chain participation. Likewise, results (column 5) show that age of the household head, education level, plot size, off-farm income, total production, the incidence of disease and

insects, perceived wild animals as a serious problem, and access to price information is significantly associated with mango farmers' value chain participation.

The second-stage estimates (i.e., outcome Eq. of consumption expenditure) of the ESR model results show factors influencing household consumption expenditure for both participants and non-participants. The findings show that a farmer's age has a negative impact on consumption expenditure for mango value chain participants. This implies that as the farmer gets older, their per capita consumption expenditure decreases. This finding is inconsistent with the study by Mmbando et al. (2015b), who found that age positively impacts consumption expenditure for pigeon pea market participants in Tanzania.

The gender of the respondent positively impacts consumption expenditure for both apple and mango value chain participants. This implies that the coefficient of the gender of the household head exhibits that the probability of apple and mango value chain participation increases with being male. Education has a significant positive effect on both participants and non-participants in the mango value chain. This might be linked to the fact that the probability of mango farmers participating in the fruits value chain enhances as their level of education increases. This finding is consistent with the study by Bahta et al. (2018), who found that gain in consumption expenditure, is highest for households with educated heads. This may mean that education plays a vital role in adequately adapting households to new production technologies and market requirements.

Farming experience impacts positively on both apple and mango value chain participants' consumption expenditure. This reveals that years of experience increased the probability of consumer spending among the participant farmers. In their study, Martey et al. (2012) argue that experienced farmers can make better production decisions and have a higher probability of value chain participation. The negative coefficient of off-farm income on apple value chain participants implies that income from non-agricultural paid jobs reduces household food consumption expenditure. This finding is in line with Seng (2016) study, which revealed that farm households engaging on off-farm income are likely to enjoy lower household food security.

Plot size impacts positively on the household consumption expenditure of both apple and mango value chain participants. This implies that households with large plots are more likely to engage in value chains. This result is consistent with Seng (2016) findings, who reported that landholding has important implications on market participants food security in Cambodia. The total production of apple and mango measured in quintals, positively and significantly impacts participants' consumption expenditure. This could imply that increased participation in the value chain is a function of apple and mango productivity. Higher apple and mango production could drive value chain participation, as growers with high productivity have a surplus to sell on the market. This finding is consistent with that of Kyaw et al. (2018); Martey et al. (2012). Perceived wild animals as a serious problem negatively and significantly impact participants' consumption expenditure in the apple value chain. In their finding, Gebru et al. (2019) argue that perceived production risks such as disease and wild animals discouraged households from engaging in the fruit and vegetable business.

The frequency of extension contacts positively and significantly impacts the consumption expenditure of mango participants; suggesting that extension contact is among the important prerequisites for value chain participation (Fischer, Patt, Ochieng, & Mvungi, 2020). Likewise, access to price information positively influences the consumption expenditure of both specifications (participants and non-participants) in the apple value chain. The positive outcome of price information suggests that households with access to price information are likely to market their products. This finding is consistent with the study by Bahta et al. (2018).

Table 12. Full information maximum likelihood estimates of the switching regression model

Variables	Apple producers			Mango producers		
	Selection Eq. of participation	Outcome Eq. of consumption expenditure		Selection Eq. of participation	Outcome Eq. of consumption expenditure	
		Participants	Non-participants		Participants	Non-participants
Age	-0.0383 (0.306)	-0.0281 (0.0287)	0.0596 (0.0364)	0.470** (0.161)	-0.0542* (0.0310)	0.0334 (0.0239)
Age squared	1.436 (4.175)	0.389 (0.416)	-0.782 (0.509)	-6.823 (2.340)	0.716 (0.423)	-0.513 (0.338)
Gender (Male)	0.938** (0.435)	0.143*** (0.0454)	-0.0902 (0.0817)	0.219 (0.377)	0.162*** (0.0567)	-0.0354 (0.0536)
Education	0.187** (0.0802)	0.00392 (0.00384)	0.00930 (0.00966)	0.215** (0.0861)	0.0191*** (0.00714)	-0.0238** (0.0120)
Household size	-0.562*** (0.161)	-0.00470 (0.0103)	0.0187 (0.0163)	0.0763 (0.102)	0.000207 (0.0136)	0.00614 (0.0120)
Experience	0.300***	0.0142***	-0.0125	0.0418	0.00870***	-0.00168

	(0.0800)	(0.00636)	(0.00775)	(0.0440)	(0.00274)	(0.00309)
Off-farm income	-0.00372	-0.00596*	0.00579	-0.0572**	-0.00133	0.00312
	(0.00448)	(0.00354)	(0.00628)	(0.0271)	(0.00438)	(0.00292)
Plot size	0.490	0.120***	-1.574	4.908**	0.312**	-0.267
	(3.531)	(0.344)	(0.538)	(2.112)	(0.160)	(0.220)
Total production	1.011***	0.0321***	-0.0327	0.225***	0.00614***	0.00379
	(0.289)	(0.00890)	(0.0285)	(0.0615)	(0.00170)	(0.00494)
Disease & insects	-0.550	-0.00274	-0.0567	-1.516**	0.0732	-0.0498
	(0.524)	(0.0473)	(0.0588)	(0.586)	(0.0617)	(0.0453)
Wild animals	-0.228	-0.101***	-0.00345	-2.787***	-0.0923	-0.0466
	(0.474)	(0.0379)	(0.0553)	(0.614)	(0.0642)	(0.0501)
Market distance	0.0160	-0.00245**	0.00200	0.0161	-0.0000696	0.000447
	(0.0137)	(0.00120)	(0.00208)	(0.0114)	(0.00145)	(0.00145)
Livestock holding	-0.121	-0.00152	0.00995	0.00201	0.00349	0.00218
	(0.0971)	(0.0121)	(0.0103)	(0.0492)	(0.00463)	(0.00520)
Price information	1.143***	0.104**	0.171***	1.235***	-0.0494	-0.181***
	(0.390)	(0.0540)	(0.0640)	(0.410)	(0.0518)	(0.0530)
Extension contacts	0.114***	0.00308	-0.0151***	0.0664	0.0107***	0.00275
	(0.0358)	(0.00256)	(0.00359)	(0.0557)	(0.00394)	(0.00532)
Neighborhood	1.328***			1.675***		
	(0.444)			(0.451)		
Extension worker	2.563***			1.601***		
	(0.753)			(0.462)		
Constant	-12.98	8.392***	12.00***	21.06***	7.630***	12.02***
	(13.67)	(1.478)	(1.737)	(7.931)	(1.420)	(1.196)
Sigma (σ_{ei})		0.237	0.157		0.241	0.175
		(0.022)	(0.015)		(0.0152)	(0.013)
rho (ρ_j)		-0.456	-0.061		-0.260	0.034
		(0.259)	(0.287)		(0.274)	(0.247)
Selection instruments (Wald test)	$\chi^2 = 64.14$ ***		F -stat = 1.48	$\chi^2 = 72.80$ ***		F -stat = 1.49
Observations	161		83	223		90

***, **, * shows significance at 1%, 5% and 10% levels. Robust standard errors in parentheses.

Source: Own field survey data (2019/20)

Table 13 exhibits the predicted treatment effects under actual and counterfactual conditions of the participation of small-scale farmers. The real causal effects are given by row-wise differences between actual and counterfactual outcomes. The estimated results indicate that participation in the apple and mango value chain increased household consumption expenditure by 17% and 18.5%, respectively. For non-participant households, the mean consumption expenditure would have been raised by 15% if they participated in the apple value chain and 8% had they been participated in the mango value chain. The transitional heterogeneity effect of both apple and mango consumption expenditure is positive, implying that the effect is greater for the participating farm household than the one that did not participate.

Table 13. Treatment effects of small-scale farmers' participation

Subsamples	Decision stage		
	Participate (ATT)	Not Participate (ATU)	Treatment Effect (ATE)
<i>(i)</i> Apple producers			
Participants	(a) 10.043	(c) 9.866	TT = 0.177 ***
Non-Participants	(d) 9.873	(b) 9.722	TU = 0.151***
Heterogeneity Effects	HE ₁ = 0.170	HE ₂ = 0.144	TH = 0.026
<i>(ii)</i> Mango producers			
Participants	(a) 10.179	(c) 9.992	TT = 0.187***
Non-Participants	(d) 10.104	(b) 10.020	TU = 0.084 ***
Heterogeneity Effects	HE ₁ = 0.132	HE ₂ = -0.028	TH = 0.160

Note: *** represents $p < 0.001$

Source: Own field survey data (2019/20)

Overall, the ATT results indicate that the apple and mango value chain's participation have a positive and significant effect on the economic welfare of farm households. This may be driven by the fact that growers belonging to the value chain have earned relatively higher prices for their products. The finding is consistent with Kissoly et al. (2017), who studied participation in the agri-food value chains in eastern Africa and identified high-value value chain participation to be linked to increased economic welfare and food security. In their analysis in Tanzania Mmbando et al. (2015b) showed that participation in maize and pigeon pea marketing increased the proportion of consumption spending by 19.8% and 28.9%, respectively. Likewise, Asfaw et al. (2012), in their study, showed that maize and pigeon pea market participation increases the proportion of consumption expenditure by 25% and 32% on average, respectively. This demonstrates the role of participation in the agri-food value chain in increasing the economic welfare of households.

7.5 Chapter Summary

This chapter examines the effects of small-scale apple and mango farmers' participation along the value chain, focusing on their household economic welfare. This household economic welfare is measured by the consumption expenditure approach. Primary data were collected

from a random sample of 384 households, 211 of which are fruit value chain participants and the rest are non-participants. Comparisons of average consumption expenditure between participants and non-participants in the apple and mango value chain have revealed some significant differences (Chapter five). However, knowledge of the average differences is not sufficient to understand the decision to participate across a sample of farmers, as they do not account for the effects of other characteristics that affect participation. Participation is thus modelled as a selection process, where the expected benefits of the fruit value chain drive farmers' decisions. Given that farm households self-select themselves into participants and non-participants, the ESR model is used to control for selectivity bias and capture the differential effect of participation in the fruit value chain of participants and non-participants. The study finds that the more apple and mango farmers join the value chain, the higher their consumption expenditure becomes. On average, the apple and mango value chain participation increased household consumption expenditure by about 17% and 18.5%, respectively.

CHAPTER EIGHT

FOOD SECURITY EFFECTS OF SMALL-SCALE FARMERS’ PARTICIPATION IN APPLE AND MANGO VALUE CHAINS IN NORTH-WESTERN ETHIOPIA

This Chapter investigates the effects of apple and mango smallholder farmers' participation along the value chain, with a focus on their household food security in Ethiopia's upper Blue Nile basin. The Chapter begins by discussing food security and its problems. The second section explains the analytical model specifications. The third section goes over how to measure household food security. The fourth section contains the findings and discussions. This is followed by a summary of the chapter.

8.1 Food Security and Problems

Food security has been a top priority and a global concern for decades (Conceição, Levine, Lipton, & Warren-Rodríguez, 2016). Among several definitions of food security, the most widely used definition is that “food security exists when all people have physical, social and economic access to adequate, safe and nutritious food at all times to meet their dietary needs and food preferences for an active and healthy life” (Ecker & Breisinger, 2012). In the first place, the definition focuses on the daily consumption of food, where distribution systems ensure food’s continued availability. Second, the concept of access to adequate and safe food includes the continued physical availability of food, and thirdly, the continued economic capacity to acquire food through the supply system. In developing countries, household food security is determined by what households can produce, storing, preparing, and purchasing from the market (Bickel, Nord, Price, Hamilton, & Cook, 2000). Correspondingly, food insecurity refers to “a situation in which people have no secure access to adequate amounts of safe and nutritious food for normal growth and development and for an active and healthy life” (Maxwell, Caldwell, & Langworthy, 2008). While some progress has been made in the fight against hunger in developing countries through increased food production, many people still have food insecurity and some form of malnutrition (Sibhatu, Krishna, & Qaim, 2015). Sub-

Saharan Africa's (SSA) widely experienced food security challenge is mainly attributed to the poor performance of its agricultural sector (Boliko, 2019).

One of the most likely pathways towards improving rural households' livelihoods and food security is integrating them into lucrative agricultural markets (Orr et al., 2018). Participation in viable markets demands system thinking to overcome barriers that limit smallholders' participation in international and local markets (Lundy et al., 2012; Tschirley et al., 2015). Of particular interest are agricultural value chains that link producers with traders and consumers of agricultural products (Lie, 2017). In agriculture, the value chain is simply described as a market-oriented approach that encompasses the entire range of activities that are undertaken to bring a product to end-users passing through the various stages of production, processing, distribution, and marketing (Devaux et al., 2018). In SSA, agricultural value chains are currently undergoing a rapid transformation driven by urbanization, dietary changes, technological changes, rising incomes, and expansion of food markets, among other underlying trends (Reardon, 2015). This increasing dynamism and transformation of agri-food systems offer farmers the opportunity to produce and sell high-value products, translating their vertically coordinated relationships into premium prices and letting them capture a bigger share of the price paid by final consumers (Wiggins, 2014). There is evidence in Ethiopia, as is elsewhere in SSA, increased access and participation of smallholders in cash-crop markets (e.g., fruits) present opportunities to improve their productivity, income, and food security (Gebru et al., 2019).

Apples and mangoes were selected as the two most important crops to be considered for the purpose of this study due to the fact that they are high-value cash-commodities and are mainly produced in the Upper-Blue Nile Basin. Moreover, these fruits have a high potential for the contribution of poverty reduction, income generation, and the attainment of household food security. Despite the rising importance of these fruits in the Ethiopian economy, there is insufficient empirical evidence of the effect of these fruits on many aspects of food security (Wiersinga & Jager, 2009). Most of the reviewed documented empirical studies such as Getahun et al. (2018), Mengesha et al. (2019), Gebre et al. (2020), and (Tarekegn et al. (2020) concentrate mostly on southern and central parts of Ethiopia, and therefore the contextual relevance to north-western Ethiopia may be scarce. That means, results from these studies vary

depending on the product being considered, the number and organization of available channels, and the institutional, technical, social, and economic environment the farmers operate in. Furthermore, many related studies conducted in different parts of Ethiopia such as Tamirat and Muluken (2018a), Getahun et al. (2018), Honja (2014a), and Rahiel, Zenebe, Leake, and Gebremedhin (2018) did not pay due attention to analyzing the food security effect; rather they focused mainly on identifying production potentials and constraints, marketing channels, and distribution of margins. Despite their significant contributions to the livelihood of millions of people in the Upper Blue Nile Basin, Ethiopia, fruit crops have not been given research attention. Therefore, this study envisages examining the effects of participation in the fruit value chain on small-scale farmers' food security in the Upper-Blue Nile Basin, Ethiopia, focusing on mango and apple crops.

8.2 Data Analysis

This study used descriptive and inferential statistics, and an econometric model to analyze data. Descriptive statistics, such as percentage, frequency, mean, and standard deviation were used to present summary statistics of quantitative data pertaining to socio-demographic, economic, and institutional characteristics of sample households. Inferential statistics, such as t-test and Chi-Square (χ^2) test, were used to assess the existence of statistically significant differences in observations between fruits value chain participant and non-participant groups of respondents. For the econometric analysis, the Propensity Score Matching (PSM) procedure was used to examine the food security effects of farmers' participation in the fruits value chain. The analysis employed different matching algorithms using the *psmatch2* command implemented on STATA 14.0 platform. In what follows, the results pertaining to estimation of propensity scores, Average Treatment Effect on the Treated (ATT), and matching quality analyses are presented.

Estimating the effect of treatment on outcomes is a major challenge because of the following three expected biases: (1) the selection of observables resulting from sampling bias, (2) the selection of a comparison group in the presence of externalities, (3) selection of unobservable resulting from differences between the treated and the control groups in the distribution of their unobserved characteristics (Wooldridge, 2010). In simple regression or logistic models, the

coefficients on the control variables would be the same for participants and non-participants. Due to this limitation, in the literature, most of the studies used the PSM model to examine the effect of treatment on outcomes (Smale et al., 2012). Because of its non-parametric approach to the balance of covariates between the treated and the control groups, the PSM method improves the ability of regression to produce reliable causal estimates (Conniffe, Gash, & O Connell, 2000). Despite many advantages, PSM cannot handle the third problem listed above (i.e., unobserved characteristics), and therefore depends on the quality of the observational data (Li, 2013). This study attempted to minimize this limitation by collecting quality data, the inclusion of the most relevant variables, and the use of recommended matching techniques. According to Dehejia and Wahba (2002), the PSM model can be specified as:

$$p(X) = Pr(D_i = 1|X) = E(D_i|X) \quad (17)$$

Where, $D_i = (0,1)$ is the dummy for value chain participation, and X represents the vector of household characteristics. The conditional distribution of X , given the propensity score $p(X)$, is similar in both groups of fruits value chain participants and non-participants.

In practice, a model (Logit or Probit for binary treatment) is estimated in which participation in a treatment is explained by several pre-treatment characteristics and then predictions of this estimation are used to create the propensity score that ranges from 0 to 1 (Aku et al., 2018; Rosenbaum & Rubin, 1983). Although both models provide almost similar output, this study used the Logit model to estimate the propensity score. In estimating the logit model, the dependent variable was participation in the fruits value chain, which takes the value of 1 if a household is a participant and 0 otherwise. According to Rosenbaum and Rubin (1983), the logit model can be specified as:

$$P_i = \frac{e^{z_i}}{1+e^{z_i}} \quad (18)$$

Where, P_i is the probability of participation.

$$Z_i = a_0 + \sum_{i=1}^n a_i X_i + U_i \quad (19)$$

Where, $i = 1, 2, 3, \dots, n$ a_0 = intercept, a_i = regression coefficients to be estimated, U_i = a disturbance term, and X_i = pre-intervention characteristics.

The probability that a household belongs to non-participant is:

$$1 - P_i = \frac{1}{1+e^{z_i}} \quad (20)$$

The odds ratio is
$$= \frac{P_i}{1-p_i} = e^{Z_i} \tag{21}$$

Taking the natural logarithm, then
$$Z_i = a_0 + \sum_{i=1}^n a_i X_i + U_i \tag{22}$$

The validity of the outputs of the PSM method depends on the satisfaction of two basic assumptions: the *Conditional Independence Assumption* (CIA) and the *Common Support Condition* (CSC) (Caliendo & Kopeinig, 2008). CIA (also known as *Unconfoundedness Assumption*) argues that treatment needs to meet the criterion of being exogenous, suggesting that any systematic difference in outcomes between treatment and control groups with the same values for characteristics X can be attributed to treatment. The *common support* or *overlap* condition means that there is sufficient overlap in the treated and untreated units' characteristics to find appropriate matches (or *common support*). After estimating the propensity scores, the ATT can then be estimated as:

$$\begin{aligned} ATT &= E(Y_{1i} - Y_{2i} | D_i = 1) \\ &= E[E(Y_{1i} - Y_{2i} | D_i = 1, P(X))] \\ &= E[E(Y_{1i} | D_i = 1, P(X)) - E(Y_{2i} | D_i = 0, P(X))] \end{aligned} \tag{23}$$

Where, Y_{1i} is the expected calorie intake if the household i participates in the fruits value chain; Y_{2i} is the expected calorie intake of household i if it chooses not to participate in the fruits value chain; $D_i = (0,1)$ is the dummy for value chain participation, and X represents the vector of household characteristics.

The propensity score is a continuous variable, and there is no way to get participants with the same score as its counterfactual(s). Thus, estimation of the propensity score is insufficient to compute the average treatment effect given by Eq. (23). Thus, after estimation of the propensity scores, seeking an appropriate matching estimator is the major task. There are different matching estimators in theory, including Nearest Neighbor Matching (NNM), Kernel-Based Matching (KBM), Radius Matching, stratification and interval matching (Caliendo & Kopeinig, 2008). All matching estimators contrast the outcome of a treated individual with outcomes of comparison group members. PSM estimators differ not only in how the neighborhood for each treated individual is defined, and the common support problem is handled, but also concerning the weights assigned to these neighbors. According to Caliendo

and Kopeinig (2008), the most widely used matching algorithms are the NNM and KBM. Therefore, this study used the NNM and KBM matching estimators. Discussion of the differences between these matching techniques and how each work can be addressed in Aku et al. (2018); Rosenbaum and Rubin (1983).

8.3 Measuring Food Security

Selecting an appropriate food security indicator is the most challenging issue due to the complexity of the food security concept (Hendriks, 2005). This is because none of the indicators capture the concept of food security accurately. Therefore, the present study used one of the indicators mentioned in Lele et al. (2016) which grouped indicators into eight different categories based on the underlying data source. Each of these could be used in various ways. The indicators based on sources of data are individual or household recall, national observations, market observations, prevalence and depth of undernourishment, anthropometric measures, breastfeeding and sanitation, clinical data, composite indexes, and multidimensional measures. Among the indicators mentioned above, individual or household recall indicators are considered the easiest way to obtain relevant data from households using survey questionnaires.

The number of total calories per household intake for each food item is one of the most important household food security measures (Berry, Dernini, Burlingame, Meybeck, & Conforti, 2015; Li, 2013). In this study, the distinction in calorie intake between the treated and the control group was estimated. Interviewees were requested to report foodstuffs consumed, in-kind and quantity, bought or otherwise by their households in the last seven days preceding the survey. In converting the amount of physical food consumed by the family into calories consumed adjusted for household sex and age, the study accompanied the following steps. First, local measurement units were converted into a common unit of measurement for each food item consumed. Second, each food item consumed was converted to calories using the national food composition table compiled by the Ethiopian Health and Nutrition Research Institute (EHNRI, 1998). Third, all food calories consumed were then added to and converted into daily amounts. The total food calories were altered in an adult equivalent (AE) unit per family using Storck et al. (1997) conversion factor for adult equivalent. The resulting average kilocalorie (kcal) per adult household equivalent per day was compared with the established

threshold (minimum subsistence kcal requirement) set by FDRE (1996) as 2100 kcal for Ethiopia. This study, therefore, uses 2100 kcal as an exact cut-off point to dichotomize the household as food secure and food insecure. Finally, the household whose physical food consumption in kcal is greater than or equal to 2100 kcal/day/AE was categorized as food secure, whereas, less than 2100 kcal/day/AE was categorized as food insecure.

8.4 Results and Discussion

8.4.1 Characteristics of the surveyed respondents

Results related to demographic, socio-economic and farm characteristics of the respondents are presented in Table 14. The study reveals that about 48.45% and 59.64% of apple and mango households, respectively, participated in the fruit value chain. This shows that participants and non-participants are systematically different. The treatment group exhibits higher food consumption than the control group by a factor of 788.53 and 1225.89 kilocalories for apple and mango households, respectively. Taking into account the nationally established food insecurity threshold (i.e., 2100 calories of food per adult equivalent per day), 47.82 and 34.97% of apple and mango households were found to be food insecure.

8.4.2 Econometric model estimation results

8.4.2.1 Estimation results of propensity score

Table 15 shows the estimation results of the logit regression model. The model is statistically significant as shown in the lower part of Table 15. The estimated model appears to perform well for this study's intended matching exercise. The pseudo- R^2 value is 0.18 and 0.16 for the respective crops. A low R^2 value means that participant households do not have many distinct characteristics overall and as such finding a good match between the participant and non-participant households becomes easier. After matching there should be no systematic differences in the distribution of covariates between both groups and therefore, the pseudo- R^2 should be fairly low (Caliendo & Kopeinig, 2008). Since we are interested in computing the propensity scores, which are used in the matching process, later on, this study is not going into

the details of why and how each of the covariates affected households' participation in the apple and mango value chain. Looking into the estimated coefficients, the result shows the existence of a statistically significant difference between treated ($n = 211$) and control ($n = 173$) groups regarding the distributions of education, working labor force, farming experience, disease, and insect pests, and access to price information. These variables were responsible for households' differential participation in apple and mango value chains.

The study finding pertaining to the effect of education on participation in the apple and mango value chain is related to that of Slamet et al. (2017) in Indonesia. However, this study finding is contrasted with Ouma et al. (2010), who reported that banana farmers' education level negatively affects their market participation in Burundi and Rwanda. Availability of the working labor force in the household exhibits a significant and positive relationship with participation in the value chain. Likewise, the farming experience is also positively associated with fruit growers' probability to participate in value chains (Nigussie et al., 2017). In a recent study in Ethiopia, Gebru et al. (2019) revealed that perceived production risks such as disease and insect pests discouraged households from engaging in the fruit and vegetable business. On the other hand, the finding is related to Magesa, Michael, and Ko (2020), who revealed that farm households who have access to better price information are likely to access the agri-food market.

Table 14. Results of the logistic regression model

Variables	Apple producers ($n = 161$)			Mango producers ($n = 223$)		
	Coefficient	Std. Err.	Z-value	Coefficient	Std. Err.	Z-value
Sex of the household head	-0.567	0.512	-1.11	0.0408	0.423	0.10
Age of the household	0.0367	0.0194	1.89	-0.00768	0.0145	-0.53
Educational level	0.144**	0.0657	2.97	0.124**	0.0631	2.50
Working labor force	0.310*	0.155	1.99	0.231*	0.150	1.78
Fruit farming experience	0.0814	0.0560	1.45	0.0786**	0.0283	2.77
Per capita income	-0.0132	0.0287	-0.46	0.0182	0.0194	0.94
Disease and insect pests	-0.319**	0.429	-2.74	-0.898**	0.346	-2.59
Livestock size	-0.0407	0.0901	-0.45	0.0597	0.0429	1.39
Access to price information	1.427***	0.410	3.48	0.997**	0.378	2.64
Extension contacts	0.0342	0.0294	1.16	-0.0434	0.0301	-1.44
Distance to the nearest market	-0.00298	0.0140	-0.21	-0.0184	0.0110	-1.67

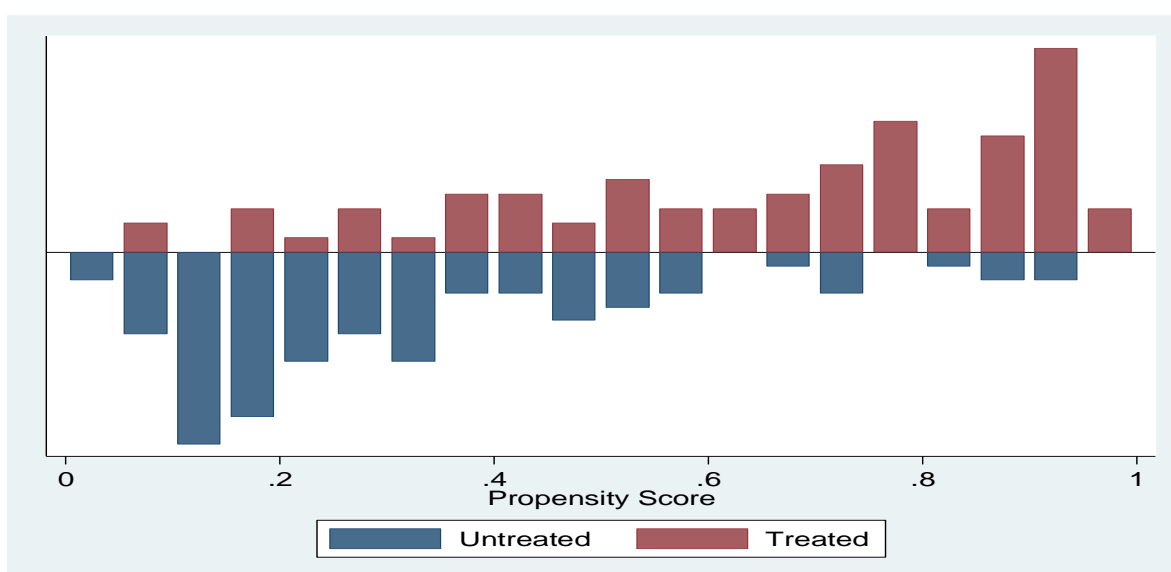
Constant	-3.960**	1.358	-1.36	0.323	1.168	0.28
Number of observations	161			223		
Pseudo R^2	0.18			0.16		
Likelihood Ratio (LR) χ^2 (12)	62.35			80.84		
Prob > χ^2	0.000			0.000		
Log likelihood	-80.346			-109.979		

*, **, *** represent statistical significance at 10%, 5%, and 1% level, respectively

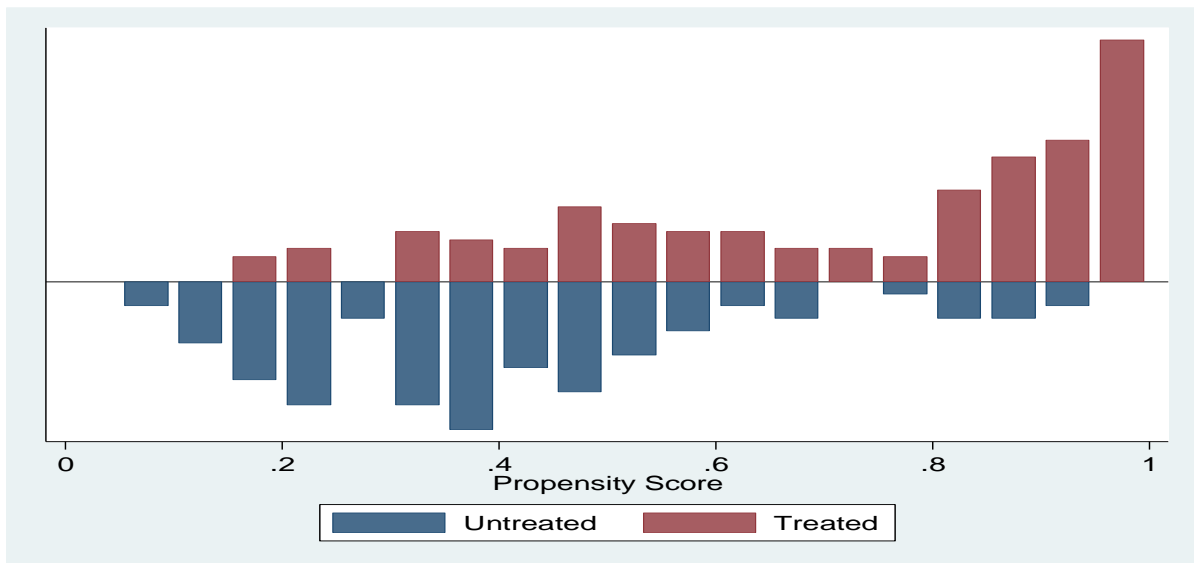
Source: Own survey data (2019/20)

8.4.2.2 Matching quality analysis

The quality of the matching process was checked after estimating the propensity scores for both the participant and non-participant groups. Figures 12 (a) and (b) shows the histograms of the estimated propensity scores for both participants and non-participants in the apple and mango value chains. Visual inspection of the density distributions of the estimated propensity scores shows that the common support condition was satisfied, as there was substantial overlap in the distribution of both the participant and non-participant propensity scores for both apple and mango. The upper half of the graph displays the distribution of propensity scores for participants and the bottom half refers to non-participants. The score densities are on the y-axis. The predicted output lies purely between 0 and 1 and is a reliable indicator of this. It shows, therefore, that there is adequate overlap in the distribution of the estimated likelihood of participation.



(a) Apple value chain participation



(b) Mango value chain participation

Figure 12. Distribution of propensity score and common support for estimate of propensity score

Source: Own survey data (2019/20)

Table 16 presents the results of matching quality from pre-and post-matching covariate balancing tests. The result shows that the assumption of balancing property is satisfied. After performing the two matching algorithms (nearest neighbor and kernel) the balancing property test was performed. The mean differences for the predictor variables were significantly smaller after matching when compared to before matching. The mean standard biases after matching were reduced to below 5% for the respective crops. The p-value of the probability ratio tests after matching exhibits that the predictor variables are not significantly different between both the treated and the control groups. This is the best quality indicator for fulfilling the assumption of conditional independence by the PSM (Rosenbaum & Rubin, 1983). Pseudo- R^2 also declined significantly after matching. Low pseudo- R^2 , low mean standardized bias, high overall bias reduction, and insignificant p-values of the probability ratio test support the assumption that both groups have the same distribution in covariates x after matching. These results suggest that the proposed propensity score specification is reasonably successful in balancing the distribution of covariates between the two groups and can be used to assess the

effect of value chain participation among groups of households with similar observed characteristics.

Table 15. Matching quality tests

Fruit type	Test for	Before matching	After matching	
			Nearest Neighbor Matching (NNM)	Kernel-Based Matching (KBM)
Apple producers	Pseudo R ²	0.285	0.03	0.023
	LR χ^2 (p-value)	78.63	5.50	4.64
	Standardized bias (mean)	20.18	4.3	3.6
Mango producers	Pseudo R ²	0.268	0.04	0.07
	LR χ^2 (p-value)	80.57	5.23	4.38
	Standardized bias (mean)	18.45	4.25	4.07

Source: Own survey data (2019/20)

8.4.2.3 Estimation of average treatment effect on the treated (ATT)

The estimation results of the ATT are obtained for household food calorie intake using the matching algorithms. Table 17 provides estimates of the average effect estimated by Nearest Neighbor Matching (NNM) and Kernel-Based Matching (KBM) approaches. Both matching methods were used to check the robustness of the results. In the case of NNM, the calorie intake of the apple participants was 2889.04 kcal and that of the non-participants was 2103.86 kcal, while the calorie intake of the mango participants was 3096.31 kcal and that of the non-participants was 2778.64 kcal. Using KBM (0.01 bandwidth), apple participants consumed 2868.32 kcal per adult equivalent per day, which is approximately 7.03% higher than the corresponding non-participants. Using a bandwidth of 0.01, the calorie intake (mean food consumption) was about 3042.33 kcal for mango participants, while the corresponding figure for non-participants was 2870.41 kcal. This shows that the participants were 7.67% better than non-participants in terms of household food calorie intake. Both matching algorithm estimates were significant at the 1% level.

Overall, the ATT result indicates that the participation of the apple and mango value chain has a positive and significant effect on the food security of the study areas of farm households. This

result is supported by the fact that growers belonging to the value chain have earned relatively higher prices for their products (Reardon, 2015; Wiggins, 2014). The result is consistent with previous studies that indicate a positive association between value chain participation and rising levels of farm household food security. In their analysis in Tanzania, Mmbando et al. (2015b) revealed that participation in the marketing of maize and pigeon pea increased the proportion of consumption spending by 19.8% and 28.9%, respectively.

Table 16. Results of average treatment effect on the treated

Outcome variable	Matching algorithm		Mean outcome variable based on matched observation		
			Participants	Non-participants	Difference (ATT)
Weekly calorie intake	NNM with replacement		2889.04	2103.86	(785.18) ***
		KBM (bwidth 0.01)	2868.32	2679.78	(188.54) ***
Mango producer	NNM with replacement		3096.31	2778.64	(317.67) ***
		KBM (bwidth 0.01)	3042.33	2870.41	(171.92) ***

Note: *** $p < 0.001$; NNM = Nearest Neighbor Matching, KMB = Kernel-Based Matching
Source: Own survey data (2019/20)

8.5 Chapter Summary

This study analyzed food security effects of apple and mango value chain participation in north-western Ethiopia using recent data from a cross-section of smallholders, measured by household food consumption in kilocalorie. With this, the study contributes to the emerging fruits value chain literature since most of the reviewed documented empirical studies have shown the role of agricultural commercialization (e.g., fruits) on smallholders in terms of productivity and income effects. Comparisons of average household food intake between participants and non-participants in the apple and mango value chain have revealed some significant differences. However, it is not possible to attribute the difference in household food

consumption (calorie intake) of the participants and non-participants exclusively to the fruits value chain as comparisons are not yet restricted to respondents who have similar characteristics. Hence, further exploration was performed employing the Propensity Score Matching (PSM) model to address the issue. The fitted values from the logistic regression generated propensity scores that were used to match the participants and non-participants of the apple and mango value chain. The unconfoundedness and overlapping assumptions were fulfilled by applying the nearest neighbor and kernel-based matching algorithms. More particularly, the gain in household food calorie intake is higher for households with a larger educational level and households accessed to price information. The empirical results from this study confirm the more apple and mango households are involved in the fruit value chain, the better the household food intake and food security become. Suggesting that participation in the apple and mango value chain has significantly increased participating households' calorie intake in the study districts.

CHAPTER NINE

SUMMARY, CONCLUSIONS, POLICY RECOMMENDATIONS AND AREAS FOR FURTHER STUDY

This chapter provides a brief summary of the results of all chapters. Following the study results, conclusions are drawn, and finally, policy recommendations and areas for further research are described.

9.1. Summary

Agri-food value chains have established rural-urban links in order to overcome barriers and provide potential benefits to both agricultural producers and urban consumers. To transform the fruits sub-sector, it is necessary to invest in small scale farmers in order for them to integrate into agri-food value chains. Under its Ten-Year Development Plan (2021-2030), the Ethiopian government has prioritized smallholder commercialization as a foundation for transforming the country's fruit sector and overall agricultural transformation. In this study, there was an argument that promoting fruit value chains would maximize additional value and improve the competitiveness of locally produced apple and mango fruits on domestic markets. Fortunately, key players in Ethiopia's fruit value chain have not been clearly addressed and characterized. In Ethiopia, only a few studies have been conducted to examine fruit crop value chains that include all chain actors. The fruit value chain has received little attention and requires further investigation.

Fruit production creates an opportunity for Ethiopian small - scale farmers to enter the market. About 114,421.81 hectares were allotted to fruit production in Ethiopia during the 2018/19 cropping season, with a total of 7,924,306.92 quintals produced locally. This implies that, despite erratic weather patterns, disease and insect pests, and inefficient harvesting and management, fruit production and land coverage in Ethiopia are increasing. Because of its favorable agro-ecology and irrigation water availability, the Upper Blue Nile Basin is ideal for fruit crop production. The main focus of this dissertation was to generate empirical evidence on fruit value chain participation and its determinants, market performance, and household

welfare and food security effects. The crops were chosen on the basis of their perceived significance and marketability.

To achieve the study's objectives, both qualitative and quantitative strategies were used. The survey respondents were chosen using a random sampling technique. Primary data were gathered from various sources using a variety of tools, including structured interview guides (for quantitative data), focused group discussion guides (FGDs), key informant interview guides (KIIs), and direct observation (for qualitative data). Personal interviews with a total of 478 respondents (384 producers, 58 traders, and 36 consumers) were used to collect primary data. Mapping and market margins were used for data analysis. The double-hurdle model was used to investigate the determinants of small-scale farmers' participation decision and intensity of participation in the fruits (apple and mango) value chain. The endogenous switching regression and the propensity score matching procedure were used to investigate the welfare and food security effects of farmers' participation in the fruit value chain. The analysis was carried out using descriptive and econometric tools on the STATA 14.0 platform. The following summarizes the study's findings.

According to the analysis presented in Chapter 4, of the 384 total farm household heads interviewed, 80 percent were male headed households, while 20 percent were female headed households. Participants in both the apple and mango studies had three years more education than non-participants on average. The landholding of the sample respondents ranges from 0.25ha to 4ha, with an average of 1.20ha per household in apple districts and from 0.13ha to 12ha, with an average of 2.32 ha per household in mango districts. In terms of fruit land allocation, an average of 0.09ha was allocated to apple cultivation and an average of 0.21ha was allocated to mango cultivation. In terms of apple and mango production, the study areas produced 5653.75 and 259.73 quintals/year, respectively.

This study attempted to investigate value chain stakeholders classified as direct (input providers, growers, traders, processors, and customers) or indirect (financial and technical services). According to the value chain analysis, there are direct and indirect agents who can participate in each stage of the apple and mango chain in the study sites. Key mango value chain actors include seedling suppliers, farmers, collectors, wholesalers, retailers, processors, and consumers whereas primary apple value chain participants include seedling suppliers,

farmers, collectors, retailers, and consumers. In terms of large sales volumes, a channel connecting mango producers to wholesalers via collectors was more efficient, whereas a channel connecting apple producers to retailers via collectors was more efficient. Margin analysis of value chain participants revealed that traders in both value chains receive the majority of gross marketing margin. The governance structure of the apple and mango value chain is buyer-driven, with little trust among different actors. Further to that, the study identified potential constraints and opportunities, as well as suggested solutions related to the value chains of mango and apples in the study areas.

Estimation of determinants of value chain participation with the help of the double hurdle model revealed result shows that the probability of a farmer being participating in the apple value chain increases with household head education level, extension contacts, fruit farming experience, and membership in local cooperatives, while decreases with household size and incidence of disease and insect pests. Moreover, mango plot size and membership in local cooperatives increase the probability of participation decisions in the mango value chain. Furthermore, households' intensity of participation in the apple value chain increases with education level and extension contacts, whereas age squared and distance to the nearest market decrease their intensity of participation in the mango value chain. Given that farm households self-select themselves into participants and non-participants, the ESR model is used to control for selectivity bias and capture the differential effect of participation in the fruit value chain of participants and non-participants. The study finds that the more apple and mango farmers join the value chain, the higher their consumption expenditure becomes. On average, the apple and mango value chain participation increased household consumption expenditure by about 17% and 18.5%, respectively. Similarly, the average treatment effect result indicates that participating in the apple and mango value chain has a positive and significant effect on the food security of farm households in the study areas.

9.2. Conclusion

The study's overall analysis can be concluded as a good starting point for understanding the apple and mango value chain system. Fruit commercialization can only be successful if it is supported by an efficient value chain and marketing system. According to the analysis, the

study area has numerous benefits for the expansion of apple and mango production and marketing. The study districts have appropriate land and environmental condition; many farm households are involved in apple and mango production and have many years of experience growing apple and mango. The process of establishing the apple and mango value chain, on the other hand, is inefficient and fraught with difficulties. The products are consumed entirely in the form of fresh fruit in the local communities, with no processing of apple and mango products. Apple and mango fruit are almost entirely marketed in the domestic market, with no export activities. The connections between the actors in the fruit chain value have been shallow and ineffective. Fresh fruit is harvested and transported by hand. Activities such as packaging, refrigeration, preservation, and processing have not yet been enacted. These factors contribute to selling apple and mango fruit, and high post-harvest losses remains a challenge and seasonal.

In terms of socioeconomic, demographic, and institutional variables, there were significant mean differences among value chain participants as well as non-participants for both fruits. There are numerous actors in the study area who play various roles in the fruit value chain. Before reaching consumers, apple and mango fruits grown in the study area pass through many intermediaries such as collectors, local wholesalers, street vendors, and/or retailers. Intermediate buyers/traders buy apple and mango fruits at a lower price from small-scale farmers and sell them to end consumers at a higher price. The greater price disparity between growers and intermediaries/traders indicates that growers received little assistance. The smaller percentage share of farmers in the apple and mango fruit value chains necessitates intervention to increase growers' profits by gaining access to better markets. Furthermore, the increased price changes observed between consumers and producers indicate that consumers had less access to purchase directly from producers, resulting in customers buy from retail outlets at higher prices.

The crucial determinants found to be significantly influencing small-scale farmers' decision to engage in apple value chains were age squared of the head, education level of household head, total household size, fruit farming experience, incidence of disease and insect pests, frequency of extension contacts, access to price information, membership in local cooperatives and Total livestock size. Similarly, factors such as education level of household head, total household size, apple/mango plot size, fruit farming experience, perceived wild animals as a serious

problem, incidence of disease and insect pests, and membership in local cooperatives have a significant impact on the decision to participate in the mango value chain. Furthermore, education level of household head, frequency of extension contacts, membership in local cooperatives, and ownership of mobile phone are significant factors influencing apple producers' level of value chain participation, whereas age of the household head, education level of household head, fruit farming experience, distance to the nearest market, frequency of extension contacts, ownership of transportation asset membership in local cooperatives, and ownership of mobile phone are significant determinants influencing mango producers' level of value chain participation.

As a result, these important factors must intervene in order to increase the potential benefit from the fruits value chain, especially in the study area. The results from this study confirm the more apple and mango households have participated in the fruit value chain, the better their consumption expenditure and economic welfare become. The central point drawn from the findings would be that value chain participation plays an important role in improving economic welfare among apple and mango farmers. Similarly, the empirical findings of this study confirm that the more apple and mango households are involved in the fruit value chain, the better the household food intake and food security become. Suggesting that participation in the apple and mango value chain has significantly increased participating households' calorie intake in the study districts.

9.3. Policy Recommendations

Based on the findings of this study, the following are potential areas of intervention for the rural development and agriculture office, as well as other development practitioners, who are going to support the fruits value chain in the Upper-Blue Nile Basin, North-Western Ethiopia.

- It is strongly recommended that the input supply system be improved so that growers have access to a sufficient variety, quality, and quantity of production inputs at the right time. Agricultural research institutes (such as Pawe, Adet, and ARARI) play an important role in pinpointing disease resistant and high yielding varieties to focus on improving apple and mango fruit production.

- Apple and mango productivity in the study area is below potential. This should be a call to action at various levels in terms of research and training (extension) efforts. To bring about long-term changes in the value chain, efforts should be made to increase producer yields by delivering better seeds and technical assistance to growers in agronomy practices. Farmers should receive extension services that take into account the perceived rates of production and marketing limitations in the value chain.
- To strengthen the link between value chain actors, it is necessary to change the actors' viewpoints by establishing the relationship among farmers and traders and/or consumers. Networking, positive attitudes toward cooperation, and interaction, in particular, should be established among the actors involved in the fruits value chain. As a result, the value chain participants should collaborate to expand production, lowering post-harvest damages, and reinforce long-term market connection in the study districts. Searching for price information and disseminating it will be critical with a close partnership among traders and growers. Farmers and traders should receive training and advice on apple and mango post-harvest loss management activities.
- Encourage and strengthen farmers to use calibrated weight balances when selling apple and mango produce. To reduce cheating on weight balance, development agents should advise farmers on how to properly implement these measurement tools for apple and mango produce marketing.
- The study's econometric analysis findings indicate that age has a positive impact on the level of mango value chain participation. Although it is hard to increase the respondents age, older farmers can share their knowledge with relatively inexperienced and young farmers. As a result, the district and kebele agricultural offices should organize experience sharing and/or training schemes to disseminate the thorough knowledge of skilled farmers to relatively inexperienced farm households.
- Household head education has a positive effect on both the decision to participate in the apple and mango value chains as well as the level of participation. A suitable strategy should also be developed that can provide basic education to agriculture-based households. That is, the responsible authority should raise household awareness regarding the significance of adult education. In this regard, local and regional governments should enhance household education levels by providing all necessary educational materials.

- The total household size correlated negatively with participation decisions in the mango and apple value chains. As a result, more emphasis should be placed on strengthening family planning policies.
- The experience of the farm household head affects the likelihood to participate in the apple and mango value chains, as well as the level of mango participation. As a result, it is essential that experienced and inexperienced farmers share their knowledge on a regular basis. Because both fruits are cash commodities in the study area, enhancing farmers' technical knowledge of fruits farming experience and facilitating adult education are suggested for enhancing productivity and increasing marketed surplus.
- The frequency of extension contacts has a positive impact on the level of mango and apple value chain participation, as well as the decision of apple to participate. As a result, emphasis should be placed on strengthening agricultural extension service delivery through training and delegating non-overlapping responsibilities to local development agents.
- Membership in local cooperatives has a positive impact on both the decision to participate in the apple and mango value chains and the level of participation. As a result, it is recommended that the government focus on continuous awareness creation of farm households to join local cooperatives. Attempting to strengthen assistance and providing short-term market linkage training to cooperative management groups in order to provide growers with up-to-date market and price information in order to improve market linkage. Social organizations, both formal and informal, should be strengthened.
- Disease and insect pest occurrence is a major factor endangering mango producers' decision to participate and intensity of participation. Therefore, improved and disease-resistant apple and mango seed cultivars should be promoted and introduced by research institutions. Increasing the capacity of development agents in fruit disease and insect control so that they can deliver expert advice and raise awareness among farmers about apple as well as mango pests and diseases.
- Mango land has also had a positive impact on participation decisions. As a result, concerned bodies should concentrate on land intensification to compensate through cash crop production, such as mango production, and crop selection, which is the best approach followed by agricultural communities through using irrigation wisely.

- According to the empirical findings, owning a mobile phone has a positive significant relationship with the level of apple and mango participation. As a result, policies aimed at enabling producers to access and use information technology (e.g., mobile phones) for market functions should be assisted. i.e., Access to mobile phones should be made easier.
- In general, the study's findings provide support to advocacy for policies that encourage extension services and training, investment in public infrastructure, field visits, and exchange of experiences. Increased opportunities for education and training in farm households' production and marketing would have a positive impact on their participation-decision and level of participation. To realize the country's long-term vision of rural and agricultural development, policymakers should consider all of the determinants of decision to participate and level of participation discussed above as a springboard for intervention measures. Overall, despite the enormous contributions of small-scale fruit growers' participation in the value chain to welfare and food security, Ethiopian policymakers should start encouraging more households to participate in the fruit value chain.

9.4. The Study's Limitations and Future Research Directions

The main intention of this dissertation was to generate empirical evidence on fruit value chain participation and its determinants, market performance, household welfare and food security effects. However, there are also a number of issues that need to be addressed. Some many limitations became noticeable while working on this dissertation. To begin, the welfare and food security effects of value chain participation are examined in this study using available cross-section data. However, cross-section data has limitations in providing a robust picture of the welfare and food security effects. In this regard, panel data can be used to more effectively analyze the welfare and food security effects of value chain participation. The primary advantage of panel data over a single cross-section is that it enables one to control for temporally persistent differences between individuals, which can bias estimates obtained from cross-sections in many cases (Hsiao, 1985). This is accomplished since panel data can account for unobserved heterogeneity, provide robust evidence, and allow the researcher to determine whether the findings persist over time. Second, future research is recommended to identify best

upgrading practices agreed upon by different chain actors in order to implement a well-organized national fruit production and marketing system. Third, future research that focuses on the determinants of fruit traders' participation along the value chain should be prioritized. Finally, future research on the effects of market channel choice on welfare and food security should be considered.

REFERENCES

- Abafita, J., Atkinson, J., & Kim, C. (2016). Smallholder commercialization in Ethiopia: market orientation and participation. *International Food Research Journal*, 23(4), 1797.
- Abankwah, V., Aidoo, R., & Tweneboah-Koduah, B. (2010). Margins and economic viability of fresh coconut marketing in the Kumasi metropolis of Ghana. *Journal of Development and Agricultural Economics*, 2(12), 432-440.
- Abate, T. M., Mekie, T. M., & Dessie, A. B. (2019). Determinants of market outlet choices by smallholder teff farmers in Dera district, South Gondar Zone, Amhara National Regional State, Ethiopia: a multivariate probit approach. *Journal of Economic Structures*, 8(1), 39.
- Abebe, G. K., Bijman, J., & Royer, A. (2016). Are middlemen facilitators or barriers to improve smallholders' welfare in rural economies? Empirical evidence from Ethiopia. *Journal of Rural Studies*, 43, 203-213.
- Abebe, K. A., Zhou, D., Etea, B. G., Senbeta, F. M., Debeli, D. K., & Osti, R. (2018). Cereal commodity trading in Ethiopian local marketplace: Examining farmers' quantity measurement behaviors. *Agriculture*, 8(12), 188.
- Abriha, T., Emanna, B., & Gebre, G. G. (2020). Factors affecting onion market supply in Medebay Zana district, Tigray regional state, Northern Ethiopia. *Cogent Food & Agriculture*, 6(1), 1712144.
- Abro, Z. A., Alemu, B. A., & Hanjra, M. A. (2014). Policies for agricultural productivity growth and poverty reduction in rural Ethiopia. *World development*, 59, 461-474.
- Achterbosch, T. J., van Berkum, S., Meijerink, G. W., Asbreuk, H., & Oudendag, D. (2014). *Cash crops and food security: Contributions to income, livelihood risk and agricultural innovation*: LEI Wageningen UR.
- Adepoju, A. O., Owoeye, I. T., & Adeoye, I. B. (2015). Determinants of market participation among Pineapple farmers in Aiyedaade local government area, Osun State, Nigeria. *International Journal of Fruit Science*, 15(4), 392-404.
- Adewale, A. R. (2017). Import substitution industrialisation and economic growth—Evidence from the group of BRICS countries. *Future Business Journal*, 3(2), 138-158.
- Ahmed, M. H., Geleta, K. M., Tazeze, A., & Andualem, E. (2017). The impact of improved maize varieties on farm productivity and wellbeing: evidence from the East Hararghe Zone of Ethiopia. *Development Studies Research*, 4(1), 9-21.
- Aku, A., Mshenga, P., Afari-Sefa, V., & Ochieng, J. (2018). Effect of market access provided by farmer organizations on smallholder vegetable farmer's income in Tanzania. *Cogent Food & Agriculture*, 4(1), 1560596.
- Alalaf, A. H. (2020). The role of biofertilization in improving fruit productivity: a review. *Int. J. Agricult. Stat. Sci. Vol*, 16(1), 107-112.
- Alemayehu, M., Tessafa, F., Bizuayehu, S., & Ayele, B. (2015). Amhara Region Horticulture Development Strategy (2015-2019). *Agro-Big, Bahir Dar, Ethiopia*. URL: https://www.agrobig.org/documents/7.1_Amhara_Region_Horticulture_Development_Strategy_2015-2019.pdf. Accessed on January, 20, 2018.
- Alene, A. D., & Manyong, V. M. (2007). The effects of education on agricultural productivity under traditional and improved technology in northern Nigeria: an endogenous switching regression analysis. *Empirical economics*, 32(1), 141-159.

- Alene, A. D., Manyong, V. M., Omany, G., Mignouna, H., Bokanga, M., & Odhiambo, G. (2008). Smallholder market participation under transactions costs: Maize supply and fertilizer demand in Kenya. *Food policy*, 33(4), 318-328.
- Alene, T. (2017). Short report on apple production and management training in Debre Birhan, Ethiopia.
- Altenburg, T. (2007). Donor approaches to supporting pro-poor value chains. *Donor committee for enterprise development*.
- Amare, M., Mariara, J., Oostendorp, R., & Pradhan, M. (2019). The impact of smallholder farmers' participation in avocado export markets on the labor market, farm yields, sales prices, and incomes in Kenya. *Land Use Policy*, 88, 104168.
- Amaza, P., Bila, Y., & Iheanacho, A. (2006). Identification of factors that influence technical efficiency of food crop production in West Africa: Empirical evidence from Borno State, Nigeria. *Journal of Agriculture and Rural Development in the Tropics and Subtropics (JARTS)*, 107(2), 139-147.
- Ameen, A., & Raza, S. (2017). Green revolution: a review. *International Journal of Advances in Scientific Research*, 3(12), 129-137.
- Amentae, T. K., Hamo, T. K., Gebresenbet, G., & Ljungberg, D. (2017). Exploring wheat value chain focusing on market performance, post-harvest loss, and supply chain management in Ethiopia: the case of Arsi to Finfinnee market chain. *Journal of Agricultural Science*, 9(8), 22-42.
- Anandajayasekeram, P., & Gebremedhin, B. (2009). *Integrating innovation systems perspective and value chain analysis in agricultural research for development: Implications and challenges* (Vol. 16): ILRI (aka ILCA and ILRAD).
- Anteneh, A., & Asrat, D. (2020). Wheat production and marketing in Ethiopia: Review study. *Cogent Food & Agriculture*, 6(1), 1778893.
- Ao, X. H., Vu, T. V., Le, K. D., Jirakiattikul, S., & Techato, K. (2019). An analysis of the smallholder farmers' cassava (*Manihot esculenta* Crantz) value chain through a gender perspective: the case of Dak Lak province, Vietnam. *Cogent Economics & Finance*, 7(1), 1645632.
- Arega, D., Manyong, V. M., Omany, G., Mignouna, H., Bokanga, M., & Odhiambo, G. D. (2008). *Smallholder marketed surplus and input use under transactions costs: Maize supply and fertilizer demand in Kenya*. Retrieved from
- Arias, P., Hallam, D., Krivonos, E., & Morrison, J. (2013). Smallholder integration in changing food markets. *Food and Agriculture Organization of the United Nations, Rome*.
- Asefa, S. (2011). Analysis of technical efficiency of crop producing smallholder farmers in Tigray, Ethiopia.
- Asfaw, N., Gunjal, K., Mwangi, W., & Seboka, B. (1997). Factors affecting the adoption of maize production technologies in Bako Area, Ethiopia. *Ethiop. Journal of Agricultural Economics*, 1(2), 52-73.
- Asfaw, S., Amare, M., Lipper, L., & Davis, B. (2011). *Welfare effects of market participation under transaction costs: evidence from Tanzania*. Paper presented at the Conference Paper. Agricultural Development Economics Division (ESA), Rome, Italy.
- Asfaw, S., Shiferaw, B., Simtowe, F., & Lipper, L. (2012). Impact of modern agricultural technologies on smallholder welfare: Evidence from Tanzania and Ethiopia. *Food policy*, 37(3), 283-295.
- Ashinie, S. K., & Tefera, T. T. (2019). Horticultural Crops Research and Development in Ethiopia: Review on Current Status.

- Ashley, C., & Hussein, K. (2000). *Developing methodologies for livelihood impact assessment: Experience of the African Wildlife Foundation in East Africa*: Overseas Development Institute UK.
- Astewel, T. (2010). Analysis of Rice Profitability and Market chain: The Case of Fogera Woreda, South Gondar Zone, Amhara National Regional State, Ethiopia. An Msc. A Masters Thesis Presented to School of Graduate Studies of Haramaya University.
- ATA. (2017). Ethiopia's Agricultural Extension Strategy (Draft): Vision, Systemic Bottlenecks and Priority Interventions. Agricultural Transformation Agency. Addis Ababa, Ethiopia.
- Atkinson, A. B. (1992). Measuring poverty and differences in family composition. *Economica*, 1-16.
- Atreya, P., & Kafle, A. (2016). Production practice, market and value chain study of organic apple of Jumla. *Journal of Agriculture and Environment*, 17, 11-23.
- Awotide, B. A., Karimov, A. A., & Diagne, A. (2016). Agricultural technology adoption, commercialization and smallholder rice farmers' welfare in rural Nigeria. *Agricultural and Food Economics*, 4(1), 1-24.
- Awulachew, S. B., & Ayana, M. (2011). Performance of irrigation: An assessment at different scales in Ethiopia. *Experimental Agriculture*, 47(S1), 57.
- Azam, M. S., Gaiha, R., & Imai, K. (2012). *Agricultural supply response and smallholders market participation: the case of Cambodia*: School of Social Sciences, University of Manchester.
- Bachewe, F., Regassa, M. D., Minten, B., Taffesse, A. S., Tamru, S., & Hassen, I. W. (2019). The transforming value chain of Ethiopia's "orphan" tef crop. *Planta*, 1-13.
- Bachewe, F. N., Berhane, G., Minten, B., & Taffesse, A. S. (2018). Agricultural transformation in Africa? Assessing the evidence in Ethiopia. *World Development*, 105, 286-298.
- Bachmann, R., & Witteloostuijn, A. V. (2006). Analysing inter-organizational relationships in the context of their business systems: a conceptual framework for comparative research.
- Bahta, Y., Owusu-Sekyere, E., & Tlalang, B. (2018). Assessing participation in homestead food garden programmes, land ownership and their impact on productivity and net returns of smallholder maize producers in South Africa. *Agrekon*, 57(1), 49-63.
- Bair, J. (2005). Global capitalism and commodity chains: looking back, going forward. *Competition & Change*, 9(2), 153-180.
- Bammann, H. (2019). Participatory value chain analysis for improved farmer incomes, employment opportunities and food security.
- World Bank (2007). *World development report 2008: Agriculture for development*: The World Bank.
- Bardhan, P., Mookherjee, D., & Tsumagari, M. (2009). *Middlemen margins and globalization*. Paper presented at the seminar organized by IFPRI, Mimeo.
- Baregheh, A., Rowley, J., & Sambrook, S. (2009). Towards a multidisciplinary definition of innovation. *Management decision*.
- Barnes, M. (2004). Value chain guidebook: A process for value chain development. *Agriculture and Food Council of Alberta. Value Chain Initiative. Alberta, Canada*.
- Barrera, A. (2011). New realities, new paradigms: the new agricultural revolution. *Comunica Magazine*, 2011(936-2016-74324).
- Barrett, C., Reardon, T., Swinnen, J., & Zilberman, D. (2019). *Structural transformation and economic development: insights from the agri-food value chain revolution*. Retrieved from
- Barrett, C. B. (2008). Smallholder market participation: Concepts and evidence from eastern and southern Africa. *Food policy*, 33(4), 299-317.

- Barrett, C. B., Bachke, M. E., Bellemare, M. F., Michelson, H. C., Narayanan, S., & Walker, T. F. (2012). Smallholder participation in contract farming: comparative evidence from five countries. *World Development*, 40(4), 715-730.
- Barrett, C. B., Reardon, T., Swinnen, J., & Zilberman, D. (2020). Agri-food value chain revolutions in low-and middle-income countries. *Journal of Economic Literature*.
- Behailu, A., & Kebede, J. (2018). A study on the causes of apple (*Malus domestica*) fruit loss at Chenchaworeda of Gamo Gofa Zone, Southern Ethiopia. *Journal of Stored Products and Postharvest Research*, 9(7), 72-77.
- Bekele, M., Satheesh, N., & Jemal, S. (2020). Screening of Ethiopian mango cultivars for suitability for preparing jam and determination of pectin, sugar, and acid effects on physico-chemical and sensory properties of mango jam. *Scientific African*, e00277.
- Bekele, W., Jema, H., & Belaineh, L. (2017). Econometric Analysis of the Determinants of Quantity of Potato Supplied to the Market: The Case of Jeldu District of Oromia National Regional State, Ethiopia. *Journal of Economics and Sustainable Development*, 8(13), 49-57.
- Belay, C. S. (2018). The effects of crop market participation in improving food security among smallholder crop producer farmers: The case of Central Ethiopia, Adaa Woreda. *Journal of Development and Agricultural Economics*, 10(9), 298-316.
- Bellemare, M. F. (2012). As you sow, so shall you reap: The welfare impacts of contract farming. *World Development*, 40(7), 1418-1434.
- Bernard, T., & Taffesse, A. S. (2012). Returns to scope? Smallholders' commercialisation through multipurpose cooperatives in Ethiopia. *Journal of African Economies*, 21(3), 440-464.
- Berry, E. M., Dernini, S., Burlingame, B., Meybeck, A., & Conforti, P. (2015). Food security and sustainability: can one exist without the other? *Public health nutrition*, 18(13), 2293-2302.
- Berti, G., & Mulligan, C. (2016). Competitiveness of small farms and innovative food supply chains: The role of food hubs in creating sustainable regional and local food systems. *Sustainability*, 8(7), 616.
- Beshargo, G. (2002). Cattle marketing in western Shewa. *An M. Sc Thesis Presented to the School of Graduate Studies of Alemaya University, Ethiopia*. 118p.
- Beshir, H., Emanu, B., Kassa, B., & Haji, J. (2012). Determinants of chemical fertilizer technology adoption in North eastern highlands of Ethiopia: the double hurdle approach. *Journal of Research in Economics and International Finance*, 1(2), 39-49.
- Bezu, S., & Holden, S. (2014). Demand for second-stage land certification in Ethiopia: Evidence from household panel data. *Land Use Policy*, 41, 193-205.
- Bickel, G., Nord, M., Price, C., Hamilton, W., & Cook, J. (2000). Guide to measuring household food security, revised 2000. *US Department of Agriculture, Food and Nutrition Service*, 52.
- Biggeri, M., Burchi, F., Ciani, F., & Herrmann, R. (2018). Linking small-scale farmers to the durum wheat value chain in Ethiopia: Assessing the effects on production and wellbeing. *Food Policy*, 79, 77-91.
- Blandon, J., Henson, S., & Cranfield, J. (2009). Small-scale farmer participation in new agri-food supply chains: Case of the supermarket supply chain for fruit and vegetables in Honduras. *Journal of International Development: The Journal of the Development Studies Association*, 21(7), 971-984.
- Block, P. J. (2006). *Integrated management of the Blue Nile Basin in Ethiopia: Precipitation forecast, hydropower, and irrigation modeling*. University of Colorado at Boulder,

- BoA. (2020). Budget year annual statistical bulletin of the Bureau of Agriculture (BoA), unpublished, Bahir Dar, Ethiopia.
- Bokelmann, W., & Adamseged, M. E. (2016). *Contributing to a better understanding of the value chain framework in developing countries*. Retrieved from
- Boliko, M. C. (2019). FAO and the situation of food security and nutrition in the world. *Journal of nutritional science and vitaminology*, 65(Supplement), S4-S8.
- Boughton, D., Mather, D., Barrett, C. B., Benfica, R. S., Abdula, D., Tschirley, D., & Cunguara, B. (2007). Market participation by rural households in a low-income country: An asset based approach applied to Mozambique. *Faith and economics*, 50, 64-101.
- Brewer, B. D. (2011). Global commodity chains & world income inequalities: The missing link of inequality and the upgrading paradox. *Journal of World-Systems Research*, 308-327.
- Burke, W. J. (2009). Fitting and interpreting Cragg's tobit alternative using Stata. *The Stata Journal*, 9(4), 584-592.
- Burke, W. J. (2009). *Triple hurdle model of smallholder production and market participation in Kenya's dairy sector*: Citeseer.
- Byerlee, D., De Janvry, A., & Sadoulet, E. (2009). Agriculture for development: Toward a new paradigm.
- Calicioglu, O., Flammini, A., Bracco, S., Bellù, L., & Sims, R. (2019). The future challenges of food and agriculture: An integrated analysis of trends and solutions. *Sustainability*, 11(1), 222.
- Caliendo, M., & Kopeinig, S. (2008). Some practical guidance for the implementation of propensity score matching. *Journal of economic surveys*, 22(1), 31-72.
- Camara, A. (2017). An Analysis of welfare effect of market participation of smallholder farm households in Guinea. *Economic Research Guardian*, 7(1), 2.
- Capéau, B., & Dercon, S. (2006). Prices, unit values and local measurement units in rural surveys: an econometric approach with an application to poverty measurement in Ethiopia. *Journal of African Economies*, 15(2), 181-211.
- Carletto, C., Corral, P., & Guelfi, A. (2017). Agricultural Commercialization and Nutrition Revisited.
- Chagomoka, T., Afari-Sefa, V., & Pitoro, R. (2014). Value chain analysis of traditional vegetables from Malawi and Mozambique. *International Food and Agribusiness Management Review*, 17(1030-2016-83035), 59-86.
- Chala, W. (2010). *Value chain analysis of fairtrade coffee: The case of Bedeno Woreda primary coffee cooperatives, East Hararghe Zone, Ethiopia*. MSc Thesis, Haramaya University, Haramaya, Ethiopia,
- Chamberlain. (2019). Smallholder Farmer Support Analysis Part 2: Theory of Change – Business model design for smallholder farmer support. Netherlands Enterprise Agency (RVO).
- Chang, K., Brattlof, M., & Ghukasyan, S. (2014). Smallholder participation in the tropical superfruits value chain: ensuring equitable share of the success to enhance their livelihood. In: Rome: Food and Agriculture Organisation.
- Chen, H., Daugherty, P. J., & Landry, T. D. (2009). Supply chain process integration: a theoretical framework. *Journal of business logistics*, 30(2), 27-46.
- Clougherty, J. A., & Duso, T. (2015). Correcting for self-selection based endogeneity in management research: a review and empirical demonstration.
- Coe, N. M., & Yeung, H. W.-c. (2019). Global production networks: mapping recent conceptual developments. *Journal of Economic Geography*, 19(4), 775-801.

- Conceição, P., Levine, S., Lipton, M., & Warren-Rodríguez, A. (2016). Toward a food secure future: Ensuring food security for sustainable human development in Sub-Saharan Africa. *Food Policy*, 60, 1-9.
- Conniffe, D., Gash, V., & O Connell, P. J. (2000). Evaluating state programmes: "natural experiments" and propensity scores. *Economic and Social Review*, 31(4), 283-308.
- Cragg, J. G. (1971). Some statistical models for limited dependent variables with application to the demand for durable goods. *Econometrica: Journal of the Econometric Society*, 829-844.
- Creswell, J. W. (2012). Educational research: planning. *Conducting, and Evaluating*.
- Creswell, J. W., & Clark, V. L. P. (2017). *Designing and conducting mixed methods research*: Sage publications.
- Creswell, J. W., & Creswell, J. D. (2017). *Research design: Qualitative, quantitative, and mixed methods approaches*: Sage publications.
- Crona, B., Nyström, M., Folke, C., & Jiddawi, N. (2010). Middlemen, a critical social-ecological link in coastal communities of Kenya and Zanzibar. *Marine Policy*, 34(4), 761-771.
- CSA. (2019). Agricultural sample survey: Area and production of major crops. Central Statistical Agency of Ethiopia. Addis Ababa, Ethiopia.
- Cui, F., & Liu, G. (2018). *Global value chains and production networks: case studies of Siemens and Huawei*: Academic Press.
- Cullen, M. T. (2020). COVID-19 and the risk to food supply chains: How to respond. *FAO: Rome, Italy*.
- Dalrymple, K. (2005). *Expanding rural land tenures to alleviate poverty*: Citeseer.
- Danso-Abbeam, G., Ehiakpor, D. S., & Aidoo, R. (2018). Agricultural extension and its effects on farm productivity and income: insight from Northern Ghana. *Agriculture & Food Security*, 7(1), 1-10.
- Dapaah, H., Asafu-Agyei, J., Ennin, S., & Yamoah, C. (2003). Yield stability of cassava, maize, soya bean and cowpea intercrops. *The Journal of Agricultural Science*, 140(1), 73.
- David, R. J., & Han, S. K. (2004). A systematic assessment of the empirical support for transaction cost economics. *Strategic management journal*, 25(1), 39-58.
- Davies, W. P. (2003). An historical perspective from the Green Revolution to the gene revolution. *Nutrition Reviews*, 61(suppl_6), S124-S134.
- De Janvry, A. (2010). Agriculture for development: new paradigm and options for success. *Agricultural Economics*, 41, 17-36.
- De Janvry, A., Dustan, A., & Sadoulet, E. (2010). Recent advances in impact analysis methods for ex-post impact assessments of agricultural technology: options for the CGIAR. *Unpublished working paper, University of California-Berkeley*.
- de Janvry, A., & Sadoulet, E. (2020). Using agriculture for development: Supply-and demand-side approaches. *World Development*, 133, 105003.
- Deaton, A., & Zaidi, S. (2002). *Guidelines for constructing consumption aggregates for welfare analysis* (Vol. 135): World Bank Publications.
- Deb, P., & Trivedi, P. K. (2006). Specification and simulated likelihood estimation of a non-normal treatment-outcome model with selection: Application to health care utilization. *The Econometrics Journal*, 9(2), 307-331.
- Degefa, T. (2006). *Combining household qualitative data and quantitative data in food security research*. Retrieved from

- Dehejia, R. H., & Wahba, S. (2002). Propensity score-matching methods for nonexperimental causal studies. *Review of Economics and statistics*, 84(1), 151-161.
- Dercon, S., Gilligan, D. O., Hoddinott, J., & Woldehanna, T. (2009). The impact of agricultural extension and roads on poverty and consumption growth in fifteen Ethiopian villages. *American Journal of Agricultural Economics*, 91(4), 1007-1021.
- Deribe, Y., & Kassa, E. (2020). Value creation and sorghum-based products: what synergetic actions are needed? *Cogent Food & Agriculture*, 6(1), 1722352.
- Dessalegn, Y., Assefa, H., Derso, T., & Tefera, M. (2014). Mango production knowledge and technological gaps of smallholder farmers in Amhara Region, Ethiopia. *American Scientific Research Journal for Engineering, Technology, and Sciences (ASRJETS)*, 10(1), 28-39.
- Devaux, A., Torero, M., Donovan, J., & Horton, D. (2018). Agricultural innovation and inclusive value-chain development: a review. *Journal of Agribusiness in Developing and Emerging Economies*.
- DFID, S. (2008). The Operational Guide for Making the Markets Work for the Poor (M4P) Approach. In: Department for International Development London.
- Di Falco, S., Veronesi, M., & Yesuf, M. (2011). Does adaptation to climate change provide food security? A micro-perspective from Ethiopia. *American Journal of Agricultural economics*, 93(3), 829-846.
- Djalalou, D., Stefano, P., Anita, R., Ousmane, C., Geoffrey, H., & Onno, S. (2012). *Market channel participation of smallholder Pineapple farmers in Benin*. Paper presented at the Las Vegas international academy conference, Nevada USA.
- Doherty, E., Ramsey, E., Ibbotson, P., Carcary, M., & Conway, G. (2018). *Utilisation of a sequential mixed methods research approach in examining SME digitization*. Paper presented at the ECRM 2018 17th European Conference on Research Methods in Business and Management.
- Donovan, J., & Poole, N. (2014). Changing asset endowments and smallholder participation in higher value markets: Evidence from certified coffee producers in Nicaragua. *Food Policy*, 44, 1-13.
- Dorward, A., Poole, N., Morrison, J., Kydd, J., & Urey, I. (2003). Markets, institutions and technology: Missing links in livelihoods analysis. *Development policy review*, 21(3), 319-332.
- Douthwaite, B., & Hoffecker, E. (2017). Towards a complexity-aware theory of change for participatory research programs working within agricultural innovation systems. *Agricultural systems*, 155, 88-102.
- Ebabu, K., Tsunekawa, A., Haregeweyn, N., Adgo, E., Meshesha, D. T., Aklog, D., . . . Fenta, A. A. (2018). Analyzing the variability of sediment yield: A case study from paired watersheds in the Upper Blue Nile basin, Ethiopia. *Geomorphology*, 303, 446-455.
- Ecker, O., & Breisinger, C. (2012). *The food security system: A new conceptual framework*. Retrieved from
- EHNRI, F. (1998). Food composition table for use in Ethiopia. *Ethiopian Health and Nutrition Research Institute*.
- EIAR, A. (2013). Seed Potato Tuber Production and Dissemination Experiences, Challenges and Prospects: Proceedings of the National Workshop on Seed Potato Tuber Production and Dissemination, 12-14 March 2012, Bahir Dar, Ethiopia. In.
- Elliot, D., Gibson, A., & Hitchins, R. (2008). Making markets work for the poor: rationale and practice. *Enterprise Development and Microfinance*, 19(2), 101-119.
- Emana, B., & Gebremedhin, H. (2007). Constraints and opportunities of horticulture production and marketing in eastern Ethiopia. *Dry land coordination group (DCG) report*, 46.

- Emana, B., & Nigussie, M. (2011). Potato value chain analysis and development in Ethiopia. *International Potato Center (CIP-Ethiopia), Addis Ababa, Ethiopia.*
- Faida, M. (2006). Chain empowerment: Supporting African farmers to develop markets.
- FAO. (2017a). The future of food and agriculture—Trends and challenges. Rome. Available at: <http://www.fao.org/3/a-i6583e.pdf>.
- FAO. (2019). Developing sustainable value chains for small-scale livestock producers. edited by G. Leroy & M. Fernando. FAO animal production and health guidelines no. 21. Rome.
- FAO. (2020). The State of Agricultural Commodity Markets 2020. Agricultural markets and sustainable development:
- FAO. (2020a). Fruit and vegetables – your dietary essentials. The International Year of Fruits and Vegetables, 2021, background paper. Rome. <https://doi.org/10.4060/cb2395en>.
- FAO. (2018). Trade and nutrition technical note. Trade policy technical notes 21. Trade and food security. Markets and Trade Division, Food and Agriculture Organization of the United Nations, Rome. www.fao.org/3/I8545EN/i8545en.pdf.
- Faße, A., Grote, U., & Winter, E. (2009). *Value chain analysis methodologies in the context of environment and trade research*. Retrieved from
- FDRE (Federal Democratic Republic of Ethiopia). (1996). *Food Security Strategy*. Paper presented at the Paper Prepared for the Consultative Group Meeting of December 10–12, 1996.
- Ferris, S., Robbins, P., Best, R., Seville, D., Buxton, A., Shriver, J., & Wei, E. (2014). Linking smallholder farmers to markets and the implications for extension and advisory services. *MEAS Brief*, 4(10), 13-14.
- Fetena, S., & Lemma, B. (2014). Assessment on major apple diseases and insect pests in Chench and BonkeWoredas of Gamo-Gofa zone, Southern Ethiopia. *Scholarly Journal of Agricultural Science*, 4(7), 394-402.
- Fischer, E., & Qaim, M. (2012). Linking smallholders to markets: determinants and impacts of farmer collective action in Kenya. *World development*, 40(6), 1255-1268.
- Fischer, G., Patt, N., Ochieng, J., & Mvungi, H. (2020). Participation in and Gains from Traditional Vegetable Value Chains: a Gendered Analysis of Perceptions of Labour, Income and Expenditure in Producers' and Traders' Households. *The European Journal of Development Research*, 1-25.
- Fita, T. (2014). White Mango Scale, *Aulacaspis tubercularis*, Distribution and Severity Status in East and West Wollega Zones, Western Ethiopia. *Science, Technology and Arts Research Journal*, 3(3), 1-10.
- Fitzpatrick, J. (2019). Competitiveness of the African cashew sector. *Gates Open Res*, 3.
- Flavel, T. C., & Murphy, D. V. (2006). Carbon and nitrogen mineralization rates after application of organic amendments to soil. *Journal of environmental quality*, 35(1), 183-193.
- Flentø, D., & Ponte, S. (2017). Least-developed countries in a world of global value chains: are WTO trade negotiations helping? *World Development*, 94, 366-374.
- Fonseca, C. M. B., Coelho, J. C., Soares, F. B., & Correia, A. (2019). Value chains analysis: Overview and context for development. *Direct Research Journal of Agricultural and Food Science*, 7(12), 356-361.
- Frank, A. (2000). The development of underdevelopment. *Development: Doctrines of development*, 1, 225.
- GAIN. (2018). Ethiopia Fresh Fruits Market Update Report. Global Agricultural Information Network (GAIN) Report Number: ET1827. Addis Ababa.

- Ganesh Kumar, C., Murugaiyan, P., & Madanmohan, G. (2017). Agri-food supply chain management: literature review. *Intelligent Information Management*, 9, 68-96.
- Gayak, B., Pandey, S. R., & Bhatta, S. (2020). Economics of production and marketing of apple (*Malus domestica*) in Mustang, Nepal. *International Journal of Agriculture Environment and Food Sciences*, 4(4), 483-492.
- Gebre-Selassie, A., & Bekele, T. (2012). A review of Ethiopian agriculture: roles, policy and small-scale farming systems. C. Bell & J. Prammer (Researchers), C. Eder, D. Kyd-Rebenburg, & J. Prammer (Eds.), *Global growing casebook: Insights into African agriculture*, 36-65.
- Gebre, G. G., Rik, E., & Kijne, A. (2020). Analysis of banana value chain in Ethiopia: Approaches to sustainable value chain development. *Cogent Food & Agriculture*, 6(1), 1742516.
- Gebre Mariam, S. (2003). Status of commercial fruit production in Ethiopia. In: Ethiopian Agricultural Research Organization.
- Gebremedhin, B. (2010). *Commercialization of smallholders: Does market orientation translate into market participation?* (Vol. 22): ILRI (aka ILCA and ILRAD).
- Gebremedhin, B., & Jaleta, M. (2010). *Commercialization of smallholders: Is market participation enough?* Retrieved from
- Gebremedhin, B., Jaleta, M., & Hoekstra, D. (2009). Smallholders, institutional services, and commercial transformation in Ethiopia. *Agricultural Economics*, 40, 773-787.
- Gebremedhin, M. B., Tessema, W., Gebre, G. G., Mawcha, K. T., & Assefa, M. K. (2019). Value chain analysis of sesame (*Sesamum indicum* L.) in Humera district, Tigray, Ethiopia. *Cogent Food & Agriculture*, 5(1), 1705741.
- Geburu, K. M., Leung, M., Rammelt, C., Zoomers, A., & van Westen, G. (2019). Vegetable business and smallholders' food security: empirical findings from Northern Ethiopia. *Sustainability*, 11(3), 743.
- Gereffi, G. (2014). Global value chains in a post-Washington Consensus world. *Review of international political economy*, 21(1), 9-37.
- Gereffi, G., & Fernandez-Stark, K. (2011). Global value chain analysis: a primer. *Center on Globalization, Governance & Competitiveness (CGGC), Duke University, North Carolina, USA*.
- Gereffi, G., & Lee, J. (2016). Economic and social upgrading in global value chains and industrial clusters: Why governance matters. *Journal of business ethics*, 133(1), 25-38.
- Getahun, W., Tesfaye, A., Mamo, T., & Ferede, S. (2018). Apple Value Chain Analysis in the Central Highlands of Ethiopia. *Int. J. Agric. Innov. Res*, 7(1), 2319-1473.
- Gheri, F., Alvarez-Sanchez, C., Moltedo, A., Tayyib, S., Filipczuk, T. and Cafiero, C. . (2020). Global and regional food availability from 2000 to 2017 – An analysis based on Supply Utilization Accounts data. FAO Statistics Working Paper 20-19. Rome. doi:<https://doi.org/10.4060/cb1120en>
- Girmalem, N., Negussie, S., & Degye, G. (2019). Determinants of Mangoes and Red Peppers Market Supply in Ahferom and Kola-Tembien Districts of Tigray Region, Northern Ethiopia.
- Girmay, G., Menza, M., Mada, M., & Abebe, T. (2014). Empirical study on apple production, marketing and its contribution to household income in Chencha district of southern Ethiopia. *Scholarly journal of agricultural science*, 4(3), 166-175.
- Giziew, A., Negatu, W., Wale, E., & Ayele, G. (2014). Constraints of vegetables value chain in Ethiopia: A gender perspective. *International Journal of Advanced Research in Management and Social Sciences*, 3(12), 44-71.

- Goetz, S. J. (1992). A selectivity model of household food marketing behavior in sub-Saharan Africa. *American Journal of Agricultural Economics*, 74(2), 444-452.
- Goetz, S. J., & Weber, M. T. (1986). *Fundamentals of Price Analysis in Developing Countries' Food Systems: A Training Manual to Accompany the Microcomputer Software Program'MSTAT'*. Retrieved from
- Goletti, F. (2005). Agricultural Commercialization, value chains and poverty reduction. *Making Markets Work Better for the Poor, ADB/DfID. Agrifood Consulting International*.
- Gómez et al., M. I., Meemken, E. and Verteramo Chiu, L.J. (2020). Agricultural value chains and social and environmental impacts: Trends, challenges, and policy options – Background paper for The State of Agricultural Commodity Markets (SOCO) 2020. Rome. FAO.<https://doi.org/10.4060/cb0715en>. doi:<https://doi.org/10.4060/cb0715en>
- Greijmans, M., Oudomvilay, B., & Banzon, J. (2007). Houaphanh bamboo value chain analysis. *Netherlands Development Organization*, 11, 14.
- Gujarati, D. N., & Porter, D. C. (1999). *Essentials of econometrics* (Vol. 2): Irwin/McGraw-Hill Singapore.
- Habtam, G. (2015). *Analysis of Potato Value Chain in Hadiya Zone of Ethiopia*. MSc Thesis, Haramaya University, Haramaya, Ethiopia. Hailu G, Ali M ... ,
- Habtewold, A. B., Challa, T. M., & Latha, D. A. (2017). Determinants of smallholder farmers in teff market supply in Ambo district, West Shoa Zone of Oromia, Ethiopia. *International Journal of advanced research in management and social sciences*, 6(2), 133-140.
- Haggblade, S. (2011). Modernizing African agribusiness: reflections for the future. *Journal of Agribusiness in Developing and Emerging Economies*.
- Hagos, A., Dibaba, R., Bekele, A., & Alemu, D. (2020). Determinants of market participation among smallholder mango producers in Assosa Zone of Benishangul Gumuz Region in Ethiopia. *International Journal of Fruit Science*, 20(3), 323-349.
- Haile, M. (2016). Market Value Chain Analysis of Mango: The Case of Arbaminch Zuria Woreda.
- Hailegiorgis, D. S., & Hagos, F. (2016). Structure and performance of vegetable marketing in East Shoa zone, Oromia Region, Ethiopia. *Journal of Marketing and Consumer Research*.
- Hailu, A. (2016). *Value chain analysis of vegetables: The case of Ejere district, west Shoa zone, Oromia national regional state of Ethiopia*. Haramaya University,
- Haq, Z. U. (2012). *Food Value chain analysis: A review of selected studies for Pakistan and Guidelines for Further Research*. Retrieved from
- Hassan, B., Bhattacharjee, M., & Wani, S. (2020). Value-chain analysis of horticultural crops-regional analysis in Indian horticultural scenario. *IJAR*, 6(12), 367-373.
- Hawkes, C., & Ruel, M. (2011). Value chains for nutrition. 2020 Conference: Leveraging Agriculture for Improving Nutrition and Health. 2020 Conference Paper 4.
- Hayesso, T. (2008). Hope in apples. *SNV Netherlands Development Cooperation Case Studies*.
- Heckman, J. J. (1979). Sample selection bias as a specification error. *Econometrica: Journal of the Econometric Society*, 153-161.
- Heierli, U., & Gass, T. (2001). Enhancing employment and income generation in rural areas. *Paper submitted to the Operations Committee of the Swiss Agency for Development and Cooperation (DEZA) on*, 11.
- Hendriks, S. L. (2005). The challenges facing empirical estimation of household food (in) security in South Africa. *Development Southern Africa*, 22(1), 103-123.

- Herrmann, R., Nkonya, E., & Faße, A. (2018). Food value chain linkages and household food security in Tanzania. *Food Security*, 10(4), 827-839.
- Hoang, H. G. (2020). Determinants of the adoption of mobile phones for fruit marketing by Vietnamese farmers. *World Development Perspectives*, 100178.
- Hoken, H., & Su, Q. (2015). *Measuring the effect of agricultural cooperatives on household income using PSM-DID: a case study of a rice-producing cooperative in China*. Retrieved from
- Holloway, G., & Ehui, S. (2002). Expanding market participation among smallholder livestock producers,(Socioeconomics and Policy Research Working Paper 48; International Livestock Research Institute, Nairobi, Kenya). *International Livestock Research Institute, Nairobi, Kenya*, 8.
- Homburg, C., Grozdanovic, M., & Klarmann, M. (2007). Responsiveness to customers and competitors: the role of affective and cognitive organizational systems. *Journal of Marketing*, 71(3), 18-38.
- Honja, T. (2014a). Review of mango value chain in Ethiopia. *Journal of Biology, Agriculture and Healthcare*, 4(25), 230-239.
- Honja, T. (2014b). Review of mango value chain in Ethiopia. *Journal of Biology, Agriculture and Healthcare*, 4(25), 230-240.
- Honja, T., Geta, E., & Mitiku, A. (2015). *Mango value chain analysis: the case of boloso bombe woreda, wolaita zone, southern Ethiopia*.
- Horlings, L. G., & Marsden, T. K. (2011). Towards the real green revolution? Exploring the conceptual dimensions of a new ecological modernisation of agriculture that could 'feed the world'. *Global environmental change*, 21(2), 441-452.
- Hsiao, C. (1985). Benefits and limitations of panel data. *Econometric Reviews*, 4(1), 121-174.
- Humphrey, J. (2004). Upgrading in global value chains. Available at SSRN 908214.
- Humphrey, J., & Schmitz, H. (2000). *Governance and upgrading: linking industrial cluster and global value chain research* (Vol. 120): Institute of Development Studies Brighton.
- Humphrey, J., & Schmitz, H. (2002). How does insertion in global value chains affect upgrading in industrial clusters? *Regional studies*, 36(9), 1017-1027.
- Hussein, K., & Suttie, D. (2016). IFAD RESEARCH SERIES 5-Rural-urban linkages and food systems in sub-Saharan Africa: the rural dimension. *IFAD Research series*.
- Hussen, S., & Yimer, Z. (2013). Assessment of production potentials and constraints of mango (*Mangifera indica*) at Bati, Oromia zone, Ethiopia. *International Journal of Sciences: Basic and Applied Research*, 11(1), 1-9.
- IBC. (2012). Ethiopia: Third Country Report on the State of Plant Genetic Resources for Food and Agriculture. Addis Ababa, Ethiopia
- Idem, N. (1999). Cotton production in Nigeria. Kaduna. In: Baraka Press and Publication Ltd., 239pp.
- IFPRI. (2020). Global Food Policy Report: Building Inclusive Food Systems. Washington, DC: International Food Policy Research Institute. <https://doi.org/10.2499/9780896293670>.
- Jahurul, M. H., Zaidul, I. S., Ghafoor, K., Al-Juhaimi, F. Y., Nyam, K. L., Norulaini, N. A., . . . Mohd Omar, A. K. (2015). Mango (*Mangifera indica* L.) by-products and their valuable components: a review. *Food Chem*, 183, 173-180. doi:10.1016/j.foodchem.2015.03.046
- Jaji, K., Man, N., & Nawi, N. M. (2018). Factors affecting pineapple market supply in Johor, Malaysia. *International Food Research Journal*, 25(1).
- Jaleta, M., Gebremedhin, B., & Hoekstra, D. (2009). Smallholder commercialization: Processes, determinants and impact.

- Jari, B., & Fraser, G. (2009). An analysis of institutional and technical factors influencing agricultural marketing amongst smallholder farmers in the Kat River Valley, Eastern Cape Province, South Africa. *African Journal of Agricultural Research*, 4(11), 1129-1137.
- Järnberg, L. (2016). Prospects for a sustainable agricultural transformation in Ethiopia: green niche actors navigating a challenging institutional context. In.
- Jaworek, M., & Kuzel, M. (2015). Transnational corporations in the world economy: formation, development and present position.
- Jensen, R. T. (2010). Information, efficiency, and welfare in agricultural markets. *Agricultural Economics*, 41, 203-216.
- Jha, S., Bacon, C. M., Philpott, S. M., Ernesto Mendez, V., Läderach, P., & Rice, R. A. (2014). Shade coffee: update on a disappearing refuge for biodiversity. *BioScience*, 64(5), 416-428.
- John, M. (2002). Reinventing the Bazaar: A Natural History of Markets. In: New York: WW Norton.
- Johnson, R. B., Onwuegbuzie, A. J., & Turner, L. A. (2007). Toward a definition of mixed methods research. *Journal of mixed methods research*, 1(2), 112-133.
- Jones Govereh, T., & Nyoro, J. (1999). SMALLHOLDER COMMERCIALIZATION, INTERLINKED MARKETS AND FOOD CROP PRODUCTIVITY: CROSS-COUNTRY EVIDENCE IN EASTERN AND SOUTHERN AFRICA.
- Jones, L. (2012). Discussion Paper for an M4P WEE Framework: How can the Making Markets Work for the Poor Framework work for poor women and for poor men? *The Springfield Centre for Business in Development, Durham, UK*.
- Joosten, F., Boselie, D., Wolde, B., & Desalegn, L. (2011). Exporting fruit and vegetables from Ethiopia: Assessment of development potentials and investment options in the export-oriented fruit and vegetable sector. *Addis Ababa*.
- JOTE, A. (2020). *THE ECONOMIC CONTRIBUTION OF INDUSTRIAL PARKS IN ETHIOPIA*. St. Mary's University,
- Kadigi, M. L. (2013). *Factors influencing choice of milk outlets among smallholder dairy farmers in Iringa municipality and Tanga city*.
- Kahenge, Z., Kavoi, M., & Nhamo, N. (2020). Determinants of non-transgenic soybean adoption among smallholder farmers in Zambia. *Cogent Food & Agriculture*, 6(1), 1797260.
- Kalinda, T., Filson, G., & Shute, J. (2000). Resources, household decision making and organisation of labour in food production among small-scale farmers in southern Zambia. *Development Southern Africa*, 17(2), 165-174.
- Kano, L., Tsang, E. W., & Yeung, H. W.-c. (2020). Correction to: Global value chains: A review of the multi-disciplinary literature. *Journal of International Business Studies*, 51, 1353-1353.
- Kaplinsky, R., & Morris, M. (2000). *A handbook for value chain research* (Vol. 113): University of Sussex, Institute of Development Studies Brighton.
- Kaplinsky, R., Morris, M., & Readman, J. (2002). The globalization of product markets and immiserizing growth: lessons from the South African furniture industry. *World Development*, 30(7), 1159-1177.
- Kassa, G., Yigezu, E., & Alemayehu, D. (2017). Market chain analysis of highvalue fruits in Bench Maji Zone, Southwest Ethiopia. *International Journal of Marketing Studies*, 9(3), 124-135.
- Kassaw, H. M., Birhane, Z., & Alemayehu, G. (2019). Determinants of market outlet choice decision of tomato producers in Fogera woreda, South Gonder zone, Ethiopia. *Cogent Food & Agriculture*, 5(1), 1709394.

- Kedir, M. (2017). Value chain analysis of sesame in Ethiopia. *Journal of Agricultural Economics, Extension and Rural Development*, 5(5), 620-631.
- Kendall, H. W., & Pimentel, D. (1994). Constraints on the expansion of the global food supply. *Ambio*, 198-205.
- Kennedy, A. (1999). Bacterial diversity in agroecosystems. *Invertebrate biodiversity as bioindicators of sustainable landscapes*, 65-76.
- Kilelu, C., Klerkx, L., Omore, A., Baltenweck, I., Leeuwis, C., & Githinji, J. (2017). Value chain upgrading and the inclusion of smallholders in markets: reflections on contributions of multi-stakeholder processes in dairy development in Tanzania. *The European Journal of development research*, 29(5), 1102-1121.
- Kilelu, C. W., Klerkx, L., & Leeuwis, C. (2017). Supporting smallholder commercialisation by enhancing integrated coordination in agrifood value chains: Experiences with dairy hubs in Kenya. *Experimental Agriculture*, 53(2), 269-287.
- Kim, Y., Choi, T. Y., Yan, T., & Dooley, K. (2011). Structural investigation of supply networks: A social network analysis approach. *Journal of Operations Management*, 29(3), 194-211.
- Kissoly, L., Faße, A., & Grote, U. (2017). The integration of smallholders in agricultural value chain activities and food security: Evidence from rural Tanzania. *Food Security*, 9(6), 1219-1235.
- KIT, I. (2008). Trading up: Building cooperation between farmers and traders in Africa. *Amsterdam (The Netherlands): KIT—Royal Tropical Institute/Nairobi (Kenya): IIRR—International Institute of Rural Reconstruction*.
- Komarek, A. (2010). The determinants of banana market commercialisation in Western Uganda. *African Journal of Agricultural Research*, 5(9), 775-784.
- Kothari, C. R. (2004). *Research methodology: Methods and techniques*: New Age International.
- Kotler, P., & Armstrong, G. (2004). Principles of marketing. 14th. *Boston: Pearson Prentice Hall*, 24(613), 97.
- Krause, H., Faße, A., & Grote, U. (2019). Welfare and food security effects of commercializing African indigenous vegetables in Kenya. *Cogent Food & Agriculture*, 5(1), 1700031.
- Kumar, R. (2018). *Research methodology: A step-by-step guide for beginners*: Sage.
- Kyaw, N. N., Ahn, S., & Lee, S. H. (2018). Analysis of the factors influencing market participation among smallholder rice farmers in magway region, central dry zone of Myanmar. *Sustainability*, 10(12), 4441.
- Lapar, M., Holloway, G., & Ehui, S. (2003). Policy options promoting market participation among smallholder livestock producers: a case study from the Phillipines. *Food policy*, 28(3), 187-211.
- Lee, J., Gereffi, G., & Beauvais, J. (2012). Global value chains and agrifood standards: Challenges and possibilities for smallholders in developing countries. *Proceedings of the National Academy of Sciences*, 109(31), 12326-12331.
- Lee, L.-F. (1978). Unionism and wage rates: A simultaneous equations model with qualitative and limited dependent variables. *International economic review*, 415-433.
- Legesse, G., Hassana, M., Gudisa, R., & Koji, T. (2014). *Value chain assessment of selected vegetable products in central rift valley of Ethiopia*. Paper presented at the th International Conference on the Ethiopian Economy, Ethiopian Economics Association July.
- Lele, U., Masters, W. A., Kinabo, J., Meenakshi, J., Ramaswami, B., Tagwireyi, J., & Goswami, S. (2016). Measuring food and nutrition security: An independent technical assessment and user's

- guide for existing indicators. *Rome: Food Security Information Network, Measuring Food and Nutrition Security Technical Working Group, 177.*
- Lema, R., Rabbellotti, R., & Sampath, P. G. (2018). Innovation trajectories in developing countries: Co-evolution of Global Value Chains and innovation systems. *The European Journal of Development Research, 30*(3), 345-363.
- Li, M. (2013). Using the propensity score method to estimate causal effects: A review and practical guide. *Organizational Research Methods, 16*(2), 188-226.
- Lie, H. (2017). Inclusive value chain development: applying systems thinking and participatory modeling to dairy value chain analyses in Nicaragua and Tanzania.
- Likoko, E., & Kini, J. (2017). Inclusive business—a business approach to development. *Current opinion in environmental sustainability, 24*, 84-88.
- Lin, J., & Chang, H. J. (2009). Should Industrial Policy in developing countries conform to comparative advantage or defy it? A debate between Justin Lin and Ha-Joon Chang. *Development policy review, 27*(5), 483-502.
- Liu, Y. (2018). *Determinants and impacts of marketing channel choice among cooperatives members: Evidence from agricultural cooperative in China.* Retrieved from
- Lokshin, M., & Sajaia, Z. (2004). Maximum likelihood estimation of endogenous switching regression models. *The Stata Journal, 4*(3), 282-289.
- Lowitt, K., Hickey, G. M., Ganpat, W., & Phillip, L. (2015). Linking communities of practice with value chain development in smallholder farming systems. *World Development, 74*, 363-373.
- Lundy, M., Amrein, A., Hurtado Bermúdez, J. J., Becx, G., Zamierowski, N., Rodriguez, F., & Mosquera Echeverry, E. E. (2014). LINK methodology: a participatory guide to business models that link smallholders to markets. Version 2.0. In: International Center for Tropical Agriculture.
- Lundy, M., Becx, G., Zamierowski, N., Amrein, A., Hurtado Bermúdez, J. J., Mosquera Echeverry, E. E., & Rodríguez, F. (2012). LINK methodology: A participatory guide to business models that link smallholders to markets. In: Citeseer.
- Lutz, C., & Tadesse, G. (2017). African farmers' market organizations and global value chains: competitiveness versus inclusiveness. *Review of Social Economy, 75*(3), 318-338.
- M4P. (2008). Making value chains work better for the poor: a tool book for practitioners of value chain analysis, version 3.
- Ma, W., & Abdulai, A. (2016). Does cooperative membership improve household welfare? Evidence from apple farmers in China. *Food Policy, 58*, 94-102.
- Maertens, A., & Barrett, C. B. (2013). Measuring social networks' effects on agricultural technology adoption. *American Journal of Agricultural Economics, 95*(2), 353-359.
- Maertens, M., & Verhofstadt, E. (2013). Horticultural exports, female wage employment and primary school enrolment: Theory and evidence from Senegal. *Food Policy, 43*, 118-131.
- Magesa, M. M., Michael, K., & Ko, J. (2020). Access and use of agricultural market information by smallholder farmers: Measuring informational capabilities. *The Electronic Journal of Information Systems in Developing Countries, 86*(6), e12134.
- Magigi, W. (2015). Research proposal development and report writing. *Pathway for Success in Higher Learning Institutions.*
- Mahlet, A., Bezabih, E., Mengistu, K., Jeffreyson, K., & Jemal, Y. (2015). Gender role in market supply of potato in Eastern Hararghe Zone, Ethiopia. *African Journal of Agricultural Marketing, 3*(8), 241-251.

- Makhura, M., Kirsten, J., & Delgado, C. (2001). Transaction costs and smallholder participation in the maize market in the Northern Province of South Africa.
- Makombe, G., Namara, R., Hagos, F., Awulachew, S. B., Ayana, M., & Bossio, D. (2011). *A comparative analysis of the technical efficiency of rain-fed and smallholder irrigation in Ethiopia* (Vol. 143): IWMI.
- Manda, J., Khonje, M. G., Alene, A. D., & Gondwe, T. (2017). Welfare impacts of improved groundnut varieties in eastern Zambia: A heterogeneous treatment effects approach. *Agrekon*, 56(4), 313-329.
- Martey, E., Al-Hassan, R. M., & Kuwornu, J. K. (2012). Commercialization of smallholder agriculture in Ghana: A Tobit regression analysis. *African Journal of Agricultural Research*, 7(14), 2131-2141.
- Martey, E., Etwire, P. M., Wiredu, A. N., & Ahiabor, B. D. (2017). Establishing the link between market orientation and agricultural commercialization: Empirical evidence from Northern Ghana. *Food Security*, 9(4), 849-866.
- Mashav. (2010). Postharvest losses of fruits and vegetables. Available at: <http://www.mashav.mfa.gov.il/mfm/web/main/document.asp?document ID=42327> (viewed march, 2012).
- Masuku, M., Makhura, M., & Rwelarmira, J. (2001). Factors affecting marketing decisions in the maize supply chain among smallholder farmers in Swaziland. *Agrekon*, 40(4), 698-707.
- Mateows, N., Amanuel, T. W., & Asfaw, Z. (2015). Market chain analysis of agro-forestry products: the case of fruit at Tembaro District, Kembata Tembaro Zone South Ethiopia. *International Journal of Business and Economics Research*, 4(4), 201-216.
- Maxwell, D., Caldwell, R., & Langworthy, M. (2008). Measuring food insecurity: Can an indicator based on localized coping behaviors be used to compare across contexts? *Food Policy*, 33(6), 533-540.
- Mayer, F. W., & Milberg, W. (2013). Aid for Trade in a world of global value chains: chain power, the distribution of rents and implications for the form of aid.
- Mbapila, S. J., Lazaro, E. A., & Karantininis, K. (2019). Institutions, production and transaction costs in the value chain of organic tomatoes and sweet peppers in tourist hotels, Unguja and Arusha. *Cogent Food & Agriculture*, 5(1), 1631581.
- McFadden, D. (1974). The measurement of urban travel demand. *Journal of public economics*, 3(4), 303-328.
- McKague, K., & Siddiquee, M. (2014). *Making markets more inclusive: Lessons from CARE and the future of sustainability in agricultural value chain development*.
- Megerssa, G. R., Negash, R., Bekele, A. E., & Nemera, D. B. (2020). Smallholder market participation and its associated factors: Evidence from Ethiopian vegetable producers. *Cogent Food & Agriculture*, 6(1), 1783173.
- Melesse, M. B., & Bulte, E. (2015). Does land registration and certification boost farm productivity? Evidence from Ethiopia. *Agricultural Economics*, 46(6), 757-768.
- Mendoza, G. (1995). A primer on marketing channels and margins. *Prices, Products, and People: Analyzing Agricultural Markets in Developing Countries*, 257.
- Mendoza, G. (1995). A primer on marketing channels and margins. P257-275. *Prices, Products, and People: Analyzing Agricultural Markets in Developing Countries*. Lynne Rienner Publishers, Boulder, London.

- Mengesha, S., Abate, D., Adamu, C., Zewde, A., & Addis, Y. (2019). Value chain analysis of fruits: The case of mango and avocado producing smallholder farmers in Gurage Zone, Ethiopia. *Journal of Development and Agricultural Economics*, 11(5), 102-109.
- Mensi, S., & Zouari, A. (2010). Efficient structure versus market power: Theories and empirical evidence. *International journal of Economics and Finance*, 2(4), 151-166.
- Meshesha, G. W., & Fufa, B. (2006). *Farmers Participation in Contract Farming: The Case of Bread Wheat (Triticum Aestivum L. Em. Thell) Production in Womberma Woreda, Amhara National Regional State*. Haramaya University,
- Messner, D. (2004). Regions in the 'world economic triangle'. *Local Enterprises in the Global Economy-Issues of Governance and Upgrading*. Cheltenham. Edward Elgar Publishing Limited, 20-52.
- Mignouna, D., Abdoulaye, T., Alene, A., Akinola, A., & Manyong, V. (2015). *Drivers of market participation decisions among small-scale farmers in yam growing areas of Nigeria and Ghana*. Retrieved from
- Mills, J. P. (1926). Table of the ratio: area to bounding ordinate, for any portion of normal curve. *Biometrika*, 395-400.
- Minten, B., Tamru, S., Engida, E., & Kuma, T. (2013). Ethiopia's value chain on the move: the case of teff. *ESSP Working Paper series 52*, 1-26.
- Minten, B., Tamru, S., Engida, E., & Kuma, T. (2016). Transforming staple food value chains in Africa: The case of teff in Ethiopia. *the journal of Development studies*, 52(5), 627-645.
- Mitchell, J., Keane, J., & Coles, C. (2009). Trading up: How a value chain approach can benefit the rural poor. *London: COPLA Global: Overseas Development Institute*.
- Mmari, D. E. (2015). The challenge of intermediary coordination in smallholder sugarcane production in Tanzania. *The Journal of Modern African Studies*, 51-68.
- Mmbando, F. E., Wale, E. Z., & Baiyegunhi, L. J. (2015a). Determinants of smallholder farmers' participation in maize and pigeonpea markets in Tanzania. *Agrekon*, 54(1), 96-119.
- Mmbando, F. E., Wale, E. Z., & Baiyegunhi, L. J. (2015b). Welfare impacts of smallholder farmers' participation in maize and pigeonpea markets in Tanzania. *Food Security*, 7(6), 1211-1224.
- MoA. (2014). Growth and Transformation Plan I (GTP-I). Draft document. Addis Ababa, Ethiopia.
- MOA, E. (2014). National Strategy for Ethiopia's Agricultural Extension System. *Vision, Systemic Bottlenecks and Priority Interventions*.
- Modell, S. (2010). Bridging the paradigm divide in management accounting research: The role of mixed methods approaches. *Management Accounting Research*, 21(2), 124-129.
- Mojo, D., Fischer, C., & Degefa, T. (2017). The determinants and economic impacts of membership in coffee farmer cooperatives: recent evidence from rural Ethiopia. *Journal of Rural studies*, 50, 84-94.
- Morris, M., & Staritz, C. (2019). Industrialization paths and industrial policy for developing countries in global value chains. In *Handbook on global value chains*: Edward Elgar Publishing.
- Morrison, A., Pietrobelli, C., & Rabellotti, R. (2008). Global value chains and technological capabilities: a framework to study learning and innovation in developing countries. *Oxford development studies*, 36(1), 39-58.
- Mossie, M., Gereziher, A., Ayalew, Z., & Nigussie, Z. (2020). Determinants of small-scale farmers' participation in Ethiopian fruit sector's value chain. *Cogent Food & Agriculture*, 6(1), 1842132.
- Mugenda, O. M., & Mugenda, A. G. (2003). Quantitative and qualitative approaches. In: Nairobi: Acts Press.

- Mulatu, G., Haji, J., Legesse, B., & Ketema, M. (2017). Impact of participation in vegetables' contract farming on household's income in the Central Rift valley of Ethiopia. *American Journal of Rural Development*, 5(4), 90-96.
- Munshi, K. (2014). Community networks and the process of development. *Journal of Economic Perspectives*, 28(4), 49-76.
- Muriithi, B. W., & Matz, J. A. (2015). Welfare effects of vegetable commercialization: Evidence from smallholder producers in Kenya. *Food Policy*, 50, 80-91.
- Musah, A. B. (2013). *Market participation of smallholder farmers in the Upper West Region of Ghana*. University of Ghana,
- Musara, J. P., & Musemwa, L. (2020). Impacts of improved sorghum varieties intensification on household welfare in the mid-Zambezi Valley of Zimbabwe. *Agrekon*, 59(2), 254-267.
- Mussema, R. (2006). *Analysis of red pepper marketing: the case of Alaba and Siltie in SNNPRS of Ethiopia*. Haramaya University,
- Nájera, J. (2017). Integration of small farmers into global value chains: Challenges and opportunities inside the current global demand. *Tec Empresarial*, 11(2), 7-16.
- Namulindwa, R. K. (2018). *Participation of smallholder farmers in Zambia's dairy value chain through interlocked contractual arrangements and its impact on household income*. University of Pretoria,
- Nandi, R., Gowdru, N. V., & Bokelmann, W. (2017). Factors influencing smallholder farmers in supplying organic fruits and vegetables to supermarket supply chains in Karnataka, India: a transaction cost approach. *International journal of rural management*, 13(1), 85-107.
- Naylor, R. (2011). Expanding the boundaries of agricultural development. *Food Security*, 3(2), 233-251.
- Neary, J. P. (2009). Putting the "new" into new trade theory: Paul Krugman's Nobel Memorial Prize in economics. *Scandinavian Journal of Economics*, 111(2), 217-250.
- Neven, D. (2014). *Developing sustainable food value chains*: FAO.
- Ngenoh, E., Kurgat, B. K., Bett, H. K., Kebede, S. W., & Bokelmann, W. (2019). Determinants of the competitiveness of smallholder African indigenous vegetable farmers in high-value agro-food chains in Kenya: A multivariate probit regression analysis. *Agricultural and food economics*, 7(1), 2.
- Ngqangweni, S. (2001). Promoting income and employment growth in the rural economy of the Eastern Cape through smallholder agriculture (South Africa).
- Nigussie, Z., Fisseha, G., Alemayehu, G., & Abele, S. (2019). Smallholders' apple-based agroforestry systems in the north-western highlands of Ethiopia. *Agroforestry Systems*, 93(3), 1045-1056.
- Nigussie, Z., Tsunekawa, A., Haregeweyn, N., Adgo, E., Nohmi, M., Tsubo, M., . . . Abele, S. (2017). Farmers' perception about soil erosion in Ethiopia. *Land Degradation & Development*, 28(2), 401-411.
- Nørgaard, A. S. (2008). Political science: Witchcraft or craftsmanship? Standards for good research. *World Political Science*, 4(1).
- Norris, P. E., & Batie, S. S. (1987). Virginia farmers' soil conservation decisions: An application of Tobit analysis. *Journal of Agricultural and Applied Economics*, 19(1), 79-90.
- Norton, R. (2014). Agricultural value chains: A game changer for small holders. Retrieved March, 20, 2017.
- NPC. (2021). Ethiopia 2030: The Pathway to Prosperity Ten Years Perspective Development Plan (2021 – 2030). National Planning Commission of Ethiopia.

- Ntakyo, P. R., & van den Berg, M. (2019). Effect of market production on rural household food consumption: evidence from Uganda. *Food Security*, 11(5), 1051-1070.
- Nyakudya, I. W., Murewa, V., Mutenje, M., Moyo, M., Chikuvire, T., & Foti, R. (2006). Hidden overburden of female-headed households in guar bean production: Zimbabwean Experience. *Journal of International Women's Studies*, 8(1), 163-170.
- Nzima, W. M., Dzanja, J., & Kamwana, B. (2014). Structure, conduct and performance of groundnuts markets in Northern and Central Malawi: Case studies of Mzimba and Kasungu Districts. *International Journal of Business and Social Science*, 5(6).
- Ohen, S., Umeze, G., & Cobham, M. (2014). Determinants of market participation by cucumber farmers in odukpani local government area, cross river state, Nigeria. *Journal of Economics and Sustainable Development*, 5(2), 188-196.
- Olounlade, O. A., Li, G.-C., Kokoye, S. E. H., Dossouhoui, F. V., Akpa, K. A. A., Anshiso, D., & Biaou, G. (2020). Impact of Participation in Contract Farming on Smallholder Farmers' Income and Food Security in Rural Benin: PSM and LATE Parameter Combined. *Sustainability*, 12(3), 901.
- Olukosi, J., Isitor, S., & Ode, M. (1990). Introduction to agricultural marketing and prices: principles and applications. *Living Book Series GU Publication Abuja, Nigeria*, 1-4.
- Omiti, J., McCullough, E., Otieno, D., Madelon, M., Nyanamba, T., & Murage, A. (2006). Participatory prioritization of issues in smallholder agricultural commercialization in Kenya. *Kenya Institute for Public Policy Research and Analysis (KIPPRA), Nairobi. Discussion Paper*, 64.
- Omiti, J. M., Otieno, D. J., Nyanamba, T. O., & McCullough, E. B. (2009). Factors influencing the intensity of market participation by smallholder farmers: A case study of rural and peri-urban areas of Kenya. *African Journal of Agricultural and Resource Economics*, 3(311-2016-5509), 57-82.
- Onwuegbuzie, A. J., Dickinson, W. B., Leech, N. L., & Zoran, A. G. (2009). A qualitative framework for collecting and analyzing data in focus group research. *International journal of qualitative methods*, 8(3), 1-21.
- Opondo, F., Owuor, G., Mshenga, P., Louw, A., & Jordan, D. (2020). Estimation of the Effect of Cassava Commercialization on Different Household Income Measurements in Kilifi County, Kenya. *Journal of Sustainable Development*, 13(1).
- Orr, A., Donovan, J., & Stoian, D. (2018). Smallholder value chains as complex adaptive systems: a conceptual framework. *Journal of Agribusiness in Developing and Emerging Economies*.
- Osti, A., van t Land, J., Magwegwe, D., Peereboom, A., van Oord, J., & Dusart, T. (2015). The future of youth in agricultural value chains in Ethiopia and Kenya. In.
- Ouma, E., Jagwe, J., Obare, G. A., & Abele, S. (2010). Determinants of smallholder farmers' participation in banana markets in Central Africa: the role of transaction costs. *Agricultural Economics*, 41(2), 111-122.
- Ponte, S. (2019). *Handbook on global value chains*: Edward Elgar Publishing.
- Ponte, S., & Ewert, J. (2009). Which way is "up" in upgrading? Trajectories of change in the value chain for South African wine. *World development*, 37(10), 1637-1650.
- Ponte, S., Kelling, I., Jespersen, K. S., & Kruijssen, F. (2014). The blue revolution in Asia: upgrading and governance in aquaculture value chains. *World development*, 64, 52-64.
- Ponte, S., & Sturgeon, T. (2014). Explaining governance in global value chains: A modular theory-building effort. *Review of International Political Economy*, 21(1), 195-223.

- Poole, N. (2017). *Smallholder agriculture and market participation*: Food and Agriculture Organization of the United Nations (FAO).
- Poole, N. (2017). *Smallholder Agriculture and Market Participation*. Rugby, UK. In: Practical Action Publishing, Published by Food and Agriculture Organization
- Popadiuk, S., & Choo, C. W. (2006). Innovation and knowledge creation: How are these concepts related? *International journal of information management*, 26(4), 302-312.
- Porter, M. E. (1985). *Competitive Advantage: Creating and Sustaining Superior Performance*. New York: Free Press.
- Pretty, J., & Bharucha, Z. P. (2014). Sustainable intensification in agricultural systems. *Annals of botany*, 114(8), 1571-1596.
- Punjabi, M. (2007). *Emerging environment for agribusiness and agro industry development in India: key issues in the way forward*. Paper presented at the Asian Workshop on Enabling Environments for Agribusiness and Agro-Industry Development, Bangkok.
- Purcell, T., Gniel, S., & van Gent, R. (2008). Making value chains work better for the poor: a toolbox for practitioners of value chain analysis. *Making Markets Work Better for the Poor Project*. London: UK Department for International Development (DFID) and Phnom Penh: Agricultural Development International.
- Quisumbing, A. R., Rubin, D., Manfre, C., Waithanji, E., Van den Bold, M., Olney, D., . . . Meinzen-Dick, R. (2015). Gender, assets, and market-oriented agriculture: learning from high-value crop and livestock projects in Africa and Asia. *Agriculture and human values*, 32(4), 705-725.
- Rabbi, F., Ahamad, R., Ali, S., Chandio, A. A., Ahmad, W., Ilyas, A., & Din, I. U. (2019). Determinants of commercialization and its impact on the welfare of smallholder rice farmers by using Heckman's two-stage approach. *Journal of the Saudi Society of Agricultural Sciences*, 18(2), 224-233.
- Rahiel, H. A., Zenebe, A. K., Leake, G. W., & Gebremedhin, B. W. (2018). Assessment of production potential and post-harvest losses of fruits and vegetables in northern region of Ethiopia. *Agriculture & Food Security*, 7(1), 29.
- Rahut, D. B., Velásquez Castellanos, I., & Sahoo, P. (2010). Commercialization of agriculture in the Himalayas.
- Raikes, P., Friis Jensen, M., & Ponte, S. (2000). Global commodity chain analysis and the French filière approach: comparison and critique. *Economy and society*, 29(3), 390-417.
- Rajala, E., Vogel, I., Sundin, A., Kongmanila, D., Nassuna-Musoke, M. G., Musundire, R., . . . Boqvist, S. (2021). How can agricultural research translation projects targeting smallholder production systems be strengthened by using Theory of Change? *Global Food Security*, 28, 100475.
- Ramirez, M., Bernal, P., Clarke, I., & Hernandez, I. (2018). The role of social networks in the inclusion of small-scale producers in agri-food developing clusters. *Food Policy*, 77, 59-70.
- Randela, R., Alemu, Z. G., & Groenewald, J. A. (2008). Factors enhancing market participation by small-scale cotton farmers. *Agrekon*, 47(4), 451-469.
- Reardon, T. (2015). The hidden middle: the quiet revolution in the midstream of agrifood value chains in developing countries. *Oxford Review of Economic Policy*, 31(1), 45-63.
- Reardon, T., Echeverria, R., Berdegué, J., Minten, B., Liverpool-Tasie, S., Tschirley, D., & Zilberman, D. (2019). Rapid transformation of food systems in developing regions: highlighting the role of agricultural research & innovations. *Agricultural systems*, 172, 47-59.
- Reganold, J. P., Glover, J. D., Andrews, P. K., & Hinman, H. R. (2001). Sustainability of three apple production systems. *Nature*, 410(6831), 926-930.

- Regasa, G., Negash, R., Eneyew, A., & Bane, D. (2019). Determinants of smallholder fruit commercialization: Evidence from Southwest Ethiopia. *Review of Agricultural and Applied Economics (RAAE)*, 22(1340-2019-3718), 96-105.
- Reyes, B., Donovan, C., Bernsten, R. H., & Maredia, M. K. (2012). *Market participation and sale of potatoes by smallholder farmers in the central highlands of Angola: A Double Hurdle approach*. Retrieved from
- Rios, A. R., Masters, W. A., & Shively, G. E. (2008). *Linkages between market participation and productivity: Results from a multi-country farm household sample*. Retrieved from
- Roduner, D. (2004). Analysis of existing theories, methodologies and discussions of value chain approaches within the development cooperation sector. *A Draft Report*.
- Romo. (2016). VALUE CHAIN ANALYSIS OF MANGO IN DONG THAP PROVINCE, VIETNAM: Opportunities to Promote Inclusive Value Chain Development.
- Rosenbaum, P. R., & Rubin, D. B. (1983). The central role of the propensity score in observational studies for causal effects. *Biometrika*, 70(1), 41-55.
- Rota, A., & Sperandini, S. (2010). Value chains, linking producers to the markets. *Rome*) Available at https://fcrn.org.uk/sites/default/files/IFAD_Value_chains.pdf [Verified 31 July 2017].
- Ruben, R., Boselie, D., & Lu, H. (2007). Vegetables procurement by Asian supermarkets: a transaction cost approach. *Supply Chain Management: an international journal*.
- Ruffer, T., & Wach, E. (2013). Review of Making Markets Work for the Poor (M4P) Evaluation Methods and Approaches.
- Rutgers, T. (2010). *An analysis of supply side constraints on Ethiopian red pepper and paprika capsicum production and export: a global value chain approach*.
- Saunders, M., Lewis, P., & Thornhill, A. (2007). Research methods. *Business Students 4th edition Pearson Education Limited, England*.
- Saunders, M., Lewis, P., & Thornhill, A. (2009). *Research methods for business students: Pearson education*.
- Scott, G. J. (1995). *Prices, products, and people: analyzing agricultural markets in developing countries: Lynne Rienner Publishers*.
- Seng, K. (2016). The effects of market participation on farm households' food security in Cambodia: An endogenous switching approach.
- Sharp, J. S., & Smith, M. B. (2003). Social capital and farming at the rural–urban interface: the importance of nonfarmer and farmer relations. *Agricultural systems*, 76(3), 913-927.
- Sharp, K., Ludi, E., & Gebreselassie, S. (2007). Commercialisation Of Farming In Ethiopia: Which Pathways? *Ethiopian Journal of Economics*, 16(1), 39-54.
- Shepherd, A. (1997). *Market information services: Theory and practice: Food & Agriculture Org*.
- Shepherd, A. (2007). *Approaches to linking producers to markets (Vol. 13): Food & Agriculture Org*.
- Sibhatu, K. T., Krishna, V. V., & Qaim, M. (2015). Production diversity and dietary diversity in smallholder farm households. *Proceedings of the National Academy of Sciences*, 112(34), 10657-10662.
- Sigei, G., Bett, H., & Kibet, L. (2014). Determinants of market participation among small-scale pineapple farmers in Kericho County, Kenya.
- Singh, S. (2016). Making Markets More Inclusive: Lessons from CARE and the Future of Sustainability in Agricultural Value Chain Development. *Indian Journal of Agricultural Economics*, 71(1), 90.

- Slamet, A. S., Nakayasu, A., & Ichikawa, M. (2017). Small-scale vegetable farmers' participation in modern retail market channels in Indonesia: the determinants of and effects on their income. *Agriculture*, 7(2), 11.
- Smale, M., Diakité, L., & Keita, N. (2012). Millet transactions in market fairs, millet diversity and farmer welfare in Mali. *Environment and Development Economics*, 17(5), 523-546.
- Somano, W. (2008). *Dairy marketing chains analysis: The case of Shashemane, Hawassa and Dale District's milk shed, Southern Ethiopia*. Haramaya University,
- Stavins, R. N. (1995). Transaction costs and tradeable permits. *Journal of environmental economics and management*, 29(2), 133-148.
- Stoian, D., & Donovan, J. (2020). Putting value chain development into perspective: Evolution, blind spots, and promising avenues. eds) *Donovan, J., Stoian, D. and Hellin, J. Value chain development and the poor: promise, delivery, and opportunities for impact at scale, Practical Action Publishing, Rugby, UK*.
- Storck, H., Adenew, B., Emanu, B., Begander, R., & Hailu, G. (1997). *Management strategies for farming systems in an uncertain environment and approaches for their improvement*.
- Sturgeon, T. J. (2007). How globalization drives institutional diversity: the Japanese electronics industry's response to value chain modularity. *Journal of East Asian Studies*, 7(1), 1-34.
- Sultan, D., Tsunekawa, A., Haregeweyn, N., Adgo, E., Tsubo, M., Meshesha, D. T., . . . Ebabu, K. (2018). Efficiency of soil and water conservation practices in different agro-ecological environments in the Upper Blue Nile Basin of Ethiopia. *Journal of Arid Land*, 10(2), 249-263.
- Swain, A. (1997). Ethiopia, the Sudan, and Egypt: The Nile River Dispute. *The Journal of Modern African Studies*, 35(4), 675-694.
- Tadesse, A. (2011). *Market chain analysis of fruits for Gomma woreda, Jimma zone, Oromia National Regional State*. Haramaya University,
- Tadesse, B., & Temesgen, A. (2019). Value Chain Analysis of Banana in Mizan Aman Town of Benchi Maji Zone, Southwest Ethiopia. *International journal of Horticulture, Agriculture and Food science*, 3(1).
- Tafesse, A., Megerssa, G. R., & Gebeyehu, B. (2020). Determinants of agricultural commercialization in Offa District, Ethiopia. *Cogent Food & Agriculture*, 6(1), 1816253.
- Tamirat, G., & Muluken, P. (2018a). Analysis of Apple Fruit Value Chain in Southern Ethiopia; the Case of Chencha District.
- Tamirat, G., & Muluken, P. (2018b). Analysis of apple fruit value chain in Southern Ethiopia; the Case of Chencha District. In.
- Tarekegn, K., Asado, A., Gafaro, T., & Shitaye, Y. (2020). Value chain analysis of banana in Bench Maji and Sheka Zones of Southern Ethiopia. *Cogent Food & Agriculture*, 6(1), 1785103.
- Tarekegn, K., Haji, J., & Tegegne, B. (2017). Determinants of honey producer market outlet choice in Chena District, southern Ethiopia: a multivariate probit regression analysis. *Agricultural and food economics*, 5(1), 20.
- Temesgen, Z., & Hiwot, A. (2017). *Determinants of Smallholder Farmers' Participation in Certified Coffee Value Chain: Evidence from Members of Coffee Cooperatives in Dale District, Sidamo, Southern Ethiopia* Retrieved from
- Tesfay, A. (2008). *Determinants of Adoption and Intensity of Adoption of Vegetable Cultivation in the Irrigated Fields: The Case of Laelaymychew District, Central Tigray*. Haramaya University,

- Tinzaara, W., Stoian, D., Ocimati, W., Kikulwe, E., Otieno, G., & Blomme, G. (2018). Challenges and opportunities for smallholders in banana value chains. *Achieving sustainable cultivation of bananas, 1*, 1-26.
- Tobin, D., Glenna, L., & Devaux, A. (2016). Pro-poor? Inclusion and exclusion in native potato value chains in the central highlands of Peru. *Journal of Rural Studies, 46*, 71-80.
- Tola, M., & Ketema, M. (2014). *Tomato value chain analysis in the central rift valley: The case of Dugda woreda, East Shoa zone, Oromia National regional state, Ethiopia*. Haramaya University,
- Trienekens, J. H. (2011a). Agricultural value chains in developing countries a framework for analysis. *International food and agribusiness management review, 14*(1030-2016-82778), 51-82.
- Trienekens, J. H. (2011b). Agricultural value chains in developing countries; a framework for analysis. *International food and agribusiness management review, 14*(2), 51-83.
- Tschirley, D., Reardon, T., Dolislager, M., & Snyder, J. (2015). The rise of a middle class in East and Southern Africa: Implications for food system transformation. *Journal of International Development, 27*(5), 628-646.
- Tufa, A., Bekele, A., & Zemedu, L. (2014). Determinants of smallholder commercialization of horticultural crops in Gemechis District, West Hararghe Zone, Ethiopia. *African journal of agricultural research, 9*(3), 310-319.
- Ullah, H., Ahmad, S., Thompson, A., Ahmad, W., & Nawaz, M. A. (2010). Storage of ripe mango (*Mangifera indica* L.) cv. Alphonso in controlled atmosphere with elevated CO₂. *Pak. J. Bot, 42*(3), 2077-2084.
- UNIDO. (2009). *Agro-Value Chain Analysis and Development*. United Nations Industrial Development Organization. Working paper 3:34. Vienna International Centre, Vienna, Austria.
- van Melle, C., Coulibaly, O., & Hell, K. (2008). *Agricultural Value Chain Development in West Africa—Methodological framework and case study of mango in Benin*. Retrieved from
- Vellema, S., Ton, G., de Roo, N., & van Wijk, J. (2013). Value chains, partnerships and development: Using case studies to refine programme theories. *Evaluation, 19*(3), 304-320.
- Verhofstadt, E., & Maertens, M. (2015). Can agricultural cooperatives reduce poverty? Heterogeneous impact of cooperative membership on farmers' welfare in Rwanda. *Applied Economic Perspectives and Policy, 37*(1), 86-106.
- W Lawrence, N. (2014). *Social Research Methods: Qualitative and Quantitative Approaches*. In: Pearson Education Limited.
- Warinda, E., M. Nyariki, D., Wambua, S., & Muasya, R. (2020). Impact of smallholder farmers' welfare through participation in on-farm regional projects in East Africa. *Agrekon, 59*(1), 16-29.
- Warsanga, W. B., & Evans, E. A. (2018). Welfare Impact of Wheat Farmers Participation in the Value Chain in Tanzania. *Modern Economy, 9*(04), 853.
- Webber, C. M., & Labaste, P. (2009). *Building competitiveness in Africa's agriculture: a guide to value chain concepts and applications*: The World Bank.
- Wiersinga, R., & de Jager, A. (2009). Business opportunities in the Ethiopian fruit and vegetable sector. Ministry of Agriculture. *Nature and Food Quality*.
- Wiersinga, R. C., & de Jager, A. (2009). *Business opportunities in the Ethiopian fruit and vegetable sector*. Retrieved from
- Wiggins, S. (2014). African agricultural development: Lessons and challenges. *Journal of Agricultural Economics, 65*(3), 529-556.

- Williamson, O., & Masten, S. (1999). *The economics of transaction costs*. Retrieved from
- Williamson, O. E. (1979). Transaction-cost economics: the governance of contractual relations. *The Journal of Law and Economics*, 22(2), 233-261.
- Williamson, O. E. (1991). Comparative economic organization: The analysis of discrete structural alternatives. *Administrative Science Quarterly*, 269-296.
- Williamson, O. E. (1996). Transaction cost economics and the Carnegie connection. *Journal of Economic Behavior & Organization*, 31(2), 149-155.
- Woldehanna, T. (2014). *The policy environment for linking agriculture and nutrition in Ethiopia*. Retrieved from
- Woldesenbet, A. T. (2013). Value chain analysis of vegetables: The case of habro and kombolcha woredas in Oromia region, Ethiopia. *School of Agricultural Economics and Agribusiness, School of Graduate Studies, Haramaya University*.
- Woldu, Z., Mohammed, A., Belew, D., Shumeta, Z., & Bekele, A. (2015). Assessment of banana production and marketing in Ethiopia. *International Journal of Sciences: Basic and Applied Research*, 24, 283-307.
- Wooldridge, J. M. (2010). *Econometric analysis of cross section and panel data*: MIT press.
- Worako, T. K. (2015). Transactions costs and spatial integration of vegetable and fruit market in Ethiopia. *Ethiopian Journal of Economics*, 24(1), 89-130.
- Wossen, T., Abdoulaye, T., Alene, A., Haile, M. G., Feleke, S., Olanrewaju, A., & Manyong, V. (2017). Impacts of extension access and cooperative membership on technology adoption and household welfare. *Journal of rural studies*, 54, 223-233.
- Yami, M., Tesfaye, T., & Bekele, A. (2013). Determinants of farmers' participation decision on local seed multiplication in Amhara region, Ethiopia: A double hurdle approach. *International Journal of Science and Research*, 2(1), 424-425.
- Zhou, D., Etea, B. G., Sedebo, D. A., & Muktar, N. H. (2019). Cereal Commodity Trade Quantity Measurement Cost and Reliability: Evidence from Local Agricultural Marketplace of Ethiopia.
- Zulfiqar, M., Khan, D., & Bashir, M. (2005). An assessment of marketing margins and physical losses at different stages of marketing channels for selected vegetable crops of Peshawar Valley. *Journal of applied Sciences*, 5(9), 1528-1532.

Appendix: Survey Questionnaire (Amharic and English Versions)

በአዲስ አበባ ዩኒቨርሲቲ እና በጃፓን ተራሮ ድርጅት የተዘጋጀ ቃለ-መጠይቅ

ለአ/አደሮች የተዘጋጀ ቃለ-መጠይቅ

ውድ የዚህ ጥናት ተሳታፊ አ/አደሮች! ይህ ቃለ-መጠይቅ የተዘጋጀው በሰሜን ምዕራብ ኢትዮጵያ በሚገኙና ለዚህ ጥናት በተመረጡ የአፕል ፍራፍሬ አብቃይ ወረዳዎች ሲሆን የጥናቱ ዋና ዓላማም ለመማሪያትና በአፕል እሴት-ሰንሰለት እንዲሁም የግብይት ስርዓት ዙሪያ ያለውን የእውቀት ክፍተትና ተግዳሮቶችን በመለየት ለሚመለከተው አካል ለማቅረብ ነው። ስለዚህ የጥናቱን ዋና ዓላማ ተረድተው ትክክለኛውን መረጃ እንዲሰጡን እየጠየቅን የሚሰጡት መልስ ሚስጥራዊነቱ የተጠበቀ ሲሆን አገልግሎቱም ለዚህ ጥናት ዓላማ ብቻ የሚውል ይሆናል። ጊዜዎችን ሰውተው ይህንን መጠይቅ ስለሞሉልን በቅድሚያ ከልብ እናመሰግናለን።

ማሳሰቢያ ለመረጃ ሰብሳቢዎች:

- ❖ በመጀመሪያ ራስን ማስተዋወቅና እንደ አካባቢው ሁኔታ ሰላምታ ማቅረብ፤
- ❖ ለተጠያቂ አባዎች/እማውራዎች ስለመጠይቁ ዓላማ ግልጽ ማብራሪያ ማድረግ፤
- ❖ እያንዳንዱን ጥያቄ ግልጽና ትህትና በተሞላበት መልኩ ተጠያቂው ሃሳቡን እንዲረዳው ማድረግ፤
- ❖ መልሱን ሲያስቀምጡ በቀጥታ የተጠያቂውን ሀሳብ ብቻ መሆን አለበት፤
- ❖ ተጠያቂው ሀሳቦችን ሲናገር ተከታትሎ መመዝገብ ይጠበቃል።

የመነሻ መረጃዎች:

- የቃለ-መጠይቁ ከድ: _____
- የወረዳው ስም: _____ የቀበሌው ስም: _____ መንደር/ጎጥ: _____
- ቃለ-መጠይቁ የተደረገበት ቀን: _____ ወር: 04 አመት: 2012 ዓ/ም
- መጠይቁን የሞላው ስምና ፊርማ: _____

ክፍል አንድ: መሰረታዊ መረጃዎች/Demographic Information/

1.1. yb@tsb# xÆ\$T mr© (**እባክዎ ከተጠያቂ አባዎራው ይጀምሩ**)

t%o. q\$.	yb@tsb# xÆL SM	ò-: (1=wND 2=s@T)	XD»: %bÑI# xmt%	yTMHRT dr©*
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

* XAEKä ከላይ ለተጠየቀው የትምህርት ደረጃ እንደመነሻ የሚከተለውን ሰንጠረዥ ይመልከቱ

0. ያልተማረ	6. ክፍል 6 »	12. ክፍል 12 »
1. ክፍል 1 ያጠናቀቀ	7. ክፍል 7 »	13. ኮሌጅ ሰርተፊኬት »
2. ክፍል 2 »	8. ክፍል 8 »	14. ኮሌጅ ዲፕሎማ »
3. ክፍል 3 »	9. ክፍል 9 »	15. ዩኒቨርሲቲ ያጠናቀቀች
4. ክፍል 4 »	10. ክፍል 10 »	
5. ክፍል 5 »	11. ክፍል 11 »	

- 1.2. የጋብቻ ሁኔታ: 1. ያላገባ/ች 2. ያገባ/ች 3. የፈታ/ች 4. የሞተበት/ባት
- 1.3. $yXR\ S\%$ ከጀመሩ ስንት አመት ይሆነዎታል? _____
- 1.4. በዋናነት የቤተሰቡ መተዳደሪያ ምንድን ነው? 1. የእርሻ ስራ 2. ንግድ 3. ቅጥር 4. ሌላ _____
- 1.5. የመሬት ይዘታን በተመለከተ የሚከተለውን ይሙሉ (በ2011 የምርት ዘመን)
 1. ያለዎት ጠቅላላ የመሬት ይዘታ _____ (በቃዳ)
 2. የተከራዩት መሬት _____ (በቃዳ)
 3. ያከራዩት መሬት _____ (በቃዳ)
 4. ለእርሻ የዋለ መሬት _____ (በቃዳ)
 5. ለአጥል ፍራፍሬ ልማት የዋለ _____ (ሜ²)

ክፍል ሁለት: የቤተሰቡ የገቢ ሁኔታ/Household Income/

2.1. የእንስሳት ሀብትን በተመለከተ እባክዎ የሚከተለውን ሰንጠረዥ ይሙሉ (በ2011 የምርት ዘመን)

የእንስሳቱ አይነት	ብዛት (በቁጥር)	ዋጋ በአሁኑ የገበያ ሁኔታ ሲተመን (በብር)	የተሸጡ እንስሳት ብዛት (በቁጥር)	በመሸጥ የተገኘ ገቢ (በብር)
ላም				
ወይፈን				
ጊደር				
ጥጃ				
በሬ				
ፈረስ				
በቅሎ				
አህያ				
ፍየል				
በግ				
ዶሮ				
ሌላ _____				

2.2: በ2011 የምርት ዘመን ከዋና ዋና ሰብሎች የተገኘ የቤተሰብ ገቢ (እባክዎ ሰንጠረዥን ይሙሉ)

የሰብል አይነት	የተመረተው መጠን በኩ/ል ወይም በቁጥር	የተሸጠው መጠን በኩ/ል ወይም በቁጥር	አማካይ የአንዱ ኩ/ል ዋጋ	የተሸጠው በብር ሲተመን
1. በቅሎ				
2. ስንዴ				
3. ጤፍ				
4. ገብስ				
5. ዳጉሳ				

6. ጭት				
7. ሰሊጥ				
8. በርበሬ				
9. ባቄላ				
10. ማሽላ				
11. ለውዝ				
12. ሽንኩርት				
13. ድንች				
14. ጥቅል ጎመን				
15. ቲማቲም				
16. ካሮት				
17. ጌሽ				
18. ከሰል ሽያጭ				
19. ከቁም ዲ/ግራር ሽያጭ				
20. ችግኝ ከመሸጥ				
21. ባህር ዛፍ				
22. ቡና				
23.				

2.3: በ2011 የምርት ዘመን ከግብርና ስራ ውጭ የተገኘ የቤተሰብ ገቢ (እባክዎ ሰንጠረዥን ይሙሉ)

የገቢ ምንጭ	የእያንዳንዱ መጠን በጥሬ ገንዘብና በአይነት		ጠቅላላ ገቢ
	በጥሬ ገንዘብ/ብር	በአይነት/ ወደ ብር በመቀየር	
1	2	3	4=2+3
1. ከእንስሳት ንግድ			
2. ከሰብል ንግድ/ለትርፍ			
3. አረቄና ጠላ መጠጦች ከመሸጥ			
4. እንጅራ ወይም ዳቦ ከመሸጥ			
5. ከቤት ኪራይ			
6. ከእጅ-ስራ ውጤቶች/ሸመና			
7. በሬ ከማከራየት			
8. ከዘመድ የተላከ			
9. ከቅጥር			
10. ከቀን ስራ			
11. ከቁጠባ ወለድ			
12. መሬት ከማከራየት			
13.			

ክፍል ሶስት : የ2011 የምርት ዘመን የአጥል ፍራፍሬ አመራረትን በተመለከተ:

- 3.1. የአጥል ፍራፍሬ ልማት ስራን ከጀመሩ ስንት አመት ይሆናል? _____
- 3.2. የአጥል ዘር /ችግኝ ከየት ነው የሚያገኙት?
 - 1. ከግሌ ችግኝ ጣቢያ 2. ከግብርና ጽ/ቤት 3. መንግስታዊ ካልሆኑ ተቋማት 4. ከገበያ
- 3.3. በአጥል ዛፍ መካከል ያለው አማካይ የተከለ እርቀት /Spacing/ ስንት በስንት ይሆናል?
 - 1) 2ሜ በ 2ሜ 2) 3ሜ በ 3ሜ 3) 4ሜ በ 4ሜ 4) 5ሜ በ 5ሜ 5) 6ሜ በ 6ሜ
- 3.4. የአጥል ዛፍ በወቅቱ የመከርከም ስራ/Pruning/ ይሰራሉ? 1. አዎ 2. አልሰራም
- 3.5. ከላይ በተራ ቁ. 3.4 መልስዎ “አዎ” ከሆነ በ2011 የምርት ዘመን ለስንት ጊዜ የመከርከም ስራ

ሰርተዋል? 1. አንድ ጊዜ 2. ሁለት ጊዜ

3.6. ለአጥል ፍራፍሬ ልማት በግብዓትነት የሚጠቀሙት: 1. ዳፕ 2. ዩሪያ 3. ኮምፖስት 4. የእንስሳት ፍግ

3.7. ያለዎት ጠቅላላ የአጥል ዛፍ ቁጥር (በ2011 የምርት ዘመን)

3.8. የፍራፍሬ አይነት	የዛፍ ቁጥር			የምርት ወራቶች ከ _____ እስከ _____	ከ አንድ (1) ዛፍ የሚገኝ አማካይ ምርት (በኩ/ል)
	በማፍራት ላይ ያለ	እስከ አሁን ያላፈራ	ጠቅላላ		
አጥል					

የአጥል ዛፍ የአመራረት ስልት ምን ይመስላል? 1. ለብቻ 2. ከሌሎች ሰብሎች ጋር በጥምር

3.9. ከላይ በተራ ቀ. 3.8 በጥምር የአመራረት ስልት የሚጠቀሙ ከሆነ የአጥል ዛፍ ከየትኛው ሰብል ጋር ያለማሉ?(ከአንድ በላይ ሊመርጡ ይችላሉ) 1. ከጓሮ አትክልት ጋር 2. ከጨት 3. ከቡና 4. ከጌሽ 5. ከእንስሳት መኖ 6. ከሌላ ከሆነ ይጥቀሱ: _____

3.10. ከላይ በተራ ቀ. 3.8 በጥምር የአመራረት ስልት የሚጠቀሙ ከሆነ ለምን ይጠቅማል? (ከአንድ በላይ ሊመርጡ ይችላሉ) 1. የመሬቱ ለምነት ይጨምራል 2. ብዙ ምርት ይሰጣል 3. ከበሽታ ይከላከላል 4. ከነፋስና ከፀሐይ ለመከላከል 5. ሌላ ካለ ይግለጹ? _____

3.11. የ2011 ዓ.ም የአጥል ምርት በተመለከተ እባክዎ በሰንጠረዥ የተመለከተውን ይሙሉ፤

በ2011 ዓ.ም የተመረተው መጠን በኩ/ል	ለቤት ፍጆታ የዋለው በኩ/ል	የተሸጠው መጠን በኩ/ል	ዋጋ (ብር/ኩንታል)	ከተሸጠው የተገኘ ጠቅላላ ገቢ በብር

- 3.12. አጥል ለማምረት ሲጀምሩ መነሻ ካፒታል ስንት ነበር _____ (በብር)
- 3.13. አጥል ለማምረት የመስኖ ውሀ ይጠቀማሉ? 1. አዎ 2. የለም
- 3.14. ከሚከተሉት የመስኖ ቴክኖሎጂዎች ውስጥ የትኛው አለዎት? 1. ሞተር ፓምፕ 2. ፔዳል ፓምፕ 3. የእጅ ጉድጓድ በባህላዊ መንገድ 4. ሮፕ ፓምፕ 5. ሌላ _____
- 3.15. የመስኖ ውሀ አቅርቦት የሚያገኙት ከየት ነው? 1. ከውንዝ 2. ከዝናብ 3. ከጉድጓድ
- 3.16. የአጥል ማሳዎ ከመኖሪያ ቤትዎ ምን ያህል ይርቃል? _____ (የእግር ጉዞ በደቂቃ)
- 3.17. የአጥል ማሳዎ ከመኖሪያ ቤትዎ አካባቢ ራቅ ያለ ቦታ ከሆነ ምን ምን ችግሮችን ያመጣል?(ከአንድ በላይ ሊመርጡ ይችላሉ)
 - 1. ለመድረስ የስራ ጊዜን ይጨርሳል 4. በማሳው ብዙ ጊዜ ለመቆየት ያስቸግራል
 - 2. ለሌባ ይዳርጋል 5. ሌላ ካለ ይግለጹ _____
 - 3. ማሳውን ቶሎቶሎ ለመጎብኘት አያስችልም

3.18. በእርስዎ እይታ የአጥል ፍራፍሬ ጥራት መገለጫዎች ምን ምን ናቸው? (ከአንድ በላይ ሊመርጡ ይችላሉ)

- 1. መጠን (ትልቅነት ወይም ትንሽነት) 2. የቀለም ልዩነት 3. ሽታ
- 4. ጣዕም 5. ከበሽታ የፀዳ መሆኑ 6. ሌላ ካለ ይገለጽ_____
- 3.19. ገበያ ላይ ሲሸጥ ከጥራት አኳያ የዋጋ ልዩነት አለ? 1. አዎ 2. የለም
- 3.20. ከላይ በቁጥር 3.19. “አዎ” ከሆነ ምን ያህል ልዩነት ይኖራል?_____ (በብር/ከአንድ ኪ.ግ)
- 3.21. በአጥል ማሳዎ ላይ የበሽታ ክስተት አለ? 1. አዎ 2. የለም
- 3.22. ከላይ በቁጥር 3.21. መልስዎ “አዎ” ከሆነ የበሽታውን ስም ይገለጹ_____
- 3.23. ከላይ በቁጥር 3.21. መልስዎ “አዎ” ከሆነ በሽታውን ለመቆጣጠር የሰፍትን ስራ ይግለጹ:
 - 1. ኬሚካል በመጠቀም 2. ግንዱን በመቁረጥ 3. የእንስሳት ፍግ በአጥልው ዙሪያ በማጨስ
 - 4. የአሞ ሳሙና በመርጨት 5. ሌላ ካለ ይግለጹ?_____
- 3.24. በ2011 የምርት ዘመን የጤና እክል ገጥሞት ነበር? 1. አዎ 2. የለም
- 3.25. በቁጥር 3.24. መልስዎ “አዎ” ከሆነ ለስንት ቀን?_____

ክፍል አራት: የግብርና ኤክስቴንሽን አገልግሎትን በተመለከተ፤

- 4.1. በ2011 የምርት ዘመን ከግብርና ባለሙያዎች የኤክስቴንሽን ድጋፍ/እገዛ አግኝተዋል? 1.አዎ 2. የለም
- 4.2. በተራ ቁ. 4.1 መልስዎ “አዎ” ከሆነ በአመት ውስጥ ለስንት ቀን _____?
- 4.3. በ2011 የምርት ዘመን በአጥል ፍራፍሬ አመራረት ዙሪያ የኤክስቴንሽን የምክር አገልግሎት አግኝተዋል? 1. አዎ 2. የለም
- 4.4. ከላይ ከተራ ቁ.4.3 መልስዎ አዎ ከሆነ በዋናነት በምን ላይ ያተኮረ ነበር?
 - 1. ስለ አመራረት የሙያ ድጋፍ
 - 2. የዋጋ መረጃ በመስጠት
 - 3. ግብአት አጠቃቀም
 - 4. ብድር አጠቃቀም 5. በሌላ ከሆነ ይገለጽ_____
- 4.5. የመኖሪያ ቤትዎ ከግብርና ጣቢያው ምን ያህል ይርቃል?_____(የእግር ጉዞ በደቂቃ)
- 4.6. በ2011 የምርት ዘመን በአትክልትና ፍራፍሬ ልማት ስራዎች ስልጠና ተሳትፈው ያውቃሉ?
 - 1. አዎ 2. የለም
- 4.7. ከላይ በተራ ቁጥር 4.6. መልስዎ “አዎ” ከሆነ ስልጠናው በማን ተሰጠ?
 - 1. በግብርና ሙያተኞች 2. መንግስታዊ ባልሆኑ ድርጅቶች 3. ሌላ ከሆነ ይገለጽ_____
- 4.8. በቤትዎ የሚሰራ/ያልተሰላሽ ሞባይል አለዎት? 1. አዎ 2. የለም
- 4.9. በተራ ቁጥር 4.8 መልስዎ “አዎ” ከሆነ በዋናነት ለምን አገልግሎት ይጠቀሙበታል?
 - 1. ከዘመድ ለመገናኘት 2. የገበያ መረጃ ለማግኘት 3. የግብርና ሙያተኞችን ለማግኘት
 - 4. ለሁሉም 5. ሌላ ከሆነ ይገለጽ_____

- 4.10. የህብረት ስራ አገልግሎት አባል ነዎት? 1. አዎ 2. አይደለሁም
- 4.11. መልስዎ "አዎ" ከሆነ የየትኛው ማህበር አባል ነዎት?
1. የመስኖ 2. የገንዘብ ብድርና ቁጠባ 3. የሽማግሌት 4. የሁሉም 5. ሌላ ካለ ይገለጹ___
- 4.12. በአካባቢዎ የአጥል ፍራፍሬ አምራቾች ማህበር አለ? 1. አለ 2. የለም
- 4.13. መልስዎ "አለ" ከሆነ እርስዎ የማህበሩ አባል ነዎት? 1. አዎ 2. አይደለሁም

ክፍል አምስት: የብድር አገልግሎትን በተመለከተ፤

- 5.1. ባለፉት 12 ወራት የብድር አገልግሎት ተጠቃሚ ነበሩ? 1. አዎ 2. የለም
- 5.2. ከላይ በተራ ቀ. 5.1. መልስዎ "አዎ" ከሆነ የሚከተለውን ሰንጠረዥ ይሙሉ

የብድር መገኛ	የተበደሩት መጠን /በብር/
ከብድር ተቋማት	
ከዘመድ	
ከጓደኛ	

- 5.3. የብድር አገልግሎት ተጠቃሚ ከነበሩ የተበደሩትን ብድር ለምን አገልግሎት አዋሉት?
1. ለግብዓት መግዣ 2. ለእርሻ መሳሪያዎች መግዣ 3. ለምግብ እህል መግዣ 4. ለአጥል ልማት
5. ለበሬ መግዣ 6. ለእንስሳት እርባታ ልማት 7. ሌላ ከሆነ ይጠቀስ___

ክፍል ስድስት: የ2011 የምርት ዘመን የአጥል ፍራፍሬ የግብይት ሁኔታ/Marketing Aspects

- 6.1. የአጥል ምርት የገበያ መረጃ አቅርቦት ምን ይመስላል? 1. ዝቅተኛ 2. መካከለኛ 3. ከፍተኛ
- 6.2. ከሚከተሉት ውስጥ ለአጥል የገበያ ዋጋ እንደ መረጃ ምንጭነት የሚያገለግልዎ የቱ ነው?
1. ሌሎች አጥል አምራቾች 3. ሞባይል 5. ራዲዮ/ቴሌቪዥን
2. በግሌ ከማውቀውና ከማየው 4. የልማት ጣቢያ ሙያተኞች 6. ሌላ _____
- 6.3. የመኖሪያ ቤትዎ ከዋናው የገበያ ቦታ ምን ያህል ይርቃል?(የእግር ጉዞ በደቂቃ)
1. ከ 10 ደቂቃ በታች 2. 20 ደቂቃ አካባቢ 3. ከ30 ደቂቃ በላይ
- 6.4. የአጥል ምርትዎን በአብዛኛው የሚሸጡበትን የገበያ ስም/ከተማ ይግለጹ _____
- 6.5. የአጥል ምርትዎን በአብዛኛው የሚሸጡት ለማን ነው?

- 2. ለከተማ ፍጆታ ተጠቃሚዎች /Consumers
- 3. ለአካባቢ ሰብሳቢዎች /Collectors
- 4. ለአቀናባሪዎች/ጁስ ቤቶች/Processors
- 5. ለቸርቻሪዎች/Retailers
- 6. ለጀምላ ሻጮች/Wholesalers
- 7. ለማህበራት/Cooperatives 7. ሌላ ካለ _____

- 6.6. የበለጠ አዋጭ የሚሆነው በአብዛኛው ለየትኛው ሲሸጡ ነው?
1. ለከተማ ፍጆታ ተጠቃሚዎች /Consumers
2. ለአካባቢ ሰብሳቢዎች/Collectors
3. ለአቀናባሪዎች/ጁስ ቤቶች/Processors
4. ለቸርቻሪዎች/Retailers
5. ለጀምላ ሻጮች/Wholesalers
6. ለማህበራት/Cooperatives 7. ሌላ ካለ _____
- 6.7. የአጥል ፍራፍሬ ለገበያ ማቅረብ ከጀመሩ ስንት አመት ሆነዎ? _____

6.8. በአብዛኛው የአጥል ምርትዎን ለገዥዎች የሚሸጡት የት ነው?

- 1. በማሳላይ
- 2. በአቅራቢያ ገበያ
- 3. በመንገድ ዳር
- 4. በወረዳው ዋና ከተማ
- 5. ሌላ ከተማ/አባክዎ የከተማውን ስም ይግለጹ_____

6.9. የአጥል ምርትዎን የተሻለ ዋጋ እንዲያወጣ ምን አይነት እሴት ይጨምሩበታል?

- 1. በደረጃ መለየት/ sorting quality product
- 2. ማጠብ/ማጽዳት/ washing/cleaning
- 3. በጥላሰታ ማሸግ/ packing
- 4. ሌላ ከሆነ ይገለጹ_____

6.10. የአጥል ምርትዎን የማሸግ/pack/ ልምድ ካለዎት ለማሸግ የትኛውን ቁሳቁስ ይጠቀማሉ?

- 1. ሳጥን/ box
- 2. ጆንያ/ plastic sack
- 3. ላስቲክ ተደርጎ በቅርጫት
- 4. ሌላ_____

6.11. ለመጓጓዣ የሚያገለግሉ ንብረቶች /የጋራ ክብት ወይም ጋራ/ አለዎት? 1. አዎ 2. የለም

6.12. ምርትዎን ከማሳዎ ወደ ገበያ ቦታ በምን ያጓጉዛሉ?

- 1. በትከሻ በመሸከም
- 2. የጋራ ክብት በመጠቀም
- 3. በጋራ
- 4. በሌላ ከሆነ ይገለጹ_____

6.13. ባለፈው አመት የአጥል ምርትዎን የሸጡት እንዴት ነው?

- 1. በቀጥታ ለገዥዎች
- 2. በደላላዎች አማካኝነት
- 3. በሌላ ከሆነ ይገለጹ_____

6.14. የአጥል ምርትዎን ሲሸጡ የመሸጫ ዋጋ የሚወሰነው በማን ነው?

- 1. በሻጭ
- 2. በገዥ
- 3. እንደገበያው ሁኔታ
- 4. በድርድር
- 5. ሌላ ከሆነ ይገለጹ_____

6.15. የአጥል ፍራፍሬ ለገበያ ከማቅረብ በፊት የገበያውን ዋጋ ያውቁት ነበር? 1. አዎ 2. የለም

6.16. የአጥል ፍራፍሬ በሚሸጡበት ጊዜ በመለኪያነት የሚጠቀሙት ቁሳቁስ በአብዛኛው የቱ ነው?

- 1. በኪሎግራም
- 2. በቅርጫት
- 3. በጆንያ
- 4. በሳጥን
- 5. በቁጥር
- 6. በሌላ_____

6.17. ባለፈው አመት የአጥል ምርትዎን ሲሸጡ ዋጋ ስንት ነበር_____ (በብር/ኪ.ግ)

6.18. ባለፉት ሁለት አመታት የአጥል የገበያ ዋጋ አዝማሚያ/Trend እንዴት ነበር?

- 1. ጨምሯል
- 2. ቀንሷል
- 3. ለውጥ የለም

6.19. በአሁኑ ጊዜ የአጥል ፍራፍሬ ዋጋ ተስፋ የሚጣልበት ነው ብለው ያምናሉ? 1. አዎ 2. የለም

6.20. የአጥል ፍራፍሬ ለሸያጭ ሲደርስ ገዥ ለማግኘት ችግሮች ይገጥሙታል? 1. አዎ 2. የለም

6.21. ከላይ በቁጥር 6.20 መልስዎ “አዎ” ከሆነ ምክንያቱ ምን ሊሆን ይችላል?

- 1. የገበያ አቅርቦት አለመኖር
- 2. የመረጃ እጥረት
- 3. የዋጋ መውረድ
- 4. ሌላ ከሆነ_____

6.22. የአጥል ምርትዎ ጥራት በገዥዎች/በተጠቃሚዎች ዘንድ ተመራጭነቱ እንዴት ነው?

- 1. ዝቅተኛ
- 2. መካከለኛ
- 3. ከፍተኛ

6.23. ምርቱን ለገበያ ለማድረስ የሚጨርሰው ወጭን በተመለከተ:

ዝርዝር	ወጭ በብር
1. ለስልክ ወጭ /Calling costs	
2. ለማስጫንና ለማውረድ/Loading and unloading	
3. ለማሸግ /Packing	
4. ለድርድር /Negotiation costs	
5. የገበያ ግብር /Sales tax	

6. ለካሳ/ሳጥን ግዥ	
7. ሌላ _____	
ጠቅላላ ወጭ	=

6.24. በአጥል እሴት ሰንሰለትና ግብይት ዋና ዋና ዝርዝር ስራዎች ውስጥ የተሳትፎ ሁኔታ:

ዝርዝር ስራዎች	የተሳትፎ ሁኔታ				
	እናቶች	ሴት ልጆች	ወንድ ልጆች	አባቶች	ተቀጣሪ
1. ግብዓት ግዥ					
2. የመሬት ዝግጅት					
3. ተከላ					
4. አረምና ኩትኪቶ					
5. ጥበቃ					
6. ምርት መሰብሰብ					
7. ማፅዳትና በደረጃ መለየት					
8. ወደ ገበያ ማጓጓዝ					
9. ገበያ ላይ መሸጥ					

ከድ: 1=0% 2=(1-20%) 3=(21-40%) 4=(41-60%) 5=(61-80%) 6=(>81%)

ክፍል ሰባት: የአጥል ማምረትና ግብይት ዋና ዋና እንቅፋቶች ምን ምን ናቸው?

7.1. የአጥል ማምረት ዋና ዋና እንቅፋቶች ምን ምን ናቸው?/production problems/

ተ/ቁ	ዕንቅፋቶች	እባክዎ በደረጃ ያስቀምጡ (1ኛ፣ 2ኛ 3ኛ፣.... በማለት ፊት ለፊቱ ያስቀምጡ)
1	በሽታና ተባይ መከሰት	
2	ውርጭ መከሰት	
3	የጉልበት ሠራተኛ ዕጥረት	
4	የእውቀት ክፍተት	
5	የእርሻ መሬት ጥበት	
6	ስርቆት	
7	የዱር አውሬ/ጦጣ መኖሩ	
8	ለምርቱ ትኩረት አለመስጠት	
9	ሌላ _____	

7.2. የአጥል ግብይት ዋና ዋና እንቅፋቶች ምን ምን ናቸው?/marketing problems/

ተ/ቁ	ዕንቅፋቶች	እባክዎ በደረጃ ያስቀምጡ (1ኛ፣ 2ኛ 3ኛ፣.... በማለት ፊት ለፊቱ ያስቀምጡ)
1	የገበያ እርቀት	
2	የዋጋ ማሸቆልቆል/ዝቅተኛነት	

3	የማከማቻ /Storage/ በታ እጥረት	
4	የትራንስፖርት እጥረት	
5	የገበያ መረጃ እጥረት	
6	የደላላዎች ጣልቃ ገብነት	
7	ቶሎ መበላሸት /Perishability	
8	ሌላ_____:	

ክፍል ስምንት: የአጥል ማምረትና ግብይት ዋና ዋና ምቹ አጋጣሚዎች ምን ምን ናቸው?

8.1. የአጥል ማምረት ዋና ዋና ምቹ አጋጣሚዎች ምን ምን ናቸው?/production opportunities/

ተ/ቁ	ምቹ አጋጣሚዎች	እባክዎ በደረጃ ያስቀምጡ (1ኛ፣ 2ኛ 3ኛ፣.... በማለት ፊት ለፊቱ ያስቀምጡ)
1	የተሻለ የገበያ ፍላጎት መኖሩ	
2	የገበያ ቅርበት መኖሩ	
3	የተሻለ ዋጋ መኖሩ	
4	የሙያተኞች ድጋፍ መኖር	
5	የመስኖ አቅርቦት መኖር	
6	ብዙ የሰው ሀይል አለመጠየቁ	
7	ሌላ_____:	

8.2. የአጥል ግብይት ዋና ዋና ምቹ አጋጣሚዎች ምን ምን ናቸው?/marketing opportunities/

ተ/ቁ	ምቹ አጋጣሚዎች	እባክዎ በደረጃ ያስቀምጡ (1ኛ፣ 2ኛ 3ኛ፣.... በማለት ፊት ለፊቱ ያስቀምጡ)
1	በብዛት መመረቱ	
2	የተሻለ ዋጋ	
3	የተሻለ የገበያ ፍላጎት መኖር	
4	የተሻለ ዝርያ	
5	ብዙ የሰው ሀይል አለመጠየቁ	
6	ቶሎ አለመበላሸቱ	
7	የገበያ ቅርበት መኖሩ	
9	ሌላ_____:	

ክፍል ዘጠኝ: የቤተሰቡ ቋሚ ንብረት

9.1. ቋሚ ንብረቶችን በተመለከተ እባክዎ የሚከተለውን ሰንጠረዥ ይሙሉ (በ2011 የምርት ዘመን)

የንብረት ዓይነት	ብዛት በቁጥር	ዋጋ በአሁኑ የገበያ ሁኔታ ሲተመን (በብር)	ጠቅላላ ዋጋ
1	2	3	4= (2x3)
1. የቆርቆሮ ክዳን መኖሪያ ቤት			
2. የሳር ክዳን መኖሪያ ቤት			
3. የበቅሎ ጋሪ			
4. የእርሻ በሬ			
5. የእርሻ ፈረስ			
6. ሞተር ፓምፕ			
7. ሮፕ ፓምፕ			
8. ሞተር ሳይክል			
9. የተሻሻለ ምድጃ			
10. ዘመናዊ የንብ ቀፎ			
11. ባህላዊ የንብ ቀፎ			
12. ሞባይል			
13. የቤት ወንበር/ሶፋ			
14. የቤት ጠረጴዛ			
15. የከተማ ቤት			
16. የእንጨት ሞዝቦልድ አልጋ			
17. የሞተር ወፍጮ			
18. መኪና			
19. ባጃጅ			
20. ሮፕ ፓምፕ			
21.			

ክፍል አስር: የቤተሰብ ወጭ / Household Expenditure

10.1: የቤተሰብ የምግብ ፍጆታ / Food Consumption

U. የቤተሰብዎን የምግብ ፍጆታ እንዴት ይገልጹታል?

1. አመቱን ሙሉ የምግብ እጥረት ታይቷል
2. አልፎ አልፎ የምግብ እጥረት ታይቷል
3. ምንም የምግብ እጥረት አልተከሰተም ነገር ግን የተትረፈረፈ አቅርቦት አልነበረም

4. የተትረፈረፈ የምግብ አቅርቦት ነበር

ለ. እባክዎ የሚከተለውን ሰንጠረዥ በጥንቃቄ ይሙሉ (የ2011 የምርት ዘመን)

ዝርዝር/Item	መለኪያ (e.g. ኪ/ግ)	ባለፉት 7 ቀናት ጠቅላላ የቤተሰቡ ፍጆታ			ባለፉት 12 ወራት የተገዛ/Bought in the last 12 months				
		በቤተሰቡ የተመረተ	የተገዛ	የተገዛበት ዋጋ በብር	የግዥ ድግግሞሽ (e.g., 2 times per month)	አማካኝ መጠን በእያንዳንዱ ጊዜ (e.g. 2 kg; etc)	የአመቱ ጠቅላላ መጠን/ quantit	አማካኝ ዋጋ per unit (ብር)	ጠቅላላ ወጭ ለግዥ (ብር)
1	2	3	4	5	6	7	8	9	10= 8*9
ዋና ምግቦች									
1. በቆሎ									
2. ጤፍ									
3. ስንዴ									
4. ገብስ									
5. ዳጉሳ									
6. አተር									
7. ባቄላ									
8.									
9.									
ፍራፍሬ									
10. ብርቱካን									
11. አፕል									
12. አሽካዶ									
13. ሙዝ									
14. አፕል									
15.									
አትክልት									
16. ቲማተም									
17. ቀይሽንኩርት									
18. ድንች									
19. ነጭሽንኩርት									
20. በርበሬ									
21. ካሮት									
22. ጎሙን									
23. ዱባ									
24.									
ስጋና የስጋ ውጤቶች									
25. የበሬ ስጋ									
26. የፍየል ስጋ									
27. የቦግ ስጋ									
28. የዶሮ ስጋ									
29. እንቁላል									
30. ወተት									
31. አይብ									
32. ቅቤ									
33. ማር									
መጠራች									
34. ሻይ									
35. ቡና									
36. ለስላሳ									
37. ጠላ									
38. ቢራ									
39. አረቄ									
40.									
ዘይትና የቅባት እህሎችና ሌሎች									

41. የምግብ ዘይት									
42. ስኬር									
43. ጨው									
44.									

10.2: ምግብ-ነክ ያልሆኑ ዋና ዋና ወጪዎች በ2011 ዓ.ም

ዝርዝር ወጪ	የግዥ ድግግሞሽ (e.g., 2 times per month)	አማካኝ መጠን በእያንዳንዱ ጊዜ (e.g. 2 kg; 4 bundles etc)	የአመቱ ጠቅላላ መጠን/quantity	አማካኝ ዋጋ per unit (ብር)/ Average per unit price (birr)	ጠቅላላ ወጪ ለግዥ (ብር)/ Total cost of purchase (birr)
1. ለልብስ					
2. ለጫማ					
3. ለሰሙና					
4. ለማገዶ እንጨት ግዥ					
5. ለናፍታ					
6. ለባትሪ					
7. ለትምህርት ቤት ክፍያ					
8. ለህክምና					
9. ለወፍጮ					
10. ለመሬት ግብር					
11. ለቤተክርስቲያን/ለመስጊድ					
12. ለማዳበሪያ ግዥ					
13. ለምርጥ ዘር ግዥ					
14. ለበሬ/ፈረስ ግዥ					
15. ለቤት መስሪያ					
16. ለከብት ጥበቃ ተቀጣሪ					
17. ለትራንስፖርት					
18. ለቤት እቃዎች ግዥ					
19. ለአልጋ፤ወንበር፤ጠረጴዛ					
20. ለቤት ጥገና					
21. ለመኪና/ባጃጅ ግዥ					
22. ለህክምና					
23. ለተማሪ ለቤት ኪራይ					
24. ለአመት በአል ወጪ					
25. ለመሬት ኪራይ					
26.					
27.					
28.					

//ተጠናቀቀ//

ጊዜዎችን ሰውተው ይህንን መጠይቅ ስለሞሉልኝ በድጋሚ ከልብ አመሰግናለሁ። //መልካም ጊዜ//

ለአ/አደሮች የተዘጋጀ ቃለ-መጠይቅ

ውድ የዚህ ጥናት ተሳታፊ አ/አደሮች! ይህ ቃለ-መጠይቅ የተዘጋጀው በሰሜን ምዕራብ ኢትዮጵያ በሚገኙና ለዚህ ጥናት በተመረጡ የማንኛ ፍራፍሬ አብቃይ ወረዳዎች ሲሆን የጥናቱ ዋና ዓላማም ለመማሪያትና በማንኛ እሴት-ሰንሰለት እንዲሁም የግብይት ስርዓት ዙሪያ ያለውን የእውቀት ክፍተትና ተግዳሮቶችን በመለየት ለሚመለከተው አካል ለማቅረብ ነው። ስለዚህ

የጥናቱን ዋና ዓላማ ተረድተው ትክክለኛውን መረጃ እንዲሰጡን እየጠየቅን የሚሰጡት መልስ ሚስጥራዊነቱ የተጠበቀ ሲሆን አገልግሎቱም ለዚህ ጥናት ዓላማ ብቻ የሚውል ይሆናል። ጊዜዎትን ሰውተው ይህንን መጠይቅ ስለሞሉልን በቅድሚያ ከልብ እናመሰግናለን።

ማሳሰቢያ ለመረጃ ሰብሰቢዎች:

- ❖ በመጀመሪያ ራስን ማስተዋወቅና እንደ አካባቢው ሁኔታ ሰላምታ ማቅረብ፤
- ❖ ለተጠያቂ አባዎች/እማውራዎች ስለመጠይቁ ዓላማ ግልጽ ማብራሪያ ማድረግ፤
- ❖ እያንዳንዱን ጥያቄ ግልጽና ትህትና በተሞላበት መልኩ ተጠያቂው ሃሳቡን እንዲረዳው ማድረግ፤
- ❖ መልሱን ሲያስቀምጡ በቀጥታ የተጠያቂውን ሀሳብ ብቻ መሆን አለበት፤
- ❖ ተጠያቂው ሀሳቦችን ሲናገር ተከታትሎ መመዝገብ ይጠበቃል።

የመነሻ መረጃዎች:

- የቃለ-መጠይቁ ክፍ: _____
- የወረዳው ስም: _____ የቀበሌው ስም: _____ መንደር/ጎጥ: _____
- ቃለ-መጠይቁ የተደረገበት ቀን: _____ ወር: 04 አመት: 2012 ዓ/ም
- መጠይቁን የሞላው ስምና ፊርማ: _____

ክፍል አንድ: መሰረታዊ መረጃዎች/Demographic Information/

1.6. yb@tsb# xÆ\$T mr© (እባክዎ ከተጠያቂ አባዎራው ይጀምሩ)

t% ባሕርይ	yb@tsb# xÆL SM	ዕ-: (1=wND 2=s@T)	XD»: ¼bÑl# xmt¼	yTMHRT dr©*
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

* XÆKä ከላይ ለተጠየቀው የትምህርት ደረጃ እንደመነሻ የሚከተለውን ሰንጠረዥ ይመልከቱ)

0. ያልተማረ	6. ክፍል 6 »	12. ክፍል 12 »
1. ክፍል 1 ያጠናቀቀ	7. ክፍል 7 »	13. ኮሌጅ ሰርተፊኬት »
2. ክፍል 2 »	8. ክፍል 8 »	14. ኮሌጅ ዲፕሎማ »
3. ክፍል 3 »	9. ክፍል 9 »	15. ዩኒቨርሲቲ ያጠናቀቀች
4. ክፍል 4 »	10. ክፍል 10 »	
5. ክፍል 5 »	11. ክፍል 11 »	

- 1.7. የጋብቻ ሁኔታ: 1. ያላገባ/ች 2. ያገባ/ች 3. የፈታ/ች 4. የሞተበት/ባት
- 1.8. yXRš S% የጀመሩበት ስንት አመት ይሆነዎታል? _____
- 1.9. በዋናነት የቤተሰቡ መተዳደሪያ ምንድን ነው? 1. የእርሻ ስራ 2. ንግድ 3. ቅጥር 4. ሌላ _____

1.10. የመሬት ይዘታን በተመለከተ የሚከተለውን ይሙሉ (በ2011 የምርት ዘመን)

6. ያለዎት ጠቅላላ የመሬት ይዘታ _____ (በቃዳ)
7. የተከራዩት መሬት _____ (በቃዳ)
8. ያከራዩት መሬት _____ (በቃዳ)
9. ለእርሻ የዋለ መሬት _____ (በቃዳ)
10. ለማንጎ ፍራፍሬ ልማት የዋለ _____ (ሜ²)

ክፍል ሁለት: የቤተሰቡ የገቢ ሁኔታ/Household Income/

2.1. የእንስሳት ሀብትን በተመለከተ እባክዎ የሚከተለውን ሰንጠረዥ ይሙሉ (በ2011 የምርት ዘመን)

የእንስሳቱ አይነት	ብዛት (በቁጥር)	ዋጋ በአሁኑ የገበያ ሁኔታ ሲተመን (በብር)	የተሸጡ እንስሳት ብዛት (በቁጥር)	በመሸጥ የተገኘ ገቢ (በብር)
ላም				
ወይፈን				
ጊደር				
ጥጃ				
በሬ				
ፈረስ				
በቆሎ				
አሀያ				
ፍየል				
በግ				
ዶሮ				
ሌላ				

2.2: በ2011 የምርት ዘመን ከዋና ዋና ሰብሎች የተገኘ የቤተሰብ ገቢ (እባክዎ ሰንጠረዥን ይሙሉ)

የሰብል አይነት	የተመረተው መጠን በኩ/ል ወይም በቁጥር	የተሸጠው መጠን በኩ/ል ወይም በቁጥር	አማካይ የአንዱ ኩ/ል ዋጋ	የተሸጠው በብር ሲተመን
1. በቆሎ				
2. ስንዴ				
3. ጤፍ				
4. ገብስ				
5. ዳጉሳ				
6. ጫት				
7. ሰሊጥ				
8. በርበሬ				
9. ባቄላ				
10. ማሽላ				
11. ለውዝ				
12. ሽንኩርት				
13. ድንች				
14. ጥቅል ጎመን				
15. ቲማቲም				
16. ካሮት				
17. ኔሽ				
18. ከሰል ሽያጭ				
19. ከቁም ዲ/ግራር ሽያጭ				

20. ችግኝ ከመሸጥ				
21. ባህር ዛፍ				
22. ቡና				
21.				

2.3: በ2011 የምርት ዘመን ከግብርና ስራ ውጭ የተገኘ የቤተሰብ ገቢ (እባክዎ ሰንጠረዥን ይሙሉ)

የገቢ ምንጭ	የእያንዳንዱ መጠን በጥሬ ገንዘብና በአይነት		ጠቅላላ ገቢ
	በጥሬ ገንዘብ/ብር	በአይነት/ ወደ ብር በመቀየር	
1	2	3	4=2+3
14. ከእንስሳት ንግድ			
15. ከሰብል ንግድ/ለትርፍ			
16. አረቄና ጠላ መጠጦች ከመሸጥ			
17. እንጀራ ወይም ዳቦ ከመሸጥ			
18. ከቤት ኪራይ			
19. ከእጅ-ስራ ውጤቶች/ሸመና			
20. በሬ ከማከራየት			
21. ከዘመድ የተላከ			
22. ከቅጥር			
23. ከቀን ስራ			
24. ከቁጠባ ወለድ			
25. መሬት ከማከራየት			
26.			

ክፍል ሶስት : የ2011 የምርት ዘመን የማንኛውንም ፍራፍሬ አመራረትን በተመለከተ:

- 3.1. የማንኛውን ፍራፍሬ ልማት ስራን ከጀመሩ ስንት አመት ይሆናል? _____
- 3.2. የማንኛውን ዘር /ችግኝ ከየት ነው የሚያገኙት?
 - 1. ከግሌ ችግኝ ጣቢያ 2. ከግብርና ጽ/ቤት 3. መንግስታዊ ካልሆኑ ተቋማት 4. ከገበያ
- 3.3. በአሁኑ ጊዜ የተሻሻለ የማንኛውን ዝርያ እየተጠቀሙ ይገኛሉ? 1. አዎ 2. የለም
- 3.4. ከላይ በተራ ቁ. 3.3 መልስዎ “አዎ” ከሆነ የተሻሻለ የማንኛውን ዝርያው ስም:
 - 1. Tommy Atkins 2. Keitt 3. Kent 4. ሁሉንም 5. ሌላ ከሆነ _____
- 3.5. በማንኛው ዘዴ መካከል ያለው አማካይ የተከላ እርቀት /Spacing/ ስንት በስንት ይሆናል?
 - 1) 2ሜ በ 2ሜ 2) 4ሜ በ 4ሜ 3) 5ሜ በ 5ሜ 4) 6ሜ በ 6ሜ 5) 7ሜ በ 7ሜ
- 3.6. የማንኛውን ዘዴ በወቅቱ የመከርከም ስራ/Pruning/ ይሰራሉ? 1. አዎ 2. አልሰራም
- 3.7. ከላይ በተራ ቁ. 3.6 መልስዎ “አዎ” ከሆነ በ2011 የምርት ዘመን ለስንት ጊዜ የመከርከም ስራ ሰርተዋል? 1. አንድ ጊዜ 2. ሁለት ጊዜ
- 3.8. ለማንኛውን ፍራፍሬ ልማት በግብዓትነት የሚጠቀሙት: 1. ዳፕ 2. ደረያ 3. ከምግብ 4. የእንስሳት ፍግ
- 3.9. ያለዎት ጠቅላላ የማንኛውን ዘዴ ቁጥር (በ2011 የምርት ዘመን)

የማንኛውን አይነት	የማንኛውን ዘዴ ቁጥር			የምርት ወራቶች ከ _____ እስከ _____	ከ አንድ (1) ዘዴ የሚገኝ አማካይ ምርት (በኩ/ል)
	በማፍራት ላይ ያለ	እስከ አሁን ያላፈረ	ጠቅላላ		

የተሻሻለ ዝርያ					
የአካባቢ ዝርያ					

3.10. የማንን ዛፍ የአመራረት ስልት ምን ይመስላል? 1. ለብቻ 2. ከሌሎች ሰብሎች ጋር በጥምር

3.11. ከላይ በተራ ቀ. 3.10 በጥምር የአመራረት ስልት የሚጠቀሙ ከሆነ የማንን ዛፍ ከየትኛው

ሰብል ጋር ያለማሉ?(ከአንድ በላይ ሊመርጡ ይችላሉ) 1. ከጓሮ አትክልት ጋር 2. ከጫት

3. ከቡና 4. ከጌሽ 5. ከእንስሳት መኖ 6. ከሌላ ከሆነ ይጥቀሱ: _____

3.12. ከላይ በተራ ቀ. 3.10 በጥምር የአመራረት ስልት የሚጠቀሙ ከሆነ ለምን ይጠቅማል? (ከአንድ

በላይ ሊመርጡ ይችላሉ) 1. የመሬቱ ለምንት ይጨምራል 2. ብዙ ምርት ይሰጣል

3. ከበሽታ ይከላከላል 4. ከነፋስና ከፀሐይ ለመከላከል 5. ሌላ ካለ ይግለጹ? _____

3.13. የ2011 ዓ.ም የማንን ምርት በተመለከተ እባክዎ በሰንጠረዥ የተመለከተውን ይሙሉ፤

በ2011 ዓ.ም የተመረተው መጠን በኩ/ል	ለቤት ፍጆታ የዋለው በኩ/ል	የተሸጠው መጠን በኩ/ል	ዋጋ (ብር/ኩንታል)	ከተሸጠው የተገኘ ጠቅላላ ገቢ በብር

3.14. ማንን ለማምረት ሲጀምሩ መነሻ ካፒታል ስንት ነበር _____ (በብር)

3.15. ማንን ለማምረት የመስኖ ውሀ ይጠቀማሉ? 1. አዎ 2. የለም

3.16. ከሚከተሉት የመስኖ ቴክኖሎጂዎች ውስጥ የትኛው አለዎት? 1. ሞተር ፓምፕ 2. ፔዳል ፓምፕ

3. የእጅ ጉድጓድ በባህላዊ መንገድ 4. ሮፕ ፓምፕ 5. ሌላ _____

3.17. የመስኖ ውሀ አቅርቦት የሚያገኙት ከየት ነው? 1. ከውንዝ 2. ከዝናብ 3. ከጉድጓድ

3.18. የማንን ማሳዎ ከመኖሪያ ቤትዎ ምን ያህል ይርቃል? _____ (የእግር ጉዞ በደቂቃ)

3.19. የማንን ማሳዎ ከመኖሪያ ቤትዎ አካባቢ ራቅ ያለ ቦታ ከሆነ ምን ምን ችግሮችን ያመጣል?(ከአንድ

በላይ ሊመርጡ ይችላሉ)

4. ለመድረስ የስራ ጊዜን ይጨርሳል 4. በማሳው ብዙ ጊዜ ለመቆየት ያስቸግራል

5. ለሌባ ይዳርጋል 5. ሌላ ካለ ይግለጹ _____

6. ማሳውን ቶሎቶሎ ለመጎብኘት አያስችልም

3.26. በእርስዎ እይታ የማንን ፍራፍሬ ጥራት መገለጫዎች ምን ምን ናቸው? (ከአንድ በላይ ሊመርጡ ይችላሉ)

1. መጠን (ትልቅነት ወይም ትንሽነት) 2. የቀለም ልዩነት 3. ሽታ

4. ጣዕም 5. ከበሽታ የፀዳ መሆኑ 6. ሌላ ካለ ይግለጹ _____

3.27. ገበያ ላይ ሲሸጥ ከጥራት አኳያ የዋጋ ልዩነት አለ? 1. አዎ 2. የለም

3.28. ከላይ በቁጥር 3.21. “አዎ” ከሆነ ምን ያህል ልዩነት ይኖራል? _____ (በብር/ከአንድ ኪ.ግ)

3.29. በማንን ማሳዎ ላይ የበሽታ ክስተት አለ? 1. አዎ 2. የለም

- 3.30. ከላይ በቁጥር 3.23. መልስዎ “አዎ” ከሆነ የበሽታውን ስም ይገለጹ _____
- 3.31. ከላይ በቁጥር 3.23. መልስዎ “አዎ” ከሆነ በሽታውን ለመቆጣጠር የሰፋትን ስራ ይግለጹ፡
 - 2. ኬሚካል በመጠቀም
 - 2. ግንዱን በመቁረጥ
 - 3. የእንስሳት ፍግ በማንጎው ዙሪያ በማጨስ
 - 4. የአሞ ሳሙና በመርጨት
 - 5. ሌላ ካለ ይግለጹ? _____
- 3.32. በ2011 የምርት ዘመን የጤና እክል ገጥሞት ነበር? 1. አዎ 2. የለም
- 3.33. በቁጥር 3.26. መልስዎ “አዎ” ከሆነ ለስንት ቀን? _____

ክፍል አራት፡ የግብርና ኤክስቴንሽን አገልግሎትን በተመለከተ፤

- 4.14. በ2011 የምርት ዘመን ከግብርና ባለሙያዎች የኤክስቴንሽን ድጋፍ/እገዛ አግኝተዋል? 1.አዎ 2. የለም
- 4.15. በተራ ቁ. 4.1 መልስዎ “አዎ” ከሆነ በአመት ውስጥ ለስንት ቀን _____?
- 4.16. በ2011 የምርት ዘመን በማንጎ ፍራፍሬ አመራረት ዙሪያ የኤክስቴንሽን የምክር አገልግሎት አግኝተዋል? 1. አዎ 2. የለም
- 4.17. ከላይ ከተራ ቁ.4.3 መልስዎ አዎ ከሆነ በዋናነት በምን ላይ ያተኮረ ነበር?
 - 5. ስለ አመራረት የሙያ ድጋፍ
 - 6. የዋጋ መረጃ በመስጠት
 - 7. ግብአት አጠቃቀም
 - 8. ብድር አጠቃቀም
 - 5. በሌላ ከሆነ ይገለጽ _____
- 4.18. የመኖሪያ ቤትዎ ከግብርና ጣቢያው ምን ያህል ይርቃል? _____ (የእግር ጉዞ በደቂቃ)
- 4.19. በ2011 የምርት ዘመን በአትክልትና ፍራፍሬ ልማት ስራዎች ስልጠና ተሳትፈው ያውቃሉ?
 - 1. አዎ 2. የለም
- 4.20. ከላይ በተራ ቁጥር 4.6. መልስዎ “አዎ” ከሆነ ስልጠናው በማን ተሰጠ?
 - 2. በግብርና ሙያተኞች 2. መንግስታዊ ባለሆኑ ድርጅቶች 3. ሌላ ከሆነ ይገለጽ _____
- 4.21. በቤትዎ የሚሰራ/ያልተበላሽ ሞባይል አለዎት? 1. አዎ 2. የለም
- 4.22. በተራ ቁጥር 4.8 መልስዎ “አዎ” ከሆነ በዋናነት ለምን አገልግሎት ይጠቀሙበታል?
 - 1. ከዘመድ ለመገናኘት
 - 2. የገበያ መረጃ ለማግኘት
 - 3. የግብርና ሙያተኞችን ለማግኘት
 - 4. ለሁሉም
 - 5. ሌላ ከሆነ ይገለጽ _____
- 4.23. የህብረት ስራ አገልግሎት አባል ነዎት? 1. አዎ 2. አይደለሁም
- 4.24. መልስዎ “አዎ” ከሆነ የየትኛው ማህበር አባል ነዎት?
 - 1. የመስኖ
 - 2. የገንዘብ ብድርና ቁጠባ
 - 3. የሽማግሌ
 - 4. የሁሉም
 - 5. ሌላ ካለ ይገለጽ _____
- 4.25. በአካባቢዎ የማንጎ ፍራፍሬ አምራቾች ማህበር አለ? 1. አለ 2. የለም
- 4.26. መልስዎ “አለ” ከሆነ እርስዎ የማህበሩ አባል ነዎት? 1. አዎ 2. አይደለሁም

ክፍል አምስት፡ የብድር አገልግሎትን በተመለከተ፤

- 10.1. ባለፉት 12 ወራት የብድር አገልግሎት ተጠቃሚ ነበሩ? 1. አዎ 2. የለም
- 10.2. ከላይ በተራ ቁ. 5.1. መልስዎ "አዎ" ከሆነ የሚከተለውን ሰንጠረዥ ይሙሉ

የብድር መገኛ	የተበደሩት መጠን /በብር/
ከብድር ተቋማት	
ከዘመድ	
ከጓደኛ	

- 10.3. የብድር አገልግሎት ተጠቃሚ ከነበሩ የተበደሩትን ብድር ለምን አገልግሎት አዋሉት?
 - 1. ለግብዓት መግዣ 2. ለእርሻ መሳሪያዎች መግዣ 3. ለምግብ እህል መግዣ 4. ለማንጎ ልማት
 - 5. ለበሬ መግዣ 6. ለእንስሳት እርባታ ልማት 7. ሌላ ከሆነ ይጠቀስ_____

ክፍል ስድስት: የ2011 የምርት ዘመን የማንጎ ፍራፍሬ የግብይት ሁኔታ/Marketing Aspects

- 6.25. የማንጎ ምርት የገበያ መረጃ አቅርቦት ምን ይመስላል? 1. ዝቅተኛ 2. መካከለኛ 3. ከፍተኛ
- 6.26. ከሚከተሉት ውስጥ ለማንጎ የገበያ ዋጋ እንደ መረጃ ምንጭነት የሚያገለግልዎ የቱ ነው?
 - 3. ሌሎች ማንጎ አምራቾች 3. ሞባይል 5. ራዲዮ/ቴሌቪዥን
 - 4. በግሌ ከማውቀውና ከማየው 4. የልማት ጣቢያ ሙያተኞች 6. ሌላ _____
- 6.27. የመኖሪያ ቤትዎ ከዋናው የገበያ ቦታ ምን ያህል ይርቃል?(የእግር ጉዞ በደቂቃ)
 - 1. ከ 10 ደቂቃ በታች 2. 20 ደቂቃ አካባቢ 3. ከ30 ደቂቃ በላይ
- 6.28. የማንጎ ምርትዎን በአብዛኛው የሚሸጡትን የገበያ ስም/ከተማ ይግለጹ_____
- 6.29. የማንጎ ምርትዎን በአብዛኛው የሚሸጡት ለማን ነው?
 - 2. ለከተማ ፍጆታ ተጠቃሚዎች /Consumers
 - 3. ለአካባቢ ሰብሳቢዎች /Collectors
 - 4. ለአቀናባሪዎች/ ጁስ ቤቶች/Processors
 - 5. ለቸርቻሪዎች/ Retailers
 - 6. ለጀምላ ሻጮች/ Wholesalers
 - 7. ለማህበራት /Cooperatives 7. ሌላ ካለ_____

- 6.30. የበለጠ አዎጭ የሚሆነው በአብዛኛው ለየትኛው ሲሸጡ ነው?
 - 7. ለከተማ ፍጆታ ተጠቃሚዎች /Consumers
 - 8. ለአካባቢ ሰብሳቢዎች/Collectors
 - 9. ለአቀናባሪዎች/ጁስ ቤቶች/Processors
 - 10. ለቸርቻሪዎች/Retailers
 - 11. ለጀምላ ሻጮች/Wholesalers
 - 12. ለማህበራት/Cooperatives 7. ሌላ ካለ_____

6.31. የማንጎ ፍራፍሬ ለገበያ ማቅረብ ከጀመሩ ስንት አመት ሆነዎ?_____

- 6.32. በአብዛኛው የማንጎ ምርትዎን ለገዥዎች የሚሸጡት የት ነው?
 - 1. በማሳ ላይ 2. በአቅራቢያ ገበያ 3. በመንገድ ዳር
 - 4. በወረዳው ዋና ከተማ 5. ሌላ ከተማ/አባክዎ የከተማውን ስም ይግለጹ_____

- 6.33. የማንጎ ምርትዎን የተሻለ ዋጋ እንዲያወጣ ምን አይነት እሴት ይጨምሩበታል?
 - 3. በደረጃ መለየት/ sorting quality product 3. በጥላስቲክ ማሸግ/ packing
 - 4. ማጠብ/ማጽዳት/ washing/cleaning 4. ሌላ ከሆነ ይገለጹ_____

- 6.34. የማንን ምርትዎን የማሸግ/pack/ ልምድ ካለዎት ለማሸግ የትኛውን ቁሳቁስ ይጠቀማሉ?
 2. ሳጥን/ box 2. ጆንያ/ plastic sack 3. ላስቲክ ተደርጎ በቅርጫት 4. ሌላ_____
- 6.35. ለመጓጓዣነት የሚያገለግሉ ንብረቶች /የጋማ ክብት ወይም ጋሪ/ አለዎት? 1. አዎ 2. የለም
- 6.36. ምርትዎን ከማሳዎ ወደ ገበያ ቦታ በምን ያጓጉዛሉ?
 1. በትከሻ በመሸከም 2. የጋማ ክብት በመጠቀም 3. በጋሪ 4. በሌላ ከሆነ ይገለጽ_____
- 6.37. ባለፈው አመት የማንን ምርትዎን የሸጡት እንዴት ነው?
 1. በቀጥታ ለገዥዎች 2. በደላላዎች አማካኝነት 3. በሌላ ከሆነ ይገለጽ_____
- 6.38. የማንን ምርትዎን ሲሸጡ የመሸጫ ዋጋ የሚወሰነው በማን ነው?
 1. በሸጫ 2. በገዥ 3. እንደገበያው ሁኔታ 4. በድርድር 5. ሌላ ከሆነ ይገለጽ_____
- 6.39. የማንን ፍራፍሬ ለገበያ ከማቅረብዎ በፊት የገበያውን ዋጋ ያውቁት ነበር? 1. አዎ 2. የለም
- 6.40. የማንን ፍራፍሬ በሚሸጡበት ጊዜ በመለኪያነት የሚጠቀሙት ቁሳቁስ በአብዛኛው የቱ ነው?
 1. በኪሎግራም 2. በቅርጫት 3. በጆንያ 4. በሳጥን 5. በቁጥር 6. በሌላ_____
- 6.41. ባለፈው አመት የማንን ምርትዎን ሲሸጡ ዋጋ ስንት ነበር_____ (በብር/ኪ.ግ)
- 6.42. ባለፉት ሁለት አመታት የማንን የገበያ ዋጋ አዝማሚያ/Trend እንዴት ነበር?
 2. ጨምሯል 2. ቀንሷል 3. ለውጥ የለም
- 6.43. በአሁኑ ጊዜ የማንን ፍራፍሬ ዋጋ ተስፋ የሚጣልበት ነው ብለው ያምናሉ? 1. አዎ 2. የለም
- 6.44. የማንን ፍራፍሬ ለሸያጭ ሲደርስ ገዥ ለማግኘት ችግሮች ይገጥሙዎታል? 1. አዎ 2. የለም
- 6.45. ከላይ በቁጥር 6.20 መልስዎ “አዎ” ከሆነ ምክንያቱ ምን ሊሆን ይችላል?
 2. የገበያ አቅርቦት አለመኖር 2. የመረጃ እጥረት 3. የዋጋ መውረድ 4. ሌላ ከሆነ_____
- 6.46. የማንን ምርትዎ ጥራት በገዥዎች/በተጠቃሚዎች ዘንድ ተመራጭነቱ እንዴት ነው?
 1. ዝቅተኛ 2. መካከለኛ 3. ከፍተኛ
- 6.47. ምርቱን ለገበያ ለማድረስ የሚጨርሰው ወጭን በተመለከተ:

ዝርዝር	ወጭ በብር
8. ለስልክ ወጭ /Calling costs	
9. ለማስጫንና ለማውረድ/Loading and unloading	
10. ለማሸግ /Packing	
11. ለድርድር /Negotiation costs	
12. የገበያ ግብር /Sales tax	
13. ለካሳ/ሳጥን ግዥ	
14. ሌላ_____	
ጠቅላላ ወጭ	=

6.48. በማንን እሴት ሰንሰለትና ግብይት ዋና ዋና ዝርዝር ስራዎች ውስጥ የተሳትፎ ሁኔታ:

ዝርዝር ስራዎች	የተሳትፎ ሁኔታ				
	እናዳች	ሴት ልጆች	ወንድ ልጆች	አባቶች	ተቀጣሪ

10. ግብዓት ግዥ					
11. የመሬት ዝግጅት					
12. ተክለ					
13. አረምና ኩትኪቶ					
14. ጥበቃ					
15. ምርት መሰብሰብ					
16. ማፅዳትና በደረጃ መለየት					
17. ወደ ገበያ ማጓጓዝ					
18. ገበያ ላይ መሸጥ					

ኮድ: 1=0% 2=(1-20%) 3=(21-40%) 4=(41-60%) 5=(61-80%) 6=(>81%)

ክፍል ሰባት: የማንነት ማምረትና ግብይት ዋና ዋና እንቅፋቶች ምን ምን ናቸው?

7.1. የማንነት ማምረት ዋና ዋና እንቅፋቶች ምን ምን ናቸው?/production problems/

ተ/ቁ	ዕንቅፋቶች	እባክዎ በደረጃ ያስቀምጡ (1ኛ፣ 2ኛ 3ኛ፣.... በማለት ፊት ለፊቱ ያስቀምጡ)
1	በሽታና ተባይ መከሰት	
2	ውርጭ መከሰት	
3	የጉልበት ሠራተኛ ዕጥረት	
4	የእውቀት ክፍተት	
5	የእርሻ መሬት ጥበት	
6	ስርቆት	
7	የዱር አውሬ/ጦጣ መኖሩ	
8	ለምርቱ ትኩረት አለመስጠት	
9	ሌላ _____	

7.2. የማንነት ግብይት ዋና ዋና እንቅፋቶች ምን ምን ናቸው?/marketing problems/

ተ/ቁ	ዕንቅፋቶች	እባክዎ በደረጃ ያስቀምጡ (1ኛ፣ 2ኛ 3ኛ፣.... በማለት ፊት ለፊቱ ያስቀምጡ)
1	የገበያ እርቀት	
2	የዋጋ ማሽቆልቆል/ዝቅተኛነት	
3	የማከማቻ /Storage/ ቦታ እጥረት	
4	የትራንስፖርት እጥረት	
5	የገበያ መረጃ እጥረት	
6	የደላላዎች ጣልቃ ገብነት	
7	ቶሎ መበላሸት /Perishability	
8	ሌላ _____ :	

ክፍል ስምንት: የማንነት ማምረትና ግብይት ዋና ዋና ምቹ አጋጣሚዎች ምን ምን ናቸው?

8.1. የማንጎ ማምረት ዋና ዋና ምቹ አጋጣሚዎች ምን ምን ናቸው?/production opportunities/

8.2.

ተ/ቁ	ምቹ አጋጣሚዎች	እባክዎ በደረጃ ያስቀምጡ (1ኛ፣ 2ኛ 3ኛ፣.... በማለት ፊት ለፊቱ ያስቀምጡ)
1	የተሻለ የገበያ ፍላጎት መኖሩ	
2	የገበያ ቅርጠት መኖሩ	
3	የተሻለ ዋጋ መኖሩ	
4	የሙያተኞች ድጋፍ መኖር	
5	የመስኖ አቅርቦት መኖር	
6	ብዙ የሰው ሀይል አለመጠየቁ	
7	ሌላ _____:	

የማንጎ ግብይት ዋና ዋና ምቹ አጋጣሚዎች ምን ምን ናቸው?/marketing opportunities/

ተ/ቁ	ምቹ አጋጣሚዎች	እባክዎ በደረጃ ያስቀምጡ (1ኛ፣ 2ኛ 3ኛ፣.... በማለት ፊት ለፊቱ ያስቀምጡ)
1	በብዛት መመረቱ	
2	የተሻለ ዋጋ	
3	የተሻለ የገበያ ፍላጎት መኖር	
4	የተሻለ ዝርያ	
5	ብዙ የሰው ሀይል አለመጠየቁ	
6	ቶሎ አለመበላሸቱ	
7	የገበያ ቅርጠት መኖሩ	
9	ሌላ _____:	

ክፍል ዘጠኝ: የቤተሰቡ ቋሚ ንብረት

9.1. ቋሚ ንብረቶችን በተመለከተ እባክዎ የሚከተለውን ሰንጠረዥ ይሙሉ

የንብረት ዓይነት	ብዛት በቁጥር	ዋጋ በአሁኑ የገበያ ሁኔታ ሲተመን (በብር)	ጠቅላላ ዋጋ
1	2	3	4= (2x3)
22. የቆርቆሮ ክዳን መኖሪያ ቤት			
23. የሰር ክዳን መኖሪያ ቤት			
24. የበቅሎ ጋሪ			
25. የእርሻ በሬ			
26. የእርሻ ፈረስ			

27. ሞተር ፓምፕ			
28. ሮፕ ፓምፕ			
29. ሞተር ሳይክል			
30. የተሻሻለ ምድጃ			
31. ዘመናዊ የንብ ቀፎ			
32. ባህላዊ የንብ ቀፎ			
33. ሞባይል			
34. የቤት ወንበር/ሶፋ			
35. የቤት ጠረጴዛ			
36. የከተማ ቤት			
37. የእንጨት ሞዝቦልድ አልጋ			
38. የሞተር ወፍጮ			
39. መኪና			
40. ባጃጅ			
41. ሮፕ ፓምፕ			
42.			

ክፍል አስር: የቤተሰብ ወጭ / Household Expenditure

10.1: የቤተሰብ የምግብ ፍጆታ / Food Consumption

ሀ. የቤተሰብዎን የምግብ ፍጆታ እንዴት ይገልጹታል?

1. አመቱን ሙሉ የምግብ እጥረት ታይቷል
2. አልፎ አልፎ የምግብ እጥረት ታይቷል
3. ምንም የምግብ እጥረት አልተከሰተም ነገር ግን የተትረፈረፈ አቅርቦት አልነበረም
4. የተትረፈረፈ የምግብ አቅርቦት ነበር

ለ. እባክዎ የሚከተለውን ሰንጠረዥ በጥንቃቄ ይሙሉ (የ2011 የምርት ዘመን)

ዝርዝር/Item	መለኪያ (e.g. ኪ/ግ)	ባለፉት 7 ቀናት ጠቅላላ የቤተሰብ ፍጆታ			ባለፉት 12 ወራት የተገዛ/Bought in the last 12 months				
		በቤተሰብ የተመረተ	የተገዛ	የተገዛበት ዋጋ በብር	የግዥ ድግግሞሽ (e.g., 2 times per month)	አማካኝ መጠን በእያንዳንዱ ጊዜ (e.g. 2 kg; etc)	የአመቱ ጠቅላላ መጠን/quantit	አማካኝ ዋጋ per unit (ብር)	ጠቅላላ ወጭ ለግዥ (ብር)
1	2	3	4	5	6	7	8	9	10= 8*9
ዋና ምግቦች									
1. በቆሎ									
2. ጤፍ									
3. ስንዴ									

4. ገብስ									
5. ዳጉሳ									
6. አተር									
7. ባቄላ									
8.									
9.									
ፍራፍሬ									
10. ብርቱካን									
11. ማንጎ									
12. አሽካዶ									
13. ሙዝ									
14. አፕል									
15.									
አትክልት									
16. ቲሞቲም									
17. ቀይሽንኩርት									
18. ድንች									
19. ነጭሽንኩርት									
20. በርበሬ									
21. ካሮት									
22. ጎሙን									
23. ዱባ									
24.									
ስጋና የስጋ ውጤቶች									
25. የበሬ ስጋ									
26. የፍየል ስጋ									
27. የበግ ስጋ									
28. የዶሮ ስጋ									
29. እንቁላል									
30. ወተት									
31. አይብ									
32. ቅቤ									
33. ማር									
መጠሮች									
34. ሻይ									
35. ቡና									
36. ለስላሳ									
37. ጠላ									
38. ቢራ									
39. አረቄ									
40.									
ዘይትና የቅባት እሴቶችና ሌሎች									
41. የምግብ ዘይት									
42. ስኳር									
43. ጨው									
44.									

10.2: ምግብ-ነክ የልሆኑ ዋና ዋና ወጪዎች በ2011 ዓ.ም

ዝርዝር ወጪ	የግዥ ድግግሞሽ (e.g., 2 times per month)	አማካኝ መጠን በእያንዳንዱ ጊዜ (e.g. 2 kg; 4 bundles etc)	የአመቱ ጠቅላላ መጠን/quantity	አማካኝ ዋጋ per unit (ብር)/ Average per unit price (birr)	ጠቅላላ ወጪ ለግዥ (ብር)/ Total cost of purchase (birr)
1. ለልብስ					
2. ለጭማ					
3. ለሰሙና					
4. ለማገዶ እንጨት ግዥ					

5. ለናፍታ					
6. ለባትሪ					
7. ለትምህርት ቤት ክፍያ					
8. ለህክምና					
9. ለወፍጮ					
10. ለመሬት ግብር					
11. ለቤተክርስቲያን/ለመስጊድ					
12. ለማዳበሪያ ግዥ					
13. ለምርጫ ዘር ግዥ					
14. ለበሬ/ፈረስ ግዥ					
15. ለቤት መስሪያ					
16. ለከብት ጥበቃ ተቀጣሪ					
17. ለትራንስፖርት					
18. ለቤት እቃዎች ግዥ					
19. ለአልጋ፤ወንበር፤ጠረጴዛ					
20. ለቤት ጥገና					
21. ለመኪና/ባጃጅ ግዥ					
22. ለህክምና					
23. ለተማሪ ለቤት ኪራይ					
24. ለአመት በአል ወጭ					
25. ለመሬት ኪራይ					
26.					
27.					
28.					

//ተጠናቀቀ//

ጊዜዎትን ሰውተው ይህንን መጠይቅ ስለሞሉልኝ በድጋሚ ከልብ አመሰግናለሁ። //መልካም ጊዜ//

በአዲስ አበባ ዩኒቨርሲቲ እና በጃፓን ተራዶ ድርጅት የተዘጋጀ

ለአትክልትና ፍራፍሬ ነጋዴዎች የተዘጋጀ ቃለ-መጠይቅ

ውድ የዚህ ጥናት ተሳታፊዎች! ይህ ቃለ-መጠይቅ የተዘጋጀው በሰሜን ምዕራብ ኢትዮጵያ በሚገኙና ለዚህ ጥናት በተመረጡ የማንጎና አፕል ፍራፍሬ አብቃይ ወረዳዎችና የገበያ ማዕከላት ሲሆን የጥናቱ ዋና ዓላማም ለመማሪያትና በማንጎና አፕል እሴት-ስንሰለት እንዲሁም የግብይት ስርዓት ዙሪያ ያለውን ተግዳሮቶችን ለመለየት ነው። ስለዚህ የጥናቱን ዋና ዓላማ ተረድተው ትክክለኛውን መረጃ እንዲሰጡን እየጠየቅን የሚሰጡት መልስ ሚስጥራዊነቱ የተጠበቀ ሲሆን አገልግሎቱም ለዚህ ጥናት ዓላማ ብቻ የሚውል ይሆናል። ጊዜዎትን ሰውተው ይህንን መጠይቅ ስለሞሉልን በቅድሚያ ከልብ እናመሰግናለን።

የመነሻ መረጃዎች:

- የቃለ-መጠይቁ ኮድ: _____
- የተጠያቂው ስም: _____

- የከተማው ስም: _____ የገበያው ስም: _____
- ቃለ-መጠይቁ የተደረገበት ቀን: _____ ወር: _____ አመት: 2012 ዓ/ም
- መጠይቁን የሞላው ስምና ፊርማ: _____

ክፍል አንድ: መሰረታዊ መረጃዎች/Demographic Information/

1. ፆታ: 1. ወንድ 2. ሴት
2. እድሜ _____ (በሙሉ አመት).
3. የትምህርት ደረጃ: 1. ያልተማረ 2. ከ1-4 3. ከ5-8 4. ከ9-12 5. ዲፕሎማ 6. ዲግሪ
4. የጋብቻ ሁኔታ: 1) ያላገባ 2) ያገባ 3) የፈታ/ች 4) የሞተበት/ባት
5. ጠቅላላ የቤተሰብ ብዛት: _____ (በቁጥር)
6. ዋና ስራ (የንግድ አይነት)
 1. አከፋፋይ 2. ቸርቻሪ 3. አቀናባሪ/Processor 4. ሰብሳቢ/Collector 6. ሌላ _____
7. ከመኖሪያ ቤትዎ እስከ ገበያ ያለው እርቀት _____ (በደቂቃ/ በእግር ጉዞ)
8. የፍራፍሬ በተለይ ማንን ወይም አጥል የንግድ ስራ ከጀመሩ ስንት አመት ይሆንዎታል? _____
9. በፍራፍሬ በተለይ የማንን ወይም አጥል ንግድ ስራ አመቱን ሙሉ ይሳተፋሉ? 1. አዎ 2. የለም
10. ከላይ መልስዎ “አመቱን ሙሉ አልሳተፍም” ከሆነ መቼ መቼ ይሳተፋሉ?
 1. ብዙ አቅርቦት ወደ ገበያ ሲገባ 2. የመግዣ ዋጋ ሲቀንስ 3. ሌላ _____
11. በሰዎች ውስጥ የገበያ ቀናቶች ስንት ናቸው? _____
12. ማንን ወይም አጥል የንግድ ስራ ሲጀምሩ መነሻ ካጥታል ስንት ነበር? _____ (በብር)
13. ከእርስዎ የፍራፍሬ ገዥዎች በአብዛኛው እነማን ናቸው?
 1. ቸርቻሪዎች 2. ለቤት ፈጆታ ተጠቃሚዎች 3. ጅምላ ሻጮች 4. አቀናባሪዎች
 5. ወደ ውጭ ላኪዎች 6. ደላላዎች
14. እርስዎ ፍራፍሬ ለንግድ የሚገዙት ከየት ነው?
 1. ከሰፈር ከሆነ የሰፈሩን ስም ይጥቀሱ _____
 2. ከገበያ ከሆነ የገበያውን ስም ይጥቀሱ _____
15. የፍርፍሬውን ጥራት ለመጨመር የሚሰሩት ስራ አለ? 1. አዎ 2. የለም
16. የፍራፍሬ ምርቱ በሰዓቱ ባይሸጥልዎ ምን ማድረግ ይችላሉ?
 1. በቅናሽ ዋጋ መሸጥ 2. ሌላ ገበያ በመውሰድ መሸጥ 3. በሌላ የገበያ ቀናት መሸጥ 4. ሌላ _____
17. አምራችን/አቅራቢዎችን እንዴት መሰብሰብ ይችላሉ?
 1. የተሻለ ዋጋ በማቅረብ 2. እነርሱን በመጎብኘት 3. ያልተጠበቀበረ ልኬት/ሚዛን በመጠቀም
18. የፍርፍሬ ግዥ የሚፈጸምለዎ ማን ነው?
 1. እኔው እራሴ 2. ደላላ 3. የእኔ ተወካይ 4. የቤተሰብ አባላት 5. ጓደኛ

ክፍል ሁለት: የግዥ ሁኔታ/ Purchase practice/

19. የማን/አጥል ፍርፍሬ ግዥ ከየትኛው ገበያ እና ከየትኛው አቅራቢ እንደሚገዙ የሚከተለውን ይሙሉ?

20. የማን/አጥል ፍርፍሬ ግዥ ሲፈጸሙ በመለኪያነት የሚጠቀሙበት በየትኛው ቁሳቁስ ነው?

1. በጅንያ 2. በቅርጫት 3. በኪ.ግ 4. በሳጥን 5. በሌላ _____

21. የማን/አጥል ፍርፍሬ ግዥ ሲፈጸሙ በቂ መጠን ማግኘት ይቸገሩ ነበር? 1. አዎ 2. የለም

ክፍል ሶስት: የሸያጭ ሁኔታ/ selling practice/

22. የማን/አጥል ፍርፍሬ ከየትኛው ገበያ እና ለየትኛው አካል እንደሚሸጡ የሚከተለውን ይሙሉ?

23. ገዥዎችን እንዴት መሳብ ይችላሉ?

1. የተሻለ ዋጋ በማቅረብ 2. እነርሱን በመሳብኝት 3. ያልተጨበረበረ ልኬት/ሚዛን በመጠቀም

24. የማን/አጥል ፍርፍሬ ግብይት ችግሮችን በተመለከተ እባክዎን ሰንጠረዥን ይሙሉ፤

የፍርፍሬ አይነት	የሚገዛበት ገበያ	ከየትኛው አቅራቢ እንደሚገዙ	በወር ውስጥ የሚገዛ አማካይ መጠን በኪ.ግ	የማን/አጥል ፍርፍሬ ሲገዙ አማካይ ዋጋ በኪ.ግ/በወር	Percentage share of mango/apple purchased from specific source	Term of payment 1= Cash 2= Credit
	1. ከሰፈር 2. ከወረዳ ገበያ 3. ክልል ገበያ 4. አዲስ አበባ 5. ሌላ-----	1. ከአምራቾች 2. ከቸርቻሪዎች 3. ከጅምላ ሻጭ 4. ከሰብሳቢዎች 5. ከማህበራት 6. ከሌላ-----				
ማን/						
አጥል						

የፍርፍሬ አይነት	የሚሸጡበት ገበያ የት ነው?	ለየትኛው አካል ይሸጣሉ	በወር ውስጥ የሚሸጥ አማካይ መጠን በኪ.ግ	የማን/አጥል ፍርፍሬ ሲሸጡ አማካይ ዋጋ በኪ.ግ	How many weeks did you operate in this market	Term of payment 1= Cash 2= Credit
		1. ለተጠቃሚዎች 2. ለቸርቻሪዎች 3. ለጅምላ ሻጭ 4. ለሰብሳቢዎች 5. ለደላላዎች 6. ለሆቴሎች 7. አይታወቅም				
ማን/						
አጥል						
ተ. ቁ.	የማን/አጥል ፍርፍሬ ግብይት ችግሮች	1=አዎ 0= የለም	አዎ ከሆነ የችግሮቹ መንስኤ ምንድን ነው	ችግሮቹን እንዴት መፍታት ይቻላል		

1	አስተዳደራዊ ችግሮች (የግብር መብዛትና ሌሎችም)			
2	የአቅርቦት መኖር			
3	የመጋዘን አለመኖር/Storage problem			
4	ስርቆት			
5	የፍራፍሬው ጥራት ዝቅተኛነት			
6	መጥፎና ጥሩ ደባልቆ ጥራት መቀነስ			
7	የመረጃ ችግር			
8	የገንዘብ እጥረት			
9	የብድር እጥረት			
10	የመንግስት ድጋፍ አለመኖር			
11	ፍላጎት አለመኖር/ዝቅተኛ ዋጋ			
12	በስራው ብዙ ተፎካካሪ መኖሩ			
13	የህገ-ወጥ ነጋዴዎች መብዛት			
14	ሌላ _____			

25. እባክዎ በግብይት ሂደት ጊዜ የሚኖሩ ወጪዎችን/ለአንድ ኩ/ል/ የሚከተለውን ሰነጠረዥ ይሙሉ፤

ወጪዎች/Cost of Marketing	ብር/ኩ.ል	
	ማንጎ	አጥል
አንድ ኩ/ል የሚገዛበት ዋጋ		
ለመጨንፍ ለማውረድ		
ለድለላ		
ለትራንስፖርት/ጋሪ ወጪ		
ለማሸግ/Packing		
የገበያ ግብር/Sales tax		
ለካሳ/ሳጥን ግዥ/ኪራይ		
በመበላሸት/Storage loss		
ለስልክ ዎጪ		
አንዳንድ የግል ወጪዎች ትራንስፖርትን ጨምሮ		
ሌሎች ወጪዎች _____		
ጠቅላላ ወጪ		

26. በአጥል/ማንጎ ፍራፍሬ ግብይት ዙሪያ ያለውት አስተያየት? _____.

ጊዜዎትን ሰውተው ይህንን መጠይቅ ስለሞሉልኝ ከልብ አመሰግናለሁ።

በአዲስ አበባ ዩኒቨርሲቲ እና በጃፓን ተራዶ ድርጅት የተዘጋጀ

ውድ የዚህ ጥናት ተሳታፊዎች! ይህ ቃለ-መጠይቅ የተዘጋጀው በሰሜን ምዕራብ ኢትዮጵያ በሚገኙና ለዚህ ጥናት በተመረጡ የማንጎና አፕል ፍራፍሬ አብቃይ ወረዳዎችና የገበያ ማዕከላት ሲሆን የጥናቱ ዋና ዓላማም ለመማሪያትና በማንጎና አፕል እሴት-ስንሰላት እንዲሁም የግብይት ስርዓት ዙሪያ ያለውን ተግዳሮቶችን ለመለየት ነው።

የመነሻ መረጃዎች:

- የተጠያቂው ስም: _____ የከተማው ስም: _____
- ቃለ-መጠይቁ የተደረገበት ቀን: _____ ወር: _____ አመት: 2012 ዓ/ም
- መጠይቁን የሞላው ስምና ፊርማ: _____

መሰረታዊ መረጃዎች

1. ፆታ: 1. ወንድ 2. ሴት
 2. እድሜ _____ (በአመት).
 3. የትምህርት ደረጃ: 1. ያልተማረ 2. ከ1-4 3. ከ5-8 4. ከ9-12 5. ዲፕሎማ 6. ዲግሪ
 4. በዋናነት የማንጎ ወይም አፕል ፍራፍሬ የምትገዙት ከየት ነው?
 1. ከአምራቾች/ከገበሬዎች 2. ከደላላ 3. ከሰብሳቢ/Collector 4. ከቸርቻሪ 5. ከጅምላ ሻጭ 6. ከሌላ--
 5. የፍራፍሬ በተለይ ማንጎ ወይም አፕል ማቀነባበር ስራ/ጁስ ከጀመሩ ስንት አመት ይሆንዎታል? _____
 6. በፍራፍሬ በተለይ የማንጎ ወይም አፕል ማቀነባበር ስራ/ጁስ አመቱን ሙሉ ይሳተፋሉ? 1. አዎ 2. የለም
 7. ከላይ መልስዎ “አመቱን ሙሉ አልሳተፍም” ከሆነ መቼ መቼ ይሳተፋሉ?
 1. ብዙ አቅርቦት ወደ ገበያ ሲገባ 2. የመግዣ ዋጋ ሲቀንስ 3. ሌላ _____
- 8) አጠቃላይ ወጭዎችን በተመለከተ እባክዎ ሚከተለውን ሰንጠረዥ ይሙሉ፤

በወር ውስጥ ስንት ኩ/ል ማንጎ/አፕል ይገዛሉ?	የአንድ ኪሎ የመግዣ ዋጋ ስንት ነበር?	ለሰራተኛ የወጣ ወጭ (በብር)?	ለትራንስፖርት የወጣ ወጭ (ብር/ኪ.ል)	ለመጫንና ለማውረድ የወጣ ወጭ (ብር/ኪ.ል)	ለስራ ቦታ ኪራይ (በብር)	ሌሎች ወጭዎች/ለግብር

9. በአፕል/ማንጎ ፍራፍሬ ግብይት ዙሪያ ያለውት አስተያየት? _____

ጊዜዎትን ሰውተው ይህንን መጠይቅ ስለሞሉልኝ ከልብ አመሰግናለሁ፡

በአዲስ አበባ ዩኒቨርሲቲ እና በጃፓን ተራይ ድርጅት የተዘጋጀ ቃለ-መጠይቅ

ውድ የዚህ ጥናት ተሳታፊዎች! ይህ ቃለ-መጠይቅ የተዘጋጀው በሰሜን ምዕራብ ኢትዮጵያ በሚገኙና ለዚህ ጥናት በተመረጡ የማንጎና አፕል ፍራፍሬ አብቃይ ወረዳዎችና የገበያ ማዕከላት ሲሆን የጥናቱ ዋና ዓላማም ለመመሪያትና በማንጎና አፕል እሴት-ሰንሰለት እንዲሁም የግብይት ስርዓት ዙሪያ ያለውን ተግዳሮቶችን ለመለየት ነው።

የመነሻ መረጃዎች:

- የተጠያቂው ስም: _____ የከተማው ስም: _____
- ቃለ-መጠይቁ የተደረገበት ቀን: _____ ወር: _____ አመት: 2012 ዓ/ም
- መጠይቁን የሞላው ስምና ፊርማ: _____

መሰረታዊ መረጃዎች

1. ፆታ: 1. ወንድ 2. ሴት
2. እድሜ _____ (በአመት)
3. የትምህርት ደረጃ: _____
4. ወርሀዊ ገቢ በብር _____
5. ባለፈው አመት የማንጎና አፕል ፍራፍሬ ገዝተው ይጠቀሙ ነበር? 1. አዎ 2. የለም
6. በወር ውስጥ ስንት ኪሎ ይገዙ ነበር: 1) በምርት ወቅት _____ ኪሎ፤ 2) የምርት እጥረት ባለበት ወቅት _____ ኪሎ
7. ባለፈው አመት የማንጎና አፕል ፍራፍሬ በአብዛኛው የሚገዙት ከማን ነበር
 1. ከገበሬዎች 2. ከመንገድ ላይ ሻጮች 3. ከጅምላ ሻጮች 4. ከቸርቻሪዎች 5. ከሌላ _____
8. ከማንጎና ከአፕል በአብዛኛው ተፈላጊ የትኛው ነው
9. የማንጎ ወይም አፕል ፍራፍሬ አቅርቦቱን በተመለከተ፤

	የማንጎ ወይም አፕል አቅርቦት	መስከረም	ጥቅ.	ህዳ.	ታህ.	ጥር	የካ.	መጋ.	ሚያ.	ግንቦት	ሰኔ	ሐም	ነሐሴ
1	በቀላሉ የሚገኝበት ወራት												
2	እጥረት ያለበት ወራት												
3	ምንም ማግኘት የማይቻልባቸው ወራት												

10. ከማንጎና አፕል ግብይትና ፍጆታ ጋር ተያይዞ ያሉ ችግሮችን ይዘርዝሩ? _____

I. Interview Schedule for Small-Scale Apple/Mango Growers

Dear Respondents,

The primary goal of this survey questionnaire is strictly academic, and it is primarily intended to:

- (vi) identify and characterize (mapping) actors involved in the fruits value chain;
- (vii) analyse the market performance of fruits along the value chain;
- (viii) explain the determinants of farmers' participation in the fruits value chain;
- (ix) examine the welfare effects of farmers' participation in the fruits value chain.
- (x) investigate the food security effects of farmers' participation in the fruits value chain.

Furthermore, the knowledge gained will be beneficial to stakeholders and will aid in the development of policies and programs to improve fruit production and marketing in the study districts and/or regions. As respondents, you are cordially requested to participate in responding to the questionnaire, and you are guaranteed that any information you share will be kept strictly confidential.

Instructions for Enumerators:

- Begin by greeting farmers warmly in accordance with local culture.
- Give a brief introduction before beginning any question, and make the purpose clear.
- Inform him/her that he/she has the right to ask questions at any time before, during, or after the interview.
- Please fill out the interview schedule based on the farmers' responses (Do not include your own feelings).
- Please ask each question patiently and clearly until the farmer understands what you're saying.
- Before you begin asking questions, please identify any unclear questions and seek clarification from the researcher/survey supervisor.

- Please circle/put the correct answer.

General Information

Questionnaire Serial No. (Code): _____
 Woreda: _____ Kebele: _____ Village/Locality Name: _____
 Date of Interview: Date: _____ Month: _____ Year: 2019
 Name of Enumerator: _____ Signature: _____

Part 1. Respondents Characteristics (please tick with “√” symbol or encircle your answers)

- Sex:** Male Female
- Age:** _____(years)
- Marital status:** Single Married Divorced Widowed
- Education level** of the household head (Number of years in school: _____)
 (See codes below)

0. None/Illiterate		
1. Grade 1	6. Grade 6	11. Grade 11
2. Grade 2	7. Grade 7	12. Grade 12
3. Grade 3	8. Grade 8	13. College certificate
4. Grade 4	9. Grade 9	14. College Diploma
5. Grade 5	10. Grade 10	15. University degree

- Family members** of the household’s including head of household (fill the table below)

Sex	Age Category			
	<10 years	10-14	15-64	>64years
Male				
Female				
Total				

- Household Composition and Characteristics**

Sr. No.	Name of household member	Sex 1= Male 2= Female	Age (In years)	Education level (0 if illiterate, Grade if literate)	Major Occupation*
1					

2					
3					
4					
5					
6					
7					
8					
9					
10					

*1= Farming 2= Herding 3=Schooling 4= Household work 5=trading 6. Others (specify)

7. Occupation/Livelihood (encircle the best match/es)

1= Farming; 2= Trader; 3= Farming + Trader; 4= other (specify) _____

8. Farming experience of household head: _____ years

9. Land holding (in “timad”) during the 2019 cropping year (last cropping year)

- 1) Total land holding owned _____ (Timad)
- 2) Total land rented in _____ (Timad)
- 3) Total land rented out _____ (Timad)
- 4) Cultivated area _____ (Timad)
- 5) Apple/mango growing area _____ (Timad)

Part 2. Household Resources (Asset Ownership)

Section 1: Production equipment’s and major household furniture

Asset	Number	If you would sell one of [...] how much would you receive from the sale (in birr)	Total value
1	2	3	4= 2x3
43. Grass roofed house			
44. Corrugated iron sheet house			
45. Mule cart			
46. House in town			
47. Plough Ox			
48. Plough horse			
49. Motorized grain mill			
50. Knapsack sprayer			
51. Motorized water pump (diesel)			
52. Mechanical water pump (hand, foot)			
53. Working Mobile phone			

54. Working Radio			
55. Improved wood stove			
56. Motor bike			
57. Car/Truck			
58. Wooden bed			
59. Wooden box			
60. Chairs/sofa			
61. Television			
62. Table			
63.			

Section 2. Present livestock possession and sale by households (please fill the table below)

Type of livestock	Number of animals owned	Number of animals sold in 2018/19	Price per unit	Total Sales of livestock in the last 12 months (Birr)
<u>Cattle:</u>				
Cows				
Calves				
Heifer				
Oxen				
Bulls				
<u>Small ruminants:</u>				
Sheep				
Goat				
<u>Equine:</u>				
Donkey				
Horse				
Mule				
Poultry				
Bee hives				
Pigs				
Total				

Section 3. Household Income from Crop sales during 2019 cropping year (please fill the table below)

Type of major crop	Quantity produced In quintal	Quantity sold In quintal	Price per 50 kg bag	Total sales
1. Teff				

2. Maize				
3. Wheat				
4. Sorghum				
5. Chat				
6. sales of firewood, charcoal making, poles, etc				
7. Beans				
Fruits				
Vegetables like potato, onion, etc				
Others,				
Total				

Section 4. Household Non-farm Income

4.1. Do you participate in non-farm income generating activities? 1. Yes 2. No

4.2. Non-farm Income during 2019 cropping year

Sources	Amount per unit (Cash & in-kind)		Total income
	Cash in Birr	Payment in kind cash equivalent	
1	2	3	4=2+3
1. Salaried employment			
2. Trading income			
3. Safety net or food for work			
4. Other business net income (sales of beverages, etc)			
5. Remittances (sent from non-resident family and relatives living elsewhere)			
6. Petty trade			
7. sale of crop residues			
8. Hand craft			
9. house rent			
10. oxen rent			
11.			
12.			

13.			
TOTAL			

Part 3. Production Aspects

- Do you produce apple/mango fruit last year? 1. Yes 2. No
- Apple/mango fruit farming experience** of household head: _____ years
- If “Yes” to question “1” please provide us the following questions:

Fruit type	Quantity Produced(qt)	Quantity consumed(qt)	Quantity sold(qt)	Price (Birr/kg)
Apple/mango				

- Total number of apple/mango trees under production, in 2019 E. c.

Fruit crop	Production system in practice 1=sole 2=intercropping 3=backyard garden 4=plantation	Number of trees				Month of harvestin g -----to----	Average production per tree (Kgs/quotl)
		Non-bearin g	bearin g	died	tota l		
Apple /mango							

- Do you currently use a better apple/mango /mango variety?
(1) Yes (2) No
- Do you have awareness about improved variety of apple/mango that is important for market?
1. Yes 2. No
- Where do you get Apple/mango seedlings?
(1) From own nursery (2) From agri. Office (3) from NGOs (4) from Market
(5) Others (specify)_____
- How do you use your Apple/mango products?**
(1) For home consumption only
(2) For sale (3) Both 1 and 2 (4) other (specify)_____
- How much was the start-up capital for the Apple/mango production? _____ (in Birr)

9. Did you have **access to irrigation technologies** for apple/mango production? 1= Yes 2= No

Part 4. Agricultural Extension Service

1. Have you ever been advised by agricultural extension agents? 1. Yes 2. No

2. How **frequent do you have** contact with agricultural extension agents?

1. Twice a week 2. Once a week 3. Twice in a month

4. Once in a month 5. Twice in a year 6. No any contact

3. If there is no any contact with extension agents, what is the reason?

1. No need for extension services 2. Availability of contact farmers in the area

3. I don't know the presence of extension agents in the area 4. I don't know the reason

4. What is the most common place you usually contact extension agents?

1. In your farm field 2. In your home 3. In his office

4. At demonstration centre 5. At church/mosque

7. Have you ever attended any **training** regarding vegetables and fruits production? 1. Yes 2. No

8. If "yes" who provides the training? (Multiple responses are possible)

1. Development agents 4. Research centers (specify) _____

2. NGOs (specify) _____ 5. Neighbors and friends

3. Woreda agri. experts 6. Others (specify) _____

9. How frequently did you get the training? 1. once per month 2. once in three month 3. once in six month 4. once per year 5. others (specify)-----

10. Are you a **member of any farmers' cooperatives**? 1. Yes 2. No

11. If yes, please could you mention the primary cooperative that you are participating?-----

12. Do you have a working mobile phone? 1. Yes 2. No

13. If yes, for what purpose do you use it? -----

18. Do you have a health problem during the last two or three years? 1. Yes 2. No

19. If yes for how many days do you sick _____

Part 5. Credit Service

1. Do you use **credit**? 1. Yes 2. No

2. Have you received formal credit last year (2019)? 1. Yes 2. No

3. If yes, how much did you take? _____ (Birr)

4. For what purpose did you take the credit?
1. To rent in land to extend apple/mango production
 2. To purchase seed/seedlings of apple/mango
 3. To purchase transporting animals
 4. To purchase motor pump/irrigation equipment
 6. Others _____

5. From whom did you get credit?
(Multiple responses are possible)
1. Relative
 2. Micro finance institution
 3. Friends
 4. Traders
 5. Cooperatives
 6. Others (specify) _____

Part 5. Marketing Aspects

1. Did you have **access to market information** for apple/mango produce? 1= Yes 2= No
2. Which one is/are your source of information on price of apple/mango markets??
1. Other apple/mango farmers
 2. Personal observation
 3. Radio or TV
 4. Mobile phone
 5. Extension agents
 6. Newspaper
6. To whom did you sell your apple/mango produce? (Multiple responses is possible)
1. Consumers
 2. Collectors
 3. Processor
 4. Retailers
 5. Wholesalers
 6. Cooperatives
 7. Hotel & Restaurant
 8. Gov't organization, (specify) _____
- 7.. Which one is more profitable for you? (Multiple responses is possible)
1. Selling to consumers
 2. Selling to collectors
 3. Selling to Processor
 4. Selling to Retailers
 5. Selling to Wholesalers
 6. Selling to Cooperatives
 7. Hotel & Restaurant
 8. Selling to Gov't organization
8. Where do you sell Apple/mango produce? _____
1. At the farm level
 2. At the local market
 3. On the main road
 4. At the district market
 5. Others/specify _____
9. What did you have done to higher (value addition) your product price?
- 1) Packing
 - 2) sorting
 - 3) washing, separating quality product
 - 4) Others specify _____
10. If you pack the product what is your packaging material?
- 1) Plastic box
 - 2) Plastic sack
 - 3) Pot
 - 4) Others (specify)
11. Do you have your **own transportation means** like equines or cart?

1. Yes 2. No

12. How do you transport apple/mango from farm to market?

1. Head loading 2. Pack animals 3. Animal cart 4. Trucks 5.

Others _____

13. What is the **distance of the main market** from your house (in walking hours on foot)?

14. Who set your selling price in 2019/1E.C.?

1. Myself 3. Set by demand and supply 5 other (specify)-----
2. Buyers 4. Negotiations

15. Did you know the market price before you sold your apple/mango? 1. Yes 2. No

16. How did you sale your produce in 2019?

1. Direct to the purchaser 2. Through broker 3. Other (specify) -----

17. How do you measure your sell?

1. By sack 2. By basket 3. By weighing (kg)
4. By 'box' 5. Others (specify) _____

18. **Current market price** of Apple/mango _____ (in Birr/kg)

19. What has been the trend of apple/mango market prices for the last 2 years?

Trend of the price (Tick "√")			If increasing, why?	If decreasing, why?
Increased	Decreased	No change		

25. Is the current price of the apple/mango is promising? 1. Yes 2. No

26. Do you face difficulties in finding buyers for the Apple/mango when it is ready for sale?

1. Yes 2. No

27. If "yes", above, why? Please indicate below

1. Inaccessibility to the market 3. Lack of information 4. Low price offered
2. Other (specify) _____

28. What are the marketing costs you incur when you take your produce to the market?

Items	Cost in Birr
Calling costs	
Sales tax	
Loading and unloading	
Packing	
Negotiation costs	
	Total cost =

29. Whose responsibility is the selling of the following production?

Crop type	Men	Women	Children
Fruits			
Other crops			

30. Who decides on the expenditure from income generated from the following products?

Crop type	Men	Women	Children
Fruits			
Other crops			

31. Do your fruit products have preferred qualities by buyers?

1. Yes 2. No

Part 6. Constraints/Challenges of apple/mango production and marketing

6.1. What are the apple/mango production constraints?

	Constraints of apple/mango production	Rank according to their importance
1	Seed Shortage	
2	Diseases	
	Insect pests	
3	Irrigation water shortage	
4	Drought	
	Frost	
5	Fertilizer shortage	
	Lack of pesticide	
6	Labor shortage	
7	Lack of skill and facility to processing	
8	Shortage of farmland	
9	Fruit theft	
10	Insufficient product handling techniques	
11	(others)_____	

6.2. What are the apple/mango marketing constraints?

	Constraints of apple/mango marketing	Rank according to their importance
1	Distance to market	

2	Low price of product	
3	Lack of storage facilities	
4	Lack of Transport service	
5	Lack of market information	
6	Brokers (hinder) fair sales	
7	Perishability	
8	Absence of demand	
9	Lack of credit/financial service	
10	(others)_____	

Part 7. Opportunities of Apple/mango production and marketing

7.1 Would you like to expand Vegetable production?

1. Yes 2. No

7.2 What opportunities exist to expand apple/mango production?

Opportunities	Rank according to their importance
Better market demand	
Proximity to market	
Better price	
Better support from experts	
Enough water/ different alternatives	
It doesn't require more man-power	
Available of different varieties	
Others	

7.3. What are the opportunities of apple/mango fruit marketing?

Opportunities	Rank according to their importance
Better production in terms of qty.	
Better price	
Better market demand	
Better variety	
It doesn't require more man-power	
Not easily perishable	
Proximity to market	

End of the interview, THANK YOU!!!!

PART II. TRADERS' INTERVIEW SCHEDULE

The purpose of this study is largely academic, and above all, to generate knowledge that will be useful to stakeholders in the fruit production and marketing industry. The study will be carried out to determine the value chain and market performance analysis of apple/mango fruits, as well as their impact on farmer welfare and food security in North-Western Ethiopia. The data provided will also aid in the development of policies and programs to improve fruit production and marketing in the study areas. As respondents, you are kindly requested to participate in answering the survey questionnaire, and you are guaranteed that any information shared will be completely confidential.

Enumerator Instructions:

- Begin by greeting traders warmly in accordance with local culture.
- Give a brief introduction before beginning any question, and make the purpose clear.
- Inform him/her that he/she has the right to ask questions at any time before, during, or after the interview.
- Please fill out the interview schedule based on the traders' responses (Do not include your own feelings).
- Please ask each question patiently and clearly until the trader understands what you're saying.
- Before you begin asking questions, please identify any unclear questions and seek clarification from the researcher/survey supervisor.
- Please circle/put the correct answer.

General Information

Questioner number/Code: _____

Name of Town _____ Name of Market _____

Date of Interview: Date _____ Month _____ Year 2019/20

Name of Enumerators _____ Signature _____

I. Respondents Socio-demographics

1. Sex-----
2. Age ----- (years).
3. Educational level -----
4. Marital Status: 1) Single 2) Married 3) Divorced 4) Widowed
5. Total Family size _____ Male _____ Female _____

6. Main occupation (type of trading)

1. Wholesaler 2. Retailer 3. Processor 4. Collector 6. Others (specify) -

7. How do you undertake apple/mango trade activity in 2019 E.C.?

1. Alone 2. With partner

8. How long have you been in apple/mango trading? ----- (years).

9. Do you participate in apple/mango trading year round? 1= Yes 0= No

10. If no, at what period of the year do you participate?

1. Year-round 2. When purchase price becomes low
3. During high supply 4. Other (specify) -----

11. Do you practice trading other than apple/mango? 1= Yes 0=No

12. Number of market days in a week? _____

13. What was the amount of your initial working capital when you start this fruit trade business? ----- (in Ethiopian Birr).

14. What is your source of working capital? _____

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

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

1. Relative/family 3. Private money lenders. 5. NGO. 7. Friends.
2. Other traders 4. Micro finance institution. 6. Bank. 8. Others (specify) --

16. What was the reason behind the loan?

1. To extend fruit trading.
2. To purchase fruit transporting vehicles/animals.
3. Others (specify) -----.

18. Who was bought Fruits from you in 2019 E.C?

1. Wholesaler 2. Retailers 5. processor 6. exporter _____
3. Household consumers 4. Brokers 7. others _____

19. From where did you purchase in 2019 E.C?

1. From village, name of village (specify) -----
2. From market, name of market (specify) -----

20. For whom do you purchase apple/mango ? 1. For own 2. For others

21. How did you set price? 1. Set at time of advance given 2. Negotiated at delivery
3. At time of delivery 4. Others _____

22. If purchasing price was set at the time of advance given, how did you agree?

1. Orally 2. Written agreement 3. Other (specify) _____

23. When did you get the money after sale?

1. As soon as you sold 2. After some hours
3. On the other day after sale 4. Other (specify) _____

24. Do you carry out any physical treatment to maintain product quality? 1. Yes 2. No

25. What do you do, if the product is not sold on time?

1. Took back home 2. Took to another market

2. Wholesalers _____ 4. Retailers _____ 6. Others (specify)

39. The reasons for low prices in 2019 E.C. are due to:

Reasons for low prices	Yes	No
- Favorable growing conditions/ excess supply		
- Poor production		
-Trade regulations		
- Increase in supply of substitutes		
-Other		

IV. Selling practices

40. To which market and to whom did you sell mango/apple in 2019 E.C?

Sold to Market (Location name)	Sold to	Quantity sold on market day (KG)	Average price per KG		% age share of buyers	Term of payment 1= Cash 2= Credit 3= Advance Payment
Where----- ----- ----- ----- =====	1. Farmers 2. Retailers 3. Wholesaler 4. Collector 5. Gov't organization, (specify) -- 6. You don't Know					

41. How did you attract your buyers?

1. By giving better price relate to others 3. By visiting them
2. By fair scaling (weighing) 4. Others (specify)

42. How many regular buyers do you have 2019 E.C.?

1. Wholesalers _____ 3. Consumers _____ 5. Processors _____
2. Assembler _____ 4. Retailers _____ 6. Others (specify) _____

43. What is your packaging material?

1. wood box/sack 2. Plastic sack
3. Basket 4. Others _____

44. Do you know the market prices in different markets (on farm, village market, Enjibara

market, Bahir Dar market) before you sold your mango/apple in 2019 E.C.?

1=Yes 0= No

45. What is your source of information? _____

46. How do you qualify the reliability, timeliness and adequacy of the information you got? regarding the nearby local and other big town market.

1. It was reliable 3. It was timely
2. It was adequate 4. Others (specify) -----

47. Accessibility to market roads in rainy seasons for vehicles is

1. Difficult 2. Easily accessible

48. Do you have other branch shops/ shades to sell your mango/apple in 2019 E.C?

1= Yes 2= No

49. What are the opportunities to expand apple/mango trading? _____

50. Do you have mobile phone? 1= yes 2=no

51. Are there restrictions imposed on unlicensed mango/apple/ traders?

52. Are there problems on mango/apple marketing? If yes what are the problems, & your suggestions to overcome each problem in 2019?

N o.	Problem	1=Ye s 0= No	If yes what do you think are the cause (s) of this problem?	What are your suggestions (s) to solve each problem?
1	Administrative measure (multiple taxation and other fees)			
2	Shortage of supply			
3	Storage problem			
4	Theft			
5	Natural quality problem			
6	Adulteration			
7	Information flow			
8	Capital shortage			
9	Access to credit			
10	Business management (Financial accounting training)			
11	Absence of government support to improve apple/mango marketing			
12	Lack of demand (low price)			
13	Too much competition with licensed traders			
14	Too much competition with unlicensed traders			

1 5	Farmer's reluctance to sell due to lower price			
1 6	Other (specify)_____			

54. Indicate your average cost incurred per quintal in the trading process in 2019 E.C?

Marketing cost components in the chain	Source (use code)--	Source (use code)---	Source (use code)---	Source (use code)---
	Birr/qt	Birr/qt	Birr/qt	Birr/qt
Purchased price of quality apple/mango per quintal				
Packaging material				
Labour employed to fill the bag and stitch				
Load				
Unload				
Brokerage				
Transportation: Vehicle				
Transportation: Cart				
Scaling rent				
Box rent				
License fee				
Taxes and fee				
Wage for permanent				
Storage loss				
Water				
Electricity				
Manufacture cost				
Telephone expense				
Watching and warding				
Information cost				
Personal travel & other				
Others (specify)				
Total costs				
Selling price of quality mango/apple per quintal				
Purchased from:				
1 Farmers urban assembler	3 Retailers Rural)	5 wholesalers Rural)		
2 Retailers Urban)	4 wholesalers Urban)	6 farmer trader (village collector)		

7 Other (specify)-----

55. Did you have bonus per quintal at the time of your purchase? 1= Yes 2= No
56. If yes how many kg per quintal? -----Kg
57. Did you pay tax for the apple/mango you sell? 1=Yes 2=No
63. Is apple/mango trading in your locality needs a trading license?
1= No 2= Yes 3= not mandatory
64. If yes, how do you see the procedure to get the license? 1 Complicated 2 Easy
65. Did you have apple/mango trade license? 1=Yes 2= No
66. How much did you pay for apple/mango trade license? _____Birr
68. Did you store apple/mango before you sold in 2019? 1= Yes 2= No
69. If yes for how long did you store maximum? ----- days
70. Do you want to participate in a group discussion on the results of the research?
1= Yes 2= No
70. What is your opinion on marketing?

PART III. PROCESSORS INTERVIEW SCHEDULE

1. Name of processor----- Sex----- Age -----(Years).
2. Educational level -----
3. Woreda/town -----
4. How long since you have started apple/mango /mango processing? _____ years
- 5) From whom do you buy apple/mango /mango?
1) Farmers 2) Middle men 3) Wholesalers 4) others specify_____
- 6) To whom do you sell apple/mango /mango?
1) Cafes 2) supper market 3) consumers 4) others specify_____

7) Please indicate your costs, transaction volume and price of apple/mango /mango trading just last one year

Type of processing	Quantity of apple/mango / mango purchase (qt/month)	Effective months of apple/mango /mango processing/year	Purchase Price (Birr/kg)	Sells price (Birr/kg)	Transportation cost (Birr/qt)	Loading / unloading cost(Birr / qt)	Packing	Other costs specify

Juice									
Others									

8) Other costs (cost of processing, storage, tax, etc)? _____Birr (give for each)

9) What are the major problems in apple/mango /mango harvest, marketing and transportation in your area?-----

PART IV. CONSUMERS INTERVIEW SCHEDULE

1. Name of consumer/restaurant ----- Sex----- Age -----(Years).
2. Educational level -----
3. Woreda/town -----
4. Type of buyer-----
5. Income (Birr/month)-----
6. Do you consume apple/mango /mango in your household?
7. Quantity purchased per week: 1) Peak season___ kg; Scarce supply season: ___kg
8. From whom do you usually buy apple/mango /mango?

1. Farmers 2) street vendors 3. wholesalers 4) Retailers 5) Others
specify_____

9. Preference (form of apple/mango needed)_____

10. Time when apple/mango is available/scarce:

apple/mango /mango availability	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
Easily available												
Scarce												
Totally not available												

8. Problems related to apple/mango marketing and consumption?_____

Thank you for taking the time to respond to my questions.

Name of the Enumerator: _____ **Date of Interview:** _____