



**Addis Ababa University**  
**College of Business & Economics**  
**Masters of Business Administration (MBA)**

**Challenges of Ethiopian Honey Export across the Honey Value Chain and Trends  
of Ethiopian Honey Production and Export**

**A Thesis Submitted to the School of Graduate Studies of Addis Ababa  
University in Partial Fulfillment of the Requirements for the Degree of  
Masters of Business Administration**

**By: Hadera Gebru**

**Advisor: Professor Ayele Tirfie**

**December, 2019**

**Addis Ababa**

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## **DECLARATION**

I, the undersigned, declare that this study entitled “Challenges of Ethiopian Honey Export across the Honey Value Chain and Trends of Ethiopian Honey Production and Export” is my original work prepared under the guidance of my advisor and has not been presented for a degree in any other university. Furthermore, all sources of materials used for the study have been duly acknowledged.

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## **CERTIFICATION**

This is to certify that Hadera Gebru has done a study on the topic “Challenges of Ethiopian Honey Export across the Honey Value Chain and Trends of Ethiopian Honey Production and Export” for the partial fulfillment of the requirements for the Degree of Masters of Business Administration in Management at Addis Ababa University with my guidance and approval as a university advisor.

Advisor’s Name: Professor Ayele Tirfie

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Date: \_\_\_\_\_

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## **LIST OF ABBREVIATIONS**

|        |                                                                |
|--------|----------------------------------------------------------------|
| BOAM   | Business Organizations and their Access to Markets             |
| BoARD  | Bureau of Agriculture and Rural Development                    |
| CSA    | Central Statistics Authority                                   |
| DAS    | Developmental Agents                                           |
| EAB    | Ethiopian Apiculture Board                                     |
| ECC    | Ethiopian Customs Commission                                   |
| EHBPEA | Ethiopian Honey and Beeswax Producers and Exporter Association |
| FAO    | Food and Agriculture Organization                              |
| FTC    | Farmers' Training Center                                       |
| HMF    | Hydroxymethylfurfural                                          |
| HVC    | Honey Value Chain                                              |
| ICOD   | Institute of Community and Organizational Development          |
| IGAD   | Intergovernmental Authority on Development                     |
| ILRI   | International Livestock Research Institute                     |
| IPMS   | Improving Productivity and Market Success of Ethiopian Farmers |
| NGO    | Non-Governmental Organization                                  |
| OoARD  | Office of Agricultural and Rural Development                   |
| RMP    | Residue Monitoring Plan                                        |
| SNV    | Netherlands Development Organization                           |
| VCA    | Value Chain Analysis                                           |
| WARDO  | Woreda Agricultural and Development Office                     |

## **ABSTRACT**

*The study was conducted to identify the challenges of Ethiopian honey export across the honey value chain and to establish trends of the Ethiopian honey production, honey export volume and honey export value. In the study a descriptive research type was adopted and the sampling technique used was non-probability- purposive sampling technique. A sample size of 10 Ethiopian honey exporting firms was used. The data collection method used was a questionnaire method and descriptive analysis was applied to analyze the data. The study examined the input supply function, production function and domestic honey marketing function of the honey value chain and has identified the honey export challenges prevailing at the function levels. At the input supply function level, inadequate supply of improved beekeeping equipment is the challenge identified. At the production function level, low honey production and productivity, inadequate use of improved beekeeping equipment, low quality honey, drought, and seasonality of honey production and poor honey harvesting method are the identified challenges. At the domestic honey marketing function level, poor market infrastructure, lack of organized market, lack of legality, adulteration and smuggling are identified. The findings indicate that these market problems led to inadequate supply and quality of honey for export, high domestic honey price and less competitiveness in the global honey market. The study has also examined support functions in the chain. Absence of mandatory honey standard and lack of internationally accredited laboratory in Ethiopia, weak regulation, absence of permanent vertical and horizontal linkage platforms for chain actors, poor extension and inadequate financial credit services are identified as challenges. The analysis of the secondary data showed that the trend of Ethiopian annual honey production showed an annual average rate of growth of 1% during 2011-2018. The trends of the Ethiopian honey export volume and honey export value showed an annual average rates of decline of 57% and 52% respectively during the same period. The findings of the study revealed that the Ethiopian honey export challenges are wide ranging and interlinked and need to be addressed holistically. The study recommends promotion of export oriented honey production, strengthening beekeeping input production and supply, adoption of export oriented beekeeping extension package and establishment of honey belt areas to enhance the Ethiopian honey export. The study also recommends, Ethiopia to have mandatory honey standard, strengthen existing regulation and bridge regulation gaps, strong beekeeping extension and financial credit services and establishment of permanent horizontal and vertical linkage platforms for honey value chain actors.*

**Keywords:** beekeeping, honey value chain, honey export challenges, honey marketing, honey export volume, honey export value, honey voluntary standard, export oriented honey production

## **CHAPTER ONE**

### **1.0 INTRODUCTION**

#### **1.1 Background of the Study**

Ethiopia has high potential of producing honey. It stands first in Africa and tenth in the world in honey production (Legesse, 2014 and Ababor and Tekle, 2018). The country is endowed with varied ecological and climatic conditions and it is also home to some of the most diverse flora and fauna in Africa. Its forests and woodlands contain diverse plant species that provide surplus nectar and pollen to foraging bees (Guyo and Legesse, 2015; Tekle and Weldeyohanis, 2016; Sahle, Enbiyale, Negash and Neges, 2018). The ideal climatic conditions and diversity of floral resources allow the country to sustain around 10 million honeybee colonies, which is the largest honey bee population in Africa (Ababor and Tekle, 2018).

Bee beekeeping is a longstanding practice in Ethiopia and is an integral part of the Ethiopian agriculture. Beekeeping has manifold benefits in Ethiopia. It is a source of foreign currency through the export of honey and beeswax (W/Giorgis, Haileselassie and Mengistu, 2015 and Yadeta, 2016). Beekeeping is a minimal investment and pro-poor agricultural sub- sector. For poor and vulnerable communities, even for those without access to land, small scale beekeeping has made a significant contribution to their livelihood security. Beekeeping is a source of cash income for households (Gebretsadik and Negash, 2016), enhances food and nutrition security and reduces poverty (Legesse, 2014), generates an employment (Belie, 2009 and Sahle et al., 2018), and provides pollination service (Gebretsadik and Negash, 2016).

Based on the technology advancement of beekeeping practice, there are four different types of honey production systems (beekeeping practices) in Ethiopia, namely traditional forest beekeeping, traditional backyard beekeeping, transitional and modern beekeeping (Yadeta, 2016 and Ababor and Tekle, 2018). Traditional beekeeping, which comprise traditional forest and traditional backyard beekeeping is the dominant honey production system in the country.

With the large honey bee population and the favorable ecological and climatic conditions for honey bees in Ethiopia, the country has an annual honey production potential of 500,000 tons (Legesse,

2014 and Ababor and Tekle, 2018). However, the actual annual honey production of Ethiopia is about 50, 000 tons (CSA, 2016, 2017), which is only about 10% of the country's annual honey production potential. The prevailing low actual honey production is linked to poor extension and credit services, poor use of and access to improved honey production Technologies, and poor honey marketing (Beyene, 2013; Guyo and Legesse, 2015; Gebretsadik and Negash, 2016 and Ababor and Tekle, 2018).

Similar to the annual low honey production capacity of Ethiopia, the annual honey export capacity of the county is also low. According to the CSA and ECC data the average annual honey export volume was only about 11% of the actual average annual honey production of the country during the period 2011-2018. The range of variation of the percent share of the annual honey export from the annual honey production was between the lower of about 2% in 2018 and the highest of about 17% in 2013. Traditional beekeeping, which is dominantly practiced in the country and characterized by low supply and quality of honey (Shiferaw and Gebremedhin, 2016 and Sahle et al., 2018), high local price of honey and lack of legality in the domestic honey market (Tekle and Weldeyohannis, 2016) have been reported to negatively influence the Ethiopian honey export.

Research work on the challenges to Ethiopian honey export from broader perspective is scarce. Guyo and Legesse (2015) and Ababor and Tekle (2018) reported that higher domestic price of honey compared with the international honey price made honey export less cost-effective in Ethiopia. Shiferaw and Gebremedhin (2016) and Sahle et al., (2018) also reported that low supply and quality of honey negatively affect Ethiopian honey export.

But the above studies failed short to establish the reasons for the honey export problems they reported, along the honey value chain. This is important because, until the honey reaches to the honey exporters and consumers as a final product, the different activities, which are carried-out along the honey value chain, at the level of different functions of the chain (starting from the level of beekeeping input supply function up to the export and consumption function levels) can negatively affect the supply and quality of honey and can also involve high cost. These in turn attribute to the Ethiopian honey export challenges, making Ethiopian honey export less competitive in the international honey market. In the light of the above, this study aims to examine the challenges of the Ethiopian honey Export across the honey value chain. The study also aims to establish the trends of the Ethiopian honey production, honey export volume and value, which are

all interlinked and together help establish the honey export challenges and inform the status of Ethiopian honey export.

## **1.2 Problem Statement**

The issue of concern as a nation with regard to the Ethiopian honey export is that despite the long standing practice of beekeeping in Ethiopia, huge honey production potential of the country, the recognition the beekeeping sub-sector is getting by government and non-governmental organizations and also the particular interest of the government to enhance the foreign earning from honey, the annual average annual honey export volume is low and only about 11% of the actual average annual honey production of the country during the period 2011-2018 (ECC). This low export figure is also despite the attainment of Ethiopia the status of Third Country Listing. Attainment of the status of Third Country Listing makes Ethiopia eligible to export honey EU countries, provided it produces honey that comply with import regulations of EU countries.

Reasons reported for the low Ethiopian honey export are general and most studies conducted to address the challenge have focused on improving the honey supply side, which failed short to address the issue in a holistic manner. Desalegn (2012) reported that past interventions have been production focused and neglected the wider value chain context, hence the impact of their investments have been negligible.

The different studies on honey value chain analysis conducted in different parts of the country (Mohammed, 2016 and Jagiso, Geta and Zemedu, 2018) aimed at identifying value chain actors and functions and studied mainly the domestic honey marketing as value chain function. Honey value chain studies, which identified honey export as a chain function and honey exporters as chain actors are scarce. There is also information gap on challenges of Ethiopian honey export across the honey value chain. Efforts made in the past to address the challenges to the Ethiopian honey export, without adequate information on the root causes of the Ethiopian honey export prevailing across the honey value, were generally only addressing the symptoms to the challenges. The lack of such information is by implication hindrance to take correct measures to rightly address the challenges and sustainably enhance the export of honey from Ethiopia, in a level that commensurate to the country's honey production potential.

Further, information on recent trends of Ethiopian honey production, honey export volume and values are not well established. Without such information proper and timely measures could not be taken to address the reported low level of honey export volume and value. Therefore, little is known about challenges of Ethiopian honey export across the honey value chain. Further, updated data on trends of Ethiopian annual honey production, annual export volume and values are also scarce. This study thus sought to contribute to the body of knowledge by identifying the challenges of Ethiopian honey export across the honey value chain. The study also sought to bridge the gap of knowledge related to recent trends of Ethiopian honey production, honey export volume and value. To address the above problems the following specific research questions are set.

### **1.3 Research Questions**

- i. What are the challenges across the honey value chain, to export Ethiopian honey?
- ii. What is the trend of Ethiopian honey production?
- iii. What is the trend of Ethiopian honey export volume?
- iv. What is the trend of the Ethiopian honey export value?

### **1.4 Research Objectives**

#### **1.4.1 General Objective**

The main objective of this study is to investigate the challenges of Ethiopian honey Export prevailing in the honey value chain, which will enable to address the export challenges in an informed manner, and enhance the Ethiopian honey export.

#### **1.4.2 Specific Objectives**

The specific objectives of the study are:

- i. To identify the challenges to Ethiopian honey export across the honey value chain;
- ii. To examine the trend of Ethiopian honey production;
- iii To explore the trend of Ethiopian honey export volume;
- iv. To assess the trend of Ethiopian honey export value.

### **1.5 Significance of the Study**

The findings and knowledge that would be generated from this study will contribute to the better understanding of the challenges of the Ethiopian honey export across the value chain, and will help to formulate appropriate policies, design strategies and prepare programs and projects to sustainably address the export challenges, and significantly enhance honey export of Ethiopia for the benefit of the Nation. Further, by sustainably improving the export of honey from Ethiopia, based on the findings of this study, the claimed benefits of beekeeping (employment generation, source of income, source of foreign currency and ecological services) can be realized given the huge and untapped honey production potential of Ethiopia. From the study, all the honey value chain actors including the beekeeping input suppliers, the vast majority of small scale beekeepers, traders, processors and exporters will be beneficiaries.

### **1.6 Scope of the Study**

This study focused on identifying the challenges to Ethiopian honey export across the honey value chain. It also focused on establishing the trends of Ethiopian honey production, honey export volume and honey export value during 2011 - 2018. Of the different honey value chain functions and support functions, the study focused on input supply function, honey production function, domestic honey marketing function and support function of the honey value chain including extension and financial credit facilities. The main honey value chain actors involved in this study are Ethiopian honey exporting firms.

### **1.7 Limitation of the Study**

The main limitation of this study is that it did not examine the Ethiopian honey export challenges prevailing across all the different honey value chain functions and support functions in the honey value chain, which extend from Ethiopia all along to the honey importing countries. The study only focused on examining the challenges of Ethiopian honey export prevailing at the beekeeping input supply function, production function, domestic honey marketing function and support functions of the honey value chain. This clearly would hinder the identification of honey export challenges prevailing at the honey value chain functions and support functions not covered in this study. Another limitation of the study is that the study was conducted on only 10 Ethiopian honey

exporting firms to identify the Ethiopian honey export challenges in the studied functions and supporting functions of the honey value chain. This limitation may therefore compromise the generalization the findings of the study.

## **1.8 Organization of the Thesis**

This paper is organized into five chapters. The first chapter is an introduction under which background of the study, statement of the problem, research questions, research objectives, significance and scope of the study, limitation of the study, organization of the thesis and ethical consideration are presented. The second chapter covers the review of literature on value chain concept and value chain development approach, honey production, Ethiopian and global honey production, export and honey export challenges prevailing across the honey value chain. The third chapter discusses the research methodology adopted by the study and covers description of the study area, research type used, target population, sampling technique, data collection method, data processing and analysis employed in the study. The fourth chapter presents results and discussion, of the findings of the survey study and findings of the analysis of the secondary data used in the study. In the final chapter summary, conclusion, recommendations and areas for future research are presented.

## **1.9 Ethical Consideration**

In the process of collecting and analyzing data in social research, ethical concerns arise. Although ethical issues are generally outlined by codes and guidelines of professional bodies, there still remains ambiguity and contests of some (Bryman, 2015).

This study has adhered to ethical issues based on participants' well-being, informed consent, anonymity and deception. Before the start of the study a supportive letter was sought from the College of Business and Economics, Addis Ababa University, which outlined the objective and benefits of the study. The supportive letter also assured that the data gathered would be kept confidential and used for academic purpose only. Secondly, supportive letter was sought from the Ethiopian Honey and Beeswax Producers and Exporters Association (EHBPEA), after the researcher visited the EHBPEA with the supportive letter from the College of Business and Economics, Addis Ababa University. The letter from the EHBPEA, which was in support of the study, was intended to send to the participating exporting firms (which are members of the

association), together with the supportive letter from the College of Business and Economics, Addis Ababa University.

The study has ensured that full consent was obtained from the participants prior to the start of the study and that the study has prioritized the participants' respect for the dignity. In addition adequate level of confidentiality of the research data was ensured. Further, the intentions of the study were clearly communicated without deception, and any type of communication was made with honesty and transparency.

## **CHAPTER TWO**

### **2.0 LITERATURE REVIEW**

#### **2.1 Introduction**

This chapter reviews relevant theoretical and empirical literature. The theoretical literature review covers concepts and definitions, value chain development approach, honey quality and benefits of beekeeping. The empirical literature review presents the potential of beekeeping in Ethiopia, honey production and honey production systems of the country, world and Ethiopian honey trade, and constraints across the honey value chain that negatively influence the country's honey production and quality as well as the Ethiopian honey export.

#### **2.2 Theoretical Literature Review**

##### **2.2.1 Basic Concepts and Definitions**

###### **2.2.1.1 Honey**

According to Codex Alimentarius (2001) honey is defined as “the natural sweet substance, produced by honey bees from the nectar of plants or from secretion of living parts of plants, or excretion of plant-sucking insects on the living parts of plants, which the bees collect, transform by combining with specific substances of their own, deposit, dehydrate, store and leave in honeycombs to ripen and mature”.

The EU defines honey as the natural sweet substance, produced by *Apis mellifera* bees from the nectar of plants or from secretions of living parts of plants, or excretions of plant-sucking insects on the living parts of plants, which the bees collect, transform by combining with specific substances of their own, deposit, dehydrate, store and leave in honeycombs to ripen and mature. The EU definition states that honey is only honey according to the definition when it is produced by *Apis mellifera* honey bees (EU Council, 2001).

###### **2.2.1.2 Beekeeping and Apiary**

According to Mejia, Hilmi and Bradbear (2011), beekeeping is the maintenance of honey bee colonies by beekeepers. Apiary, also known as a bee yard, is a location where honey bee colonies are kept in bee hives by beekeepers.

### **2.2.1.3 Value Chain**

A value chain is a set of linked activities that work to add value to a product and it consists of actors and actions that improve a product while linking commodity producers to processors and markets (Norton, 2014). Value chains work best when their actors cooperate to produce higher-quality products with efficiency and generate more income for all participants along the chain.

### **2.2.2 The Value Chain Concept**

According to Shunk and Feller (2006), the Value Chain concept was developed and popularized in 1985 by Michael Porter in “Competitive Advantage,” a seminal work on the implementation of competitive strategy to achieve superior business performance. Porter (1985) defined value as the amount buyers are willing to pay for what a firm provides. He linked up the value chains between firms to form what he called a Value System. However, in the present era of greater outsourcing and collaboration the linkage between multiple firms’ value creating processes has more commonly become the “value chain.” (Shunk and Feller, 2006). As this name implies, the primary focus in value chains is on the benefits that accrue to customers, the interdependent processes that generate value, and the resulting demand and funds flows that are created. Effective value chains generate profits. Most corporate initiatives are really about developing appreciation and awareness of customer needs and values, and then organizing the firm’s activities around efficiently providing for those needs quickly, accurately, and at minimum cost.

In “Lean Thinking by Jones and James (2003) the first Lean Principle was “defining value from the customer’s perspective.” From this comes two critical factors that need to be clarified when strategizing the creation of value: (i) who is the customer? (ii) what do they value? Similar to Shunk and Feller (2006) Jones and James (2003) had reported that most corporate initiatives are really about developing appreciation and awareness of customer needs and values, and then organizing the firm’s activities around efficiently providing for those needs – quickly, accurately, and at minimum cost. This is because value occurs when customer needs are satisfied through an exchange of products and/or services for some form of payment. The degree to which the needs that are met exceed the price paid in the exchange is one objective way that value can be measured. In recent years, the concept of value chain is widely used as a facilitation tool for integrating small enterprises into high value market.

### **2.2.3 Value Chain Development Approach**

A value chain development approach focuses on improving the competitiveness of the industry/sector in which the firm operates (Jones, 2011). The core of the value chain approach is the recognition that, the strategies for enterprise/sector development needs to focus on the entire value chain rather than focusing on a particular aspect of provision of credit or input supply. The value chain approach emphasizes on identifying the opportunities for and constraints to industrial/sector growth by considering the value chain actors ( example firms), linkages among firms, supporting markets, end markets, and the business enabling environment at all levels (Field, Downing and Kula, 2006).

Further, value chain approach also emphasizes on other factors that influence the chain's performance, including access to and the requirements of terminal markets, the legal, regulatory and policy environment, and the availability and quality of support services such as financial services, equipment manufacture and repair, business management services and information technology. Value chain development is fundamentally about strengthening market relationships so that businesses work better together to compete more effectively in the global market (McVay and Mehlbradt, 2005).

### **2.2.4 Quality of Honey**

According to Codex Alimentarius (2001), honey must not have any objectionable matter, flavor, aroma or taint absorbed from foreign matter during its processing and storage. The honey should not have begun to ferment or effervesce. No pollen or constituent particular to honey may be removed, except where this is unavoidable in the removal of foreign inorganic or organic matter. Honey must not be heated or processed to such an extent that its essential composition is changed and/ or its quality is impaired. The use of chemical or biochemical treatments to influence honey crystallization is also restricted.

Honey consists essentially of different sugars, predominantly fructose and glucose, as well as other substances such as organic acids, enzymes and solid particles derived from honey collection. The color of honey varies from nearly colorless to dark brown. The consistency can be fluid, viscous or partly crystallized to entirely crystallize. The flavor and aroma may vary and depend on the honey's plant origin (Codex, 2001). The Codex standards also specify that honey sold as such

must not have any food ingredients added to it including food additives. It also must not have any other additions other than honey.

The Codex Alimentarius Commission has laid down 15 parameters relating to standards for honey. For example, the moisture content in honey (except heather honey) should not be more than 20 %. Sucrose content, which is also an indication of adulteration, should not be more than 5 gr per 100 gr of honey. The standard also has rules about contaminants such as heavy metals, pesticide residues and veterinary drugs since these pose a hazard to human health. These standards also contain provisions for hygiene, labelling of honey designation according to the method of removal from the comb and the method of sampling and analysis. In these standards additional composition and quality factors such as free acidity, diastase activity, hydroxymethylfurfural (HMF) content and electrical conductivity are also defined. Diastase activity and HMF content are quality factors determined after processing and/ or blending.

The EU regulates honey under Council Directive 2001/110/EC (Appendix 3). EU standards and compositional requirements for moisture content, sugar content, HMF, electrical conductivity, diastase activity, and physico-chemicals are the same to the Codex Alimentarius standards (Appendix 2). The EU has adopted legislation on the use and monitoring of veterinary drugs. The EU has also listed substances safe to use in beekeeping. These substances include formic acid, phenol, fluvalinate, thymol and menthol, oxalic acid and lactic acid. Further, the EU has set a provisional MRL of 25 ppb for oxytetracycline in honey, 0.3 ppb for chloramphenicol, and 1.0 ppb for nitrofurantoin.

All countries trading honey on the international market standards set by the Codex Alimentarius (Appendix 3) and when exporting honey the countries have to also comply with the importing countries' honey quality requirements. Ethiopia has also developed national honey standard based on the Codex Alimentarius (Appendix 2).

### **2.2.5 Benefits of Beekeeping**

According to Mejia et al. (2011) there are ten excellent reasons for beekeeping. These are: (i) pollination- bees pollinate flowering plants and cultivated crops and maintain the ecosystem; (ii) source of a valuable energetic and healthy food and income source; (iii) source of beeswax, propolis, pollen and royal jelly; (iv) few resources are needed, beekeeping is feasible even for people with minimal resources; (v) land ownership not essential, hives can be placed anywhere

convenient, and so beekeeping does not use up valuable land, bees collect nectar and pollen wherever they can find it, so wild, cultivated and wasteland areas all have value for beekeeping; (vi) nectar and pollen are otherwise not harvested, nectar and pollen are not used by other livestock, only bees harvest these resources, so there is no competition with other crops. Without bees these valuable resources could not be harvested; (vii) different sectors and trades benefit from a strong beekeeping industry, other local traders benefit by making hives and equipment, and from using and selling the products; (viii) beekeeping encourages ecological awareness; (ix) everybody can be a beekeeper, bees can be kept by people of all ages and bees do not need daily care and beekeeping can be done when other work allows; and (x) beekeeping is environmentally friendly, it generates income without destroying habitat, and thus encouraging beekeeping means encourages the maintenance of biodiversity.

## **2.3 Empirical Literature Review**

### **2.3.1 World Honey Production**

According to FAOSTAT (2016, 2017), world honey production totaled 1859 thousand tons in 2016 and 1861 thousand in 2017, with an increase of 2 thousand tons (11% increase) in 2017 compared with that of 2016. China was the top honey producer in the world in 2016 and 2017, producing 563 and 551 thousand tons respectively. Turkey followed China in honey production and produced 106 and 114 thousand tons of honey in 2016 and 2017 respectively.

Based on the average annual honey production during the period 2011-2017 (FAOSTAT, 2018), the top ten honey producing countries in the world were China, Turkey, United States of America, Iran, Argentina, Russian Federation, Ukraine, Mexico and Ethiopia. China always ranked first in the world with an average annual honey production of 480 thousand tons followed by Turkey with an average of annual honey production of 101 thousand tons. Ethiopia ranked tenth during the period producing an average annual honey production of 50 thousand tons. While the trend of the world honey production has been on the increase (FAOSTAT), the global demand for pure honey is constantly exceeding supply (Mbeiyerewa, 2014). Honey is becoming increasingly valuable and an expensive commodity. This is an opportunity to capitalize on, for countries with high honey production potential, provided the countries produce and supply marketable honey, which the world honey market demands. The world honey trade is presented below.

### **2.3.2 World Honey Trade**

According to the Trade Map data (2016, 2018), total world honey export volume was 637 thousand tons in 2016 and 689 thousand tons in 2018, with an increase of 52 thousand tons (8% increase) in 2018 compared with that of 2016. The corresponding world honey export values were 2, 230 million USD in 2016 and 2, 232 million USD in 2018. The increase in world honey export value was 2 million USD (0.09 % increase) in 2018 compared with that in 2016. Based on the average annual honey export volumes of 2014-2016 (FAOSTAT, 2018) the top five honey exporting countries in the world were: China, Argentina, Viet Nam, Ukraine and Mexico, ranging from average annual export volume of 134 thousand tons of China to 37 thousand tons of Mexico.

According to Trade Map data (2016, 2018), world honey import volume totaled 642 thousand tons in 2016 and 681 thousand tons in 2018, with an increase of 39 thousand tons (6% increase) in 2018 compared with that in 2016. The world honey export values were 2,039 million USD in 2016 and 2, 240 million USD in 2018. Based on the average annual honey import volume of the period of 2014-2016 (FAOSTAT, 2018) the top five honey importing countries in the world were United States of America, Germany, Japan, United Kingdom and France, ranging from average annual honey import volume of 169 thousand tons by the United States of America to 34 thousand tons by France. These major importing countries are potential markets for high honey producing countries. Section 2.3.3 covers the beekeeping potential of Ethiopia.

### **2.3.3 Beekeeping Potential of Ethiopia**

Beekeeping is a longstanding practice and integral part of Ethiopian Agriculture, which utilizes natural nectar and pollen for the production of honey, wax and other bee hive products (Legesse, 2014; W/Giorgis et al., 2015 and Ababor and Tekle, 2018).

Ethiopia is endowed with varied ecological and climatic conditions, and it is also home to some of the most diverse flora and fauna in Africa. Its forests and woodlands contain diverse plant species that provide surplus nectar and pollen to foraging bees (Legesse, 2014; Guyo and Legesse, 2015; Tekle and Weldeyohanis, 2016 and Sahle et al., 2018). Nowadays, more than 7000 species of flowering plants are estimated to be found in the country, of which most of them are honey bee plants. The ideal climatic conditions and diversity of floral resources allow the country to sustain around 10 million honey bee colonies, of which seven million are kept in local bee hives by farmers and the remaining exist in the forests as wild colonies. With over 10 million honey bee colonies,

Ethiopia has the largest bee population in Africa, and stands first in Africa and tenth in the world in honey production (Legesse, 2014 and Ababor and Tekle, 2018).

The benefit of beekeeping in Ethiopia is manifold. Beekeeping is a minimal investment and pro-poor agricultural sub-sector. For poor and vulnerable communities, even for those without access to land, small scale beekeeping has made a significant contribution to their livelihood security. Beekeeping is a source of cash income for households (Gebretsadik and Negash, 2016) enhances food and nutrition security and reduces poverty (Legesse, 2014). It generates an employment (Belie, 2009; Yadeta, 2016 and Sahle et al., 2018) and provides pollination service (Gebretsadik and Negash, 2016 and Ababor and Tekle, 2018). Further, beekeeping is source of foreign currency earnings through the export of honey and beeswax (W/Giorgis et al., 2015 and Yadeta, 2016). However, the claimed benefits of beekeeping can fully be realized and sustained only through proper beekeeping practices/honey production systems. The honey production systems practiced in Ethiopia are detailed below.

### **2.3.4 Honey Production Systems in Ethiopia**

Based on the technological advancement of beekeeping practice, there are four different types of honey production systems (beekeeping practices), in Ethiopia, namely traditional forest, traditional backyard, transitional and modern beekeeping (Yadeta, 2016 and Ababor and Tekle, 2018).

#### **2.3.4.1 Traditional Forest Beekeeping**

Traditional beekeeping practice is the longstanding and predominant beekeeping practice in Ethiopia, which has been carried-out for thousands of years (Legesse, 2014; Guyo and Legesse, 2015 and Ababor and Tekle, 2018). In almost all parts of Ethiopia, several million bee colonies are managed with this old traditional beekeeping practice. There are two types of traditional beekeeping, namely traditional forest and traditional backyard beekeeping, which both use traditional bee hives as the name indicates. Traditional forest beekeeping is widely practiced in forest-covered parts of the country, especially in the western and southern part of Ethiopia by hanging traditional bee hives on trees, while in most other parts of the country, traditional backyard beekeeping is practiced with relatively better management, compared with traditional forest beekeeping (Legesse, 2014 and Ababor and Tekle, 2018). The advantages of traditional forest beekeeping are that the honey bees can get abundant forage plants in their vicinity and the bees do not cause harm to domestic animals and humans. The disadvantages are the lack of close

follow up and damage of bee honey colonies during honey harvesting period because beekeepers drop down the bee hives from the trees. It is also dangerous for the beekeeper to climb tall tree in night (Shenkute, Getachew, Assefa, Adgaba, Ganga and Abebe, 2012 and Ababor and Tekle, 2018).

#### **2.3.4.2 Traditional Backyard Beekeeping**

Traditional backyard beekeeping, compared with forest traditional beekeeping is mostly practiced at homesteads, which are better safeguarded for honey bees. The advantages of such practices are the following. The bee hive construction is very simple and it does not require improved beekeeping equipment. It does not also require skilled manpower. The disadvantages include inconvenience to undertake internal inspection and feeding and in some places the size is too small and causes swarming. Further, it has no possibilities of supering and there is no partition to differentiate brood chamber and honey chamber (Legesse, 2014 and Ababor and Tekle, 2018).

Traditional bee hives are constructed from locally available materials. Different types of traditional hives are found in different parts of the countries, which include hollowed logs, bark hives, bamboo or reed grass hives, mud (clay) hives, animal dung (mixed with ash), gourd and earthen hive. In Ethiopia, the large share of honey production comes from this traditional beekeeping practice (Legesse, 2014; Guyo and Legesse, 2015 and Ababor and Tekle, 2018).

#### **2.3.4.3 Transitional System of Beekeeping**

Transitional system of beekeeping is a type of beekeeping, which is an intermediate step between traditional and modern/ frame hives (Legesse, 2014; Guyo and Legesse 2015; Sahle et al., 2018 and Ababor and Tekle, 2018). Transitional hives have a higher honey yield over traditional hives and provide a mechanism for monitoring the maturity of honey and enable to harvest honey at the optimal time (Guyo and Legesse, 2015).

The advantages of transitional (intermediate) beekeeping as reported by Ababor and Tekle (2018) are the following. The bee hive can be opened easily and quickly. The bees are guided to build parallel combs by following the line of the top bars and the top bars are easily removable. Beekeepers are able to work fast, the top bars are easier to construct than frame hives and honeycombs can be removed from the hive for harvesting without disturbing combs containing brood. The hive can be suspended with wires or ropes, which this gives protection against pests (Ababor and Tekle, 2018). The disadvantages of transitional beekeeping are that top bar hives are

relatively more expensive than traditional hives and combs suspended from the top bars are more apt to break off than combs, which are built within frame hives.

Top-bar hive is, generally a single story long box, with sloping side walls inward toward the bottom (forming an angle of 115° with the floor) and covered with bars of fixed width, namely 32 mm for East African honey bees (Smith, 1961, cited by Ababor and Tekle, 2018).

#### **2.3.4.4 Modern Beekeeping**

Modern beekeeping is carried- out with the objective of obtaining maximum honey crop, season after season, without harming honey bees (Guyo and Legesse, 2015; Ababor and Tekle, 2018 and Sahle et al., 2018). Modern hive/ movable frame hives consists of precisely made rectangular box hives superimposed one above the other in a tier. The number of boxes varies seasonally according to the population size of bees. Movable frame hives allow appropriate colony management and the use of higher level of technology with larger colonies and gives higher honey yield and quality. Honey from frame hives is suitable for production of table honey for local and export market (Ababor and Tekle, 2018 and Sahle et al., 2018). On the other hand modern beekeeping involves high investment cost and requires trained manpower. The prices of equipment required for the modern beekeeping are expensive, require skilled manpower to use and the equipment need very specific specifications that need to be carefully followed to realize the claimed benefits of modern beekeeping. Honey production in Ethiopia is discussed below.

#### **2.3.5 Honey Production of Ethiopia**

With varied ecological and climatic conditions and diverse plant species that provide surplus nectar and pollen to foraging bees, Ethiopian has favorable environment for the production of honey, beeswax and other bee products (Guyo and Legesse, 2015; Legesse, 2016 and Ababor and Tekle, 2018). The ideal climatic conditions and diversity of floral resources allow the country to sustain around 10 million honey bee colonies, of which seven million are kept in local bee hives by farmers and the remaining exist in the forests as wild colonies. With over 10 million honey bee colonies, coupled with the ideal ecological and climatic conditions, Ethiopia has an average annual honey production potential of 500,000 tons and stands first in Africa and tenth in the world in annual honey production (Legesse, 2014 and Ababor and Tekle, 2018).

However, according to the CSA data (2017), the actual annual honey production of Ethiopia was about 48, 000 tons, which is only about 10% of the country's annual honey production potential.

Annual average honey production of the country totaled about 49, 000 and 51,000 tons in 2015 and 2016 respectively (CSA, 2015 and 2016), both yields still only about 10% of the annual honey production potential of the country. It is evident from these yield figures that the country's huge honey production potential has not yet been properly utilized, which is an issue of concern in the face of food and nutrition insecurity, poverty in the country as well as chronic shortage of foreign currency earnings from export.

According to different authors (Sebebo, 2015; Yadeta, 2016 and Ababor and Tekle, 2018), the low honey production of the country is attributed to the traditional honey production system, which is predominantly practiced in the country and characterized by low honey yield and quality. Ethiopian honey export is discussed in the following section.

### **2.3.6 Ethiopian Honey Export**

According to the data of ECC, the Ethiopian annual honey export volume totaled to about 459 tons in 2016 valued in thousand at about 1,623 USD and about 421 tons in 2017 valued in thousand at about 1,668 USD. The shares of honey export volumes from the annual country's honey production during 2016 and 2017 are about 1% and 0.9% respectively. The major importing countries include Sudan, Norway, Germany, France, United Kingdom and Somalia.

The traditional beekeeping, which is dominant in the country and characterized with low supply and quality of honey (Shiferaw et al., 2016 and Sahle et al., 2018), high local price of honey and lack of legality in the domestic market (Tekle and Weldeyohannis, 2016), have been reported to negatively influence the Ethiopian honey export. These all negatively influence the supply and quality of honey available for export.

Guyo and Legesse (2015); Yadeta (2016) and Ababor and Tekle (2018) in their review papers have reported that the honey price in the domestic honey market is mostly advanced than the international honey price, which makes honey export less cost-effective in Ethiopia. Due to this several honey exporting companies have dropped out of the international honey trade and are now targeting the local markets which are still attractive. But there is no mention in the review papers whether or not the high domestic honey price was the only reason for the exporters to dropped out of the international honey trade and target the local markets.

Studies on challenges of Ethiopian honey export across the value chain are scarce. Guyo and Legesse (2015) and Ababor and Tekle (2018) reported that higher domestic price of honey compared with the international honey price made honey export less cost-effective in Ethiopia. Shiferaw et al. (2016) and Sahle et al. (2018) also reported that low supply and quality of honey negatively affect Ethiopian honey export. But the studies failed short to establish the root causes of the export problems they reported across the honey value chain. Until the honey reaches to the honey exporters and consumers as final product of the chain, different activities, which are carried-out at the levels of functions and support functions of the chain (starting from the beekeeping input supply) can cause honey supply and quality problems and involve high cost, which in turn attribute to the Ethiopian honey export challenges.

In the absence of adequate information on the root causes of the Ethiopian honey export, efforts to solve the honey export challenges were only addressing the symptoms. A piecemeal approach has been followed to solve the problems, rather than investigating in to the whole honey value chain in holistic approach for corrective measures. Desalegn (2012) reported that past interventions have been production focused and neglected the wider value chain context, hence the impact of their investments have been negligible.

As stated by Desalegn (2012), another constraining factor to expand the Ethiopian honey export to EU countries (which have large and lucrative honey market) was that Ethiopia was not eligible to export to the EU until 2008. In order to export to the EU countries, Ethiopia has to attain the Third Country Listing status, which makes the country eligible to export honey to EU countries. This requirement indicates that challenges of Ethiopian honey export are broader than just issue of honey supply and high local price of honey. This urges to address the Ethiopian honey export challenges in a wider honey value chain context.

A notable intervention to improve the Ethiopian honey export was the initiative by SNV in collaboration with the Embassy of the Netherlands (EKN). This was the “Support to Business Organizations and their Access to Markets (BOAM) program”, which facilitated the honey sector’s development in which initiatives were taken based on a new business model (Desalegn, 2012). The objective of the program was to create a well-developed Ethiopian honey sector that is globally competitive for its high quality of processed honey and beeswax, with increased honey production, productivity and improved quality that would create employment and increase incomes for rural

households. The program supported vertical integration and working hand in hand of relevant actors across the honey value chain to meet the set objectives of the program. The program trained 8,193 small holder out-grower farmers, who supply their honey to 8 leading exporters. The program also supported the country to attain the Third Country Listing status, which made the country eligible to export honey to EU countries.

According to Desalegn (2012), Ethiopia exported its first consignment of honey to the European Union (EU) in 2008, after a three year period of preparations towards attaining Third Country Listing status. The author stated that it was the result of a deliberate set of interventions of the BOAM to help increase processing capacity in combination with an out-grower scheme to increase honey supply. The honey production yield and revenue of the out-grower farmers increased as follows. During the three years of the program alone (2008-2010) the increases were 23% in honey production and 27% USD / 83% (ETB) in revenue. As a nation the increases were 122% growth in exports value and 107% growth in its share of the world exports.

While these results are encouraging, the increasing trend reported by Desalegn (2012) was not sustained, rather the honey export volume and value started declining since 2015 (ECC, 2016). In 2017, for example, the honey export volume was only about 421 tons (58%) compared with the honey export volume in 2011, which was about 729 ton (ECC). Although information on why the success was not sustained is not clear, it is understood that support from NGOs can only demonstrate good practices, and it is then the responsibility of a country to mainstream good practices into the beekeeping system, even stepwise, and sustain the success, which did not seem has happened.

To sustain the Third Country Listing status, Ethiopia must annually submit a Residue Monitoring Plan (RMP), which is a requirement by the EU, upon which on approval by the EU Commission, makes Ethiopia eligible to export honey to EU countries (Greiling, 2008 and Gallmann and Thomas, 2012, as cited by W/Giorgis et al., 2015). EU countries are major honey importers that can be capitalized on, if and only if the exporting country has adequate marketable honey along with fulfilling other import requirements. Ethiopia is annually spending substantial amount of money for the preparation of RMP to submit to the EU Commission. In view of the declining trends of Ethiopian honey export volume and honey export value in one hand, and the Third Country Listing status of Ethiopia and annually submitting the RMP (which is a requirement by

the EU) on the other hand, it is clear that the Third Country Listing status of Ethiopia and annually submitting the RMP (which is a requirement by the EU) alone cannot guarantee to enhance export of Ethiopian honey. This urges the country to address the honey export challenges, in a wider honey value chain context. By doing this challenges for the Ethiopian honey export prevailing across the honey value chain can be fully captured and properly addressed.

A sub-sector study on beekeeping was also conducted by Addis Ababa University, which was commissioned by the Ministry of Industry with the aim to develop a “Strategic Plan to Develop a Globally Competitive Honey Industry in Ethiopia” (W/Georgis et al., 2015). Although the study was not carried-out in a honey value chain approach as such and the extent of inclusion of honey exporters not clear, the study has brought-up honey export related issues that require attention in the beekeeping sub-sector and has made recommendations for action. The study has set ten years target of activities to enhance Ethiopian honey export and make it competitive. According to the 10 years’ strategic plan set by the study the target for honey production in the country for the year 2016 was 210, 000 tons and the export value for the same year in thousand USD was about 210, 000 (with the assumption that 50% of the production will be exported at 2 USD/Kg).

The targets for the year 2017 was 420,000 tons of honey and export value in USD 420, 000 (with the assumption that 50% of the production will be exported at 2 USD/Kg). However, according to the CSA data on annual honey production and the data on annual honey export value of the same period (ECC), the set targets were not met, and the actual honey production yields and the export values are way below the set targets. Therefore, the challenges to the Ethiopian honey export need to be adequately established, along the honey value chain. This is important because the challenges start being built up right from the first function/activity in the chain that is the beekeeping input supply function.

If for example there is no supplier of beekeeping inputs such as beekeeping equipment, honey bee queen, the beekeeper cannot produce honey. Like other agricultural activities honey production also requires affordable, quality, timely and regular supply of beekeeping input. In the absence of the supply of necessary beekeeping inputs, production of honey is reduced. This in turn leads to reduced honey supply for export. Such constraints can only be captured and acted upon if the honey value chain is studied. The honey Value Chain in Ethiopia is detailed below.

### **2.3.7 Honey Value Chain in Ethiopia**

In agreement with the concept of a value chain, (Norton 2014) and Guthiga, Karugia, Massawe, Ogada, Mugweru, Ongudi and Mulei (2017) in their review paper on mapping livestock value chains in the IGAD Region, stated that honey value chain is a full range of activities/functions and actors required to bring the product ("honey as a commodity") to final consumers, passing through different phases of production, processing and delivery. Different studies conducted in different parts of Ethiopia on honey value chain analysis have identified the actors, activities/ functions and the enabling environment in the honey value chain in their respective study areas (Gebru, 2015; Mohammed, 2016 and Jagiso et al., 2018).

Gebru (2015) in a study conducted in Kilte Awlalo District, Eastern Tigray, identified the honey value chain main actors and their functions as well as support functions and enabling environment. The main honey value chain actors identified included the following. Producers (farmer beekeepers and commercial beekeepers), honey collectors, retailers, whole sellers, beekeeper cooperatives, unions, companies, exporters and consumers. The main honey value chain functions identified were input supply, production, processing, marketing and consumption. The honey value chain supporters identified in the study area were ATVET, FTC, research organizations and government and non-government organizations. The enabling environment identified by the author were infrastructure, laws, policies (livestock and agricultural development), investment policies, standards, social and cultural norms, and apiculture organizations, and agriculture). In agreement with the basic concept of honey value chain (Norton, 2014 and Oduor, 2015), the study has identified the basic and major activities and their associated functions in the honey value chain in the study area, except that while input supply was identified as chain function, the input suppliers were not identified as chain actors.

According to a study conducted by Mohammed (2016) in Semen Shewa Zone of Amhara Region, the case of Basona Worena, the main value chain actors identified were input suppliers, honey producer /beekeepers, cooperatives, retailers, tej brewers and processor. The main supporters of the honey value chain in the study areas were Office of Agricultural and Rural Development (OoARD) and Service Cooperative and honey processing company. In view of the concept of honey value chain (Norton, 2014 and Guthiga et al., 2017), this study has failed to identify

consumers as actors and to identify the functions of the major actors identified in the study. It also did not identify honey marketing as a function.

Jagiso et al. (2018), carried-out a study on honey value chain analysis and producers financing in Damot Gale District, Southern Ethiopia, with the objective of identifying the major actors and their respective functions across the honey value chain in the study area. They identified seven major actors across the honey value chain. These were producers, collectors, wholesalers, retailers, cooperatives, processors and consumers. The functions/activities identified in the honey value chain were transporting, sorting and packing, filtering and processing. The authors also identified value chain supporters which provide credit service. They were Omo Micro Finance Institution, WARDO and cooperatives. This study missed to identify input suppliers, producers/beekeepers as actors in the honey value chain and input supply, honey production, marketing and consumption as honey chain functions.

A study conducted by the Institute of Community and Organizational Development (ICOD) in Kenya (2009) on beekeeping/ honey value chain financing in five provinces of Rwanda, identified the actors and functions in the respective honey value chains. The study, broadly clustered them into three main tiers, namely the bottom, middle and top tiers, based on their role/s in the production of honey, which ranged from production, handling, processing, and distribution all through to the end markets. According to the study the following were established:

**(i) the bottom tier actors and functions were** input supply and suppliers, honey production and producers/beekeepers, farm level semi-processing and honey producers/beekeepers, primary transportation, and honey producers. Further primary collection, bulking and semi-processing and three main actors for this function (the co-operative societies, local retailers and commercial bulking agents (middlemen) were identified. In addition secondary transportation assumes the link between the collection points, honey refining and packaging centers (honey processing companies) and /or the end markets.

**(ii) the middle tier functions and actors included** secondary bulking, refining and packaging that involved further refining and packaging by medium and large honey processing companies distribution. This is the wholesale /retail level within the value chain and it comprises large retail stores.

**(iii) top tier functions and actors involved** certification and end markets. Certification is a function of the Rwanda Bureau of Standards (RBS). The end markets mostly comprised of the eventual consumers of honey, which included but were not limited to domestic consumers, who used honey as a table food.

The study has also identified supplementary value chain functions and actors, which mainly comprised of actors involved in the supportive functions of beekeeping sub-sector but who do not directly or indirectly handle the commodity. Their functions are critical to the growth and development of the beekeeping sub-sector whereby without them the sub-sector would not function effectively especially in the production and processing elements.

While the basic concept of honey value chain remains the same, the main actors and their functions, and the supportive functions identified in a given study area can vary from place to place, as revealed in the above studies. The variations are on the level and depth of the study/the scope of the study, development level of beekeeping, market and infrastructure development of the study area and availability of relevant beekeeping equipment. Yet, a given honey value chain, in view of the value chain concept, has a basic core and support activities/functions and actors starting from input supply and suppliers and goes up to consumption that is the end of the honey value chain.

Based on the information presented above, a honey value chain has at least the following activities/functions and their associate actors and support functions. Input supply, production, processing, storage, transportation, marketing and consumption together with their associated chain actors and support functions. The different functions identified in a given honey value chain have linkages among themselves and with the honey export in a way that what happened in every level of the chain has a negative or positive impact on the Ethiopian honey export. This could be through impact on honey supply and quality, sustainability of the honey flow and the price of honey.

Thus the whole issue of studying the honey value chain as far as honey export is concerned is to identify the challenges for honey export in every level of the chain functions and support functions and to take timely and informed corrective measures. It also is to employ effective and efficient activities along the value chain in a holistic manner to enhance the flow of adequate supply of export standard honey from the honey value chain at world competitive prices. Moreover, it is to

identify important support services necessary to the promotion of honey export and take appropriate measures either to strengthen the existing or create new as appropriate. Challenges for Ethiopian honey across the honey value functions are discussed in the following section.

### **2.3.8 Challenges of Ethiopian Honey Export across the Honey Value Chain Functions**

Different honey value chains can have different value chain functions and support functions. Yet a honey value chain has at least the following activities/functions and their associate actors and support functions. Input supply, production, processing, storage, transportation, marketing and consumption together with their associated chain actors and support functions.

This section will cover the following honey value chain functions to look into the prevailing honey export challenges in every value chain function and support function. Input supply function, honey production function, honey processing function at the farm level, domestic honey marketing function, and support functions including extension and credit services. Export challenges are built up along the honey value chain functions and support functions starting from the level of beekeeping input supply function up to the honey export function and consumption.

#### **2.3.8.1 At Input Supply Function**

Like other agricultural practices beekeeping requires beekeeping inputs to produce honey. Thus at this level of the honey value chain, the availability of inputs for honey production is important. Absence or inadequate beekeeping input for the honey producers, means reduced honey production. Further, if the input available to use is of low quality (sub-standard) the honey supply and quality can be compromised. By implication, supply of quality honey to the export market is affected. This indicates what happened at the start of the honey value chain “at input supply function level” can affect the honey export. Supply of different beekeeping inputs including bee colony, beekeeping equipment and bee forage are discussed in the following section.

##### **2.3.8.1.1 Bee Colony Supply**

According to different studies conducted in different parts of Ethiopia, the main source of bee colonies for farmers to start beekeeping or expand their beekeeping has been mostly, by trapping or catching bee swarms (Belie, 2009; Shenkute et al., 2012; Guyo and Legesse, 2015; Gebretsadik and Negash, 2016 and Ababor and Tekle, 2018). Bee colony marketing is not common although limited practice of bee colony marketing has been reported in some parts of the country (Belie, 2009 and Gebru, 2015).

Shenkute et al. (2012), reported that in a study conducted in Kaffa, Sheka and Bench –Maji Zones of Southern Ethiopia, about 85% respondent beekeepers explained that selling of honey bee colonies is not a common practice in the study areas. The study did not mention what the explanation was of the other remaining 15% of the respondent beekeepers. As the beekeeping practiced in the study area is very traditional, the only source of bee colony is swarming. About 67% of the respondents get bee colony by hanging traditional hives upon trees while the rest get from wild nest. This would mean that honey production either for the first time or to expand the honey production is delayed until swarming takes place, which occurs by chance.

Similar results have been reported by Gebretsadik and Negash (2016), based on a study conducted on honey bee production system, challenges and opportunities in selected Districts of Gedeo Zone, Southern Nation, Nationalities and Peoples Regional State Ethiopia. The authors stated that the survey results indicated that of the respondent beekeepers 71% started beekeeping by catching bee swarms and 14% by getting bee colonies as gift from parents. The 10% respondents started beekeeping both by catching bee swarms and gift from parents. The authors stated that in the study area, selling bee colonies was uncommon. There were no respondent beekeepers who started beekeeping by buying bee colony.

Limited practice of bee colony marketing has been reported by Belie (2009) in Burie District in Amhara Region. In the study area, of the survey respondent beekeepers interviewed to explain the source of their foundation bee colony, 25 % replied from market, 34.2 % got their colonies by catching swarms (hanging bait hives on the apex of trees), 22.5% from gift 10% from training and 8.3 % from Agricultural Office. The author stated that in the study area honey bee colony marketing is becoming a known practice, and beekeepers carry bee colonies to market to sell for cash. But the author further noted that as the practice of selling bee colonies has emerged recently, only a small portion of the respondents (14.4%) had the experience of selling honey bee colonies.. Gebru (2015) has also reported practice of bee colony marketing in Kilte Awlaelo District, Eastern Tigray, and Ethiopia.

From the different studies cited above, it is apparent that the main source of foundation bee colonies to start beekeeping or/and to expand the beekeeping practice is through trapping bee swarms. This indicates that well established and sustainable source of bee colonies (queen rearing and supply of bee colonies), is either inadequate or lacking. It is clear that honey production in

such situation, is delayed until the time bee swarms are trapped. This in turn results in reduced honey yield leading to inadequate supply of honey to the honey export.

#### **2.3.8.1.2 Beekeeping Equipment Supply**

The basic beekeeping equipment required by beekeepers can vary based on the level of beekeeping technology the beekeepers use. There are beekeeping equipment types that are required for modern beekeeping practices, but not required for traditional beekeeping practices (Belie, 2009 and Gebru, 2015). However, the availability, accessibility and affordability of the appropriate bee equipment remain important for both traditional and modern beekeeping practices.

According to the review papers by Legesse (2014) and Guyo and Legesse (2015) as well as by different studies (Belie, 2009; Shenkute et al., 2012 and Gebretsadik, 2016), three types of bee hives, namely traditional, transitional or intermediate are used in the practice of beekeeping in different parts of Ethiopia. Among the three types of bee hives in use, traditional bee hives are dominantly used in the country. According to the CSA data of 2016, the percentage shares of traditional, intermediate and frame bee hives in use in Ethiopia of the total number of all types of bee hives in use were 96.46 %, 1.2 % and 2.34% respectively.

According to different studies conducted in different parts of Ethiopia (Belie, 2009; Shenkute et al., 2012 and Gebru, 2015) and review paper by Ababor and Tekle (2018), the traditional bee hives are constructed by beekeepers from locally available materials that are readily available for use by beekeepers, which is evidenced by their predominant use in the beekeeping practice. Shenkute et al., 2012 reported that in their study area, 99% of traditional hives were used, and only very few beekeepers reported to have intermediate and modern hives that have been supplied by different non-governmental organizations like Farm Africa, WIN Rock Ethiopia in Kaffa Zone, Zonal and Woreda Agricultural and Rural Development Bureaus, and Non Timber Forest Products Project in Sheka Zone and Zonal and Woreda Agricultural and Rural Development Bureaus.

In a study conducted in Burie District of Amhara Region, of the sample respondents 60% constructed their traditional hives, 27% bought locally constructed traditional bee hives and 1.7 % bought from the market. The same study reported that of the sample respondents 20% constructed their top bar hives and 80% of respondents received top bar hives from government on credit. The majority of the respondents (97.1%) received frame hives from government on credit, and 2.9% of the sampled respondents got frame hives from NGO on credit.

Gebru (2005) reported that in her study area, where the majority of the respondent beekeepers (95.5%) used frame bee hives and only 4.5% of the beekeepers used traditional bee hives. Of the respondents who used frame bee hives, 83.3% of the sampled respondents received frame bee hives from government on credit, 12.8% and 1.3% from NGO on credit and on support base respectively. Of the respondents who used traditional bee hives, 98.7% and 1.3% replied that they constructed and purchased their traditional bee hives respectively. The author stated that the major actors that provided bee hives included BoARD, REST, Dede-bit Credit and Saving Institution (DCSI), World Vision, Ethiopian Orthodox Church Development and Inter-Church Aid Commission (EOCDICAG), IFAD, Save the Children, GIZ, Helivethas, Wukro St. Mary's College, Wukro Agricultural Technical and Vocational Training College and the regional research system. The author also reported that workshops owned by small and micro enterprise in the district have been involved in the production of bee hives.

While it is clear that traditional hives are constructed from locally available materials and are easily available to beekeepers, information is scarce on how (i) distribution of the modern hives to beekeepers by different offices, was coordinated and (ii) modern hives distributed to beekeepers by different offices were ensured to have the right specification. Gebru (2015) reported that in the study area coordination of the efforts of the different modern hive providers was loose and emphasized the need for well-coordinated supply of the modern hives. Another observation during a field survey of a study conducted by Belie (2009) was that moveable frame hives, which were distributed by the BoARD were not to the standard, and they had ample drawbacks. The author stated that more than 55% of the modern hives distributed to the sample respondent were empty. Consequently, the degree of acceptance of frame hives was low. Uncoordinated supply of modern equipment and use of substandard modern bee hives would obviously result in reduced number of modern hives in use, and hence reduced honey yield and quality.

In addition to bee hives of any type, other beekeeping equipment accessories are necessary in beekeeping practices. The inadequate supply of other beekeeping equipment accessories other than modern bee hives that beekeepers faced has been reported by different authors (Belie, 2009; MoA and ILRI, 2013 and Jagiso et al., 2018).

According to Belie (2009), when the sample respondents were asked to list the equipment they use, they mentioned a wide range of accessories that goes hand in hand with beekeeping practices.

The full ranges of accessories are the following: smokers, gloves, bee veils, boots, water sprayer, bee brush, queen lauder, knife, honey container, honey presser, and honey extractor. The results of the study (Belie, 2009), however, revealed that of the mentioned accessories, except the known basic hive tools, many of the materials are either non-existent or kept by quite few number of respondents. The author stated that particularly the honey extractor was reserved at the center of the PAs for demonstration purpose. In the study area, 83% respondents used beekeeping equipment (materials) made by themselves, and 17% of the respondents possessed fabricated (smokers, gloves and other types of protective clothing). However, the respondents expressed their opinion that, the qualities of the materials made locally are very poor and result in reduced honey yield and quality.

Belie (2009) reported that top bar and moveable frame type hives, generally demand more beekeeping equipment accessories than traditional hives. Top bar hive beekeeping practices require improved beekeeping equipment like protective cloth, smoker and chisel, and moveable frame bee hive beekeeping requires additionally, casting mold, honey extractor and queen excluder. In the study area, the majority of the beekeepers lacked protective cloth, smoker, casting mold and honey extractors, without which improved beekeeping practices cannot be successful.

The above findings indicate that traditional beekeeping equipment are readily available to the bee keepers. They are mostly made by beekeepers from locally available materials and are characterized by low yield and quality honey. The availability /supply of modern bee hives is limited. It is also clear from the reports that coordinated supply of modern bee equipment is lacking. Further, information is limited on how standard (quality) of the beekeeping equipment distributed to the beekeeping is controlled.

Therefore, the limited availability of modern beekeeping equipment on one hand and readily available of traditional beekeeping equipment on the other hand means, the majority of beekeepers are using traditional beekeeping equipment. This by implication leads to reduced quality and supply honey to the honey export.

#### **2.3.8.1.3 Availability of Bee Forage**

In Ethiopia, an estimate of more than 7000 species of flowering plants are found, of which most of them are honey bee plants. The country's forests and woodlands contain diverse plant species

that provide surplus nectar and pollen to foraging bees (W/Giorgis, et al., 2015; Gebretsadik and Negash, 2016; Yadeta, 2016 and Ababor and Tekele, 2018).

According to different studies (Shenkute et al., 2012; Beyene, 2013; Sahle, et al., 2018 and Ababor and Tekle, 2018) conducted in different parts of the country, honey bees depend mainly on naturally available forages for their source of feed. Honey bees collect nectar and pollen for their own consumption and store honey for the dearth period.

A study conducted by Shiferaw and Gebremedhin (2016) in Tigray, Amhara, Oromia and SNNP regions on technical efficiency of small-scale honey producers in Ethiopia: a stochastic frontier analysis, reported that natural bee forage was the primary source of food supply for bees in the study areas. The results showed that the amount of honey production was directly correlated with the availability of bee forage.

Although honey bees store honey for their own consumption during the period of feed scarcity, beekeepers exploit the stored honey leading the honey bees to starve to death. Some of the honey bees abscond their bee hives, which leads to reduction of their population and subsequent reduction in honey production (Beyene, 2009 and Gebru, 2015). In addition, seasonality of availability of honey bee forages, drought and erratic rainfall, which affect the flowering of plants, and deforestation activities lead to reduced plant diversity and forage. This then lead to honey bees feed scarcity (Shenkute et al., 2012; Belay, 2013 and Gebru, 2015).

Different studies conducted in different parts of the country have reported the scarcity of forage that honey bees face and the absence or limited practices of beekeepers to provide honey bees with supplementary feed during honey bee forage scarcity (Dubale, 2015; Gebrehiwot, 2015; Ababor and Tekle, 2018 and Sahle et al., 2018). The practices of providing supplementary feed to honey bees in times of honey bee forage scarcity have been reported by Belie (2009), Gebru (2015) and Ababor and Tekle (2018). Belie (2009) reported that of the sample respondents, 58.3% explained that they provide supplementary feed to honey bees. The types of supplementary feed provided to the honey bees during dearth period include beso, shiro, sugar syrup, honey and water mixtures and peeper. Gebru (2015) has also reported that of the sample respondents 89.1% practiced provision of supplementary feed to honey bees. The types of supplementary feed used include, Seseg (*Ocimum basilicum*), Hamliadri (*Brassica* spp.), suf (*Helianthus annus* L.), Keyh-Bahrzaf (*Eucalyptus camaldulensis*.), Gesho (*Rhamnus prinoides* L.). In the study area, majority

(95.5%) of the beekeepers owned frame bee hives and only 4.5% of the beekeepers owned traditional bee hives, and this might have contributed to the high percentage of the respondents practicing provision of supplementary feed.

Cultivation of improved honey bee forage, to minimize the shortage of honey bee forage during times of feed scarcity is not commonly practiced in Ethiopia (Belie, 2009). However, as reported by Gebru (2015) in her study area, there have been efforts to promote rehabilitation of graded lands and plantation of stock exclusion areas and close to homestead areas, which also included flowering plants suitable for honey bee foraging.

According to the above presented results of studies, honey bee forage scarcity is prevalent in different parts of the country, and the practice of provision of supplementary feed to honey bees is either non-existence or limited. Although, the promotion of planting honey bee forage during plantation programs is on the increase, honey bee forage scarcity has still been identified by beekeepers as major beekeeping constraint. This indicates that adequate plantation of bee forage plants has not been practiced to ensure access of honey bees to ample bee forage during time of bee forage scarcity. From the above reported results the challenges to honey export prevailing at the level of in the input supply function are the absence or inadequate supply of the important inputs (bee colony, beekeeping and honey forage) required for the production of honey. The implication is that because of the absence or inadequate of required inputs, yield and quality and yield of honey are comprised. This in turn means low supply and quality of honey to the honey export. The following section covers the honey production function.

#### **2.3.8.2 At Honey Production Function**

In this section constraints to increased honey yield and quality, and hence the honey export, prevailing at the production function will be looked into. There is generally absence or inadequate beekeeping input supply in the country for use by beekeepers. Further, information on how the production of beekeeping inputs is managed and how the distribution of inputs is responsibly coordinated is scarce. In the absence of organized production and distribution of inputs, timely provision of adequate and standard inputs are often compromised. This section discusses the extent of use of available inputs, the beekeeping practices employed and their associated yield and quality of honey. Their implications on the honey export are also highlighted.

#### **2.3.8.2.1 Use of Traditional Bee Hives**

Ethiopian honey production system is dominated by traditional beekeeping, which is characterized by low honey production and quality (Legesse, 2014; Guyo and Legesse, 2015; Ababor and Tekle, 2018 and Sahle et al., 2018). Traditional beekeeping uses traditional bee hives, which yield lower honey volume and quality compared with transitional and modern-frame bee hives. Use of traditional bee hives goes hand in hand with traditional beekeeping equipment and accessories, compounding the low yield and quality of honey from traditional bee hives.

According to the CSA data of 2016 and 2017 the percent shares of traditional bee hives in use out of all types of bee hives used were 96.46% and 95.37 % respectively. During the same period the percent shares of transitional bee hives in use out of all types of bee hives used were 1.2% and 1.31 % respectively. The figures for modern/frame bee hives for the same period were 2.34% and 3.33 % respectively.

In 2011, six years back from 2017, the percent share of traditional bee hives in use of all types of bee hives used was 96.38% (CSA, 2011), which indicates how persistent has been the dominance of traditional bee hives in the Ethiopian honey production system. The figures for transitional and modern/frame bee hives for the same period were 0.81% and 2.81% respectively.

Different authors (Belie, 2009; Shenkute et al., 2012; Guyo and Solomon, 2015; Yadeta, 2016 and Ababor and Tekle, 2018) have also reported the dominance of the use of traditional bee hives in different parts of Ethiopia, and their lower yield and quality of honey, when compared with the transitional and frame hives. According to Yadeta (2016) the national average annual honey yields per hives from traditional, transitional and frame bee hives are 5-8, 20, 30kg respectively.

Belie (2009) based on findings of a study conducted in Burie District of Amhara Region, Ethiopia on honey production and marketing systems and constraints and opportunities, reported that the annual average honey yield was in kg 8.94, 10.66 and 15.56 from traditional, transitional and frame bee hives respectively. Shenkute et al. (2012), based on their study carried-out in Kaffa, Sheka, Benj zone in Southwest parts of Ethiopia, have also reported lower yield of honey from traditional bee hives. In their study area the average annual honey yields from traditional, transitional and frame bee hives were in kg: 15, 18 and 35 respectively. Similar lower average annual yields of honey from traditional bee hives were reported from studies conducted in Kilte Awlalo District, Eastern Tigray, Ethiopia (Gebru, 2015) and in Bale zone, Oromia Region

(Dubale, 2015). In addition a study conducted in four regions of Ethiopia, Tigray, Amhara, Oromia and SNNP (Shiferaw and Gebremedhin, 2016), revealed that traditional beekeeping practices dominate the beekeeping sub-sector in Ethiopia, and average yields per bee hives from the three types of bee hives in use were in kg 5.7, 13.77 and 16.01 from traditional, transitional and frame bee hives respectively.

According to different studies (Belie, 2009; Shenkute et al., 2012 and Gebru, 2015), traditional bee hives are constructed by beekeepers from different locally available plant species. Although traditional bee hives can easily be constructed from locally available materials, and are better available and affordable compared with modern bee hives, there are disadvantages associated with traditional bee hives as documented by Gallmann and Thomas (2012) as cited by Gebru (2015). According to the author the disadvantages of using traditional bee hives include the following, (i) there is no possibility to inspect comb for brood diseases (ii) the work must be performed in complete darkness at high chance that the colony is killed during harvesting (iii) it is very difficult to judge the maturity / ripeness of honey before harvesting (iv) brood and honey combs are harvested together because separation of the two is laborious and difficult. The reported drawbacks of traditional bee hives, among others, attribute to the low honey yields and quality of honey from traditional hives, which in turn negatively affect the honey export.

The high number of traditional bee hive in use in the country, their associated low yield and quality of honey and their reported drawbacks result in low yield and quality of honey as a nation. If modern frame bee hives were used, higher yield and quality were possible to be gained. The challenge in this regard to the Ethiopian honey export as a nation is the use of traditional bee hives leading to low supply and quality of honey for export.

#### **2.3.8.2.2 High Cost and Limited Availability of Improved Beekeeping Equipment**

The benefits of using improved beekeeping equipment in terms of improved honey yield and quality, have been well documented (Gebru 2015; Yadeta, 2016; Ababor and Tekle, 2018 and Sahle et al., 2018). To realize the claimed benefits, government and non-government organizations have been engaged in the promotion of improved beekeeping practices including the use of improved beekeeping equipment (Gebru, 2015; Legesse, 2016 and W/Giorgis et al., 2015).

However, the level of use of modern hives and accessory equipment has remained low and the percent shares of modern-frame bee hives were only 2.34% in 2016 and 3.33% in 2017 out of all

type of bee hives (CSA, 2016 and CSA, 2017). Different authors (Belie, 2009; Beyene, 2013; Gebru, 2015; Tekle and Weldeyohanis, 2016 and Ababor and Tekle, 2018) have reported that the high cost and limited availability of the different improved beekeeping equipment and accessories, have hindered the wide use of the equipment.

Beyene (2013) reported that in a study conducted in Wonchi District, South West Shoa Zone of Ethiopia, costs of some of the beekeeping equipment such as modern bee hives, wax printers and honey extractors were very high, and beekeeping farmers were not able to buy and use these equipment. During the study period, the unit costs of the different modern equipment amounted to 900-1000 ETB for modern bee hive, 4000-5000 ETB for honey extractor and from 5000-6000 ETB for wax printer. These cost figures were also reported by Sahle et al. (2018) in their review paper.

IVACA (2009) cited by Guyo and Legesse (2015), also reported that an introduction of improved bee hives and working tools to rural community are beyond the capacity of farmers and are not easily available even for those who could afford. Similarly, Shiferaw and Gebremedhin (2016), who conducted a study in the regions of Tigray, Amhara, Oromia and SNNP, have reported that improved bee hives were expensive in the study areas and had limited the farmers' ownership of modern bee hives. Tekle and Weldeyohanis (2016) in their review paper, have also documented that low level of use of modern-frame hives by beekeeping farmers was due to the high purchase prices of frame bee hives. According to the authors, moving from traditional bee hives to transitional and then to modern bee hives required an initial investment capital that most beekeepers could not afford. So they continued to produce honey using traditional methods. Further, frame bee hives, unlike traditional bee hives required different accessory equipment, which is expensive.

The above results indicate that the level of using improved beekeeping equipment by beekeepers is low due to their high cost and limited availability. Hence, the beekeepers in the country are heavily dependent on the use of traditional bee hives and associated equipment, resulting in low yield and quality honey at country level, leading to a supply and quality challenge to the Ethiopian honey export.

#### **2.3.8.2.3 Scarcity of Honey Bee Forage**

In order to survive, prosper and be productive honey bee colonies, must have a supply of both nectar and pollen in adequate quantities. Not all plant species are equally good for beekeeping. Some supply both nectar and pollen abundantly when in bloom and are often called honey plants, as they are best suited for honey production.

Although, Ethiopia is endowed with varied ecological and climatic conditions and its forests and woodlands contain diverse plant species that provide surplus nectar and pollen to foraging bees, different studies conducted in different parts of the country (Belie, 2009; Shenkute et al., 2012; Beyene, 2013 and Gebrehiwot, 2015) have documented that shortage of honey bee forage is among the major beekeeping constraints in their respective study area. The authors stated that honey bees faced shortage of forage to feed on, during the off season, drought and also associated with deforestation. Gebretsadik and Negash (2016); Ababor and Tekle (2018) and Sahle et al. (2018) have also reported similar results. Actually, honey bees collect nectar and pollen for their own consumption and store honey for their own use during the period of feed scarcity. But beekeepers exploit the stored honey leading the honey bees to starvation at times of feed scarcity (Beyene, 2013 and Gebru, 2015).

According to a review paper by Sahle et al. (2018), detrimental environmental factors such as drought, erratic rainfall, which affect flowering of plant and deforestation activities lead to reduced plant diversity and forage for bees to feed on and then lead bees to starve to death and some to abscond their bee hives. The implication is reduced bee population and honey production.

Honey bee forage cultivation and provision of supplementary feed to honey bee, have not been common practice to overcome honey bee forage scarcity, for both honey bees' survival and sustenance of honey production (Belie, 2009 and Shenkute et al., 2012). Shiferaw and Gebremedhin (2016), who carried out a study in four regions of Ethiopia, in Tigray, Amhara, Oromia and SNNP, reported that the use of purchased inputs such as bee forage and other supplementary feed by respondent honey producers was very limited. This indicated that natural bee forage was the primary source of feed supply for bees in the study areas.

Belie (2009) and Gebru (2015) have reported that in their study area there have been efforts to provide supplementary feed and/ or cultivate honey bee forage around homesteads and in soil and

water conservation closure areas to overcome feed scarcity of honey bee forage. According to a study conducted by Belie (2009) in Burie district of Amhara Region, of the sample respondent 58.3% explained that they provide supplementary feeds, which included beso, shiro, sugar syrup, honey and water mixtures.

The author stated that in the study area there was no promotion of cultivating improved bee forage, except the introduction of some species such as *Desmantis* spp by IPMS project. Beekeepers in the study area have been encouraged by the extension service to grow indigenous bee forage, and of the sample respondents 82.5% grew different local bee forages like Tenadam, Girawa, Gesho, Sunflower, Sesbania, Yekelem Abat, Wolkef, Wanza, Eucalyptus, and Nuge. Gebru (2015) has also reported similar results.

The findings of the different authors noted above indicate that honey feed scarcity is among the major constraints in beekeeping. The practice of providing supplementary feed to honey bees in time of forage scarcity is low, although there have been limited efforts in different parts of the country as reported by the different authors. By implication shortage of honey bee forage is a challenge to produce adequate honey which the honey export demands. Honey export demands timely and consistent supply of bulk honey.

#### **2.3.8.2.4 Chemical Application**

Most of the time, the exposure of honey bees to chemicals is through ingesting of residues from the pollen and nectar of plants and water. When insecticides, herbicides and fungicides are applied to crops, they reach the bees through pollen, nectar and through the air, water or soil (Oliver, 2012, cited by Bett, 2017). The author stated that this occurs when bees are on the flowers at the time of application of the insecticide and the bees die instantly. Some other types of pesticides allow the bees to return home and then they die. There are certain pesticides that do not have any effect on the adult honey bees but cause damage to young and immature bees.

Historically, insecticide sprays were responsible for a number of fatal incidents with bees and also continuous contamination of honey (when the poisoned bees return to their hives). This leads to production of low quality honey (Oliver, 2012, cited by Bett, 2017).

According to different studies conducted in different parts of Ethiopia (Belie, 2009; Beyene, 2013; Gebru, 2015 and Mohammed, 2016) and review papers (Guyo and Legesse, 2015; Ababor and

Tekle, 2018 and Sahle et al., 2018) chemical poisoning by pesticide and herbicides application is one of the major constraints in beekeeping. Belie (2009) reported that out of the respondent beekeepers 97.5% explained that application of agro-chemicals in their area caused honey bee poisoning. In a study carried out by Beyene (2013) in Wonchi district, South West Shoa Zone, where farmers produce mainly wheat, barley, teff, chickpea and different horticultural crops, and use chemical spray such as pesticide and herbicide, the interviewed farmers responded that a number of bee colonies either died or absconded from their hives due to extensive use of agro-chemical in the study areas. The author stated that the chemical spray used by farmers, was also reported to destroy bee forages like herbs and shrubs, which are used as source of bee forage.

Gebbru (2015), based on a study in Kilde Awlalo District, Eastern Tigray, Ethiopia, reported that nearly 43.6% of the respondent beekeepers were victims of poisonous plants and the majority of the bee poisoning occurred due to the use of agro-chemicals mainly insecticides and herbicides. However, according to the beekeepers, restriction has been made to indiscriminate application of agrochemicals to avoid the poisoning of honey bees and since then there had been an improvement on the effect of chemicals on bee colonies from time to time. Mohammed (2016), who did a study in Semien Shewa Zone of Amhara Ethiopia, namely Basona Worena Woreda, has also reported that pesticide and herbicide application was one of the major beekeeping constraints identified by the sample respondents in the study area.

As reported by the different authors, the use of agro-chemicals is a major problem in different parts of the country resulting in the death of bees and reduction of bee population as well as reduced honey production and contaminated honey (low quality honey). The implication is that the Ethiopian honey export, would be constrained, both by shortage supply of honey supply and low quality of honey.

#### **2.3.8.2.5 Honey Pests and Predators**

Ethiopia, as one of the sub-tropical countries, has ecological and climatic conditions, which are favorable to bees and that are also favorable to different kinds of honey bee pest and predators that interact with the life of honey bees (W/Giorgis et al., 2015). Pests and predators cause devastating damage to honey bee colonies within a short period of time and even overnight.

Desalegn (2015) in his review paper, reported the wide spread of honey bee diseases, pests and predators in Ethiopia. According to the review, ants (different types), wax moths (greater and

lesser wax moths), mice, birds (different types), honey badger, wasps, death's head hawk moths, bee lice (*Braula coeca*), beetles (different types), lizards, toads/frogs, praying mantis, spiders, pseudo scorpions (chelifera species) were among the major honey bee pests registered locally. Different studies conducted in different parts of the country (Belie, 2009; Shenkute et al., 2012; Gebru, 2015 and Mohammed (2016), have also documented the major pests and predators identified by the respondent bee keepers in their respective study areas, which cause damage on honey bee colonies there by negatively impacting on yield and quality of honey.

Belie (2009) who conducted a study in Burie District of Amhara Region reported that in the study area the major pests and predators identified by the respondent beekeepers were ants, wax moths (*Galleria mellonella*), bee lice (*Braula coeca*), beetles (*Aethina tumida*), spiders, wasps, prey mantis, lizard, snake, birds and honey badger (*Mellivora capensis*).

Shenkute et al. (2012) reported that the major honey bee enemies identified in the study areas were ants, honey badgers, birds and small hive beetles in their degrees of damages and occurrences. According to the results of the study, the honey bee enemies cause great losses of 40.7% of total honey production per annum. The authors stated that honey badger commonly damaged honey bee colonies in the months of November to April when there is brood and honey in the bee hive. Birds attack the honey bees mainly during the rainy seasons when there is no grain to feed. According to the authors, although beekeepers practice different prevention methods, the practices are not totally efficient, which urge for developing suitable prevention methods.

Gebru (2015) based on a study conducted in Kilde Awlalo District, Eastern Tigray, Ethiopia reported that the sample respondents identified, honey badger, ants, wax moths, spiders, birds, lizard and snake as the major bee pests and predators in their order of importance. Gebretsadik and Negash (2016) conducted a study in selected districts of Gedeo zones of Southern Nation Nationalities and People's Regional State of Wonago, Kochere and Dilla Zuria/chichu/districts. The authors stated that the honey bee enemies identified as major constraints in the study areas were ants, honey badgers, birds and small hive beetles which may account for 20% of the total honey production loss annually.

According to the information reported by the different authors, pests and predators are major enemies of honey bees in most parts of the country causing both honey yield and quality reduction in the country and by implication resulting in short supply and low quality honey to honey export.

#### **2.3.8.2.6 Honey Harvesting**

Information on the influence of honey harvesting time and method on yield and quality of honey is scarce. According to Shenkute et al. (2012), who conducted their study in Kaffa, Sheka and Bench-Maji zones of Ethiopia, where traditional honey production system and forest beekeeping is dominantly practiced in particular, the respondent beekeepers have indigenous knowledge on when the honey ripens and is ready for harvest. In Bench-Maji Zone, they check the ripeness of honey by taking out honey combs from the hive hung on trees. During harvesting all respondents mainly use ‘Teff’ straw smoke to subdue and push away the bees. Some also use smoke of *Vernonia amygdalina* leaves and animal dung for the same purpose. The authors also reported that in Kaffa and Sheka zones, while harvesting honey from hives hung in forest trees, the respondent beekeepers pulled the log hives to the ground and split the logs to let colony leave away and harvest all honey combs, all brood and larvae. They remove colony on the ground and keep hives in house until next season. The authors stated that such practices, which are so rudimentary and long standing practice, obviously compromise both quantity and quality of honey.

Dubale (2015), who conducted a study in Bale Zone of Oromia Region on beekeeping practices, on factors affecting production, quality of honey and beeswax, reported that in the study area respondents explained that they use smoking materials during harvesting honey to push away the bees. The major smoking materials used are Bark of *Juniperus procera*, old cloth and Hasufe, which ranked first, second and third respectively. When the respondents were asked whether the smoking materials they use have an effect on the quality of honey, 52.2% replied there was no effect, but 47.2% responded that there was an effect on the quality of honey when the smoking materials were not used appropriately. Of the respondents who replied the smoking materials had a negative effect on honey quality, 35.6% said the negative effect was on color, 43.3 % said on odor, 38.3% said on taste and 24.4% respondents said the smoking poisoned the honey.

According to a study conducted by Songo (2015) in Tanzania, during discussions held with sampled respondents, the outcome of the study revealed that some beekeepers did harvest unripe honey due to lack of enough skills to assess whether or not the honey was ripe and ready for harvest. The author also stated that harvesting techniques depended on the type of hives owned by the honey produces. Producers with traditional hives harvested by cutting across and removing the central comb, which sometimes leads to harvesting raw honey or honey mixed with larvae. In the

study area most of the beekeepers interviewed reported that they remove all the honeycombs and brood combs from the bee hives and mix the pollen, brood and honey for sale or for own consumption. All the respondents (100%) remove all seal honey and brood parts from the hives. The author stated that harvesting unripe honey and removing all the honeycombs and brood combs from the hives and mixing the pollen, brood and honey, all compromised the honey yield and quality.

The effect of the method of harvesting on the quality of honey, using the quality attributes of color, total solids, viscosity, pH, diastase activity, acidity, sugars, ash, nitrogen, total antioxidants, hydroxymethylfurfural (HMF) content and microbial properties, was studied by Babarinde, Babarinde, Adegbola and Ajayeoba (2011) in Nigeria. The study compared two honey harvesting methods, which are practiced in the study area. The traditional method, which involves the use of naked flames to get rid of or even destroy honey bees and the modern method, which involves the use of smoke to suppress bees' aggressiveness. The authors reported that the honey samples harvested using modern harvesting method had better quality in terms of ash content, total antioxidants, diastase activity, color, sugars and microbiological attributes. They also explained that the lower quality of the honey harvested using the traditional method could be attributed to the adverse effect of the burning during traditional harvesting. Based on the results, the authors concluded that modern method of harvesting honey produces better quality of honey and should be encouraged.

Kugonza and Nabakabya (2008), who conducted a study on honey quality affected by handling, processing and marketing channels in Uganda", reported that the quality of honey was mainly compromised by harvesting immature honey, bad extraction methods and contamination by extraneous materials. When honey is harvested prematurely, fermentation occurs frequently, and this negatively affects the quality of honey, due to higher water content.

The above studies indicate that honey quality is compromised when honey is harvested prematurely and when traditional harvesting methods are used. Although some of the studies are conducted in other parts of Africa, the results are likely to be relevant to Ethiopia. This is because similar to that in Ethiopia traditional beekeeping is the dominant beekeeping practice in those countries which goes hand in hand with traditional beekeeping practices. The findings of the above noted studies highlight how the traditional harvesting method and the premature harvesting of

honey negatively affect the quality of honey, which in turn negatively affect the Ethiopian honey export. This is further indication that every beekeeping practice employed at different levels of the honey value chain functions can influence the honey export of the country.

### **2.3.8.3 Honey Processing Function at Farm Level**

In Ethiopia, the most commonly practiced honey processing at the farm level after honey harvest is, semi-processing using locally available materials, which could be attributed mainly to the dominantly used traditional bee hives in the country (Belie, 2009; Shenkute et al., 2012; Mohammed, 2016 and Jagiso et al., 2018).

According to Belie (2009), of the sample respondents in his study area, 73.3% strained honey before marketing whereas 26.7% of them had no practice of straining honey. From those who practiced straining honey, 50.6% simply crush and squeeze the honey comb and remove the floating impurities by hands, 32.6% used honey extractor, and 7.9% used cloth, 5.6% sieve materials and 3.4% simple decantation. The sample respondents who practiced honey straining, believed that straining of honey improved honey quality and would be sold at high price (78.7%), would satisfy the consumer (3.4%) would be comfortable while eating (6%) and helped to produce high amount of beeswax (12.4%). The reasons mentioned by the respondents for not straining honey was lack of straining materials (21.2%), lack of knowledge (36.4%), thinking that the amount of honey would be reduced when strained (12.1%) and lack of material and knowledge (21.2%).

In a study conducted by Shenkute et al. (2012), sample respondents in the study areas, where about 50% of the household income was reported to come from the sell of honey, explained that they did not process honey before sale, they just sold it crude. Regarding the basic processing practices in the locality, the respondents responded that the practice used is to chunk the comb honey into a liquid mixture using *C. anisata* and /or *C. macrostachyus* sticks, and compress the sacks with their foot. Some use direct heating and sunlight to melt their honey. The authors stated that such practices compromise the quality and quantity of honey, because of the use of unhygienic materials and overheating. Mohammed (2016), who carried out a study on value chain analysis of honey in Semien Shewa Zone of Amhara Ethiopia, namely in Basona Worena reported that in the study area, majority of the sample respondents (42.3%) replied that they used decantation to strain (semi-process) honey in the farm level, 22.3 % respondents used hand and 20 % used cloth and the rest

of 7.7%, 6.4% and 1.4% used honey presser, sieve and honey extractor for straining crude honey respectively.

Jagiso et al. (2018), based on a study of honey value chain analysis and producers financing in Damot Gale District, Southern Ethiopia, reported that the sample respondents practiced honey filtering activities. The authors stated that the establishment of cooperatives has initiated the honey filtration activity in the study area and has enabled the producers to get higher value for the honey they produce. Out of the total sampled households, 38.3% filtered their product both manually and by machine before they supplied their product to the market. Of the respondents 23.7%, 73.7% and 2.6% filtered their product manually, by machine and by both, respectively.

According to a study conducted in Tanzania by Songo (2015), in the study area processing of honey at household level is mainly done through local methods (sieving using cloth, hand squeezing and fish nets), mainly due to lack of skills and equipment for processing the honey. The findings of the study revealed that sieving was done by 72.11% of the respondents, followed by hand squeezing (6.73%) and 1.92% used fish nets/clothes to purify the honey harvested. The remaining 19.23% of the beekeepers used other forms of processing. The author did not mention what the other forms of processing were. The author explained that in view of the traditional honey processing activities practiced by beekeepers, there is a possibility at the farm level of the processing stage, that the quality of honey would likely be compromised through inclusion of foreign substances and impurities, unhygienic handling techniques and malicious practices. According to the author, the claim was made by interviewed traders, who reported to have been receiving poor quality honey from beekeepers.

According to the above findings of the different authors, the commonly practiced honey processing activity at the farm level is semi-processing mostly using locally available materials, which comprise yield and quality of honey, mainly due to lack of skill/knowledge and lack of appropriate equipment for honey processing at the farm level. The implication is that there would be reduced yield and quality of honey supply to the honey export.

#### **2.3.8.4 Honey Storage Facilities**

Beekeepers in the rural areas who comprise the vast majority of honey producers in Ethiopia, mostly store/keep their harvested honey in locally available containers (Belie, 2009; Shenkute et al., 2012; Gebru, 2015; Alemu, Seifu and Bezabih, 2015 and Areda, 2015).

Belie (2009), reported that in a study area conducted in Burie District in Amhara Region, the majority of the sample respondents did not basically store honey due to firstly, high cash income need of the households and secondly because of lack of storage facilities. As explained by the respondents, plastic bucket (46.7%), plastic sack (40.0%), gourd (10.8%) and animal skin (2.5%) were used to store honey for short periods. Regarding the containers, the author stated that they were not technically appropriate storage facilities as they result in serious quality deterioration. But the author did not mention why and how.

According to Shenkute et al. (2012), in the study areas, in three zones namely Kaffa, Sheka and Bench-Maji zones of Ethiopia, the honey containers mostly used by the sample respondents included plastic sack, tin/barrel, clay/log pot, animal skin, gourd pot and plastic containers. The respondents explained that these containers helped to store honey for a long time and are air tightened. The authors stated that in the study area most of respondents knew that honey is hygroscopic and 91% of them try to put the honey separately from other products in a safe place until it is sold or consumed.

Alemu et al. (2015) based on their study conducted in Sekota District, Northern Ethiopia, on post-harvest handling, opportunities and constraints to honey production, reported that the most important honey storage materials used in the study area were gourd, earthen pot, plastics and animal skins. Of the sample respondents 67.8% used plastic containers, 36.6% used gourd, 11% used earthen pot and 8.8% used animal skin. The authors stated that the respondents have reported drawbacks of each container used to store honey in the study area. The sample respondents said gourd allowed entry of red ants via the mouth of the container into the honey and it is easily broken during transportation. Gourd also allows loss of moisture from honey during dry period. Regarding earthen pots, the respondents explained that they are heavy to hold and transport, and red ants can enter into the pots. The entry of red ants into the containers was due to the incompatibility of the lid with the main body of the container. In addition, unless the container is tight, it will absorb moisture from the environment and the honey starts fermenting during humid conditions, which compromise the quality of honey. The problems observed when plastic containers are used are that they are damaged by rats and become hot when the environmental temperature rises. Animal skins change the original taste of the honey and are damaged by rats. In agreement with the views of the respondents Adgaba (1991) as cited by Alemu et al. (2015) has

reported that all local containers used in Ethiopia are not appropriate to store consumable honey for a longer time.

In a study conducted in Guji District, Ethiopia by Areda (2015), the results of the study revealed that during honey harvesting, beekeepers cut and pull the fixed combs one by one and then pollen, brood and honey combs are removed and kept in a container and covered with a lid, which affects the quality of honey with length of storage time. Plastic bucket and plastic sacks were highly used in the study area. However, in some cases they used nickels to store honey for both short and long period and, which results in rusting, deterioration of the honey, indicating that such containers are technically not appropriate for honey storage.

According to Gebru (2015) who, among others studied effects of storage containers and durations on Physico-Chemical properties of honey in Kilte Awlalelo district, Eastern Tigray, Ethiopia, reported that when 20 kg of honey harvested from frame bee hive of a single farmer and stored in plastic pot, tin-can and glass for 0, 3 and 6 months and analyzed for moisture, ash, pH, acidity and HMF, the results of the physicochemical analysis indicated that all the samples (100%) were within the acceptable range of the world and Ethiopian honey quality standards with moisture (17.25%), ash (0.14%), pH (3.86), acidity (17.57 meq /kg) and HMF (1.71 mg/kg) contents. Based on the results of the physio-chemical analysis, the author reported that the storage duration and the containers used to store the honey did not affect the quality of honey, and that the honey quality of the study district to be of high quality and safe for local consumption and for export. According to the author, of the sample respondents 54.5% used plastic pots, 30.1% used tin-can, 9.6% used glass and 5.8% used clay pots (5.8%) to store honey in the study area.

However, the study failed to describe the condition of the containers that, whether the study used new containers and the environment under which the containers were kept, which could have an impact on the quality of honey. Further, because the containers were not randomly selected from plastic containers used by beekeepers. As such the study is unlikely to represent the way other beekeepers in the study area store their honey and their storing conditions, and is hard to make general statement as “the honey quality analysis indicated that the honey from the study district to be of high quality and safe for local consumption and for export.”

The above findings reported by the different authors show that locally available containers are dominantly used by beekeepers to store honey in different parts of the county, which can

compromise the quality of honey. As a nation, this is a challenge to enter into and be competitive in the honey export market, which is highly competitive.

#### **2.3.8.5 At Domestic Honey Marketing Function**

The domestic honey marketing has been widely studied in different parts of the country and honey marketing constraints have been identified (Abebe, 2009; Shenkute et al., 2012; Bayenes, 2013; Yadeta, 2016 and Ababor and Tekle, 2018).

According to a review paper on honey production and marketing in Ethiopia by Yadeta (2015), the whole domestic honey market of Ethiopia lacks proper structure and legality. It is of lengthy chain of actors that widens gap for the access of producers to bigger and better paying markets. According to the author the market faces challenges like smuggling that pushes the legal actors out of the market. In many cases, adulteration of honey has been a frustrating factor for both the producers and legal buyers and sellers as traceability and accountability of sellers is hardly possible.

Abebe (2009) who conducted a study on market chain analysis of honey production in Atsbi Wemberta District, Eastern Zone of Tigray National Regional State, reported that the basic problems in honey marketing, as explained by respondent traders during the survey were, quality problem (adulteration), competition with unlicensed traders, shortage of finance, less demand and unfair tax fee. Quality problem was the priority problem identified by the honey traders. The traders explained that among the problems causing poor quality honey was that they thought unlicensed traders/honey collectors might be mixing honey with sugar.

According to the study by Shenkute, et.al., 2012, on honey production in the case of Kaffa, Sheka and Bench-Maji zones of Ethiopia, where honey is used as a source of cash income and as food in home consumption, about 97% of the respondents reported that they sell their produce retaining some of it for home consumption. Their major buyers are 'Tej' brewers and middle merchants in the nearby markets. For 77% of the sample respondents, market price of honey is promising. However, more than 97% of respondents mentioned that the price of honey is subjected to fluctuation with seasons. According to the respondents, honey price decreases during main harvesting season in April and increases in other months of the year.

Baynes (2013), studied the honey market constraints and opportunities in the case of Lasta woreda, North Wollo Zone, Amhara Regional State in Ethiopia, and has identified the honey market constraints to be lack of well-organized market channels, lack of rural market infrastructure, lack of market information flow, very limited or absence of credit and extension services, actors lack of skill in honey processing handling and marketing and lack of strong business oriented producers cooperative.

According to a review paper by Tekle and Weldeyohanis (2016) on challenges and opportunities of honey marketing in Ethiopia, the domestic honey market starts at the smallholder beekeepers level, who mainly sell crude honey to collectors in the nearest town/village markets. The collectors mainly pass the honey to the whole sellers in big cities and towns, though a significant amount of honey they collect also goes to local *tej* brewers, processors and other consumers. The whole sellers are largely situated in cities and big towns and they distribute the honey they get from collectors to retailers, *tej* brewers, processors and consumers. In some areas, beekeepers form honey producing and marketing cooperatives to cope with the market challenges they face. The cooperatives collect crude honey from their members and sell the semi processed honey to processing companies and other intermediaries who buy in bulk and retail. However, in many cases the cooperatives lack proper collection, storage and transportation facilities and hence compromise the quality of the honey.

Yadeta (2015) and Tekle and Weldeyohanis (2016) reported that the domestic honey market as a whole lacks proper structure and legality. It has a long chain of actors, which widens gap for the access of producers to bigger and better paying markets. So, the beekeepers complain the business as not rewarding and even lacking the market for their product, while the consumers see the ever increasing price of honey as unfair. Moreover, the market faces challenges like smuggling that pushes the legal actors out of the market. In many cases, adulteration of honey has been a frustrating factor for both the producers and legal buyers and sellers as the traceability and accountability is hardly possible.

As reported by the different authors, the domestic markets in different parts of the country have constraints, which influence negatively the supply and quality of honey available in markets. This causes honey price distortion leading to high domestic honey prices. Yadeta (2015) and Tekle and Weldeyohanis (2016) in their review paper have well documented that the honey price in the

domestic market is mostly advanced than the international honey price. The implication is that there would be short supply of quality honey, at a lower price than international honey price for honey exports. This negatively affects the export of Ethiopian honey.

#### **2.3.8.6 Extension Service**

According to different studies (Shenkute et al., 2012; MoA and ILRI, 2013; Beyene, 2013; Yimer, 2014 and Dubale, 2015) and a review paper by Guyo and Legesse (2015), poor extension service has been identified as one of the major constraints to beekeeping in different parts of the country.

Assessment of previous study reports revealed that there are inadequate extension services and training materials and guidelines for beekeepers, processors and traders, and there is lack of appropriate demonstration sites and extension packages (MoA and ILRI, 2013). Apiculture extension services are not well organized and they lack a strategic approach and coordination. Moreover, with limited staff, even more limited budget and poor facilities, it is difficult to make an impact.

In a study conducted by Belie (2009), the survey results indicated that of the sample respondents 63.3% received improved bee hives and 36.7% did not receive. Of the respondents, 62.5% were trained and 37.5 % were not trained. However, the majority of sample respondents reported that they cannot transfer the colony from local to frame hives, and even those who can transfer were unable to harvest honey from the frame hives. In the study area 55% box hives were empty. The author emphasized the importance of adequate and practical training and strong extension service both for beekeepers and development agents. The author also noted the need to establish and support regular training programs to develop experienced and skilled experts, development agents and farmers in beekeeping management and marketing.

Yimer (2014) based on his study results reported that, of the total respondent beekeepers only 19.2% received some training in bee management that is on how to harvest and handle honey and apiary site selection for two days on average. But 88.8 % did not. The author stated that according to the information from the District Office of Agriculture and Rural Development, the office had shortage of trained personnel in apiculture and financial and logistic problems to increase the scope of its beekeeping extension services. Absence of practical training for the farmers and experts has aggravated the problem. The author explained that in the study area, not only the farmers but also the agricultural development experts have very limited or no practical training on beekeeping to

practically advise the farmers. Lack of adequate knowledge and skills have also been identified as constraints to beekeeping by Belie (2009); Abebe (2009); Assefa (2009) and Guyo and Legesse (2015).

Similar results were reported by Kumsa and Dinka (2016), who studied the challenges and practices of honey production in Ambo District, West Shoa Zone, and Oromia Regional State of Ethiopia. The authors reported that lack of extension services was one of the major factors affecting beekeeping in the study area. When the sample respondents were asked if they got beekeeping extension service only 31% said yes and 69% said no. They were also asked if they received training on techniques of honey production and management, and only 28% said yes, while 72.3% said no. The authors stated that as the majority of sample respondents did not get any training on techniques of honey production and management, this has an adverse impact on the quantity and quality of honey harvested in the study area. Mohammed (2016) has also reported that the majority of the sample beekeepers in his study area did not get beekeeping training. Of 88 beekeeper respondents, 85 % needed training but did not get.

In contrast, Gebru (2015) reported that the sample respondents explained that the beekeeping practice is given due attention and hence receive better extension services. The author stated that in addition to the farmers' indigenous knowledge, the District Agricultural Bureau, NGOS and other governmental projects have distributed modern bee hives and have offered training to the beekeepers. The results of the study revealed that of the sample respondents, 75% of the beekeepers received beekeeping extension service and out of which 45% got training from the District DAS, and other non-governmental organizations. The trained farmers have the opinion that the training they received had an impact on increasing their understanding of beekeeping practices and has helped them maintain the quality of their honey and improve the management of the colonies. Besides, more farmers are encouraged to buy frame bee hives after training because of the increased understanding about the importance of framed hives

Although there may be some areas in different parts of the country where there is strong extension service (Gebru, 2015), the general status as reported by the different authors is that the beekeeping extension services are generally poor. Further, the lack or inadequate beekeeping knowledge and skill of development agents and the shortage of skilled and knowledgeable beekeeping experts are constraints of the sub-sector. By implication the beekeeping practices are being done mostly based

on the traditional knowhow of the beekeepers resulting in the widely reported low honey yield and quality in the country.

#### **2.3.8.7 Access to Credit Service**

According to different studies in different parts of Ethiopia, access of beekeepers to credit service is limited due to absence of earmarked credit facility to beekeeping (Yiemer, 2014 and Kumsa, 2016), inadequate availability the credit service (Belie, 2009 and Gebru, 2015), high interest rate (Belie, 2013 and Mohammed, 2016), down-payment required to get credit and restrictive procedures of financing institutions (Belie, 2009) and due to setting upper limit for credit, but inadequate (Gebru, 2015).

Belie (2009), based on the findings of his study conducted on honey production and marketing systems, constraints and opportunities in Burie District of Amhara Region, Ethiopia, reported that of the sample respondents 85.0% had access to credit services and 15% had no access. The main credit sources of the sample respondents were cooperatives (79.2%), Amhara credit and saving institution (17.8%), WARDO (2%) and NGO (1%). Of the respondents, 15% had no access, mainly due to high interest rate (30%), late delivery (19.2%), lack of cash for down payment (12.5%), restrictive procedure (=11.7%), lack of knowledge (10%) and inflexibility of procedures (9.2%) and lack of collateral (5%).

According to MoA and ILRI (2013) paper on apiculture value chain vision and strategy for Ethiopia, well-built hives, frames, foundation combs, centrifuges and other hive management equipment are generally expensive and not widely available. For beekeepers in the central and Northern parts of the country, it is becoming more difficult to procure bee colonies due to credit constraints. Lack of credit service prevents farmers from buying high yielding beekeeping equipment and undertaking modern colony management. Further, prices have gone up from 800 ETB to more than 1000 ETB for a bee colony over the last few years and are increasingly becoming unaffordable to smallholders.

In a study conducted by Gebru (2015) in Kilte Awlalelo District, Eastern Tigray, Ethiopia, the study results indicated that Dedebit Credit and Saving Institution was one of the micro-finance institutions operating in Tigray. With upper limit of 5000 Birr credit and 18% interest rate, the institution was the major credit provider and supports the beekeepers with credit to set-up or further develop their beekeeping activities. However, the author stated that according to the responses of

the beekeepers, the allowed upper limit of credit of 5000 birr was not sufficient for the beekeeping activities they intend to employ. The high interest rate (18%) and the group of people required for collateral were also identified by the sample respondents, as constraints to access credit. In addition to Dedit Micro Finance, non-governmental organizations like Wukiro St. Mary's College also provide credit in-kind to farmers in the form of frame bee hive, bee equipment and colonies.

Kumsa and Dinka (2016) who studied the challenges and practices of honey production in Ambo District, West Shoa Zone, and Oromia Regional State of Ethiopia, reported that the sample respondents replied that there was no credit service for beekeeping, which was confirmed by the local agricultural office. Similar results were reported by Yimer (2014) who did assessment of beekeeping practices and honey production in Mejhengir Zone of Godere District, Gambella People National Regional State of Ethiopia.

The above study reports reveal that beekeepers encounter availability and accessibility problem of credit services, either to modernize or/ and expand/sustain their improved beekeeping practices. Thus if the bee keepers are not able to sustain, strength, expand and modernize their beekeeping practices because of financial constraint, supply and quality of honey can be compromised, which in turn leads affects the Ethiopian honey export.

## **2.4 Conclusion**

The theoretical literature review has highlighted the concept of value chain and the core focus of value chain development approach. It informed the competitiveness that can be gained if an industry/sector properly follows the value chain development approach. The empirical literature review has well documented that Ethiopia is endowed with varied ecological and climatic conditions, favorable for honey bees, and that it is also home to some of the most diverse flora and fauna in Africa. The country's forests and woodlands contain diverse plant species that provide surplus nectar and pollen to foraging bees. The literature has also well covered the multifold benefits of beekeeping, the different honey production systems in the country, of which the traditional beekeeping is the persistently predominant practice. According to the literature, traditional beekeeping practice, which is dominantly practiced in the country is characterized by low yield and quality of honey. The literature has captured that of the three types of bee hives in use in Ethiopia, the high yield and quality honey comes from frame bee hives followed by that

from transitional and traditional bee hives. It pointed out that the large share of honey of the country comes from the traditional bee hives, and this trend has persisted for many years.

The literature has also reported that, despite the high honey production potential of Ethiopia, the actual honey production, when compared with its honey potential, is very insignificant. Similarly, the low honey export volume and value of the country are also reported. Further to this, the literature has well established the major beekeeping constraints encountered by beekeepers. However, most of the studies failed short of addressing beekeeping constraints along the honey value chain. Rather, the literature focused mostly on identifying honey production constraints in general. Also, the literature failed short of documenting the need to address constraints in a holistic approach rather than in a piece meal manner. In addition, the analysis of the literature showed that information on challenges to export Ethiopian honey is limited. The literature, apart from reporting export data sourced from ECC, FAO STA and Trade Map, and making some general statements, challenges of exporting Ethiopian honey are not well documented. The commonly reported challenge for honey export is high domestic honey price, but whether this challenge is the only challenge or not is not clear. Thus, there is gap of information on the challenges facing Ethiopian honey export across the honey value chain.

The different studies on honey value chain analysis, which identified major actors in the honey value chain mostly failed to include honey exporters (as appropriate) as major chain actors. Thus the literature failed short of capturing the challenges the honey exporters encountered in exporting Ethiopian honey, through direct interaction with the honey exporters.

Further to this, information on updated national trends of honey production, honey export volume and value is also scarce, which are necessary for timely and appropriate promotional policy measures and development interventions.

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## **CHAPTER THREE**

### **3.0. RESEARCH METHODOLOGY**

#### **3.1. Introduction**

This chapter covers the description of the study area, the research type used and the target population of the study. The sampling procedure and sample size, methods of data collection, data processing and analysis employed in the study are also covered.

#### **3.2 Description of the Study Area**

The study is a national level study conducted in Ethiopia. It is not region/area specific or honey source specific. Ethiopia is located in the North Eastern part of the African continent or what is known as the “Horn of Africa.” The country is bounded by Sudan on the west, Eritrea and Djibouti on the northeast, Somalia on the east and southeast, and Kenya on the south. Ethiopia lies between the Equator and the Tropic of Cancer, between the 30 N and 150N Latitude or 330 E and 480 E Longitude. The country occupies an area of approximately 1,127,127 square km., which is slightly less than twice the size of Texas. The total land area is 1,119,683 square km and the area occupied by water bodies is 7,444 sq. km. The Ethiopian border is 5,311 km long.

Ethiopia is endowed with varied ecological and climatic conditions, and it is also home to some of the most diverse flora and fauna in Africa. Its forests and woodlands contain diverse plant species that provide surplus nectar and pollen to foraging bees. More than 7000 species of flowering plants are estimated to be found in the country, of which most of them are honey bee plants. The ideal climatic conditions and diversity of floral resources allow the country to sustain around 10 million honey bee colonies. Ethiopia has the largest bee population in Africa, and in honey production the country stands first in Africa and tenth in the world.

Based on the technological advancement of beekeeping practice, there are four different types of honey production systems in Ethiopia, namely traditional forest, traditional backyard, transitional and modern beekeeping. However, the traditional honey production, which is characterized by low honey supply and quality, is the predominantly practiced honey production system in the country. Thus, the lion’s share of the Ethiopian honey production comes from the traditional honey production system.

### **3.3. Research Type**

The research type used in the study is descriptive research type. Descriptive type of research was employed because of the type of research questions of the study intended to answer (the “what questions”). Further, as indicated in the problem statement of the study, the area is not well researched, the available information is scarce and there is a substantial gap of knowledge. Thus, the study sought to examine, interpret, establish trends and report the present stature of the subject matter problem and hence used descriptive type of research. As reported by Kottori (2004), the major purpose of descriptive research is description of the state of affairs as it exists at present. This type of research gives researchers the ability to look at whatever they are studying in so many various aspects and can provide a bigger overview as opposed to other forms of research.

### **3.4 Target Population**

The target population for the study was the licensed Ethiopian honey exporting firms in Ethiopia as of 2018. Before conducting the study, the first measure taken was investigating into the target population to be studied, to have a clear map of the target population. With a support letter from the College of Business and Economics, Addis Ababa University, a visit was made to the Ministry of Trade (MoT), which is an organization authorized to issue export trade licenses. The support letter outlined the objective and benefits of the study. According to the information from the responsible experts in the MoT during the visit, the type of trade license, which the ministry issues is “honey and honey products producer and exporter”. A holder of this kind of license is eligible to either produce or export honey and honey products, or to produce and export honey and honey products. Because of the type of the trade license, which the MoT issues related to honey, its central database does not hold disaggregated data on honey exporting firms. Therefore, it was not possible to get the data of honey exporting firms from the central database of TO. The only available data of licensed Ethiopian honey exporting firms as of 2018 were 6 years data (2013-2018), from the Export Promotion Directorate, under the Ministry of Trade. According to these data, the total number of the honey exporting firms in Ethiopia during that period was 70. Thus, in this study, the target population of the Ethiopian honey exporters included the 70 honey exporting firms during 2013-2018.

### **3.5 Sampling Technique and Sample Size**

Discussions were held with relevant officials and experts in the Ministry of Trade (MoT), Ethiopian Honey and Beeswax Producers and Exporter Association (EHBPEA) and Ethiopian Apiculture Board (EAB) to seek information that helped to select sample honey exporting firms, which can provide adequate information for the study. Based on the information from the discussions made, a sample size of 25 Ethiopian honey exporting firms were selected using non-probability purposive sampling technique out of the 70 target population of the study. Firms, which are active exporters with adequate experience and capacity were included in the sample. Additionally, in the process of selecting the firms to be included in the study, efforts were made to capture variation within the participating firms. The honey exporting frequency and pattern of the exporting firms were considered.

### **3.6 Data Collection Method**

The study used both primary and secondary data.

#### **Collection of Primary Data**

A questionnaire data collection method was employed in the study to collect the primary data of the study. The questionnaire used to collect the data was developed by the researcher. The researcher did extensive review of previous relevant studies to select the questions and develop the questionnaire. Most of the questions in the questionnaire are close-ended questions, with some open-ended questions in order to invite free responses of respondents and to be able to get information not captured by the different questions of the instrument. The developed questionnaire was reviewed by two experts with expertise in the research area. Necessary modification was made to the questionnaire based on the feedback from the experts. Following the review by the experts, the questionnaire was pilot tested in one of the active and experienced honey exporting firms. The results from the pilot testing helped to make necessary modifications to the questionnaire, which otherwise would have inhibited collection of accurate and relevant data.

The questionnaire was then sent electronically through email message to the 25 purposely selected honey exporting firms, together with supportive letters from College of Business and Economics Addis Ababa University, and EHBPEA. Both letters explained the objective and benefits of the study. Of the 25 exporting firms to which questionnaires were sent, 10 firms responded and sent

the completed questionnaires to the researcher electronically through email message. Of the 10 firms who were interested and available to participate in the survey 70 % are active and experienced honey exporting firms in the country with well-established honey processing plants. The 30% are also active honey exporters but do not have honey processing plants. They purchase processed honey from honey suppliers and export. The 10 participating firms are with better understanding, experience and perception in exporting honey, and hence the researcher has the opinion that the sample size was sufficient for this study, which is descriptive research type. The 10 honey exporting firms were assigned codes from F1 to F10.

### **Collection of Secondary Data**

The source of the second data used in this study are Ethiopian Central Statistics Agency and Ethiopian Customs Commission, which are considered sources of reliable and valid national data. Eight years secondary data, 2011-2018 were used in the study with the intention to establish recent trends of Ethiopian honey production, honey export volume and value. Additionally, this period (2011-2018) was particularly used to make it closer/same to the period of 2013-2018, during which the honey exporting firms (sample respondents) were exporting honey. It was thought that having closer/same periods (2011-2018 and 2013-2018) would help to examine challenges of Ethiopian honey export on one hand and observe the trends of Ethiopian honey export on the other hand.

### **3.7 Data Processing and Analysis**

The collected primary raw data were edited to detect errors and omissions and to correct these when possible. They were then coded and numerals were assigned to answers so that responses can be put into a limited number of categories or classes. Further, classification of the data was made to reduce the data into homogeneous groups in order to draw meaningful relationships. Tabulation of the data was also performed as appropriate to summarize and display the raw data in compact form for further analysis. The secondary data were tabulated as required and put in a way ready for analysis.

Descriptive analysis was applied in this study to analyze the processed primary and secondary data. SPSS software program version 25 and Excel version 13 were used in the analysis. The major statistical measures used in the analysis of the study data include frequency, percentage, mean, mean deviation and score.

## **CHAPTER FOUR**

### **4.0 RESULTS AND DISCUSSION**

#### **4.1 Introduction**

This chapter presents the results and discussion of the findings of the analysis of the primary data and findings of the analysis of the secondary data used in the study. The findings of the analysis of primary data cover profiles of the survey respondents (Ethiopian honey exporting firms) and the Ethiopian honey export challenges prevailing across the honey value chain functions and support functions identified by this study. The findings of the analysis of the primary data are organized under the different honey value chain functions and support functions examined by the study. The honey value chain functions and support functions studied and under which the findings of this study are organized are the following. (i) Beekeeping input supply function (ii) Honey production function (iii) Domestic honey marketing function and (iv) Support functions of honey value chain.

The findings of the analysis of the secondary data cover the following. Percent shares of bee hive types used in the country, percent shares of honey yields of bee hive types used in the country, trends of Ethiopian honey production, honey export volume and value. The findings also cover the Ethiopian honey export destination and related honey export volumes and values.

#### **Results and Discussion of the Analysis of the Primary Data**

#### **4.2 Profiles of the Honey Exporting Firms**

##### **4.2.1 Years Honey Exported by Firms since their Establishment**

Table 4.1 shows the years honey exported by the sample respondents since their establishment. Of the total respondents 50% of the respondents exported honey for years ranging from 1-5 years and 30% and 20% of the firms have exported honey for years ranging from 6-10 and for more than 10 years respectively. The number of years that each firm exported honey since establishment range from a minimum of one year to a maximum of 12 years, with a mean of 6.8 honey exporting years. The length of the period that the firms were engaged in honey export is not long in view of the long standing beekeeping practice in Ethiopia. It can be said that the firms are generally at an active age. The level of education of the firm's manager is explained below.

#### 4.2.2 Level of Education of the Firm Managers

As shown in Table 4.1, 80 % of the firm managers are masters degree or bachelor degree holders. Masters degree holders constitute 40% and bachelor degree holders constitute 40%. Of the total firm managers only 20% have educational level of grade 6-10. The high educational level of the majority of the farm managers is an opportunity to capitalize on, in enhancing export of Ethiopian honey. They can easily understand the requirements of the international honey market and play their part as well as work hand in hand with the government for improved Ethiopian honey export.

#### 4.2.3 Firms' Apiary and Honey Processing Facility Ownership

The findings in Table 4.2 show that only 30% of the respondents have apiary and the majority 70% of the respondents do not have apiary. These results indicate that 70 % of the respondents totally depend on other honey suppliers to export. The 30 % respondents, who have apiaries, supplement the honey produced in their apiaries with honey from other honey suppliers.

As illustrated in Table 4.2 of the sample respondents 70% have honey processing facilities and 30% do not have honey processing facilities. The 70 % of the respondents with honey processing facilities, purchase crude honey, process and export. While the 30% respondents without honey processing facilities, purchase processed honey and export. The firms' annual average honey export capacities, as explained by the respondents are shown below.

**Table 4.1: Years Honey Exported by Firms and Level of Education of Firm Managers**

Total sample (n=10)

| Profiles of firms                        | Number of respondents | Percentage (%) |
|------------------------------------------|-----------------------|----------------|
| <b>Years honey exported by firms</b>     |                       |                |
| 1-5                                      | 5                     | 50             |
| 6-10                                     | 3                     | 30             |
| >10                                      | 2                     | 20             |
| <b>Total</b>                             | <b>10</b>             | <b>100</b>     |
| <b>Level of education of firm manger</b> |                       |                |
| Grade 6-10                               | 2                     | 20             |
| Bachelor degree                          | 4                     | 40             |
| Masters degree                           | 4                     | 40             |
| <b>Total</b>                             | <b>10</b>             | <b>100</b>     |

Source: Survey data, 2018

**Table 4.2: Firms' Apiary and Honey Processing Facility Ownership**

Total sample (n=10)

| Parameter                                         | Number of respondents | Percentage (%) |
|---------------------------------------------------|-----------------------|----------------|
| <b>Firms' apiary ownership</b>                    |                       |                |
| The firm has apiary                               | 3                     | 30             |
| The firm has no apiary                            | 7                     | 70             |
| <b>Total</b>                                      | <b>10</b>             | <b>100</b>     |
| <b>Firms' honey processing ownership of firms</b> |                       |                |
| The firm has honey processing facility            | 7                     | 70             |
| The firm has no honey processing facility         | 3                     | 30             |
| <b>Total</b>                                      | <b>10</b>             | <b>100</b>     |

Source: Survey data, 2018

**4.2.4 Potential Capacity of Average Annual Honey Export Volumes of Firms**

Table 4.3 indicates the potential capacity of average annual honey export volumes of the firms.

**Table 4.3: Potential Capacity of Average Annual Honey Export Volumes of Firms (in ton)**

Total sample (n=10)

| No | Firm                 | Annual average honey export capacity of firms (in ton) |
|----|----------------------|--------------------------------------------------------|
| 1  | Firm 1               | 250.00                                                 |
| 2  | Firm 2               | 416.00                                                 |
| 3  | Firm 3               | 120.00                                                 |
| 4  | Firm 4               | 30.00                                                  |
| 5  | Firm 5               | 500.00                                                 |
| 6  | Firm 6               | 3.60                                                   |
| 7  | Firm 7               | 40.00                                                  |
| 8  | Firm 8               | 100.00                                                 |
| 9  | Firm 9               | 140.00                                                 |
| 10 | Firm 10              | 200.00                                                 |
|    | <b>Total</b>         | <b>1799.60</b>                                         |
|    | <b>Minimum</b>       | <b>3.60</b>                                            |
|    | <b>Maximum</b>       | <b>500.00</b>                                          |
|    | <b>Mean</b>          | <b>179.96</b>                                          |
|    | <b>St. Deviation</b> | <b>166.07</b>                                          |

Source: Survey data, 2018

The results show that the firms have in total, a potential capacity of average annual honey export volume of 1,799.60 tons, if they operate at their full capacity. The minimum potential capacity of average annual honey export volume is 3.60 tons by firms. The maximum potential capacity of average annual honey export volume is 500 tons by firms, and the standard deviation is 179.96. The large standard deviation reflects, the large amount of variation of the farms' export capacities. But in the situation of this study, where data are collected and recorded (just observe and record data), a large standard deviation isn't necessarily a bad thing. It just reflects a large amount of variation in the group that is being studied. The highly varied capacities of honey export volumes indicate how it is possible to be engaged in the honey export industry regardless of the initial investment capital firms have. It also shows the high honey export capacity built in the county to capitalize on. Percent shares of the actual average annual honey export volumes of firms from their potential capacity of average annual honey export volumes are elaborated in the following section.

#### **4.2.5 Percent Shares of the Actual Average Annual Honey Export Volumes of Firms from their Potential Capacities of Average Annual Honey Export Volumes**

The findings in Table 4.4 show the percent share of average annual actual honey export volumes of firms from their potential capacities of average annual honey export volume.

**Table 4.4: Percent Shares of the Actual Average Annual Honey Export Volumes of Firms from Their Potential Capacities of Average Annual Honey Export Volume (%)**

Total sample (n=10)

| <b>No</b> | <b>Firm</b>          | <b>Percent share of actual annual honey export capacity of firms from their potential export capacity (%)</b> |
|-----------|----------------------|---------------------------------------------------------------------------------------------------------------|
| 1         | Firm 1               | 18.00                                                                                                         |
| 2         | Firm 2               | 20.00                                                                                                         |
| 3         | Firm 3               | 1.06                                                                                                          |
| 4         | Firm 4               | 33.33                                                                                                         |
| 5         | Firm 5               | 8.00                                                                                                          |
| 6         | Firm 6               | 8.32                                                                                                          |
| 7         | Firm 7               | 50.00                                                                                                         |
| 8         | Firm 8               | 50.00                                                                                                         |
| 9         | Firm 9               | 14.26                                                                                                         |
| 10        | Firm 10              | 20.00                                                                                                         |
|           | <b>Minimum</b>       | <b>1.06</b>                                                                                                   |
|           | <b>Maximum</b>       | <b>50.00</b>                                                                                                  |
|           | <b>Mean</b>          | <b>22.30</b>                                                                                                  |
|           | <b>St. Deviation</b> | <b>17.00</b>                                                                                                  |

Source: Survey data, 2018

The minimum percent share of actual average annual export volume is 1.06 %, and the maximum actual percent share is 50%, with 22.30% mean and 17% standard deviation. The results show that the respondents are working below their exporting capacities, only on average of 22.30 % of their potential honey export volume capacities. This is despite the already built honey exporting capacities of the firms. The sources of honey supply to the firms, as explained by the survey respondents, are presented in section 4.3.1. 1

### **4.3 Challenges of Ethiopian Honey Export across the Honey Value Chain**

Identifying the challenges of Ethiopian honey export prevailing across the honey value chain is important in searching informed and pertinent solutions for the challenges, rather than addressing the challenges in piece meal approach. This way of identifying the honey export challenges is a win-win-win situation. The actors in the honey value chain, including the vast majority of beekeepers (who are mostly producing the honey), the honey exporters and also the nation as a whole will all benefit. The intention of the study is that every challenge prevailing at the levels of different honey value chain functions/activities and support functions in the process of honey production, contributes to the total national honey export challenges. Thus it was with this understanding that the challenges were identified at the level of the functions and support functions (covered in the study) to better capture the prevailing export challenges.

During the survey, the honey exporting firms were asked to respond to relevant questions, and identify honey export challenges they encountered across the different chain function/activities including support functions/activities, with the aim of establishing the honey export challenges. The following honey value chain functions and support functions were examined during the survey and Ethiopian honey export challenges identified.

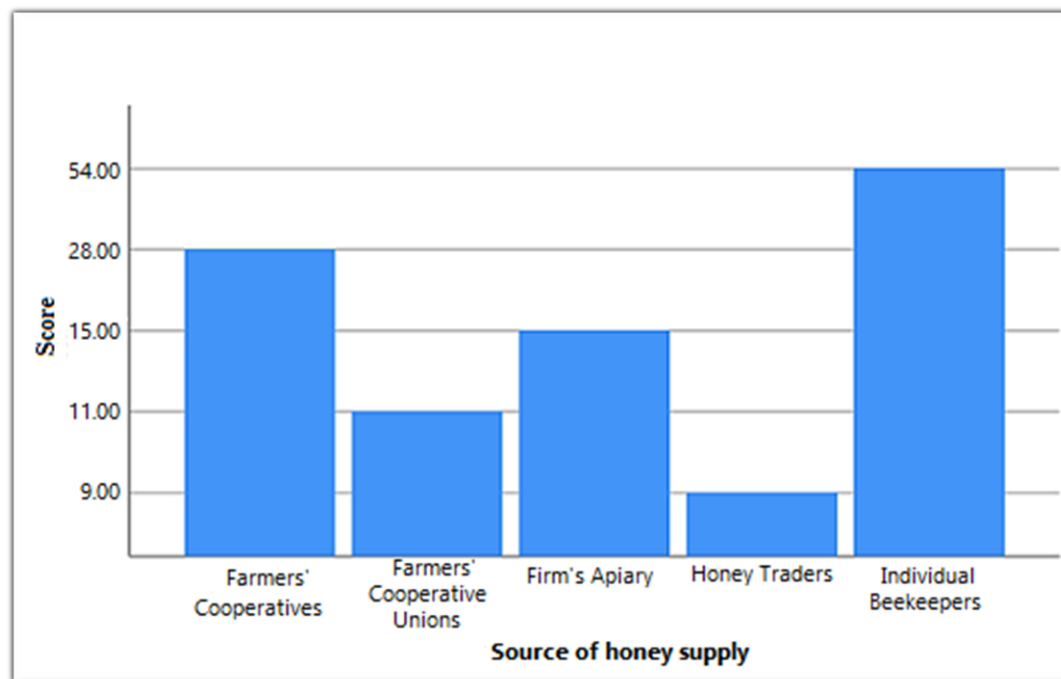
#### **4.3.1 At the Input Supply and Honey Production Functions**

##### **4.3.1.1 Source of Honey Supply for the Firms in Order of Importance**

As indicated in Figure 4.1 of the different sources of honey sources identified by the respondents, individual beekeepers ranked first as source of honey for firms followed by Farmers' Cooperatives and followed by firm's apiary. Farmers' Cooperative Union ranked 4<sup>th</sup> and traders ranked 5<sup>th</sup> as sources of honey for the firms. The findings are in agreement with that of Belie (2009), where it

was reported that honey processors' and exporters' market channels (market outlets) start from beekeepers.

**Figure 4.1: Source of Honey Supply for the Firms in Order of Importance**



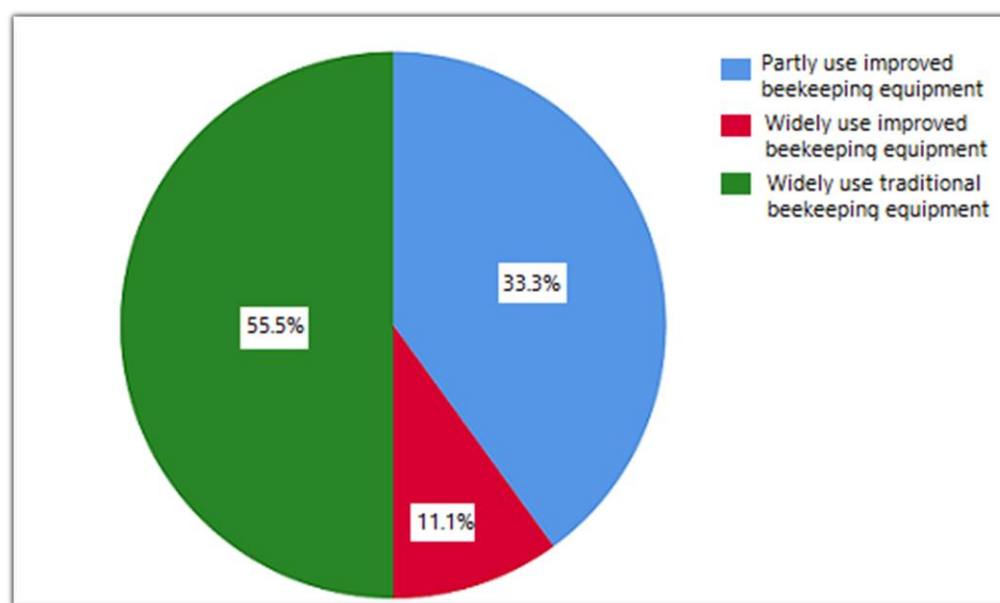
Source: Survey data, 2018

#### **4.3.1.2 Low Level of Use of Improved Beekeeping Equipment by Beekeepers**

As illustrated in Figure 4.2 below, when the sample respondents were asked the level of using of improved beekeeping equipment by the individual beekeepers who are the major honey suppliers to firms, the majority of the respondents (55.5%) replied that individual beekeepers widely use traditional beekeeping equipment. 33.3% of the respondents replied that the beekeepers partly use improved beekeeping equipment and 11.1% of the sample respondents stated that the beekeepers use improved beekeeping equipment. The 33.3 % who reported that the beekeepers partly use improved beekeeping means that the beekeepers used partly improved and partly traditional beekeeping equipment, which makes the percentage of the use of traditional beekeeping higher than the reported 55.5%. The findings from Figure 4.2 are in disagreement with the findings of Gebru (2009), who reported that in the study area majority (95.5%) of the beekeepers used modern frame bee hives and only 4.5% of the beekeepers used traditional bee hives.

However, the findings of this study are in agreement with the findings of Shenkute et al. (2012), who reported that in their study area, beekeeping practice using traditional bee hives was the dominant system accounting for more than 99% of the survey respondents. While the use of intermediate/transitional and modern bee hives was less than 1%. Moreover, the findings are also in agreement with the national data reported by CSA (2016, 2017), in which the percent shares of traditional bee hives in use in the country out of all types of bee hives used were 96.46% and 95.37 % respectively. During the same period the percent shares of transitional bee hives in use out of all types of bee hives used were only 1.2% and 1.31 % respectively. The figures for the use of modern/frame bee hive for the same period were 2.34% and 3.33 % respectively. Furthermore, closer findings were also reported by Songo (2015) in a study area, where the sample respondents (100%) reported to have been using locally made beekeeping equipment (materials).

**Figure 4.2: Level of Use of Improved Beekeeping Equipment by Beekeepers Who Supply Honey to Firms**



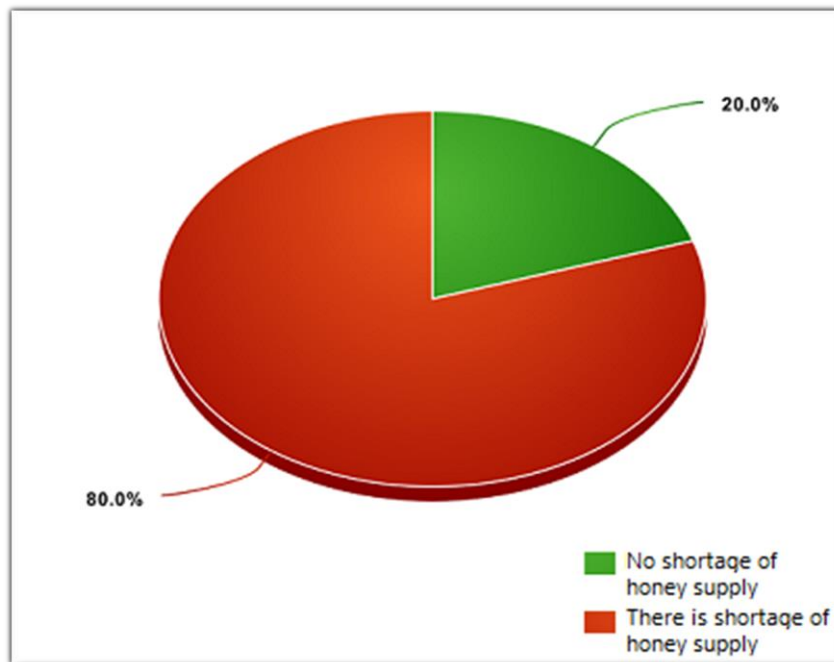
Source: Survey data, 2018

The findings of the study show that the majority of beekeepers, who are the main honey suppliers to the honey exporting firms use traditional beekeeping equipment. Use of traditional beekeeping equipment is associated with traditional beekeeping practices, which are associated with low supply and quality honey. Low supply and quality of honey is a challenge for Ethiopian honey export, which requires quality honey in bulk.

#### 4.3.1.3 Shortage of Honey Supply

As presented in Figure 4.3, of the total survey sample 80% reported that there is shortage of honey supply for export and 20% reported that there is no shortage of honey supply for export.

**Figure 4.3: Level of Availability of Honey Supply for Firms**



Source: Survey data, 2018

As Table 4.5 indicates, when the respondents who reported that there is shortage of honey supply, were asked to identify the major reasons for the shortage of honey supply in order of importance, low honey production and productivity ranked 1<sup>st</sup>, followed by low quality honey and then followed by drought. Seasonality of honey production ranked 4<sup>th</sup> and honey smuggling ranked 5<sup>th</sup>.

**Table 4.5: Major Reasons for the Shortage of Honey Supply Encountered by Firms in Order of Importance**

Total sample (n=8)

| Parameters                      | Score | Rank |
|---------------------------------|-------|------|
| Low production and productivity | 32    | 1    |
| Low quality Honey               | 27    | 2    |
| Drought                         | 17    | 3    |
| Seasonality of honey production | 14    | 4    |
| Honey smuggling                 | 12    | 5    |

Source: Survey data, 2018

The findings of this study are in agreement with the findings of different authors in different parts of Ethiopia (Belie, 2009; Shenkute et al., 2012 and Guyo and Solomon, 2015) in which they reported in their respective study areas low honey production and productivity from traditional beekeeping practices. Traditional beekeeping practices are characterized by low yield and quality of honey when compared with the honey yields and quality from modern beekeeping. Further, the findings of this study are in agreement with the findings of Jagiso et al. (2018) in where it was reported drought as a reason for low honey supply in their study area. The shortage of bee forage in the dry season led to loss of bees and decreased honey yield. In their study area 75% of the sampled households considered drought as a challenge to produce sustained quantity of honey throughout the year and they perceived it as a cause for a loss of bee colonies.

Similar to the findings of this study, seasonality of honey production as a reason for honey availability was also identified in a study by Songo (2015) in Tanzania in which he reported that in the study area there are two high honey harvesting seasons and 89.4% of the total annual honey is harvested during May-July of the year and only 10.9% of the total annual honey produced is harvested in the second high honey production season. Thus it is clear that the supply of honey in the market is influenced by the honey harvesting seasons

The implication of the shortage of honey supply reported by the firms due to the identified reasons is that the firms cannot be competitive in the honey export market which demands reliable, consistent supply of honey in bulk. This necessitates addressing the root causes for the shortage of honey supply prevailing at the production function level in the honey value chain to enhance the export of Ethiopian honey. Responses of the sample respondents, when they were asked the extent of quality of the honey supply available for them for purchase are presented in the following section.

#### **4.3.1.4 Poor Quality of Honey Supply**

The findings in Table 4.6 indicate that 70% of the survey sample responded that there is quality problem of the honey supply available for them to purchase and 30% said there is no honey quality problem. The findings of the study are in agreement with the reports of different authors (Sebebo, 2015; Yadeta, 2016 and Ababor and Tekle, 2018) who documented that honey production in Ethiopia is dominated by traditional honey production system, which is characterized by low

honey yield and quality. The major reasons for the quality problem of the honey available for purchase as explained by the respondents are presented in Table 4.7.

**Table 4.6: Extent of Quality of Honey Supply**

Total sample (n=10)

| Parameter                                                            | Number of respondents | Percentage (%) |
|----------------------------------------------------------------------|-----------------------|----------------|
| <b>Honey Quality</b>                                                 |                       |                |
| Is there quality problem of the honey supply available for purchase? |                       |                |
| No                                                                   | 3                     | 30             |
| Yes                                                                  | 7                     | 70             |
| <b>Total</b>                                                         | <b>10</b>             | <b>100</b>     |

Source: Survey data, 2018

Table 4.7 shows the major reasons for quality problem of honey available for purchase as identified by the sample respondents, who replied that there is honey quality. Of the respondents all (100%) identified lack of adequate knowledge and skill of beekeepers in improved beekeeping, lack of adequate use of improved beekeeping equipment as major reasons for quality problem of honey available for the firms for purchase. Of the respondents 86% identified harvest of premature honey and use of heavy smoke during honey harvesting as major reasons for quality problem and 43% of the respondents identified chemical application as a major reason for the quality problem (Table 4.7). The findings of this study are in agreement with the findings of Kugonza and Nabakabya (2008); Dubale (2015) and Bett (2017). Kugonza and Nabakabya (2008) who conducted a study on “honey quality as affected by handling, processing and marketing channels in Uganda” reported that the quality of honey was mainly compromised by harvesting immature honey, bad honey extraction methods and contamination by extraneous materials. When honey is harvested prematurely fermentation occurs frequently and this negatively affects the quality of honey due to higher water content.

Similarly Dubale (2015) reported closer findings to the findings of this study that in his study area the sample respondents used local smoking materials during honey harvesting, to push away honey

bees. As stated by the author when the sample respondents were asked whether the smoking materials they used affected quality of honey 52.2% replied there was no effect and 47.2% of the respondents responded that there was an effect on the quality of honey when the smoking materials were not used appropriately. Of the respondents who replied the smoking materials had negative effect on honey quality 35.6% said the negative effect was on color 43.3 % on odor 38.3% on taste and 24.4% respondents said the smoking poisoned the honey.

**Table 4.7: Major Reasons for Honey Quality Problem Encountered by Firms**

Total sample (n=7)

| <b>Parameter</b>                                                          | <b>Number of respondents</b> | <b>Percentage (%)</b> |
|---------------------------------------------------------------------------|------------------------------|-----------------------|
| Lack of adequate knowledge and skill of beekeepers in improved beekeeping | 7                            | 100                   |
| Lack of adequate use of improved beekeeping equipment                     | 7                            | 100                   |
| Harvest of pre-matured honey and use of heavy smoke during harvesting     | 6                            | 86                    |
| Application of chemicals and pesticide for crop protection                | 3                            | 43                    |

Source: Survey data, 2018

Further, the findings of this study are closer to the findings of Belie (2009) who reported that, in the study area, out of the respondent beekeepers 97.5% explained that application of agro-chemicals in their area caused honey bee poisoning. By implication the poisoned bees either die or/and contaminate the honey in their hives making the quality of the honey poor.

#### **4.3.1.5 Use of Inappropriate Containers to Store Honey after Harvest**

The findings of the study show that 86% of the survey respondents reported that the individual beekeepers who are their major source of honey store/keep their honey in containers which comprise the quality of honey. Of the respondents 14% reported no problem caused by containers.

The findings of this study are in agreement with the findings of Alemu, Seifu and Bezabih (2015) who reported that of the sample respondents in their study area 67.8% used plastic containers 36.6% used gourd 11% used earthen pot and 8.8% used animal skin to store/keep their honey. The authors stated that the respondents have also reported drawbacks of each containers used to store honey in the study area. The sample respondents said gourd allows entry of red ants via the mouth of the container into the honey and it is easily broken during transportation. Gourd also allows loss of moisture from honey during dry period. Regarding earthen pots the respondents explained that they are heavy to hold and transport and red ants can enter into the pots. The entry of red ants into the containers were due to the incompatibility of the lid with the main body of the container. In addition unless the container is tight it absorbs moisture from the environment and the honey start fermenting during humid conditions. This compromises the quality of honey. As explained by the respondents the problems observed when plastic containers are used are that the plastic containers are damaged by rats and become hot when the environmental temperature rises. Animal skins change the original taste of the honey and are damaged by rats.

Similar findings to this study were also reported by Belie (2009) where in the study area 46.7% of the sample respondents used plastic bucket 40.0% used plastic sack 10.8% used gourd and 2.5% used animal skin to store honey for short period. The author stated that the containers used in the study area were not technically appropriate storage facilities as they result in serious honey quality deterioration. It is clear from the findings how the quality of honey is compromised by use of inappropriate containers by beekeepers who are the major honey supplies of the firms.

#### **4.3.2 At the Domestic Honey Marketing Function**

##### **4.3.2.1 Domestic Honey Marketing Problem and Major Reasons for the Problem**

When the sample respondents were asked whether they encounter honey marketing problem or not in the domestic honey marketing 90% responded that they encounter honey marketing problem and only 10% reported that they do not face honey marketing problem.

The findings of the study are close to that of Baynes (2013) who reported the honey market constraints identified in his study area. The identified market constraints include lack of well-organized market channels, lack of rural market infrastructure, lack of market information flow, very limited or absence of credit, extension and training, lack of skill of actors in honey processing, handling and marketing, and lack of strong business oriented producers cooperative.

**Table 4.8: Major Reasons for the Honey Marketing Problem Encountered by the Firms**

Total sample (n=9)

| Major reasons              | Number of respondents | Percentage (%) |
|----------------------------|-----------------------|----------------|
| Poor market infrastructure | 9                     | 100            |
| Lack of organized market   | 7                     | 78             |
| Lack of legality           | 7                     | 78             |
| Adulteration               | 5                     | 56             |
| Smuggling                  | 5                     | 56             |

Source: Survey data, 2018

The findings of the study are close to that of Baynes (2013) who reported the honey market constraints identified in his study area. The identified market constraints include lack of well-organized market channels, lack of rural market infrastructure, lack of market information flow, very limited or absence of credit, extension and training, lack of skill of actors in honey processing, handling and marketing, and lack of strong business oriented producers cooperative.

Further, close findings were also reported by Abebe (2009) that as explained by respondent honey traders during the survey, quality problem of honey (adulteration), competition with unlicensed honey traders and shortage of finance, less demand for honey and unfair tax fee, are major honey marketing problems.

#### **4.3.2.2 Major Constraints Encountered by the Firm Because of the Domestic Honey Marketing Problems**

Table 4.9 indicates that when the respondents were asked constraints they encounter because of the domestic honey marketing problems, 100% identified less competitiveness in the global honey market as a constraint, 89% identified inadequate supply of honey for export, 78% identified high domestic honey price, and 78% identified low quality of honey supply for export. When the sample respondents were asked how they rate the domestic honey price as compared with the international honey price, the majority of the respondents (60%) replied that the domestic honey price is higher than the international price, and 40% replied that the domestic honey price is less than the international honey price. The results illustrate that, the domestic market problems and the constraints encountered by the firms because of the domestic honey marketing problem, are

far reaching and are negatively affecting the Ethiopian honey export as explained by the respondents.

**Table 4.9: Major Constraints Encountered by the Firms Because of the Domestic Honey Marketing Problem**

Total sample (n=9)

| <b>Major constraints encountered by firms</b> | <b>Number of respondents</b> | <b>Percentage (%)</b> |
|-----------------------------------------------|------------------------------|-----------------------|
| Less competitive in the global honey market   | 9                            | 100                   |
| Inadequate supply of honey for export         | 8                            | 89                    |
| High domestic price of honey                  | 7                            | 78                    |
| Low quality of honey supply for export        | 7                            | 78                    |

Source: Survey data, 2018

The findings of this study agree with that of Ababor and Tekle (2018) where it was reported that honey price in the domestic honey market is mostly advanced than the international honey price which makes Ethiopian honey export less profitable. The findings are also in agreement with that of Abebe (2009) in which it was reported that quality problem was the priority problem identified by the honey traders in the study area. The traders explained that among the problems causing poor quality honey were (as they perceived) the unlicensed traders/honey collectors, which might be mixing honey with sugar (adulteration). The findings of this study also comply with that of Yadeta (2015) in which it was stated that challenges like smuggling in the domestic honey market pushes the legal actors out of market. In many cases adulteration of honey has been a frustrating factor for both the producers and legal buyers and sellers as the traceability and accountability is hardly possible.

### **4.3.3 At the Support Function**

#### **4.3.3.1 Absence of Mandatory Honey Standard in Ethiopia**

The findings in Table 4.10 show that out of the total survey sample 50% replied that there is mandatory honey standard in the country and 50% replied there is no mandatory honey standard. However, according to the information from the Ethiopian Standard Agency (ESA, 2018) there is honey standard in the country, but it is voluntary honey standard. This means there is no

mandatory honey standard in the country. The 50% respondents who replied that there is mandatory honey standard might be due to lack of information. The voluntary honey standard in Ethiopia as the name indicates is that it is not mandatory to comply with. Rather it gives actors the chance to either comply with the standard or deviate depending on one's interest. This means that the set standards can be easily violated without accountability.

The findings indicate that when the respondents who replied that there is no mandatory honey standard in Ethiopia were asked to identify the problems they encountered due to the absence of mandatory honey standard. All respondents identified less competitiveness in the local honey market due to high price of honey, shortage of quality honey supply for export and less competitiveness in the global honey market. Further, the sample respondents were asked, the extent of regulation by government with regard to health and safety and the majority (70%) replied the regulation is weak and 30% replied there is strong regulation. However, during discussion with responsible expert in the Food, Medicines, and Control Authority of Ethiopia (FMHACA), it was confirmed that because of limited manpower the regulation is weak. According to the findings of the study the country does not have mandatory honey standard and strong regulation. The implication is that in such situation it is a challenge to compete in the international honey export market in the current ever stringent regulation in place, in importing countries.

#### **4.3.3.2 Absence of Internationally Accredited Laboratory**

Table 4.10 show that only 10% of the survey respondents replied that there is internationally accredited laboratory in Ethiopia and the majority (90%) replied that there is no internationally accredited laboratory in the country. However, according to the information from the Ethiopian Conformity Assessment Enterprise under the MoT and the Food, Medicines and Control Authority of Ethiopia (ECAE) there is no internationally accredited laboratory in the country. When the sample respondents were asked where they test the honey they export 70% replied they use internationally accredited laboratories abroad, 30 % said that they send their honey to countries with less stringent importing regulation which do not require testing the honey in internationally accredited laboratory and 10% replied the importing companies handle the honey testing in internationally accredited laboratory abroad. The findings indicate that exporting honey to countries with stringent import regulations require testing the honey in internationally accredited

laboratory. As explained by the respondents those countries with stringent importing regulations such as the EU countries have large and lucrative honey markets.

**Table 4.10: Availability of Honey Standard and Internationally Accredited Laboratory in Ethiopia**

| Total sample (n=10)                                                                         |           |                |
|---------------------------------------------------------------------------------------------|-----------|----------------|
| Parameters                                                                                  | Frequency | Percentage (%) |
| <b>Is there mandatory honey Standard in Ethiopia?</b>                                       |           |                |
| Yes                                                                                         | 5         | 50             |
| No                                                                                          | 5         | 50             |
| <b>Is there internationally accredited laboratory in Ethiopia, to test honey for export</b> |           |                |
| Yes                                                                                         | 1         | 10             |
| No                                                                                          | 9         | 90             |

Source: Survey data, 2018

When the sample respondents who use internationally accredited laboratory abroad to test their honey for export were asked to identify problems they encountered due to the absence of internationally accredited laboratory, all the respondents (100%) identified the following. Lengthy process to have sample honey tested abroad, high cost incurred to have sample honey tested abroad and problem to meet honey delivery deadlines of importers.

The findings of this study show the problems the sample respondents encountered in the process of getting the honey tested abroad which coupled with the other challenges identified by the respondents along the value chain make the Ethiopian honey less competitive in the international honey market. The following section discusses the findings on the extent of beekeeping extension service provided to beekeepers, from which the sample respondents purchase honey.

#### **4.3.3.3 Weak Beekeeping Extension Service to Beekeepers**

The results in Table 4.11 shows that the majority of the respondents (60%) stated that the extension service provided to beekeepers (who sell honey to the firms) by responsible government body is good and 40% stated that the Beekeeping extension service is poor. The findings of this study are in contrary to the findings of Shenkute et al. (2012); Beyene (2013); Yimer (2014) and Dubale

(2015) where in their respective study poor extension service was identified as one of major constraints to beekeeping. The findings of this study are also in disagreement with the findings of Kumsa and Dinka (2016) where it was reported that lack of extension service was one of the major factors affecting beekeeping in the study area. These authors reported that when the sample respondents in the study area were asked if they have received beekeeping extension service only 31% said yes and 69% of the respondent said no. The respondents were also asked if they received training on techniques of honey production and management and only 28% said yes while 72.3% of the respondents said no. The authors stated that as the majority of sample respondents did not get any training on technique of honey production and management, this has adverse impact on the quantity and quality of honey harvested in the study area.

On the other hand, the findings of this study are in agreement with the findings of Gebru (2015) where it was reported that the sample respondents explained that the beekeeping practice has been given due attention and hence they receive better extension services. Of the sample respondents 75% received beekeeping extension service and out of these 45% of the respondents got training from the District DAS and other non-governmental organizations.

Even though 60% of the sample respondents in this study reported that the beekeeping extension service provided to beekeepers was good, the weak beekeeping extension service reported by 40% of the respondents is also important to consider. The 40% respondents who reported weak extension service in this study coupled with the widely reported poor beekeeping extension service in different parts of the country indicate the need to strengthen the beekeeping extension service to improve the dominantly practiced traditional beekeeping in the country, which is characterized by low yield and poor quality honey.

#### **4.3.3.4 Absence of Permanent Vertical and Horizontal Linkage Platforms for Relevant Actors**

As shown in Table 4.11 all the survey sample (100%) stated that there are no permanent vertical and horizontal linkage platforms for honey value chain actors. They reported that platforms do not exist where relevant actors across the honey value chain meet and discuss challenging issues and seek solutions for mutual benefit. The respondents explained that the platforms they are aware of are government organized and are often ad hoc and not inclusive.

**Table 4.11: Level of Beekeeping Extension Service to Beekeepers, Availability of Vertical and Horizontal Linkage Platforms for Honey Value Chain Actors**

Total sample (n=10)

| Parameters                                                                                         | Number of Respondents | Percentage (%) |
|----------------------------------------------------------------------------------------------------|-----------------------|----------------|
| <b>What is the level of beekeeping extension service to Beekeepers?</b>                            |                       |                |
| Excellent                                                                                          | -                     | -              |
| Very good                                                                                          | -                     | -              |
| Good                                                                                               | 6                     | 60             |
| Poor                                                                                               | 4                     | 40             |
| <b>Are there permanent vertical and horizontal linkage platforms for honey value chain actors?</b> |                       |                |
| Yes                                                                                                | -                     | -              |
| No                                                                                                 | 10                    | 100            |

Source: Survey data, 2018

Further, the respondents have recognized the existence of the Ethiopian Honey and Beeswax Producers and Exporters Association (EHPEA). They said membership of the association is on voluntary basis and some of the Ethiopian honey exporting firms are members and some are not. Most of the respondents stated that the association is not strong and not able to provide relevant services, which the respondents thought would have been useful. The views of the sample respondents were confirmed through discussion made with the responsible person in the Ethiopian Honey and Beeswax Producers and Exporters Association. As it came out clear during the discussion with the association, the association is under serious financial constraint. Despite the potential services the association can provide to members including to the exporters, it is not working at its full capacity due to budgetary constraint. The association stated that the main financial source of the association is members' fee. As membership of the association is on voluntary bases some of the exporters are members and some are not. Further, it was explained by the association that some members do not timely and regularly pay their membership fee. Thus it

is a concern that urges attention to strengthen the association and enable to serve the honey exporters with full capacity.

The findings of this study indicate that permanent vertical and horizontal linkage platforms for the honey value actors including the exporters does not exist. Thus in view of the benefits for the actors in the honey value chain (and hence the nation) there is a need for strong and regular support of government in fostering/supporting HVC actors' permanent horizontal and vertical linkage platforms. It is also important to strengthen existing relevant associations such as the Ethiopian Honey and Beeswax Producers and Exporters Association, which can help enhance the export of Ethiopian honey.

**Table 4.12: Financial Credit Service to the Firms**

Total sample (n=10)

| Parameter                                                  | Number of Respondents | Percentage (%) |
|------------------------------------------------------------|-----------------------|----------------|
| <b>Is there financial credit service for the firm?</b>     |                       |                |
| Yes                                                        | 7                     | 70             |
| No                                                         | 1                     | 10             |
| Not required (use own finance)                             | 2                     | 20             |
| If yes<br><b>Is the financial credit service adequate?</b> | (n=7)                 |                |
| Yes                                                        | 2                     | 29             |
| No                                                         | 5                     | 71             |

Source: Survey data, 2018

#### **4.3.3.5 Inadequate Financial Credit Service to the Honey Exporting Firms**

As shown in Table 4.12 the majority of the respondents (70%) reported that there is financial credit service, 10% replied there is no financial credit service and 20% responded they use their own finance and did not check the availability of credit service. When the respondents who explained there is financial credit service were asked if the credit service was adequate, 71 % replied that the credit crevice was not adequate and 29% reported the credit service was adequate.

The findings indicate that financial limitation is a challenge for the honey exporters either to strengthen or expand their firms. By implication, the financial constraint of the firms together with

other identified challenges in this study negatively affects the competitiveness of Ethiopian honey in the international honey market.

## **Results and Discussion of the Analysis of the Secondary Data**

The results and discussions of the analysis of the secondary data cover, the percent shares of the different types of bee-hives in use, their respective honey yield percent shares, trends of the Ethiopian honey production, honey export volume and export values during 2011-2018. It also cover the Ethiopian honey export destinations during the same period. The sources of the secondary data used for the study are the Ethiopian Central Statistics Agency (CSA) and the Ethiopian Customs Commission (ECC).

### **4.4 Percent Shares of Bee Hive Types in Use and their Percent Shares of Honey Yields, 2011-2018**

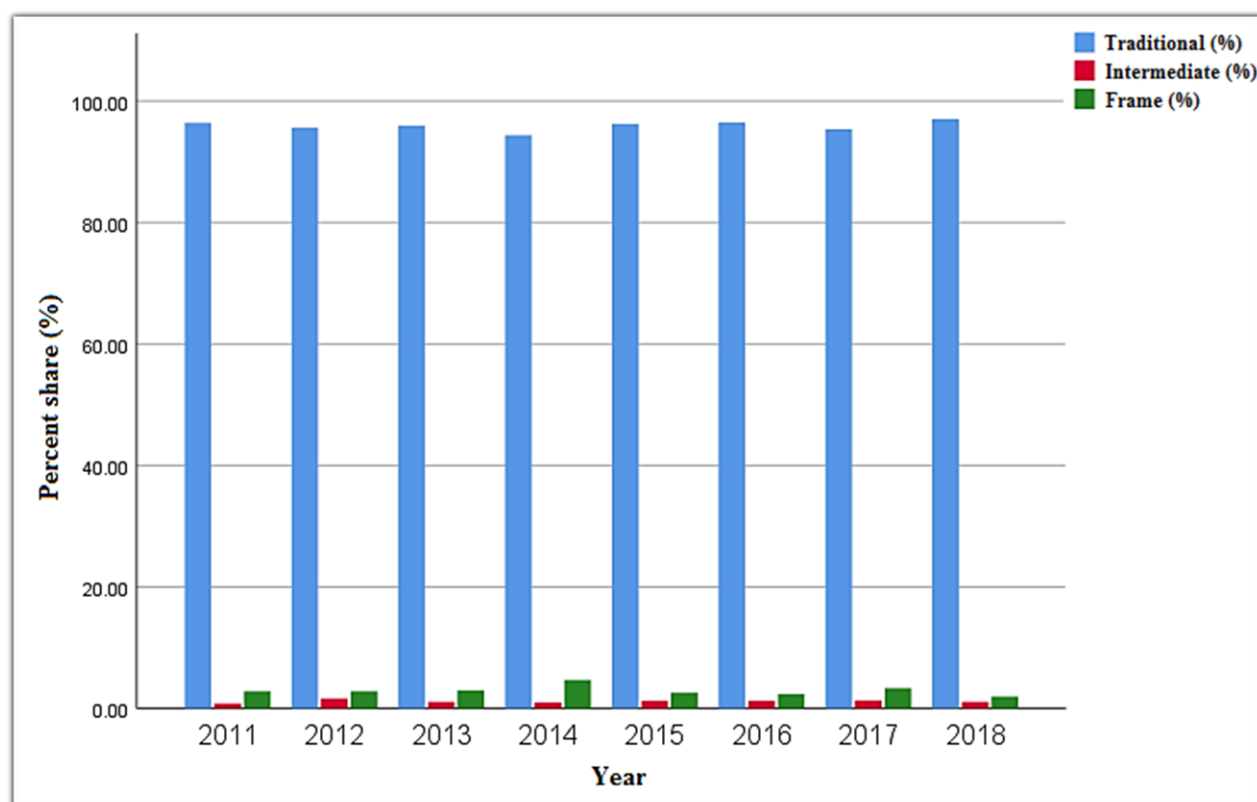
Figure 4.4 illustrates the percent shares of the different types of bee hives in use in the country during 2011-2018. During the period, the annual percent shares of traditional bee hives in use were consistently higher than the percent shares of frame and transitional bee hives in use. During the period, the annual percent shares of the frame bee hives were higher than the annual percent shares of the intermediate/transitional bee hives. The range of the variation of the percent shares of traditional bee hives in use was between the lowest of 94.37% in 2014 and the highest of 96.98% in 2018. The range of variation of percent shares of the frame hives in use was between the lowest 1.95 % in 2018 and the highest of 4.68% in 2014. The intermediate/transitional bee hives always had lower percent shares of use than the frame bee hives.

The range of variation of the percent shares of intermediate/transitional bee hives in use was between the lowest of 0.81% in 2011 and the highest of 1.63% in 2012%. The findings illustrated in Figure 4.4 are in agreement with the widely reported predominant use of traditional beehives in different parts of the country (Belie, 2009; Shenkute et al., 2012 and Guyo and Solomon, 2015). Yadeta, (2016) and Ababor and Tekle (2018) have also reported the dominant use of traditional bee hives. Similar results were also reported by W/Giorgis et al. (2015).

Figure 4.5 presents the percent shares of honey yields of the different bee hive types from the total honey production of the country during 2011 – 2018. As indicated in Figure 4.5, in all the years (2011-2018) the percent shares of honey yields of traditional bee hives from the total

honey production were substantially higher than the percent shares of honey yields from frame bee hives, followed by the percent shares of honey yields from transitional bee hives. The range of variation for traditional bee hives was between the lowest percent share of honey yield of 89.98% in 2017 and the highest percent share of honey yield of about 96.34% in 2018.

**Figure 4.4: Percent Shares of Bee Hive Types in Use by Year, 2011 - 2018**



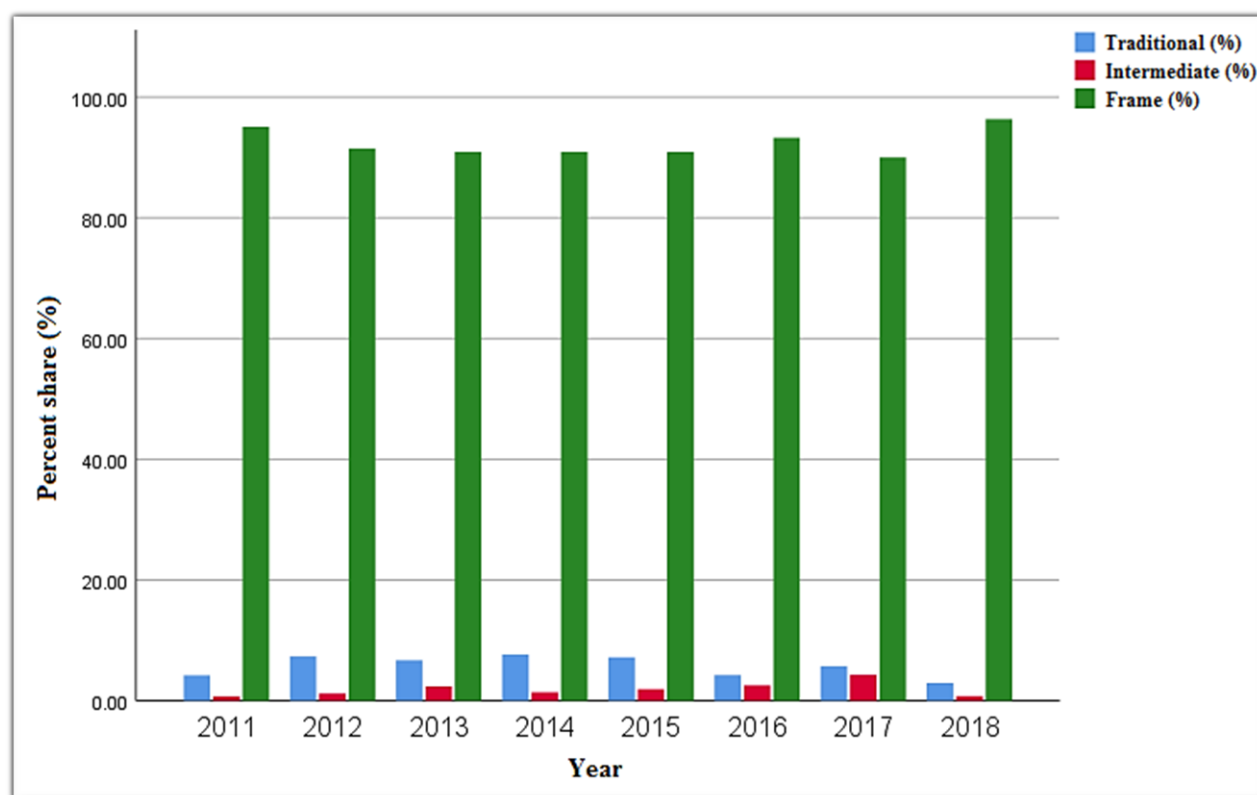
Source: CSA

For the frame bee hives the range of variation was between the lowest percent share of honey yield of 2.91% in 2018 and the highest percent share of honey yield of 7.66% in 2014. For the transitional/intermediate bee hives the range of variation was between the lowest percent share of honey yield of 0.72% in 2018 and the highest percent share of honey yield of annual honey 4.27% in 2017. Similar findings were reported by W/Giorgis et al. (2015) in which they reported that the present shares of traditional bee hives out of the total national honey production, were higher than that from frame and transitional/intermediate bee hives.

The higher percent shares of honey yields of the traditional beehives illustrated in Figure 4.5 compared with the percent shares of honey yields of frame and transitional bee hives was because

of the high number of traditional bee hives in use as illustrated in Figure 4.4. Otherwise the per hive honey yields of traditional bee hives are lower than per hive honey yields of frame and transitional bee hives (Belie, 2009; Shenkute et al., 2012; Guyo and Solomon, 2015 and Yadeta, 2016). It is important to note how persistently the percent shares of honey yields from frame and transitional hives were little during the period. Their percent share of use were also persistently little as illustrated in Figure 4.4. This is a challenge for honey export which urges attention.

**Figure 4.5: Percent Shares of Honey Yield of Bee Hive Types by Year, 2011 – 2018**



Source: CSA

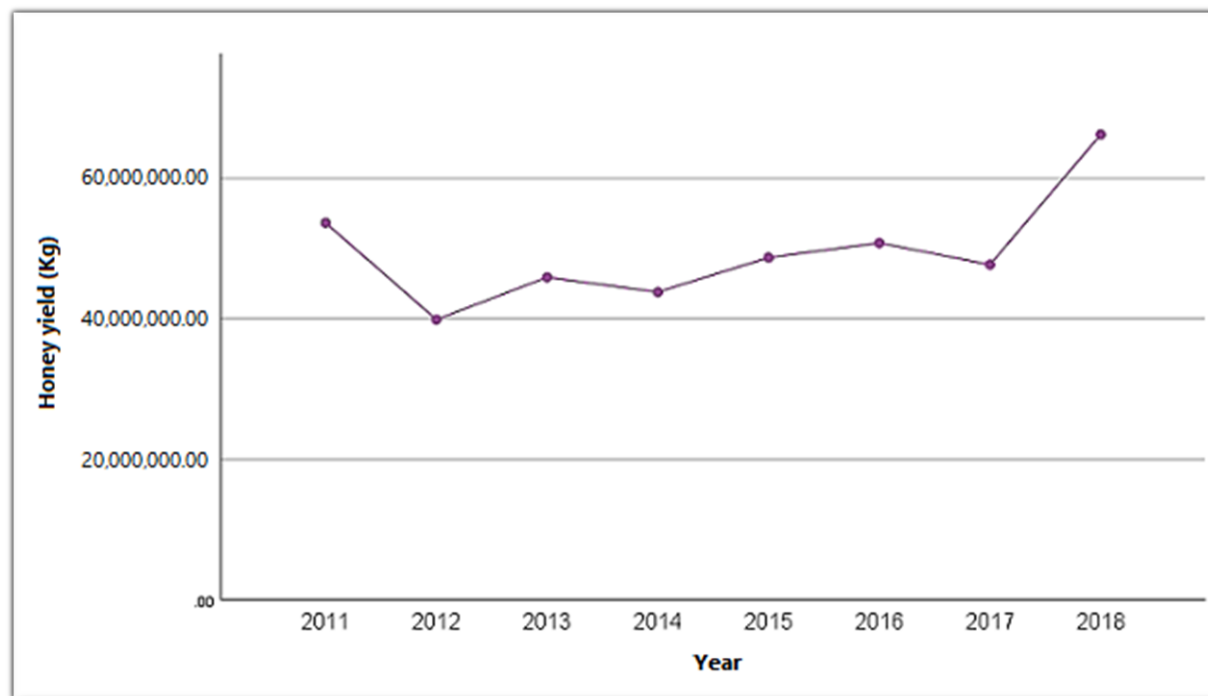
The findings of the study illustrated in Figure 4.4 and Figure 4.5 indicates that the country's beekeeping practice is highly dominated by the use of traditional bee hives. Traditional bee hives are characterized by low yield and quality of honey, and their wide use means production of low level and quality of honey in the country. This in turn is a challenge for honey export.

#### **4.5 Trend of Ethiopian Honey Production, 2011-2018**

Figure 4.6 illustrates the trend of the annual honey production in Ethiopia during the period of 2011-2018. The findings in Figure 4.6 show that the best honey production was about 66,000 tons

in 2018 followed by about 54, 000 tons in 2011. The least honey production was 40, 000 tons in 2012.

**Figure 4.6: Trend of Ethiopian Annual Honey Production, 2011 – 2018**



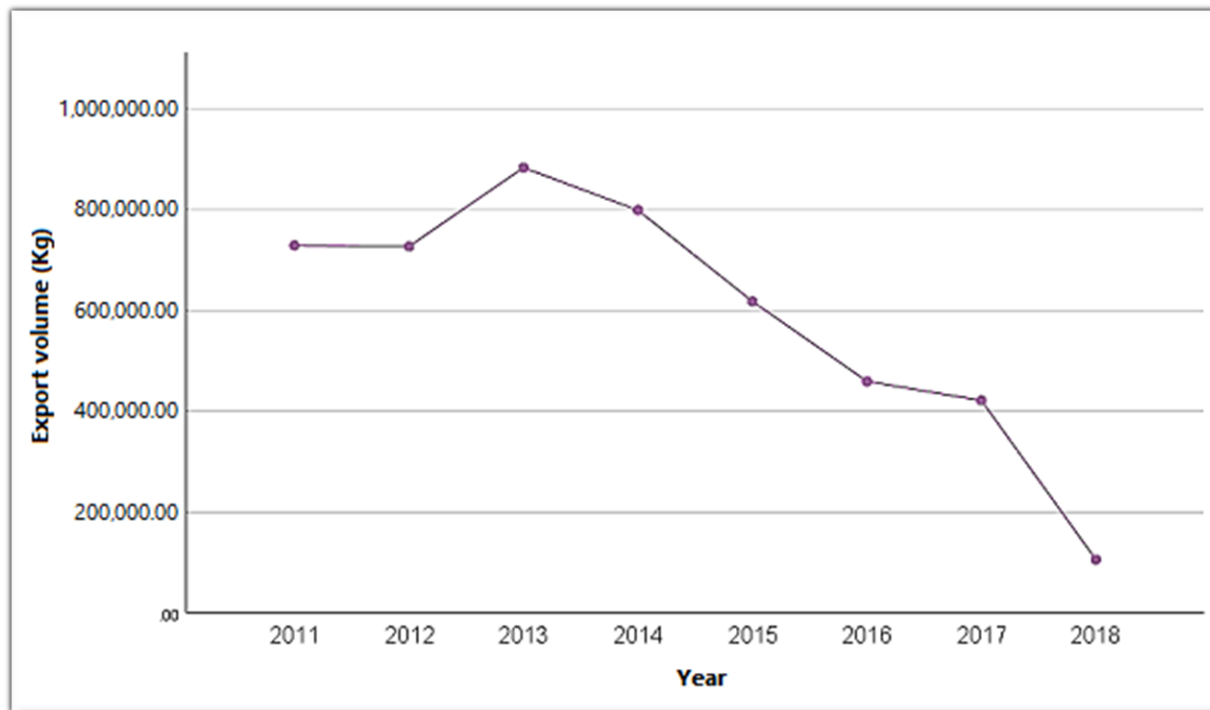
Source: CSA

The honey production of 2011 (about 54,000 tons) sharply decreased to about 40,000 tons in 2012. From 2012 the trend of honey production showed ups and downs and sharply decreased in 2017 (48, 000tons). It then sharply increased in 2018 (66, 000 tons). During the period the production of honey in the country (both from the traditional and modern hives), showed an average annual growth rate of 1%. This growth rate is low given the high annual honey production potential of the country which is 500, 000 tons (Legesse, 2014 and Ababor and Tekle, 2018). Actually, it is not only the low volume of honey produced in the country, which matters as far as honey export is concerned. But it is also the low quality of the honey produced in the country, which concerns, for the reason that the lion's share of the national hone production comes from the traditional bee-hives as illustrated in Figure 4.5. Traditional bee hives are characterized by low yield and low quality honey. This is a challenge that needs to be addressed and ensure the adequate supply of quality honey for export. The trend of Ethiopian honey export volume is discussed in section 4.6.

#### 4.6. Trend of the Ethiopian Honey Export Volume, 2011-2018

Figure 4.7 shows, the trend of Ethiopian honey export volume from 2011-2018. The results show that the general trend of the Ethiopian honey export volume was on a sharp decline.

**Figure 4.7: Trend of Ethiopian Annual Honey Export Volume (Kg), 2011 – 2018**



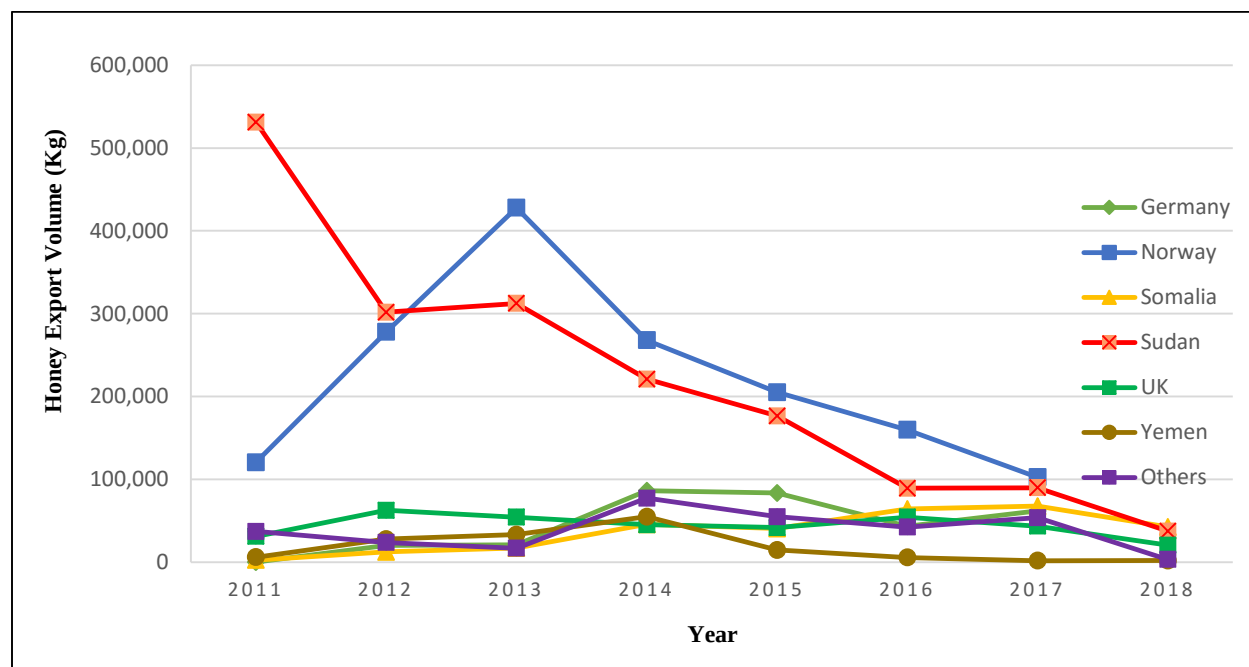
Source: ECC

The honey export volumes of 2011 and 2012 were about the same, and in 2013 there was a sharp increase. Then after the honey export volume continued declining sharply at an alarming rate and hit the lowest honey export volume level in 2018 since 2011. The minimum honey export volume was about 106 tons in 2018 and the maximum honey export volume was 883 tons in 2013 with a mean of 593 tons. Over these years, the Ethiopian honey export volume decreased at an average annual rate of 57%. The findings of this study clearly show the urgent need of government and the private sector to develop the honey value chain in an informed manner and transform the beekeeping sub-sector and enhance the honey export. The issue is what the root causes for this alarming declining rate of the honey export are. Reasons for this are not well established. This study has identified the challenges of Ethiopian honey export prevailing across the honey value chain, which when addressed would help to enhance the Ethiopian honey export.

#### 4.7 Ethiopian Annual Honey Export Volume and Value by Destination, 2011-2018

Figure 4.8 illustrates the destination of Ethiopian honey volume exported during 2011-2018.

**Figure 4.8: Ethiopian Annual Honey Export Volume (Kg) by Destination, 2011 – 2018**

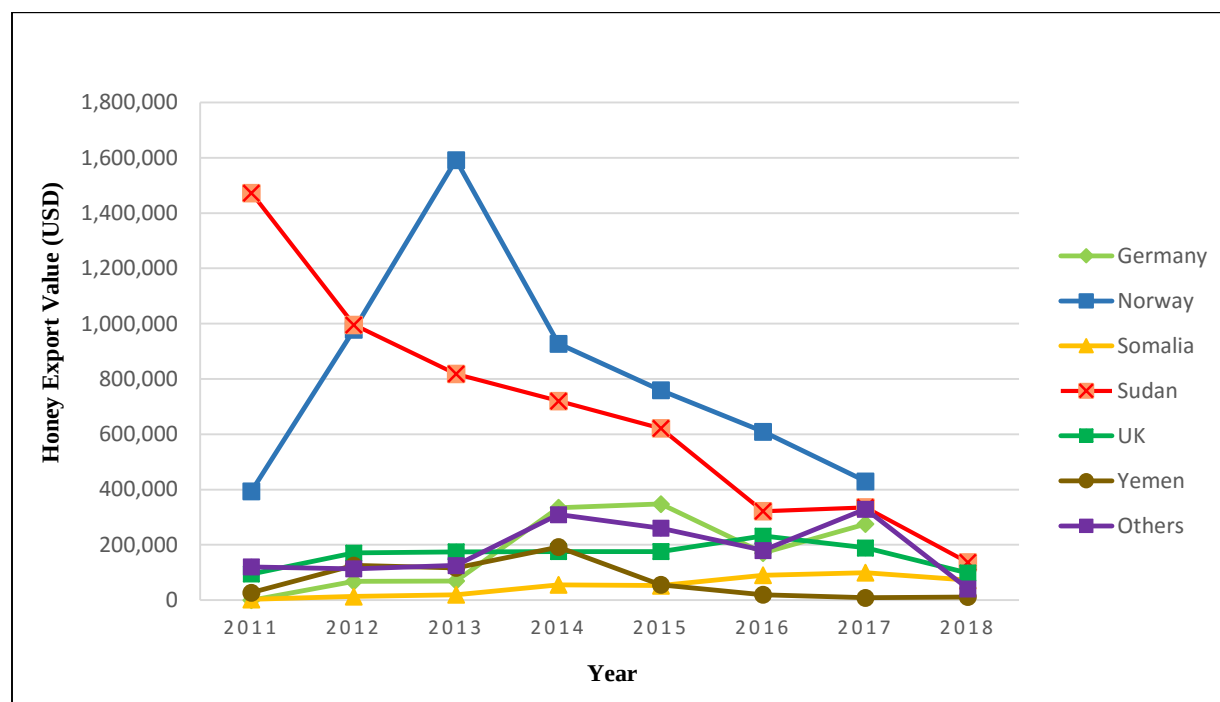


Source: ECC

Norway, Sudan, Germany, United Kingdom, Somalia and Yemen were the major honey importers. Except in 2011, Norway was the leading honey importer up to the year 2017 followed by Sudan. Sudan imported the highest honey volume in 2011. As illustrated in Figure 4.8 the general trend of the honey import of all countries was on the decline. All countries hit their lowest level of honey volume import in the year 2017 or 2018. The trend of the Ethiopian annual honey export volume (Kg) by destination is about the same to that of trend of Ethiopian annual honey export volume. Reasons for this are not well documented. The sharp declining trend as illustrated in Figure 4.8, is a concern for Ethiopia, which is striving to diversify export commodities and enhance foreign earnings. While the reasons for the declining rate of honey export volume to those countries are not well document, it is clear that the declining rate of the Ethiopian honey export volume illustrated in Figure 4.7 is likely to have had an impact.

Figure 4.9 shows the Ethiopian annual honey export value by destination. The trend of the honey export values by destination during 2011-2018 is about the same to the trend of the Ethiopian honey export volume by destination during the same period (Figure 4.8).

**Figure 4.9: Ethiopian Annual Honey Export Value (USD) by Destination, 2011 – 2018**



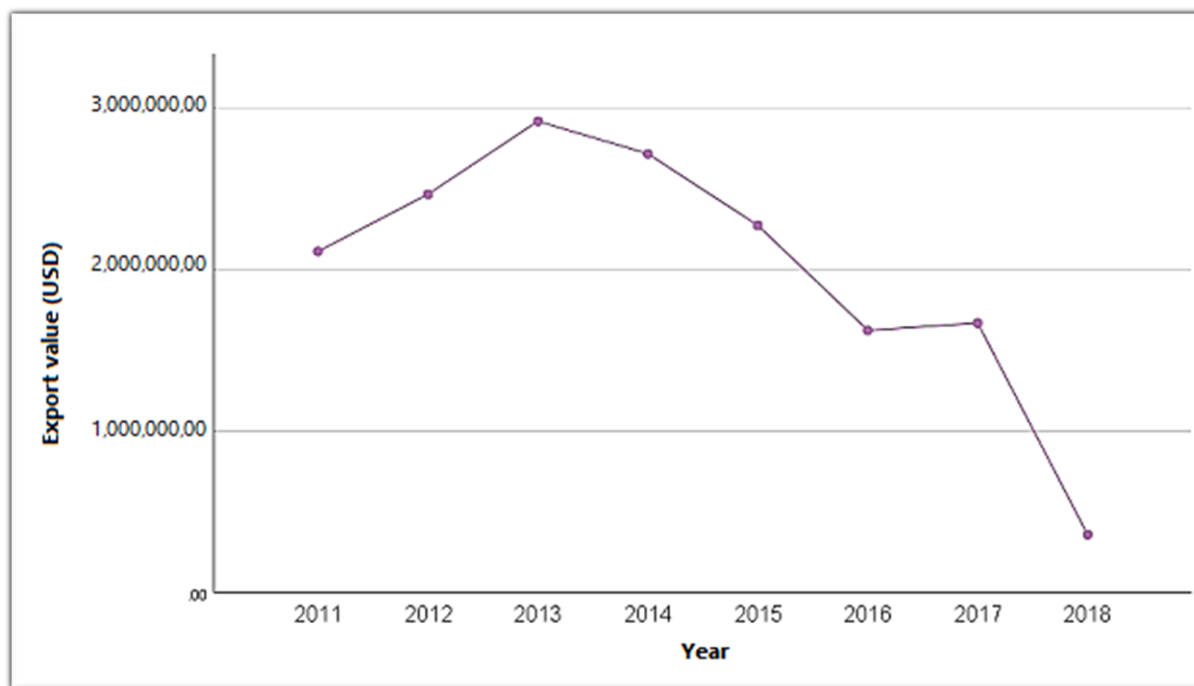
Source: ECC

As presented in Figure 4.9, over the years except in 2011 and 2012, the highest honey export values earned were from Norway followed by that from Sudan. But the honey export values earned from the different importing countries showed a sharp decline and the honey export values earned from of all the counties reached the lowest levels in 2017 or in 2018. These findings are also indication of, how the Ethiopian honey export volume and export values decreased at an alarming rate during 2011-2018. While the reasons for the declining rate of honey export values earned from the honey importing countries are not well documented, the declining rate of the Ethiopian honey export volume by destination illustrated in Figure 4.8 and the declining rate of Ethiopian honey export volume illustrated in Figure 4.7 are likely to have had an effect on the declining trend of honey export value by destination.

#### 4.8 Trend of the Ethiopian Honey Export Value, 2011-2018

The trend of the Ethiopian honey export value during the period of 2011-2018 is shown in Figure 4.10. As illustrated in figure 4.10, the trend of Ethiopian honey export value sharply increased in 2013 and then after almost sharply declined from the year 2013 to 2018. The export value hit the lowest level in the year 2018. The minimum honey export value is, USD 260 thousand, the maximum is USD 2, 918 thousand, with the mean of, USD 2,017. Over these years, the honey export value, decreased with an annual average rate of 52%. The trend of Ethiopian annual honey export value is about the same to the trend of Ethiopian annual honey export volume (Figure 4.7).

**Figure 4.10: Ethiopian Annual Honey Export Value (USD) by Destination, 2011 – 2018**



Source: ECC

It is likely that when honey export volume decreases (Figure 4. 7), honey export value also decreases as illustrated in Figure 4.10. It is also evident that the declining rate of the honey export volume (Figure 4.7), the low honey yield and quality associated with the traditional bee-hives, which are predominantly used in the country (Figure 4.4) are also contributing factors. Further, the challenges for Ethiopian honey export, identified in this study are also contributing factors for the sharply declining trend of honey export value.

## **CHAPTER FIVE**

### **5.0 SUMMARY, CONCLUSION AND RECOMMENDATIONS**

#### **5.1 Introduction**

This chapter presents the summary, conclusion and recommendations of the study. It gives a brief summary of the study and conclusion derived from the main findings. The chapter also covers the recommendations made based on the findings of the study, and the suggested areas for future research.

#### **5.2 Summary**

According the findings of the analysis of the primary data of this study, the challenges of Ethiopian honey export prevailing across the honey value chain functions and support functions examined by the study are the following. At the beekeeping input supply function of the honey value chain, inadequate supply of improved beekeeping equipment to beekeepers is the identified challenge. Thus, because of the inadequate supply of improved beekeeping equipment, the alternative for the beekeepers is to use traditional beekeeping equipment, which goes hand in hand with traditional beekeeping practices. As traditional beekeeping equipment and associated traditional beekeeping practices are characterized by low quantity and quality of honey, their wide use by beekeepers leads to low supply and quality of honey, which is a challenge for the honey export.

At the production function of the honey value chain, the honey export challenges identified are, low honey production and productivity, low quality of honey, drought, seasonality of honey production and smuggling, which lead to shortage of honey supply for honey export. Further, at the production function of the chain, lack of adequate knowledge and skill of beekeepers in improved beekeeping, inadequate use of improved beekeeping equipment, harvest of pre-matured honey and poor honey harvesting method are identified as challenges, which in turn lead to poor honey quality for honey export. In addition the study revealed that the wide use of inappropriate and unhygienic containers by beekeepers to store/keep honey after harvest compromises honey quality and is a challenge for honey export.

At the domestic honey marketing function of the honey value chain, the findings of study revealed that poor market infrastructure, lack of organized market, lack of legality, adulteration and

smuggling are the identified challenges, which in turn lead to inadequate supply and quality of honey for export, high domestic honey price and less competitiveness in the global honey market. These are all challenges to Ethiopian honey export. At the support function of the honey value chain, the identified challenges for honey export are, poor beekeeping extension and inadequate financial credit services, absence of mandatory honey standard and internationally accredited laboratory in the country, weak regulation and absence of permanent vertical and horizontal linkage platforms for the honey value chain actors.

The findings of the analysis of secondary data (raw data sourced from the Ethiopian Central Statistics Agency (CSA) and the Ethiopian Customs Commission) showed that the percent shares of the traditional hives in use in the country and their percent shares of honey yields of the total honey production of the country were higher than that of the modern hives. Although the per hive honey yield from the traditional bee hive is lower compared with that of frame and transitional bee hive, because of the high number of traditional bee hives in use in the country, the honey from the traditional bee hives takes the lion's share of the total honey production of the country. This by implication means low honey production and quality in the country, which in turn negatively affect the Ethiopian honey export.

Based on the finding of the study, the trend of the honey production of Ethiopia showed that the honey production of 2011 (about 54,000 tons) sharply decreased to about 40,000 tons in 2012. From the year of 2012 the trend of honey production showed ups and downs and sharply decreased in 2017 (48, 000 tons). It then sharply increased in 2018 (66, 000 tons). During the period the production of honey in the country (both from the traditional and modern bee hives), showed an average annual growth rate of 1%. This growth rate is low, given the high annual honey production potential of country.

The study revealed that trends of the Ethiopian honey export volumes and values during the period of 2013-2018 were generally on the decline, although there were sharp increases in 2013. Thereafter, the trends of the honey export volume and value continued declining sharply at an alarming rate and hit the lowest honey export volume and value levels in 2018 since 2011. The major importing countries were Norway, Sudan, Germany, United Kingdom, Somalia and Yemen.

The study also showed that the general trends of honey import volumes by different countries and the export values that Ethiopia earned from the honey export from the importing countries during

2011-2018, were on the decline, All countries hit their lowest levels of honey volume import and associated values in the year 2017 or 2018. Generally, the findings of the analysis of the primary and secondary data of the study are complimentary, and have revealed the challenges of the Ethiopian honey export and the alarming declining trend of Ethiopian honey export, which require urgent attention.

### **5.3 Conclusion**

From this research study, it can be concluded that the Ethiopian honey export is affected by a wide ranging and interlinked challenges prevailing across the honey value chain, which urge addressing the challenges holistically across the honey value chain. The trend of the Ethiopian honey production showed ups and downs during 2011-2018, and over the period increased at an average annual rate of only 1%. During the same period, the trends of the Ethiopian honey export volume and honey export value showed a sharp decline. Over the period (2011-2018), the Ethiopian honey export volume decreased at an average annual rate of 57% and the honey export value decreased at an average annual rate of 52%. The findings of the analysis of the primary and secondary data of the study are complimentary, and have revealed the challenges of the Ethiopian honey export and the alarming declining trend of Ethiopian honey export volume and value.

The low average annual rate of increase of the annual Ethiopian honey production (only 1%) and the alarming declining rates of the Ethiopian honey export volume and value require urgent and informed corrective measures. This is important, given the huge and untapped honey production potential of Ethiopia. In addition, as the challenges of Ethiopian honey export identified in this study are wide ranging and interlinked, they need to be addressed in a holistic manner across the honey value chain.

### **5.4 Recommendations**

Based on the findings of this study the following recommendations are made for informed development interventions and policy measures, to develop the honey value chain and enhance the Ethiopian honey export.

- Design beekeeping input production and supply strategy and implement. Like in other agricultural practices, which require supply of improved agricultural inputs to produce marketable agricultural products, beekeeping practice also requires timely and adequate

supply of inputs to either strengthen existing beekeeping activities or/and establish new apiaries. According to the findings of this study, currently there is no well-coordinated beekeeping input production and supply in the country. Thus, beekeepers encounter problem to get improved inputs such as improved bee hives, which are necessary to produce adequate and quality honey. Therefore, there is an urgent need to map the beekeeping input production and supply land scape in the country and design beekeeping input production and supply strategy and implement. This is to ensure sustainable, accessible and affordable supply of improved beekeeping inputs to beekeepers, and enhance the production of adequate and quality honey for export.

- Proper use of the widely available traditional bee hive resource in the country. Although there is a need to promote improved beekeeping practice and use of modern beekeeping equipment to improve supply and quality of honey for export, it is at the same time advisable to properly use the traditional bee hives available in the country. At present traditional bee hives are dominantly used in Ethiopia, and are contributing, the lion's share of honey supply for export. Therefore, in order to better use this resource, which requires no/limited external resource, appropriate extension service need to be provided to improve the honey yield and quality from this widely available and predominantly used traditional bee hives to the level possible. In this regard, identification and documentation of good practices of indigenous knowledge in beekeeping in the country and sharing them among beekeepers are advisable. Such measures can help improve the quality and yield of honey from traditional bee hives to the level possible.
- Establish honey belt areas in different parts of the county. Although beekeeping can be practiced in most parts of Ethiopia, because of the varied ecological and climatic conditions in Ethiopia favorable to honey bees, there are areas relatively better endowed with high honey production potential. Therefore, there is a need to identify honey belt areas in the different parts of the county and provide all necessary inputs that will enable to produce export standard honey in bulk. Further, challenges for honey export prevailing across the honey value chain in the honey belt areas need to be properly and timely addressed holistically in a honey value chain development approach. Establishing honey belt areas in potential honey producing parts of the county will help to properly use the limited resource of the country in an informed and market oriented manner, rather than scattering scarce

resources. This will help to sustainably produce adequate supply and quality of honey, and this in turn enhances the Ethiopian honey export.

- Develop, informed, export oriented and functional beekeeping extension package and promote its implementation. The actual annual honey production of Ethiopia is insignificant (50, 000 tons) compared with the honey production potential of the country (500, 000 tons). To properly tap the huge honey production potential of the county and enhance the Ethiopian honey export there is a need to develop, informed and honey export oriented beekeeping extension package and promote its implementation.
- Conduct honey market study in potential honey producing areas and develop corrective measures/strategies. The domestic honey marketing in the country is full of challenges which put the legal traders, including the honey exporter, in disadvantage. Further, because of the market problems the domestic honey price is highly distorted and is very advanced than the international honey price. Thus, there is a need to conduct honey market study in potential honey producing areas and honey markets and develop corrective measures/strategy to address the domestic honey marketing problem and their root causes and enhance the honey export.
- Adopt and ensure provision of strong honey export oriented beekeeping extension and financial credit services.
- Have mandatory honey standard, strengthen existing regulation and bridge regulation gaps
- Strengthen and establish permanent vertical and horizontal linkage platforms where actors in the honey value can, among others, meet to discuss issues and share experiences.

## **5.5 Areas for Future Research**

While research findings on different aspects of beekeeping at woreda and zonal levels are better established in the country, on the other hand nation and regional level research findings on different aspects of beekeeping are limited. Thus, there is a need to conduct region and nation-wide research studies to bridge knowledge gap and to inform the development of nation and/ or region wide improved beekeeping, rather than focusing only on conducting localized researches. This is important in the effort of the country to enhance the export of honey, which needs bulk supply and quality of honey. Such research studies can be guided and conducted by national, regional

research centers and higher learning institutions in different parts of the county. With this intention the following areas are suggested for future research.

- Assessment of the status of input supply to beekeeping in different parts of the country, identification of challenges and opportunities.
- Honey bee queen rearing in Ethiopia, challenges and opportunities
- Economics of feeding honey bees with supplementary feed.

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## APPENDIX

### Appendix 1: Questionnaire Used for the Survey

My name is Hadera Gebru. I am a post graduate student in Business and Economics College, Addis Ababa University. I am conducting an academic study on “Challenges of Ethiopian Honey Export across the Honey Value Chain and Trends of Ethiopian Honey Production and Export”.

Your honey exporting firm has been selected to participate for in the survey for the research. I would appreciate if you could spare some time for the interview session. The information you provide in this question is confidential and will be used for academic purpose only.

#### I. Basic details of the respondent

Date:.....

Name of the Firm: .....

Level of education of the firms' Manager.....

Years honey exported by firm since its establishment (in year): .....

Does the Firm have Apiary? (1) Yes (2) No

Does the Firm have honey processing facility? (1) Yes (2) No

What is the potential capacity of average annual honey export volumes of the firms (in ton) .....

What is the percent share of the actual average annual honey export volume of the firm from its potential capacities of average annual honey export volume (%).....

#### II. Input supply and honey production functions of the honey value chain

1. Which of the following is (are) the source (s) of honey supply for the firm in the order of Importance?

| No | Source of Honey Supply     | Rank |
|----|----------------------------|------|
| 1  | Firm's Apiary              |      |
| 2  | Individual beekeepers      |      |
| 3  | Farmers' Cooperative       |      |
| 4  | Farmer's Cooperative Union |      |
| 5  | Honey Traders              |      |
| 6  | Others (specify)           |      |

2. What is the degree of use of improved beekeeping equipment by beekeepers who supply honey to firms?

- (1) Widely use improved beekeeping equipment (2) Partly use improved beekeeping Equipment (3) Widely use traditional beekeeping equipment

3. Does the firm encounter shortage of honey supply?

- (1) Yes (2). No If yes,

4. What are the major reasons for the shortage of honey supply encountered by firms in order of importance?

| No | Major Reasons for Shortage of Honey Supply | Rank |
|----|--------------------------------------------|------|
| 1  | Low production and productivity            |      |
| 2. | Low quality honey                          |      |
| 3  | Drought                                    |      |
| 4  | Seasonality of honey production            |      |
| 5  | Honey Smuggling                            |      |
| 6  | Others (specify)                           |      |

### Quality of honey supply

5. Does the firm encounter honey quality problem?

- (1) Yes (2) No If yes,

6. What are the major reasons for honey supply quality problem encountered by firm?

| No | Major reasons for quality problem of the honey supply?                    | Yes | No |
|----|---------------------------------------------------------------------------|-----|----|
| 1  | Lack of adequate knowledge and skill of beekeepers in improved beekeeping |     |    |
| 2  | Lack of adequate use of improved beekeeping equipment                     |     |    |
| 3  | Harvest of pre-matured honey and use of heavy smoke during harvesting     |     |    |
| 4  | Application of chemicals and pesticide for crop protection                |     |    |
| 9  | Others (specify)                                                          |     |    |

### III. Domestic honey marketing function

7. Does the Firm encounter honey marketing problem, while buying honey for export?

- (1) Yes (2) No If yes,

8. What are the major reasons for the domestic honey marketing problem?

- (1) ) Poor market infrastructure (ii) Lack of organized market (3) Lack of legality  
(4) Adulteration (5) Smuggling (6) Others (specify)

9. What are the major problems encountered by the firm because of the domestic honey marketing problem(s)?

(1) ) Less complete in the global honey market (2) Inadequate supply of honey for export  
(3) High domestic local honey price (4) Low quality of honey supply for export (5) Other  
(Specify)

10. How does the firm rate the local honey price per Kg rate compared with the global honey price per Kg?

(1) The same (2) Higher (3) Less

#### **IV Support function**

##### **Honey standard, regulation and internationally accredited laboratory**

12 Is there mandatory honey standard in Ethiopia?

(1) Yes (2) No If no,

13. What problem(s), has the firm encountered due to the absence of mandatory honey standard in Ethiopia?

(1) Less commutative in the local honey market (2) Shortage of quality honey supply for export  
(3) Less competitive in the international honey market (4) others (specify).

15. What is the extent of regulation of honey standard, health and safety by the responsible government body?

(1) Very Strong (2) Strong (3) Weak (4) others (specify)

17. Which importing countries have large and lucrative honey export market?

(1) Importing countries with stringent regulation (2) Importing countries with less stringent regulation (3) Others (specify)

(1) To Importing countries with stringent regulation (2) To Importing countries with less Stringent Regulation (3) Others (specify)

18. Is there internationally accredited laboratory in Ethiopia to test honey quality and other importing country required tests?

(1) Yes (2) No If no,

18. What problem(s), has the firm encountered due to the absence of internationally accredited laboratory in Ethiopia?

(1) Lengthy process to have sample honey tested abroad  
(2) High cost incurred to have sample honey tested abroad  
(3) Problem to meet honey delivery deadlines of importers  
(4) Others (specify)

19. Where does the firm get larger export market and lucrative market for honey?

- (1) In importing countries with stringent import regulations
- (2) In importing countries with less stringent import regulations
- (3) Others (specify)

**Extension Service, financial Credit facility and vertical and horizontal platforms for actors**

20. How does the firm rate the extension service provided to beekeepers by government?

- (1) Excellent
- (2) Very good
- (3) Good
- (4) Poor

21. Is there financial credit service for honey export?

- (1) Yes
- (2) No
- (3) Not applicable
- If yes.

22. Is the provision of the financial credit adequate?

- (1) Yes
- (2) No

23. Are there permanent vertical and horizontal platforms for actors in the honey value chain to meet and discuss relevant issues for result oriented collective actions?

- (1) Yes
- (2) No
- (3) Others (specify)

**V. Relevant issues not covered in this questionnaire?**

24. In your opinion, what measures should the government take to improve the Ethiopian honey export?

25. Do you think there are important issues not covered in this questionnaire?

- (1) Yes
- (2) No
- If yes, specify

**The end**

**Thank you!!**

## Appendix 2: Voluntary Quality Standard of Honey in Ethiopia

| Parameters             | Unit            | Amount |
|------------------------|-----------------|--------|
| Moisture               | % by mass, max  | 22     |
| Ash                    | % by mass, min  | 1      |
| Sucrose                | % by mass max   | 5      |
| Reducing Sugar         | % by mass, min. | 60     |
| Fructose Glucose ratio | %               |        |
| Acidity                | % by mass, min. | 0.2    |
| Water insoluble solid  | % by mass, max  | 0.5    |
| Hydroxymethylfurfural  | Mg/kg mx.       | 40     |

Source: Honey specification (2018). Ethiopian Standards Agency. Third Edition

### Appendix 3: EU and CODEX Honey Quality Standard Directive 2001/110 EC

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| <b>Compositional</b>      |                   | <b>Revised CODEX 2001</b> |
|---------------------------|-------------------|---------------------------|
| <b>Criteria</b>           | <b>EU General</b> | <b>General</b>            |
| Moisture %                | < 20              | < 20                      |
| Fructose + glucose %      | > 60              | > 45                      |
| Sucrose %                 | < 5               | < 5                       |
| Water – insoluble solid % | < 0.1             | < 0.1                     |
| Acid meg kg-1             | < 50              | < 50                      |
| HMF meg -1                | <40               | < 40                      |

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Source: Council Directive 2001/110/EC of 20 December 2001 Relating to Honey (2001).  
Official Journal of the European Communities, .2002.