

Review Article

Contribution of Beekeeping for Job Creation and Poverty Alleviation in Ethiopia

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Abstract

The production of foodstuffs, the care of animals, agricultural products, and the preservation of natural resources may all be combined with beekeeping, an environmentally friendly activity. It's easy to integrate with other everyday tasks because it isn't a labor-intensive activity. Given the current state of the economy, it is improbable that farmers did not set aside land for the cultivation of bee flora and/or beekeeping. Following technological intervention in the watershed, the main crops planted there were maize (24.6%), teff (21%), wheat (15.1%), potatoes (20%), and beekeeping (19.8%). These contributed significantly to the watershed's overall economic output. The survey results also showed some of the benefits that the beekeeping industry has to offer, including increased income, better access to nutritional values (honey consumption by family members directly leads to improved feeding habits), improved access to livestock development (buying cows and oxen), ability to pay off debt and save money, purchase of household goods, construction of houses in towns, and similar benefits. All of these show that beekeeping is helping farmers support their way of life. Therefore, the government should support policies that encourage self-employment opportunities in off-farm activities like beekeeping, value chain development, agricultural service provision, and agribusiness activities in order to increase beekeeping productivity and reduce poverty and create jobs. However, it is believed that one million farm households utilize traditional, intermediate, and contemporary hive production methods in their beekeeping businesses. In Ethiopia there are two harvesting seasons for beeswax and honey from October to November and from April to June based on the presence of flowering crops and the potential flowering ability of Eucalyptus tree, respectively. A significant amount of honey is sold in Ethiopia to generate revenue in domestic and export markets.

Keywords

Beekeeping, Ethiopia, Job Creation, Poverty Alleviation

1. Introduction

Around 95% of the Ethiopia's agricultural output is produced by smallholder agrarians [3] also has been go through prolonged food insecurity. Hence, about 29 percent of the

population lives inferior to the national poverty [4]. The ability of the homeland address food and nutritional insecurity, poverty, and to stimulate for sustain national economic

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growth and development is very much needy on the performance of agriculture. Therefore, from agriculture, livestock subsidize up to 20% to Ethiopia's GDP and livelihoods of 60-70 percent of the population. Apiculture, which is one of the essential livestock subsectors, contributes significantly to the upgrading of the livelihood's economy [4]. Generating employment opportunities that can absorb the large number of youths reaching working age is a development challenge [2]. The problem is more pronounced in rural areas where more than 84% of the youth did not complete primary school and their access to productive resources such as land and credits is limited [14]. Rural youth are often employed in family works (>50%) and self-employed (about 40%), and the nature of their employment is considered low-quality due to low payments and lack of secure contracts [5]. This situation is unfortunate considering the potential of the agricultural sector in employment creation for rural youth in livestock, cash crops, food crops and non-farm activities such as agro-industry and value chain [8].

For Ethiopian farmers, apiculture is a respectable way to earn money outside the farm, and it plays a significant part in boosting annual revenue. In addition to helping customers purchase nutritious food, it has the ability to increase beekeepers' profits beyond what they would receive from the sale of honey, beeswax, and colonies. The pollination impact of honeybees creates direct employment possibilities, monetary revenue, food in rural regions, and helps to boost crop yields in agriculture. For those who lack land, money, or space, apiculture is a great concept because it requires very little of it. It is commonly believed that a well-managed honey bee will yield a significantly large net return [13].

2. Methods of Beekeeping

Modern, traditional, and transitional hives are used in Ethiopian apiculture nowadays, depending on the state of technical development. There are between 4 and 10 million hives in Ethiopia, of which 95, 4.5, and 0.5% are traditional, transitional, and contemporary varieties, respectively, according to [15].

Honey Harvest Season

The customs that traditional Ethiopian beekeepers have developed include sniffing honey, gathering bees around hive entrances, weighing hives at the end of blooming season, and identifying the best time to collect honey and beeswax. Some apiculturists use a small stick inserted into the hive to determine the honey season. If there is honey, the stick returns with the honey strips. It is also hard to determine whether honey has matured externally, making this way of pointing useless for distinguishing honey from brood by weighing. However, in the case of a moving comb and frame hive, the maturity and pure honey are readily visible [16].

In Ethiopia, beeswax and honey are typically harvested in two distinct seasons: October through November and April through June. The major prominent feature of the second

season is the potential for eucalyptus trees to blossom, although flowering crops are present in the first. Furthermore, in Ethiopia's numerous agro-ecologies, different minor harvesting seasons are dependent on the type of flowering plants and patterns of rainfall. As a result, locals and professional apiculturists readily correlate the collection period with the botanical source of honey in their area [17, 18].

3. Contribution of Beekeeping for Job Creation

In Ethiopia, the exact quantity of engaged people in the honey sub-sector is not well known. Nevertheless, it is predictable that around one million farm households are elaborate in the honey bees business using the traditional, intermediate and modern hives. It could also be observed that a large quantity of mediators and traders participate in the collection of honey and retailing at village, district and zonal levels. Thousands of households are involved in Tej-making in almost all urban areas processors are emerging and exporters [9].

Beekeeping practices generate job opportunities for landless men and women for their livelihood as it needs low capital to start [1]. It can also serve as job opportunities to local carpenters and organized youth in construction of beehive. Beekeeping subsector has significant role in generating and diversifying the income of subsistence smallholder farmers mainly the small land holders and landless toward poverty reduction in rural areas [10].

The program targeted at improving the income and livelihoods of farmers (youth and adults) in areas identified as high potential for bee keeping. It focused on improving the quality and quantity of honey production using innovative methods from input use to post harvest handling. The program also facilitated farmers' access to market by establishing business networks in the apiculture value chain [6]. Challenges faced: Price fluctuations for honey export; delay in repayment of loans by producer organizations; limited follow up and technical support of partners; limited capacity of local level government institutions; inadequacy of technical staff to enforce standards and regulations on produce; requirements for establishing laboratories; and low-level of awareness on quality assurance [10].

4. Contribution of Beekeeping for Poverty Alleviation

Apiculture is an ecologically sustainable activity that can be integrated with agricultural practices like animal husbandry, crop production, horticultural crops and conservation of natural resources. Thus, it would be one of the most significant involvement areas for the sustainable development of poor countries like Ethiopia [6]. Non-farm business activity has an enormous involvement to the economies of segments

of society and the national economy as a whole [7].

Due to not a labor-intensive activity Beekeeping can easily be combined with other daily activities. Apiculture in the study watershed agreed and started forming and organizing themselves in Beekeeping Associations, improving their techniques, increasing production and strengthening their position on the market [13]. Nevertheless, forages could be grown as hedges around field edges and on soil bunds, particularly on the sloping land. In the watershed area, after the involvement of the technology, the total economic contribution proportions were beekeeping (19.8%), teff (21%), Maize (24.6%), wheat (15.1%), and potato (20%) are the major crops grown in the watershed [13].

The beekeeper's yearly income from producing honey is the sum of net cash flows after financing, excluding all costs of family labor, rental costs of land, and costs associated with the maintenance of the beehives. In poverty-prone countries like Ethiopia, the increases in annual income enable advanced food security and increased purchasing power. This type of income boost goes in hand with the most important objectives of international assistance organizations in developing countries: poverty reduction and increased food security [11].

In addition to the source of income from the sale of honey products, families are consuming honey with an average yearly consumption of 4.6 kg/household with a standard deviation of 3.79 [12]. In the case of Northern Ethiopia, beekeeping activities enhanced the livelihood 90% of the sample respondents said that there was a change in livelihood due to the involvement in beekeeping activities while the remaining 10% responded that there is no change in livelihood brought by their involvement in beekeeping activities [12]. Beekeeping has that help farmer beekeepers to get better their well-being.

4.1. Honey

It is a product of honeybee, described as man's excellent sweetest energy source of food contains more than 180 elements [19]. In Ethiopia, traditionally much honey has been fermented to make 'Tej' which about 85% of the total honey estimated to be brought to market and remaining 15% is consumed at home [20]. Furthermore, from the total honey produced in the Ethiopia estimated to earn about 360-480 million birr per annual [21].

Ethiopia is the principal beeswax and honey producer worldwide and the regional leader in Eastern Africa in bee product business growth due to its highest quantity of bee colonies and additional honey flora. Ethiopia exceeds other countries in Africa by far in terms of volumes of beeswax and honey harvested and traded. Honey production of Ethiopia about 43,373 metric tons of crude honey/year, thus sharing 23.5 and 2.35% of African and world's honey production, respectively. This makes the Ethiopia rank 1st in Africa and 10th in the world [15-17].

Honey has a value for both domestic market and export market and is considerable part of socio-cultural significance [18]. In the county, farmer apiculturists are loved by the community for their sweet products. In addition, the production of 'Tej' as a local festival drink and it is a highly regarded product and widely used in diverse religious, cultural, traditional medication and ritual ceremonies [6, 9].

4.2. Beeswax

In Ethiopia, beeswax is largely collected from traditional hives rather than moveable frame hives and others. The beeswax yield from traditional hives is estimated to be 8-10% of the honey yield, compared to 0.5-2% from moveable frame hives [12]. Making of votive candles is an integral part of the cultural heritage within the many religious and ethnic groups are the use of beeswax.

In several regions of the Ethiopia, beeswax gathering is not significant and it is produced by honeybees, which could be harvested by beekeepers, is exhausted. The beeswax is mostly left or thrown away because beekeepers do not bother to collect it since it is of little practical value for beekeepers and the people do not know the local beeswax is generating attractive money [19].

However, the yearly beeswax production of Ethiopia is expected at 3,658 tones [9]. This makes Ethiopia next to China, Mexico and Turkey the 4th largest beeswax-producing country in the world. Beeswax supports the national economy through foreign exchange earnings. Currently, beeswax is one of the most important exportable honeybee's products. In Africa, Ethiopia is the 3rd largest beeswax exporter and the average value of beeswax is estimated at 125 million birr per annual. Beeswax is a multipurpose natural honeybee product, which is used in the manufacture of more than 300 commodities and also plays a big role in the cultural and religious life of the people of Ethiopia [10].

Table 1. Honey export from 1998 – 2003.

Year	Honey (in tons)	Value (in Birr)
1998	1781.10	78,188
1999	100.80	29,245
2000	761.20	221,363
2001	129.00	30,922
2002	333.90	93,269
2003	340.30	79,087
Total	1843.30	532,074
Average	307.22	88,679

Source: Ministry of Trade and Industry

4.3. Cash Income

Apiculture is believed to play an important role and is one of the possible smallholder farmers to sustain their livelihood. It serve as a source of additional income, quite several people entirely depend on beekeeping and honey-selling for their livelihoods indicating that honeybee and their products supply through cash income for beekeepers. In Ethiopia, honey production is not attractive for selling their colonies in the market. So, honeybees serve as 'near cash' capital which generates attractive money. This indicates for rural communities, bee keepings are a source and means of diversification of income. In the Jimma Zone, beekeepers estimated to earn up to 40 thousand birr/year. In some communities, solely depends on honey-selling. In addition, from the sale of honey making in the Amhara region who are elaborate in beekeeping technology packages to earn up to 3000 birr [14].

Currently the regional and domestic honey markets are under-saturated in Uganda and Kenya; which is sound for Ethiopia, where hotels, urban supermarkets, and other retail channels deliver chances for sales of honey. If supplies are erratic, small volumes are acceptable, lower marketing and transaction costs, less stringent quality criteria, less stringent certification requirements easier to sell without any special marketing approach fewer consequences are the advantages of locally selling [20, 21]. Fresh local honey product is at all times more highly prized than imported honey. Several beekeepers sell their products openly to clients. Honey is habitually used as a barter commodity in villages, especially in remote areas because of long shelf life. It will remain wholesome for many years if gathered carefully. Honey consumption increases as standards of living rise [11-13].

Most developed countries import honey to meet demand. This condition can be responsible for developing countries from honey exports with a useful source of foreign exchange. If production is more than local requirements, all developing countries can export honey because apiculture does not use land, for local consumption the production of honey for export need not conflict with growing crops [19-21].

The price is determined by different production costs, diverse vegetation and climate zones, and the yield/bee colony [20]. At different market points, honey has a good domestic market all year round with slight price changes [15, 19-21].

Table 2. Production of beeswax and honey.

Country	Honey (metric tons)	Beeswax (metric tons)
Angola	23,000	2,000
Burundi	240	45
Cameroon	3,000	287
Central A. R	13,000	690
Chad	960	0

Country	Honey (metric tons)	Beeswax (metric tons)
Ethiopia	39,000	4,300
Guinea	600	0
Guinea-Bissau	65	100
Kenya	21,000	2,400
Madagascar	390	0

Source: FAO (2005)

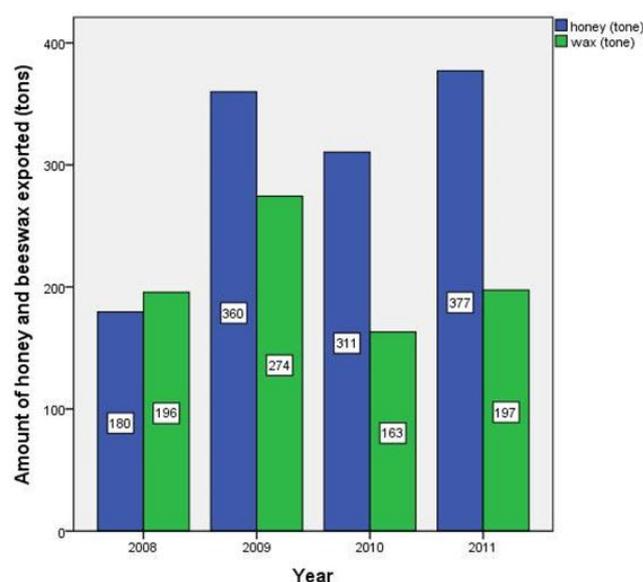


Figure 1. Export of Beeswax and Honey (in tons) (Gezahegne, 2012).

4.4. Increase Quantity and Quality of Crop by Pollination

In order to ensure pollination, many fruit crops—such as blueberries, apples, blackberries, cranberries, cherries, pears, raspberries, plums, and strawberries—need an insect pollinator. An abundant supply of pollinators during flowering is necessary to yield a harvest that can be sustained. Proper pollination accelerates fruit maturity, increases fruit size at yield, and creates a more symmetrical fruit shape. Higher pollination rates on flowers result in more seeds and larger fruit. Smaller and more asymmetrical fruits result from improper pollination because the ovarian tissue is not encouraged to expand around the seedless portions. Plants have evolved strategies for transmitting and receiving pollen since they are sedentary creatures. Bees are primarily responsible for livestock-facilitated pollination in agriculture. Because honey bees are very easy for humans to keep and relocate, they are the most widely used pollinators in agriculture. [16, 19-21].

Because of their large colonies—up to 60,000 workers in

the summer—honey bees may be more efficient pollinators than other bee species, although native bees are also significant pollinators and occasionally even more effective than honey bees on an individual basis. However, since agriculture depends more and more on honey bees maintained by beekeepers, the number of native bees is decreasing. A producer can boost the possibility of appropriate pollination and make up for the decline in wild bee populations by renting honey bee colonies [18].

There are now more income prospects due to the increasing recognition of the ecological and economical value of natural insect pollination, which enhances crop quality and quantity. A forest or wild grassland with natural pollinators close by can increase the productivity of agricultural products by roughly 20%, including apples, almonds, and coffee. A basic illustration of the economic worth of ecological services is the possibility that forest owners will demand payment for their role in the increased agricultural results due to the advantages of native pollinators. A vital component of the agricultural system is bees. Honeybees have a major role in enhancing national food supply and plant species regeneration, even though their value in crop pollination is underestimated. The world's most important pollinators are honeybees. It is more harder to measure their utility, but their pollination service is thought to be worth nearly 15 times the value of all hive products combined [15-18].

Honeybees are thought to contribute significantly to Ethiopia's economy by way of pollination services. One of the most crucial elements influencing agricultural seed production is pollination. A study carried out in Ethiopia to ascertain the impact of pollination on Niger (*Guizotia abyssinica*) revealed that honeybees enhanced the seed output of Niger by approximately 43% [17]. An estimated one-third of all plants or plant-derived foods consumed by humans depend on bees for pollination, either directly or indirectly [20]. Certain crop varieties feature flowers that might only receive pollination for a brief time. A crop of such kind will lose its blossoms and not produce any seeds, berries, or fruit if it is not pollinated during that period. The crop that has been pollinated must have a enough quantity of bees [21].

In addition to producing more fruits, berries, or seeds, bee pollination may also improve the quality of the food. Effective flower pollination may also help shield crops from pests. The growth of all the seeds within a fruit results in a superior weight that is caused by adequate pollination. The fruit will be larger and more uniformly formed the more seeds that have fully developed. An intriguing finding from bilberry research was that 89.1% of the blooms on bilberries planted near an apiary underwent fertilization and bore fruit. Fertilization and berry production were just 47.5% in a bee-free environment. For the bilberries near bees, the average berry weight was 0.578 grams, whereas for the berries far from bees, it was 0.348 grams. Out of 100 blossoms, 51.1 grams of berries were harvested when there were bees in the area, compared to

only 16.8 grams when there were none [17-21].

5. Honey Marketing System

5.1. Domestic Market

A significant amount of honey is sold in Ethiopia to generate revenue. Smallholder beekeepers, who mostly sell raw honey to collectors in the closest town or village markets, are the origin of the domestic honey market [12-15]. The need for honey in local industries, the consumption of processed table honey in most metropolitan areas, and the rapidly growing demand for tej are all contributing factors to the growth in domestic honey consumption [22]. A total of 163,257.42 tons were consumed domestically between 2007 and 2011, of which 146,931.67 tons were consumed domestically [24]. Out of a total of 47,706,101 tons, the country's domestic honey market is estimated to have been 42, 935 tons as of late [23]. Retailers, final honey consumers, producers/farmers, honey collectors/assemblers, and others are among the many honey marketing participants, as noted by [22].

Producers: At the village or district market center, producers and farmers sell their honey to various consumers. Due to limited supply of honey products and a dearth of knowledge about honey marketing at other locations, farmers prioritize individual marketing in the marketplace nearest to their place of residence in order to minimize transportation expenses and reduce their negotiating power.

Honey collector: In order to resale their honey to other collectors, merchants, and customers from other parts of the region in the district market center, the honey collectors in the research area bought their honey directly from farmers at a small village market.

Retailers: Some stores and merchants split up big quantities of the goods and offer it to customers in smaller portions. These are the last connections in the chain that provide honey to customers.

Consumers: From the perspective of the customer, the likelihood that the retail price will be reasonable increases with the length of the marketing chain. These are individual homes that purchased the commodity for both personal use and the production of "Tej." Traditional, intermediate, and enhanced box hives sold honey for an average of 35.35 and ETB 55 (€1.58, €1.58, and €2.49) per kg, respectively [23].

5.2. Export Market

Ethiopia is now on the European Commission's list of nations that export honey as a third party. There are several conditions, both main and secondary, that must be fulfilled in order to export to the European Union. The main criteria were being a feasible offer to the market, being included in the EU inventory of third-country honey exporters, and hav-

ing clean honey. The buyer's business relationships, a traceability system for quality control and hazard analysis, and the idea of a key control point were among the secondary criteria [21-23].

Products from beekeeping contribute significantly to the growth of the national economy. In many African nations, honey and other apiculture products with great potential for export include beeswax, propolis, pollen, royal jelly, and bee venom [21]. Honey and other apiculture products provide underdeveloped nations with an opportunity to trade money. Ethiopia sells honey to the United Kingdom, Yemen, Sudan, Norway, Saudi Arabia, Japan, and the United States. In 2008, Ethiopia sold 30 tons of honey to the United Kingdom, marking its first export to a European nation. From 2008 to 2011, Ethiopia exported 7,068 kg of honey and 6,752 kg of beeswax. As it was increasing from time to time, it reached 4252.8 tons of honey in the year 2011-2016 [23].

6. Conclusion and Recommendation

Ethiopia has a great deal of potential for beekeeping due to its diverse flora and agro-ecological zones. The situation of agro ecology, different flora and geographical location are suitable to facilitate beekeeping activities. One non-farm business venture that significantly boosts revenue is beekeeping and livelihood improvements of the rural youth and the national economy and the economics of several societal sectors. In Ethiopia there are three types of hive such as traditional, transitional and modern hives. According to the existence of flowering crops and the possibility for eucalyptus tree to flower, Ethiopia has two harvesting seasons for beeswax and honey: October to November and April to June, respectively. Ethiopia sells a lot of honey to make money both domestically and internationally. Therefore, government of Ethiopia should be close attention to the apiculture sector to realize appropriate contribution of the sub-sector in the process of poverty alleviation and job creation.

Abbreviations

FAO	Food and Agriculture Organization
GDP	Growth Domestic Products
USAID	United States Agency for International Development

Author Contributions

Mekuanint Tadilo: Conceptualization, Methodology, Data curation, Formal Analysis, Software, Visualization, Writing the original draft

Habtie Ambaw: Conceptualization, Data curation, Formal Analysis, Supervision, Writing of review & editing

Conflicts of Interest

The authors declare no conflicts of interest.

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