ECONOMIC ANALYSIS OF HONEY PRODUCTION AND MARKETING IN HAI DISTRICT, KILIMANJARO, TANZANIA

BY

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A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTERS OF SCIENCE IN AGRICULTURAL ECONOMICS OF SOKOINE UNIVERSITY OF AGRICULTURE. MOROGORO, TANZANIA

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ABSTRACT

The objective of the study was to analyze economic factors that affect honey production and marketing in Hai District. Specific objectives were (i) to analyse profitability of honey production (ii) to assess efficiency of honey marketing and role-played by various market participants (iii) to evaluate contribution of beekeeping to household income and (iv) suggest intervention strategies to improve the existing situation. A cross sectional research design was adopted, the sample size of 80 respondents obtained through both simple random and purposive sampling techniques. The study used both quantitative and qualitative methods for data analysis in order to address the objectives of the study. Statistical Package for Social Sciences (SPSS) 11.5 was used to analyze the data. The results of the study show that beekeeping is a household viable enterprise. Beekeepers owned on average 1-30 beehives and earned Tshs 37 850 as gross profit per one beehive. It was also observed that 84% of the sampled beekeepers didn't process honey into other valuable forms including wax. Processed honey and waxes earn more income compared to raw honey by about 30% higher. Constraints to honey and beeswax production as identified by respondents include: insects, legal access to forest reserve and drought as identified by 24.4%, 22.3% and 16.4% of the sample beekeepers respectively. Marketing constraints identified were low prices of honey (83.4% of the sampled beekeepers) and no strong market for honey products (16.6% of the sampled beekeepers). From this study it is concluded that beekeeping enterprise contributes to household cash income of Tshs 10 000-221 000 per year with a mean of Tshs 215 659 and it was seen that the contribution of beekeeping sector to the household income is significant. Meaningful interventions to enhance the

competitiveness of the value chain should start with organizing the players, letting them build a platform to interact addressing key chain issues. Any organization already involved in the establishing a supply chain of honey should be fully supported by all stakeholders. On the overall, despite its potential, it has failed to attract investment and therefore has remained at subsistence level. Government at all level and CSOs need to join efforts to commercialize the sector. Whatever efforts we do, market is the determining factor, e.g. why improve quality if the market is not ready to pay an extra cost for quality products? Since entry into export market requires strict quality products, let us develop the local market, which shall form the springboard for exports.

DECLARATION

I, JOEL JOHNSON MMASA, do hereby declare to the Senate of Sokoine University of Agriculture that this dissertation is my original work and has not been submitted for a higher degree in any other university.

_____

_____

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(MSc. Candidate)

The above declaration is confirmed by,

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(Supervisor)

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DEDICATION

This work is dedicated to my Lord Jesus Christ who has been my helper and a very trustful friend throughout my life when I am in need of his support. This dedication is also extended to my beloved father Johnson Mmasa and my Mother Christabel Mmasa and my sister Esther who laid the foundation of my education.

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LIST OF ABBREVIATION

BDP	-	Beekeeping Department Plan
BDP	-	Beekeeping Development Project
CBFM	-	Community Based Forest Management
CSO	-	Civil society Organizations
DNRO	-	District Natural Resources Officer
ELCT	-	Evangelical Lutheran Church of Tanzania
FAO	-	Food and Agriculture Organization
FODA	-	Food Development Association
GDP	-	Gross Domestic Product
GFP	-	Golden Food Product
GM	-	Gross Margin
GNP	-	Gross National Product
HABECO	-	Hai Beekeepers' Cooperative Society
ILRI	-	International Livestock Research Institute
JFM	-	Joint Forest Management
MKUKUTA	-	"Mkakati wa Kukuza Uchumi na Kupunguza Umaskini
MNRT	-	Ministry of Natural Resources and Tourism
NBKP	-	National Beekeeping Programme
NBP	-	National Beekeeping Policy
NBS	-	National Bureau of Statistics
NGOs	-	Non-Governmental Organization
NRM	-	Natural Resource Management
NSGPR	-	National Strategy for Growth and Poverty Reduction

PEM	-	Protein Energy Malnutrition
ROI	-	Return On Investment
S-C-P	-	Structure Conduct model Performance
SIDP	-	Sustainable Industrial Development Policy
SMEs	-	Small and Medium Enterprises
TAS	-	Tanzania Assistance Strategy
TBS	-	Tanzania Bureau of Standards
TC C I A	-	Tanzania Chamber of Commerce, Industries and
TFAP	-	Tanzania Forest Action Plan
TR	-	Total Revenue
TVC	-	Total Variable Costs
UK	-	United Kingdom
URT	-	United Republic of Tanzania
WMA	-	Wildlife Management Areas

CHAPTER ONE

INTRODUCTION

1.1 Background information

Beekeeping is principally dealing with the management of bees and processing of bee products from natural forests, plantations, agricultural land and other habitats (URT, 1998a). Beekeeping products include; honey, beeswax, royal jelly, propolis and pollination services (URT, 1998a). It is an important income generating activity with high potential for improving incomes, especially for communities leaving close to forests and woodlands. In Miombo woodlands of Tanzania Monela *et al*, (2000) found that household derive more than 50% of their cash from selling forest or non-wood products such as honey, wild fruits, charcoal and firewood. Honey appeared to be the woodland products with very high significant contribution to cash income in six village of Dodoma, Iringa and Morogoro (Monela *et al*, 2000).

The contribution of forest sector and hunting contribution to GDP was 3.1% in 2004 and 3.1% in 2005 (URT, 2005a). Contribution of Honey sector to the GDP is 1% in 2003 (MNRT, 2004). It is a source of employment, provides income to the people, a source of recreation, ecotourism and foreign exchange earning (MNRT, 2001a).

Beekeeping also plays major role in improving biodiversity and increasing crop production through pollination (Mwakatobe, 2001). Beekeeping offers great potential for development and is comparatively less demanding in terms of investment, labour and time (Apiconsult, 2003). In 2004/2005 Tanzania exported 367.72 tons of honey

and 193 tons of beeswax worth US$ 418 358 and US$ 754 400 respectively (Mapolu, 2002).

The number of appropriate beehives increased in Handeni, Manyoni, Kondoa, Kibondo and Tabora due to Beekeeping Development Programme from an average of six per person in 1998/99 to 62 in year 2004 (URT, 1998b). On the other hand, traditional beehives made from barks of trees decreased from an average of 200 per person in 1998/99 to two in 2003/04 (MNRT, 2001a). On average, honey production using appropriate beehives increased from 174.5 kilograms in 1998/99 to 407 kilograms in 2003/04 per hive per year (MNRT, 2001a). This increased the average income per person from 180 000 TShs. in 2000 to 266 313 TShs. in 2004 (MNRT, 2001a).

Between 1994/1995 and 2003/04 a total of TShs. 26.1 billion was collected as revenue from forest products like wood fuels, bee products, catchments and environmental values and other forest products. Others came from the following sub sectors mainly Fisheries, wildlife, beekeeping and tourism. The export of forestry products generated US$ 52.3 billion (MNRT, 2004).

There are other non-wood forest products of economic significance and with the potential for growth such as gums, resins, bark, tannin, aromatics, latex, natural dyes, fruits, nuts, fibre, spices, medicinal plants and beekeeping products include honey, beeswax, royal jelly, propolis and pollination service (FAO, 1992). In 1988 honey exports earned US $ 800 000 and wattle exports US $ 4 million (URT, 1998a).

In 2005, the government continued to implement the National Forestry and Beekeeping programme by carrying out evaluation in Mtwara, Lindi, Tabora and Shinyanga regions. Also during that particular period the government continued to encourage community participation in forestry conservation and beekeeping in 13 villages around Angai forestry reserve in Arusha District as well as demarcating beekeeping areas in Handeni and Uyui Districts in Tanga and Tabora regions respectively. In 2005, a total of 141 267 000 trees were planted in all regions compared to 133 271 038 trees in 2004. The increase was due to sensitization of trees planting and its importance (URT, 2005).

1.1.1 Beekeeping production trend

Beekeeping in Tanzania is carried out using traditional methods that account for 99% of the total production of honey and beeswax in the country (Kajembe, 1994). Approximately 95% of all hives are traditional including log and bark hives. Others are reeds, gourds and pots. During the colonial and early independence period, production of bee products was higher than what we have now and was among the important non-wood products from the forests with a higher contribution to the national GDP and international trade (Kihwele, 1991). Tanzania (i.e. then Tanganyika) was an important source of beeswax during the Germany colonial period (Ntenga, 1976). The production of beeswax from Tanzania increased from 320 to 905 tonnes during 1906 to 1952. Honey was estimated at an annual average production of 10 000 tonnes, all consumed locally (Kajembe, 1994). Following independence in 1961, a marketing organization of honey and beeswax was formed. According to Ntenga (1976), Tanzanian exports averaged 368 tonnes of beeswax and

467 tonnes of honey this could be due to reliable market of honey and beeswax in German during colonial periods and well-organized market system.

Tanzania is endowed with favourable environment for the production of honey, beeswax and other bee products. Miombo and Acacia woodlands, which are found throughout the country are ideal for developing beekeeping industry (MNRT, 2004). Over 95% of beekeeping in Tanzania is practiced in Savannah forests “miombo woodland” (MNRT, 2001a).

According to the URT (1998a), it is estimated that production potentials of bee products in the country are about 138 000 tons of honey and 9 200 tons of beeswax per annum from the estimated potential number of 9.2 million honeybee colonies. The current national honey and beeswax production figures are estimated to be 4 860 tons and 324 tons per year respectively, which is about 3.5% only of the production potential (MNRT, 2001a).

Production of honey and beeswax in the East African countries is still low and contributes little to the National Gross Product (GNP) of each country (Masalu, 1997). The per capita income of Tanzanians is reported to be US $ 293 (Household Budget Survey, 2001/2002) while that of Moshi Region was Tsh 181 103 (URT, 1998b).

According to (Mlay, 1997), beekeeping in Tanzania is still mainly carried out in the Miombo woodlands, which constitute about 43 million hectares. Agricultural

resources, however, have gradually diminished because of deforestation to accommodate settlements and provide farmland fuel wood, timber and an assortment of other forest products, which result in the loss of habitats for bees. Because of the successful afforestration and agro forestry campaigns, the rich-shrub vegetation of high biodiversity surrounds most of the settlements, throughout the country, and meliferous value both on farms and the general landscape. This vegetation provides ideal habitats for bees and could become formidable bases on the modern beekeeping industry in this country (Mlay, 1997).

1.1.2 Trade and prices for different bee product

In 2005, total export earnings from forestry and beekeeping products were Tshs 27 463 472.50 compared to Tshs 11 637 340 000 in 2004 (URT, 2005c). Tanzania honey fetches high prices on the international market when quality control was adhered during handling before it reaches to final consumer, when compared to prices of other exported products, prices of bee products have remained relatively high which indicates high demand and lucrative opportunities for Tanzania bee products (Mkamba, 2006). Bee products include Honey Comb, Honey Pollination Services, Wax, Propolis, Pollen, Royal Jelly, Bee Venom and Larval (Hilmi, 2005). The price of Honey is Tsh 1 500 per kg and Tsh 2 000 per kg of beeswax (Mapolu, 2005).

1.1.3 Beekeeping in Tanzania

It is estimated that Tanzania has a natural carrying capacity of 9.2 million bee colonies that can produce about 138 000 MT of honey per annum (URT, 1998b). The

value of this honey at the ruling farm gate price (June 2007) is approximately 197 billion Tanzanian shillings. The export value of raw honey is approximately USD 200 million while resulting wax is worth about USD 30 million. Hence at primary level, is worth about USD 193 million (MNRT, 2004). Through value addition and external economies (integrated industries), the sector may be able to contribute in excess of 278 million USD. There are substantial non-monetary benefits including employment creation, nutrition, medicine, and sustenance of biodiversity (URT, 1998b).

1.1.4 Utilization of bees' products

Beekeeping in Tanzania plays a major role in social-economic development and environmental conservation (Mkamba, 2006). It is a source of food (e.g. honey, pollen is food for bees also protein source for human and brood young bees image some people do eat), raw materials for various industries (e.g. beeswax candles, lubricants) medicine (honey, propolis, beeswax bee venom) and source of income for beekeepers. It is estimated that the sector generates about US$ 1.7 Million each year from sale of honey and beeswax and employs about 2 million rural people in Tanzania (Mwakatobe, 2001).

1.2 Problem statement

Findings from various studies for example Ngaga, (2005). Otsyina, (2005), Senkondo, (2005) and Mpuya (2005), it is evident that beekeeping has been supporting the livelihood of many Tanzanians. However, it s full potential has not yet been utilized. For example average annual income of a household of beekeeper in 2005 was as follows: Tsh 810 000 Chunya District, 648 500 Songea District and

377 500 in Nachingwea District. Comparing to the national per capita GDP, which is about Tsh 280, 000, it shows that beekeepers in these districts earn relatively higher income from beekeeping industry. The contribution of the beekeeping sub sector to the household income in Nachingwea was 24%, Songea 30% and 34% in Chunya, The above situation occur when beekeeping full potential is not yet utilized (URT, 1998a).

Demand for honey and beeswax in the world market is very high and the demand for Tanzania honey and beeswax exceeds supply (MNRT, 2001b). The International markets for Tanzanian honey and beeswax are highly competitive in terms of quality (URT, 1998b). In 1991, Tanzania honey won by 100% the quality tests for “organic honey” in UK. (Mkamba, 2006), however, quality control in terms of other factors such as Hydroxylmethy lfurfuraldehyde “HMF”, color, taste, viscosity and aroma, needs legal directives that will have to be adhered to all people handling honey before it reaches the consumer (URT, 1998a).

In Tanzania traditional beekeeping is credited for almost all production of honey and bee wax (Mwakatobe, 2001). Besides playing wider domestic roles in the bees and bee products industry in Tanzania, beekeeping is also a good source of foreign exchange earnings. The information currently available indicates that during the year 1996/1997, Tanzania exported 359 tons of bees wax and 2.46 tons of honey worth US$ 1 019 020 and US$ 2 058 respectively (BDP, 2005; Tanzania Customs Department, 1997). Several authors (Kihwele & Bradbear, 1989; TFAP, 1988; Mlay

1997) have estimated that the production of bee products could increase by 50% if its potential could be optimally exploited.

1.2.1 Justification of the study

Tanzania development initiative is guided by National Development Vision 2025, which envisages raising the general standard of living of the population to the level of typical medium income developing country by 2025, in terms of human development. The vision aim at ensuring basic food security, improving income level, and increasing exports earning (National Development Vision, 2025).Accorfing to Seegeren *et al.* (1996), in 1990 world honey export totaled 270 000 tones of which 60% came from the tropics.,which used in the manufacture of cosmetics, candles, foundation sheets for hives, medicines and polishes. According to Kimbi *et al*. (1998) the price of honey in the market was TShs 15 000 – 20 000 per 28 kg for crude honey. In Handeni District the average price of unprocessed honey in the local market 'mnada' was TShs 18 000 a tin of 20 litres (28 kg). Honey business should be built on value for money relations, every stakeholder is aware of the value he/she adds, deserves, and demands a fair share. One option is to encourage contract arrangements between large buyers and beekeepers where they will negotiate fair prices. Cash purchases should be encouraged to stimulate trust and confidence in the chain. The beekeepers association should be registered with the Fair Trade UNDP (2006).

According to Mapolu (2005), the internal markets for honey and beeswax are not well established. Demand for honey as food and as an authentic ingredient in various foods and as product with healing qualities is increasing. About 50% of honey

produced is sold locally for honey beer and honey wine production and about 10% of honey produced is consumed locally as industry honey in confectioneries and pharmaceutical industries.

Hai District has 3 000 beekeepers owning 60 000 traditional hives and 300 modern hives (Hai District, 2006) and potential to exploit 2 500 tons but only 500 tons is produced (MNRT, 2001b) (Appendix.2). The main buyers of Tanzania honey are the European Union member countries especially the UK, German and The Netherlands. Other countries are United Arab Emirates, Oman and Kenya**.** The gist of this study is that the potential for honey production and marketing opportunities appears not to be fully realized. The aim is to find out why so little honey are harvested and marketed finally to suggest remedial intervention strategies to improve honey production and marketing in the District.

1.3 Objectives of the study

1.3.1 General objective

The overall objective of this study is to undertake an economic analysis of honey production and marketing in Hai-District.

1.3.2 Specific objectives

(i) To analyze profitability of honey production in Hai District.

(ii) To assess efficiency of honey market and the role played by various market participants.

(iii) To evaluate contribution of beekeeping to household income.

(iv) Basing on (i) to (iii) to suggest remedial intervention strategies to improve honey production and marketing in the district.

1.3.3 Hypothesis

(i) Honey production is not economically profitable.

(ii) The role-played by marketing participants of honey and beeswax have significant influence to its performance.

(iii) The contribution of honey and beeswax to the household income is not significant.

CHAPTER TWO

LITERATURE REVIEW

2.1 Beekeeping production techniques

2.1.1 Indigenous knowledge on beekeeping activities

“Indigenous knowledge” is a broader term covering all knowledge considered to be characteristic of a certain cultural group (Kajembe, 1994). Indigenous knowledge means it originated or developed naturally in a particular land, region or environment. In Tanzania beekeeping is a traditional economic activity. According to Kihwele (1994), over 99% of Tanzanian beekeeping industry (Apiculture) is carried out by forest-based small-scale beekeepers that use indigenous technical knowledge in beekeeping. Traditional beekeeping is the form of beekeeping where activities or techniques are based on methods that are handed down from ancestors to posterity (Kajembe, 1994). Usually such methods are passed from one generation to the other by means of oral instruction and also by practice. Traditional beekeeping has been relatively successful for so many years in Tanzania because traditional beekeepers are rich in the knowledge about the honeybees and their management, the phonology of the bee fodder plants and the associated beekeeping calendar (Kihwele,1993).

The current beekeeping practices are mainly traditional, based on indigenous technical knowledge on hive construction, management of honeybee colonies, harvesting and processing of hive products (Kihwele, 1993). The beekeeping industry in Tanzania is mainly carried out by small-scale beekeepers that use log and bark hives (Kihwele, 1993). Other hives include the movable comb hives (box hives

such as Tanzania Top-bar hives), pots and gourds that account for less than one percent of the beekeeping industry. Lines of communication have not been effectively opened in either direction. Indigenous knowledge of beekeepers, which can be utilized in managing forest-bee ecosystems to guarantee their sustainable use and stability, should be utilized. Local people generally have enough knowledge in the management of their natural resources, but unfortunately have little formal education (Cunningham, 1991). However, local knowledge is important but apparently not rewarded equitably. There are very interesting roles played by traditional beekeepers in conservation of natural resources especially in forest conservation and bee management (Wainwright, 1989).

2.1.2 Types of hives and their construction

A report by FAO (1986a) indicated that traditionally the Wagogo are beekeepers using log hives. Traditional hives are cheaper to construct in comparison with the modern hives and local beekeepers have inherited knowledge on traditional hive construction. They use locally available raw materials. There is no standard measurement of a hive, the size is generally governed by diameter of the tree used. The manufacture of hives from dry logs and barks does not destroy the forest. Since these materials are readily available in the forest. They do not need to cut down fresh trees for hive construction (Kiondo, 1998b).

2.1.3 Hive sitting

According to (Kiondo, 1998a), Wairaqu are traditional beekeepers hanging their hives in areas with potential for bee plants and safe from forest fire, safari ants,

honey badger and other enemies. Traditional beekeepers very rarely site their hives on low-level stands.

2.1.4 Baiting materials

It is essential for beekeepers to have their beehives occupied as soon as possible after sitting them (Ntenga & Mugongo, 1990). Beekeepers use different attractant materials to attract honeybee colonies. According to Silas (1998b), the mostly common attractant used are beeswax, cow dung, and cassava (Manhot spp).

2.1.5 Hive harvesting

In traditional hives, beekeepers can tell when to start harvesting honey by using indicators like period of field crops ripening, end of rainy season and start of dry seasons. Bees cluster outside the hive and ceasation of activities of foragers at the hive entrance is observable (Kihwele, 1993). According to Kimbi *et al.* (1998) and Kiondo (1998a), in “Arumeru and Mbulu Districts beekeepers do not use protective gear during harvesting and work is carried out at night. They harvest according to their beekeeping calendar. These operations generally called seasonal management because they vary from one season to another and these seasons are influenced by the flowering calendar of melliferous plants (Liseki, 1997). A flowering calendar will enable the beekeeper to determine different management operations at appropriate time for example where to site a hive and when to harvest the products.

2.2 Constraints faced by beekeepers in Tanzania

According to URT (1998a), constraints faced by beekeepers in Tanzania include lack of appropriate equipment, storage facilities, packaging materials and obsolete technologies and the beekeeping industry in general. Knowledge of proper honey and beeswax handling methods presently used to maintain quality and quantity is also poor. Supporting services offered to the beekeepers are weak in such areas as local processing and commercial arrangements. Inadequate extension services and poor research facilities have further hampered the development of the industry. The sector is experiencing a lot of problems such as lack of law, lack of formal cross – sectoral coordination, ineffective beekeeping extension services, insufficient statistical information, and inappropriate beekeeping technology (MNRT, 2001b).

Lack of appropriate equipment as well as handling facilities, inappropriate storage facilities, poor packaging, obsolete technology and poor market information hamper the development of the beekeeping industry. Knowledge of honey and beeswax handling to maintain quality and quantity is also poor. Declining natural forest cover and the use of pesticides in vermin and pest control also affect the industry (URT, 1998a).

Other problem include the isolation of the area and the transport problem, lack of resources and skills to implement Natural Resource Management (NRM) plans, the mistrust that sometimes exists between villagers and officials and changes in climate that can greatly affect honey production. Another area that was identified as problematic was the need for professionalism in beekeeping in order to increase

honey and wax production and quality while decreasing impact on the environment. The introduction of modern hives, made from local materials to limit their cost, has been identified as one way of achieving these goals. Poverty was identified as one of the main obstacles to the long-term continued non-sustainable practices to maintain their daily existence Economic alternatives to poaching and deforestation for tobacco cultivation must be found; the development of beekeeping activities and ecotourism present opportunities to create employment and generate income for local communities without increasing the pressure on the ecosystem (Kihwele, 2000).

According to Lema (1991), the initial capital needed to start beekeeping is very little but it effectively limits participation of most women in the rural areas in beekeeping activities. In Arumeru District although some hives have been found to be appropriate for the area (e.g. Tanzanian Top Bar hives) most beekeepers cannot afford to buy them due to lack of capital (Kimbi *et al*., 1998). Other problems also include land shortage and labour. Inefficient beekeeping extension services are among the most critical problems in East Africa resulting in low productivity (Masalu, 1997). Due to lack of effective beekeeping extension services, goods and services of the beekeeping sector are still low in quality and quantity. The number of beekeepers is still small, and as a result the national production of honeybee products is less than 5% of the production potential (URT, 1998a).

Extension work is crucial for successful and appropriate promotion of beekeeping activity in the rural areas. According to Aidoo (1999), extension and regulatory programmes have played the important roles in helping beekeepers succeed. This

may include technical support or stock development, training the beekeepers to extend beekeeping skills and information, providing support services for marketing such as quality assurances, and implementing resistance management programme to protect effective products used to control diseases and pests, lack of adequate and appropriate processing and storage facilities of honeybee products which has a negative impact on the quality and quantity of honey to the consumer (URT, 1998a). Lack of capital has effect on purchasing power of the storage facilities like plastic containers (buckets, drums, and bottles) and processing facilities like honey press. According to Kihwele (1993), about 15 – 20% of the honeybee colonies are not harvested every year due to lack of bee protective and scarcity of appropriate containers. Lack of bee-fodder the main cause of the bee-forage shortage is deforestation. In Tanzania deforestation rate of closed forests and woodlands were estimated to lie between 0.01 and 1.2 million ha per year (FAO, 1992). This trend is comparable to that for the whole Africa where the rate of deforestation is 30 times that of reforestation (FAO, 1990a). Environmental pollution and other factors (environmental catastrophes) can cause losses to bees and hives in the region affected, endangering the whole of a beekeeper's livelihood (Crane, 1990).

According to Ntenga & Mugongo (1990), the honey badger has proved to be most destructive, particularly, in the miombo woodland areas. This animal, though very small, is extremely strong. It heaves out the beehives, which are full of bees and using its claws and teeth, breaks the hive with remarkable ease to reach the honey, which it eats together with bee brood.

Weather variation has direct effect on colony productivity e.g. prolonged drought, strong winds, heavy and long rains can cause colony starvation and retard foraging activities of the bees hence low storage. According to Kagio & Muriithi (1988), lack of the permanent water sources was the greatest factor limiting beekeeping as an enterprise in Kenya. According to Liseki (1997), sugars feeding to bees have proved to be important as it reduces absconding rate, increases production indirectly and hence increases the income to beekeepers. The ratio of 2:1 sugar syrup (Two part sugar and one part water) is recommended to ensure solution is concentrated enough to attract bees to eat. Also in a new colony the concentrate is used as a starter.

2.3 Honey and beeswax

In industries honey is used as an important ingredient in the pharmaceutical industry, food preservation, honey-beer brewing and medium preparation (honey wine) and confectioneries (URT, 1998a).

According to Krell (1996), in developing countries with traditional beekeeping methods, wax is often wasted. If it is rendered, most of it is subsequently exported and local manufacturers use only relatively small proportions. This, however, depends very much on the local industry. In pharmaceutical industries beeswax is used as a coating for drugs or pills. Beeswax coating facilitates ingestion of the drugs but retards the dissolution of the enclosed compounds until they reach the digestive tract. Beeswax can, also, be prepared as a mixture with the drug, in which case it functions as a time release mechanism, releasing the drug over a long period (Krell, 1996).

2.3.1 Source of food

Honey is used at household levels as substitute for sugar in tea or porridge, as supplementary food for lactating mothers, and as an appetizer (Kimbi *et al*., 1998). According to Krell (1996), honey is most commonly consumed in its unprocessed state i.e. liquid, crystallized or in comb. In these forms it is eaten as food or incorporated as an ingredient in various food recipes. The traditional use of honey in food preparations has been substituted, in most cases, by sugar and various sugar syrups derived from starches. It is used in baked products, confectionery, candy, marmalades, jams, spreads, breakfast cereals, beverages and milk products.

2.3.2 Medicines

According to Kihwele (1991a), honey being an anti-biotic, is variously used as medicine by traditional healers. In conventional medicine honey is used as carrier for other drugs. Klima (1968); Ntenga & Mugongo (1990); Krell (1996); Lema (1997); Kiondo (1998a) and Liseki & Mmbaga (1998), reported that when honey is used pure or when mixed with the other ingredients, it cures coughs, stomachs, ulcers, malaria and burns. In addition, honey is used to improve assimilation and its usefulness and effectiveness in chronic intestinal cases such as constipation, duodenal ulcers and liver disturbances. In its pure and unprocessed form honey helps against infections, promotes tissue regeneration and reduces scarring (Armon, 1980; Dumronglert, 1983). It is also used in mosturing and nourishing cosmetics creams (Krell, 1996).

2.3.3 Pollination services

Most beekeeping operations are practices within cultivated areas and in forest due to the dependency of the crops and trees on bee pollination. Both the agricultural crops and the forest vegetation are important food sources for the bees. Stinging and stingless honeybees are both important flower visitors and pollinators in the tropics (Biesmeijer, 1992). Therefore according to Crane *et al* (1984), an increased population for foraging. Honeybees ensure pollination and increased yield of general crops.

2.4 Honey and beeswax market

Marketing is an important aspect of the honey industry. This aspect is considerably undermined by many people who feel that the focus should be on production and then simply selling the outcome of production to customers (Hilmi, 2005). Certainly production is a very important aspect, especially in the case of organic honey, where production procedures and processing have to be maintained. But, equally important, marketing has to be considered and given the same importance (Hilmi, 2005)

2.4.1 Internal markets for honey and beeswax

The internal market for honey in Tanzania is not well established. However, demand for honey is increasing as food and an authentic ingredient in various foods and as a product with healing qualities (MNRT, 2001a). About 50% of honey produced in Tanzania is sold locally for the production of honey beer and honey wine, and about 10% is consumed locally as industrial honey in confectioneries and pharmaceutical industries (MNRT, 2001a).

FAO (2000) reported experience from Vietnam that domestic markets can be increased through creating knowledge of quality to consumers. It also reported that in Vietnam total production of honey in 1998 was 4 500 tones out of which 3 500 tones were exported and 1 000 tones were used in the domestic markets. It was expected that consumption by local market would increase to 2 000 tones in year 2 000 as the domestic knowledge about quality of honey was increasing. The Vietnam experience also revealed that the export price for honey was lower than the domestic price, the reasons are domestic knowledge and awareness of quality of honey to local consumers was increasing. Where the export price was between 0.95 and 1.45 US$ per kg, the domestic market price was between 1.5 and 3 US$.

FAO (2000) case study in Vietnam reported that labeled and packed quality is sometimes regarded, as industrial honey that has lost its natural quality, however labeled honey is important if the honey is to be sold in supermarkets. For this reason, prospects for the development for a niche market for pure, natural, certified honey for the domestic market should be studied.

2.4.2 International markets of honey and beeswax

According to Honey Update article (2005) China is still the largest raw honey supplier into the world market, and world honey prices are usually defined by Chinese honey prices. Tanzania honey is well known in the world market because of its flavour and its organic nature (Mkamba, 2006). The current markets for Tanzania honey are the European Union member countries especially The UK, Germany and The Netherlands. Other countries are United Arab Emirates, Oman and Kenya. The

main importers of Tanzanian beeswax are Japan, USA and European Union member countries.

2.4.3 Marketing and income generation from honey products

Beeswax is an important product of beekeeping, which is often neglected as a source of income or as a resource to be utilized within the household (Krell, 1996). According to Clauss (1992), in North Western Province of Zambia, beekeeping is the most important income generating activity for at least 15% of all rural households and the comb honey which is the basic source of honey brew, never saturates the local and regional markets. According to Clauss (1992), trade in beeswax in the North Western Province of Zambia has a long tradition. In Tanzania, it is a source of food, raw materials for various industries, medicine and income to beekeepers (URT, 1998a). According to Lema (1991), beekeeping activities in Hai District are valuable sources of additional income to the family. Beekeepers receive a net income from just few colonies with little investment in terms of capital, time and labour. Beekeeping programmes based on economic motives are justifiable (Biesmeijer, 1992). However, lack of awareness, poor processing techniques and poor marketing systems result in low production of beeswax.

2.5 Beekeeping and Economic development

Economic development can be defined as the process of improving the quality of human life through increasing per capita income, reducing poverty, and enhancing individual economic opportunities (Hilmi, 2005). It is also sometimes defined to include better education, improved health and nutrition, conservation of natural

resources, a cleaner environment, and a richer cultural life or as sustainable wealth creation process that works within the framework of community parameters to maximize the efficient and effective utilization of community resources for economic gain for the local population. More simply, the process of creating wealth for as many people as possible (Hilmi, 2005).

Kihwele (1991) revealed the importance of beekeeping activities for socio-economic development that; it provides people with nutrition and income including foreign exchange. The income generated from beekeeping activities can be used to pay for social services such as education, health, transport and housing. Beekeeping provides employment for both urban and rural people e.g. keeping bees, honey-beer business, and production of bee equipment and bee protective.

2.6 Policies and strategies in beekeeping enterprises in Tanzania

The Government has been working to create an enabling environment largely responding to the need for the sector to contribute to poverty alleviation rather than building a growth focused, internalized, Self-propelling sectoral capacity. There is a National Beekeeping Policy and the National Beekeeping Programme for 2001 – 2010 in place. Several Acts have been passed to promote honey industry. This synthesis attempts to cover the current national development and sector policies in Tanzania such as Tanzania National Development Vision 2025 (http:/www.tanzania.go.tz/vision), Poverty Reduction Strategy Paper (URT, 2000), National Forestry Policy (URT, 1998a) and national Beekeeping Policy (URT, 1998b), the National Trade Policy (URT, 2003a), and the Small and Medium

Enterprise Policy (URT, 2003b) provide conducive environment for sustainable beekeeping enterprises.

The objective of Nation Development Vision 2025 is to awaken, co-ordinate and direct peoples efforts and minds towards sectors that will enable the country to attain development goals and succeed in the global economic competition. Poverty alleviation is the main target for Nation Development Vision 2025 and is spelt out in five main goals: High quality livelihood, peace, stability and unity, good governance, a well educated and learning society, strong and competitive economy.

This Vision was operationalised through the Poverty Reduction Strategy Paper (PSRP) (URT, 2000), and the Tanzania Assistance Strategy, that provided a framework for external contribution to the fight against poverty. The PRSP (2000-2003) has recently been revised and renamed National Strategy for Growth and Poverty Reduction 2005 (NSGPR) or '*Mkakati wa Kukuza Uchumi na Kupunguza Umaskini Tanzani*a (*MKUKUTA)'* (URT, 2005a). Beekeeping is one of the viable subsector that can reduce poverty and improve income of the people.

2.6.1 Beekeeping sector policies

The overall goal of the national beekeeping policy is to enhance the contribution of the beekeeping sector to the sustainable development of Tanzania and the conservation and management of her natural resources for the benefit of present and future generations (URT, 1998b). Policy Objectives: Sustainable maintenance of honeybees and adequate bee reserves under effective management, improved quality

and quantity of bees products on sustainable basis, increased employment opportunities and foreign exchange earnings, ensured ecosystem stability and biodiversity conservation and enhanced national capacity to manage and develop the beekeeping sector.

Cognizant to the enhancement of the sustainable beekeeping enterprises is the national Beekeeping Policy approved in 1998, contains mission and vision of beekeeping development in Tanzania. The policy clearly identifies the bottlenecks as being inefficient beekeeping practices, the use of poor processing and packaging techniques, which have negative effect on the quality and quantity of the bee products and protection of the natural resources. In 2001 Government of Tanzania developed and approved a National Beekeeping Progamme (NBKP) as a strategy tool to implement the beekeeping policy. NBKP came with strategies and action plan to tap the potential of bees products for the benefit of the present and future generation. Marketing of bees product is one of the important aspects to support and complement the beekeeping industry. The Beekeeping Act No. 15 of 2002 was enacted by Parliament in April 2002. Its main objectives are: (i) To make provisions for the orderly conduct of beekeeping; (ii) To improve the quality and quantity of bee products; (iii) To prevent and eradicate bee diseases and bee pests, and (iv); To improve revenue collection.

The National Forestry Policy Provides opportunities for beekeepers to practice beekeeping in forest reserves to be carried out in Wildlife Management Areas (WMA) by involving local communities. With special permission from the Director

of Wildlife beekeepers are allowed to carryout beekeeping in game reserves and game controlled areas.

The Village Land Act 1999 is one of the most important legislative texts that support community based natural resources management. It empowers the community at local level (village) recognizing it as the appropriate representative structure to implement natural resources management. In view of this, through village land use management system beekeepers can be allocated land for beekeeping development. Our main challenge now is to use this enabling environment created by the Policy, Programme and legal framework to encourage Tanzanians and other investors to take up beekeeping so that they can benefit in terms of income, poverty reduction and conservation of environment.

On 24th April 2002 the Beekeeping (URT, 1998a) was passed by parliament to protect and direct appropriate beekeeping practices, maintenance of quality of bee products, protection of bee resources, bee fodder and consumers of bee products; however the Act has not yet to be practiced.

2.7 Conceptual framework

Conceptual framework (figure 1) shows factors affecting production and marketing of honey which includes primary and secondary factors. Primary factors forms the basic set of instrument used in production and marketing of product. Secondary factors on other hand facilitate primary factors. Both primary and secondary factors can lead to poor production and marketing of honey. However through interventions

such as appropriate policy, legal institution, good infrastructure, well established information system and improved environment could improve production and marketing of honey.

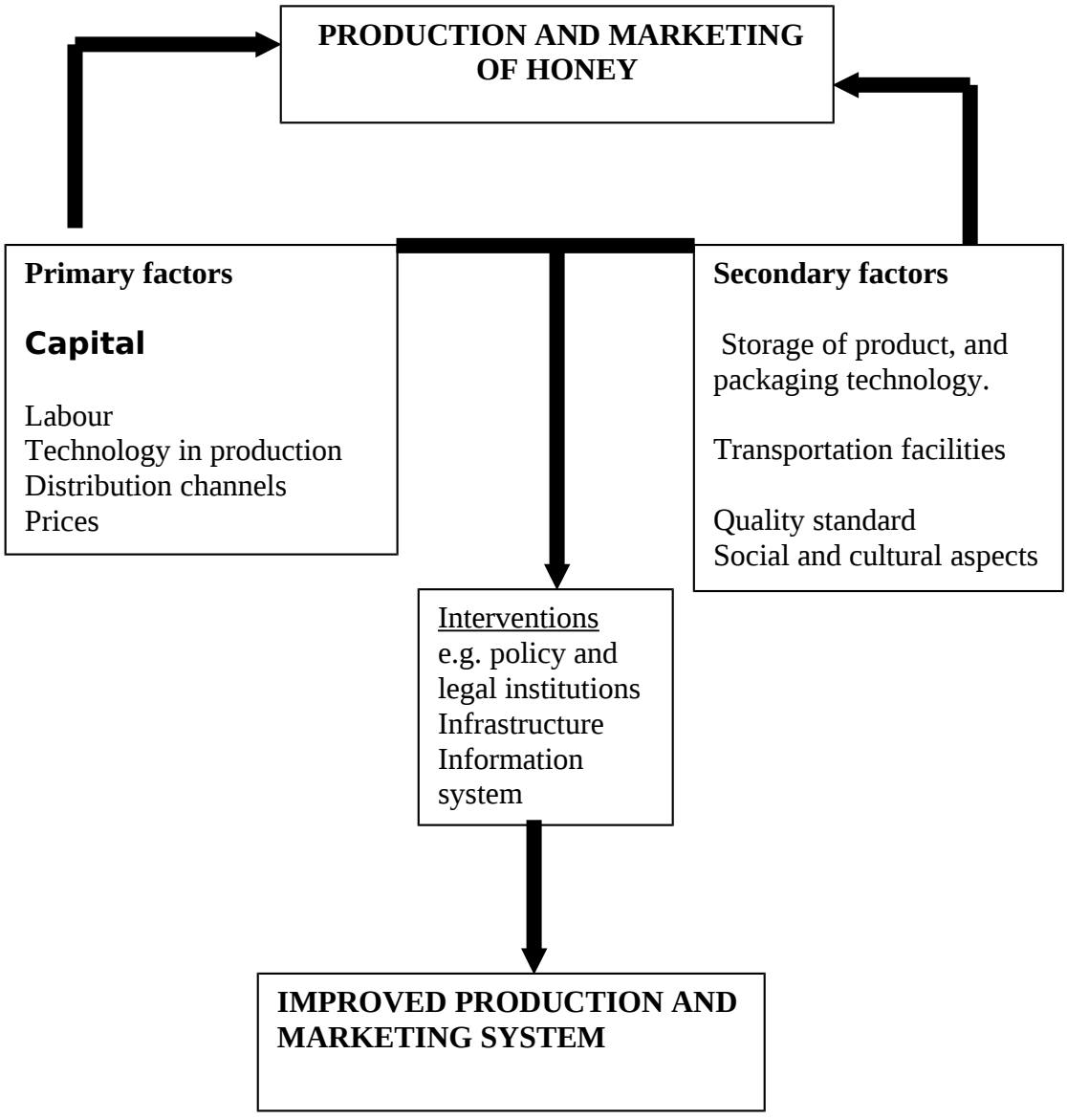

Figure 1: Conceptual framework: economic analysis of honey production and marketing

Source: Food and Agriculture Organization (FAO).

CHAPTER THREE

METHODOLOGY

3.1 Location and description of the study area

3.1.1 Locations

Hai District in the North-Eastern part of the country is among the six Districts from Kilimanjaro Region. Other districts are: Moshi Rural, Moshi Municipal, Mwanga, Same and Rombo (Figure.2). The District lies between latitudes 2 ºC, 50 minutes and 3 ºC, 29 minutes, south of Equator and Longitudes 30 ºC, 30 minutes and 37 ºC, 10 minutes East of Greenwich. According to the 2002 National Population Census results the District population is Female 85 044 Male 82 053 Total 167 097.

3.1.2 Climate

The District is classified as tropical savanna area, but due to the influence of Mount Kilimanjaro, which is situated on the North – East corner of the District climate is considerably varied. Rainfall is bimodal with two rainy seasons namely:-

- Long rains (Masika)- caused by the passage of the inter- tropical convergence zone (ITCZ) start from March to June.
- Short rains (Vuli) caused by the Southward movement of the (ITCZ). The short rains usually fall in the month of November to December. These are heavy in the middle zone up wards but very limited in the low land zone of the District.

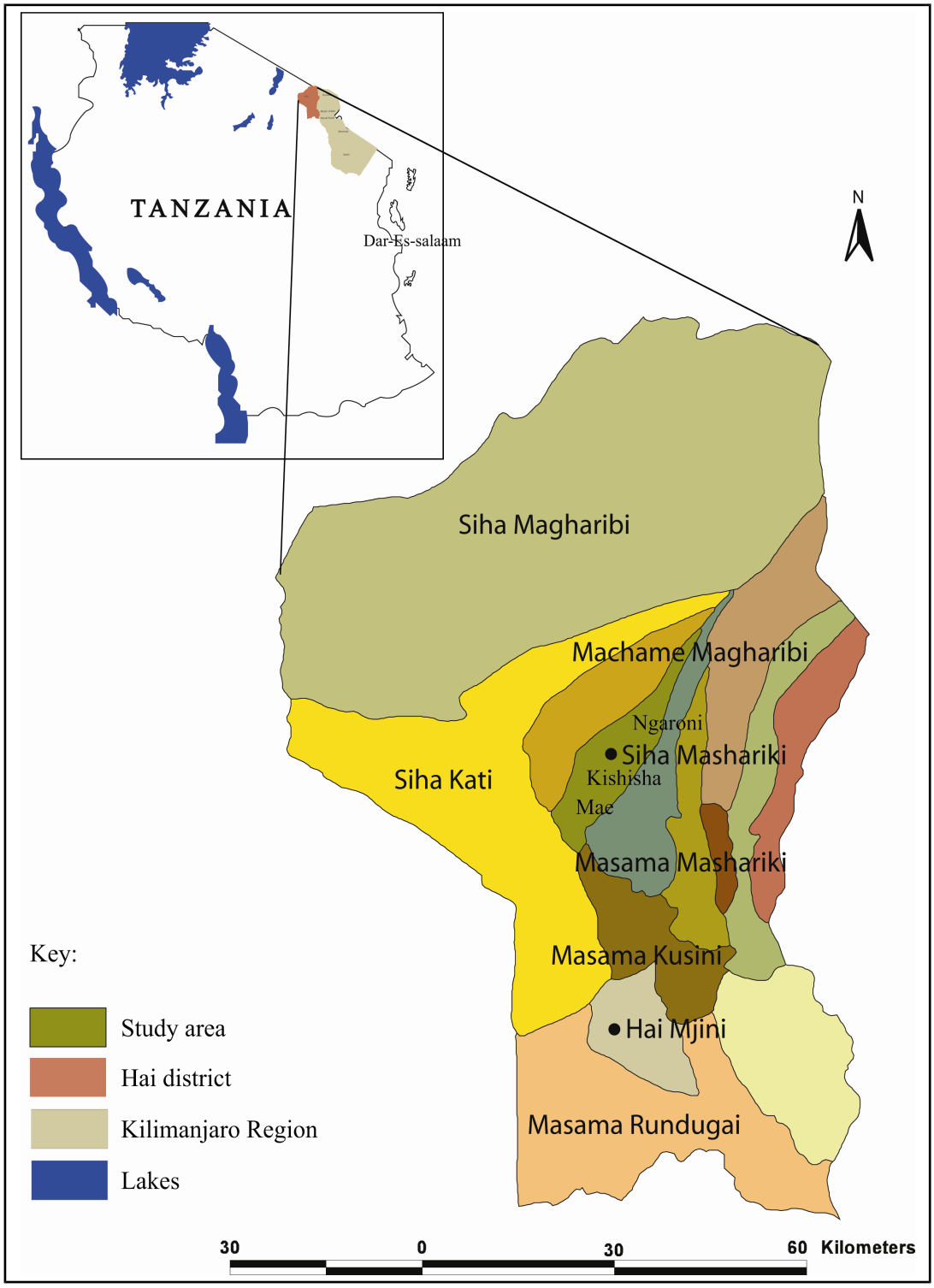

Figure. 2 Map of Hai District

Source: International Livestock Research Institute (ILRI) (1995).

3.1.3 Temperature

Temperatures are also closely related to altitude. But between 700m and 1200m above mean sea level the variation in mean monthly temperature is small (22 –26 c). The hot season last from October to March and is accompanied by high humidity with maximum temperatures of 35 ºC. The hot season starts from June to September, it has monthly temperatures in the range of 18 to 22 ºC.

3.1.4 Ecological zones

The district is divided into main ecological zones shown here under: -

i) Mount Kilimanjaro park:

This zone lies above elevation 1800m and includes the Kibo Peak of the Kilimanjaro at 589m. This zone comprise of the forest reserve and national park. It is unpopulated area of the District. This zone is located on the North east of the District and covers approximately 24% of the District area.

ii) Upper zone

The zone lies between 1666 metres and 1800m above sea level in the slope of Mount Kilimanjaro. The zone receives rainfall ranging from 1250mm to 1750 mm per annum. Banana and coffees are produced from small-scale family farmers surrounding homes.

iii) Middle zone

The zone lies between 900m and 1666m above see level. It receives rainfall ranging from 700mm to 1250 mm per annum. Chagga tribe mainly dominates this zone. Most of the cash and food crops mentioned in the upper zone are also found in this zone. To some extent the climate of the upper

zone is the same with this zone. But due to the reduced height and altitude this zone is more one. The two zones (upper and middle) are good in the production of milk for markets.

iv) Lowland zone

This zone lies bellow 900m above sea level. It receives rainfall ranging from 500mm to 700mm per annum. Farming of crops like beans, maize, sunflower, rice is the main economic activity.

3.2 Research Design and Sampling Procedure

3.2.1 Research Design

The research design for this study was a cross-sectional, where data was collected at a single point in time using survey method. The reason for choosing this design is simply because it is flexible and economic (Babbie, 1995; Bailey; 1998). It is easy to manipulate data and information.

3.2.2 Sampling procedure

Both Simple Random sampling and Purposive methods were applied in this study. A simple random sampling method was used in selecting three villages out of six villages. Purposive sampling technique was used in selecting both one administrative division and beekeepers based on potentiality in beekeeping activities.

3.2.3 Sampling technique and sample size

Then random sampling was done to obtain three villages out of six villages. These are Kishisha, Mae and Ngaroni.Selection of respondents was the last stage.

Purposive sampling method was used in sample selection since there were no records of beekeepers in order to get at least a reasonable number of respondents required as a representative for statistical analysis. Beekeepers were selected based on their experience on production of honey and availability during the interview. Total 80 households were selected for interview.

3.3 Data Collection

A well-structured questionnaire with both closed and open-ended questions were used to collect primary data. The primary data was supplemented by secondary data obtained at Hai District Office reports Hai District agricultural and forest officers, internet and published documents, statistics and from Sokoine National Agricultural Library (SUA).

3.4 Data analysis

The data collected was analyzed by using a Statistical Package for Social Science (SPSS) and Microsoft statistical programme in C-language (MSTART C). The Gross Margin analysis to determine relative profitability between honey and other important crops in the study area, structure conduct performance model was employed to assess structure and performance of honey products marketing. Descriptive statistical analysis was employed to compute household income including honey production and Marketing.

Gross Margin Analysis was used to test hypothesis 1, that production costs and returns analyses per hives of honey production, in order to examine profitability. The gross margin of a farm activity is the difference between the gross income earned

and variable costs incurred (Makeham *et al*., 1986). Advantage of this method of analysis is simple, but in many as sufficiently powerful tool for economic analysis of introduced technologies

GM=TR-TVC

Where:

GM= Gross Margin (Tsh/hive),

TR=Total Revenue (Tsh/hive)

TVC=Total Variable Costs (Tsh).

Structure –Conduct -Performance model (S-C-P) was used to test hypothesis 2, to assess the structure and performance of honey marketing. This model emphasizes on the relationship between functionally similar firms and their markets behavior as the group that is, given certain basic conditions the performance of particular industries depends on the conduct of its sellers and buyers which in turns is strongly influence by structure of relevant market.

Descriptive analysis was used to test hypothesis 3, to compute potential sources of household income including honey production.

3.5 Limitation of the Study

Much of primary information for the study was collected through interview. Error was resulted from respondents is one of the limiting factors relying on the respondents to recall the honey production, income, expenditure and saving thus it

was difficult to obtain the exact amount of honey harvested, sold and consumed due to poor record keeping. However he strength and weakness of data was balanced by conducting focus group discussion. Therefore researcher believes that the findings presented in chapter four provide a relevant picture and recommendations made thereafter important to policy makers, planners, managers and relevant stakeholders in beekeeping sector.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents the results of the study: Results are presented in various forms including percentage, statements, tables and figures. Results presented are based on objectives of the study and hypothesis. Discussion follows immediately to interpret the trend shown by the results and reasons.

4.2 Beekeepers' social economic characteristics

4.2.1 Gender and beekeeping

Survey findings indicated 88.7% and 11.2% of the interviewed sampled beekeepers were male and female beekeepers respectively (Table 1). From this it is clear that beekeeping is an activity which is dominated by male. The reasons could be the nature of activities itself due to fact that participation of female in beekeeping is greatly hampered by lack of confidence by female afraid to be bitted by bees especially during harvesting, climbing trees to set beehives and most of female do not have ability to construct their own hives, the activity that involve labour of cutting big log and make hives from it. But females can participate in processing and marketing of honey, both male and female of all ages at a household level could practice beekeeping (MNRT, 1998).

4.2.2 Education level

Survey revealed that the 61.4% of beekeepers attained primary level of education, 30.8% of the interviewed sampled beekeepers attained secondary school education,

2.3% of the interviewed beekeepers attained others levels of education like colleges, higher education institutes and 3.4% of the interviewed beekeepers reported not to have attained any formal education and 3.3% had attained adult education (Table 1). When farmers attained a certain level of literacy like completing primary school education this could implies to have great opportunities toward adopting honey productions and marketing techniques in terms of resources use, time use, skills and knowledge.

4.2.3 Marital status

Regarding beekeepers' marital status it was found that the majority of them were married. Overall 85% of the sampled beekeepers were married, 11.6% said they were single and 3.4% were widowed (Table 1) these results shows that married individuals, particularly males mostly perform beekeeping activities. The situation can be explained by the fact that beekeeping is not time consuming activity and married men have family obligations, they engage in beekeeping activities in order to generate cash income to meet various family needs or requirements.

4.2.4 Age structure

Beekeepers are over 3,000 of different ages ranging from 25-70 years (Hai District, 2007). Survey findings revealed 66.1% of sampled beekeepers range from 41-60 years, 23.8% ranges from 61-80 years and 10.2% from 21-40 years (Table 1). This implies that participation of all categories of ages in this sector could influence honey and beeswax production and marketing in the district in the near future.

4.2.5 Family size

Results presented in Table 1 indicate that 68.8% interviewed sampled beekeepers family size ranges from 5-9 people, 27.4% from 0-4 people and 4% ranges from 10-14 people. Due to a large number of family size of beekeepers much effort is needed to improve the sector so that beekeeper could earn to get extra income from honey to cover some basic needs.

Table 1: Social economic characteristics of sampled beekeepers

Beekeeper's social economic characteristics	Mae Village n=30		Kishisha Village n=28		Ngaroni village n=22		Overall % N=80
	Number	%	Number	%	Number	%	
Gender							
Male	28	93.3	26	92.9	19	86.4	88.8
Female	2	6.7	2	7.1	3	13.6	11.2
Education level							
No formal education	1	3.3	1	3.5	0	0.0	2.3
Adult education	3	10.0	0	0.0	0	0.0	3.3
Primary education	12	40.0	21	75.0	15	68.2	61.0
Secondary education	14	46.6	4	14.2	7	31.8	30.8
Other (College, universities etc.	0	0.0	2	7.1	0	0.0	2.3
Marital status							
Married	26	86.6	23	82.0	19	86.4	85.0
Single	2	6.7	4	14.3	3	13.6	11.6
Widowed	2	6.7	1	3.6	0	0.0	3.4
Divorced	0	0.0	0	0.0	0	0.0	0.0
Age							
21 – 40	3	10.0	2	7.1	3	13.6	10.2
41 – 60	20	66.7	19	67.9	14	63.6	66.1
61 – 80	7	23.3	7	25.0	5	22.7	23.8
Family size							
0 – 4	6	20.0	9	32.1	7	31.8	27.4
5 – 9	23	76.7	17	60.7	15	68.2	68.8
10 – 14	1	3.3	2	7.1	0	0.0	3.8

4.3 Beekeeping production

4.3.1 Honey and beeswax productivity

The results in Table 2 indicate that production of honey ranged from a minimum of 2kg to a maximum of 1,000 kg with a mean of 96.45kg per season per beekeeper and

standard deviation of was 164.67635.Implying that the formed errors in the data was either not well recorded and there was an error in precise in editing and readjustment of the final data before analysis. Hence it is probable that there was missing data that has resulted in large standard deviation among other factor.

Table 2 Honey productions

Honey production	Minimum	Maximum	Mean	Std. Deviation
Amount produced per kg	2.00	1000.00	96.4500	164.67635

4.3.2 Number of beehives owned by beekeepers

The results in Table 3 indicated that 50.6% of the interviewed sampled beekeepers owned from 1-30 hives, 44.7% owned from 31-60 hives, 2.3% owned from 61-90 hives, 1.1% owned 91-120 hives and 1.1% owned between to 121-150 hives .The results imply that majority of sampled beekeepers own only a few number of beehives which in turn might lead to low production and moreover 63.6% of the interviewed sampled beekeepers owned 1-10 improved beehives, 25.6% had no improved beehives and 8.4% owned 11-20 improved beehives and 2.3% of the interviewed sample owned 21.30 improved beehives. This implies that beekeepers owned few number of improved beehives ranges from 11-20 (63.6%) improved beehives. This implies that lack of technology and skills on the use of improved beehives lower honey production.

Table 3: Distribution of beekeepers and number of beehives owned

Number of beehives owned	Mae Village n=30		Kishisha Village n=28		Ngaroni village n=22		Overall % N=80
	Number	%	Number	%	Number	%	
Beehives owned							
1 – 30	19	63.4	12	43.0	10	45.4	50.6
31 – 60	10	33.3	13	46.4	12	54.5	44.7
61 – 90	0	0.0	2	7.0	0	0.0	2.3
91 – 120	1	3.3	0	0.0	0	0.0	1.1
121 – 150	0	0.0	1	3.5	0	0.0	1.1
Improved beehives							
Nothing (0**)**	9	30.0	8	28.5	4	18.0	25.6
1 – 10	18	60.0	15	53.5	17	77.3	63.6
11 – 20	3	10.0	3	10.7	1	4.5	8.4
21 – 30	0	0.0	2	7.1	0	0.0	2.3

4.3.3 Honey and beeswax production and extension services

Hai District has several NGOs supporting beekeeping activities the NGO's and religious organization include ELCT (Evangelical Lutheran Church of Tanzania), Roman Catholic Church, FODA – Food Development Association Norgesvel, TAHEA, ENVIROCARE and Hai Beekeepers Cooperative society (HABECO). All these organization play important roles in beekeeping.

Survey results show that 54.4% of the sampled beekeepers received inputs and extension services from villages extension officers, 24.6% reported to have received extension services from various NGOs and other civil society organizations and 21% of sampled beekeeper received inputs and extension services from private dealers (Table 4). This indicates that 54.4% of beekeepers receive extension services from village extension officers hence more effort is needed from NGOs and other civil

society organizations to support beekeeping sector in order to improve honey production.

Table 4: Distribution of beekeepers and extension services

Extension services	Mae Village n=30		Kishisha Village n=28		Ngaroni village n=22		Overall % N=80
	Number	%	Number	%	Number	%	
Village extension Officers	12	40.0	18	64.3	13	59.0	54.4
From NGOs	12	40.0	7	25.0	2	9.0	24.6
Private dealers	6	20.0	3	11.0	7	32.0	21.0

4.3.4 Beekeepers and protective gears

Table 5 shows that 50.3% of interviewed sampled beekeepers do not have harvesting gears and 49.7% of sampled beekeepers have harvesting gears. This could mean that half of the sampled beekeeper owned harvesting gears which protect them from being stinged by bees and enable beekeepers to harvest honey in a recommended manner, during which could in turn influence quality of the honey harvested. Protective gear includes smoker, bee veil, jungle hat, gloves, gumboots and overall. These recommended equipments reduce risks to contamination than using local methods.

Table 5: Distribution of sampled beekeepers and harvesting gears

Harvesting gears	Mae Village n=30		Kishisha Village n=28		Ngaroni village n=22		Overall % N=80
	Number	%	Number	%	Number	%	
Yes	14	46.7	10	36.0	15	68.2	50.3
No	16	53.3	18	64.0	7	31.8	49.7

4.3.5 Honey processing opportunities and challenges

Honey processing involves separation of honey from honeycombs, using pressing machine. Pressed honey is filtered to get processed honey which can be used in pharmaceutical industry: in food preservation, honey beer, brewing, honey wine and as a food. Survey revealed that 84.2% of interviewed beekeepers did not process honey and 15.5% of sampled beekeepers do process honey into other valuable forms like processed honey and wax (Table 6). This indicate that majority of beekeepers sold unprocessed honey due to lack of skills and knowledge for processing, lack of tools for processing and lack of market information for processed honey. Beeswax is also obtained after extracting honey from honeycombs. The remaining honeycombs residues is mixed with water to make a mixture of water and honey combs residues. The mixture is boiled and the boiled mixture is then filtered to get solution which is left to cool to form wax.

Table 6: Distribution of sampled beekeepers by honey processing

Honey Processing	Mae Village n=30		Kishisha Village n=28		Ngaroni village n=22		Overall %
	Number	%	Number	%	Number	%	N=80
Honey and wax	1	3.3	6	21.4	5	22.7	15.8
Sell unprocessed honey	29	96.7	22	78.6	17	77.3	84.2

4.3.5.1 Challenges for not processing

The survey results show that 67% of the interviewed sampled beekeepers did not process honey into other forms due to lack of processing equipments/tools, 23.9% of the interviewed sample beekeepers reported that market demanded unprocessed honey, and 8.96% of interviewed sampled beekeepers did not process honey due to

lack of technological skills in processing. Thus, it can be concluded that beekeepers sell unprocessed honey only because they lack equipments for processing, capital to buy machine for processing and others did not process honey because most of buyers prefer to buy unprocessed honey due to the fact that farmers are not aware on the price information of processed honey and do not have skills and knowledge to process honey so as to meet to the required standards.

Table 7: Distribution of sampled beekeepers by challenges for honey and waxes processing

Challenges to honey and waxes processing	Mae Village n=30		Kishisha Village n=28		Ngaroni Village n=22		Overall % N=80
	Number	%	Number	%	Number	%	
Lack of processing equipment	18	60.0	23	82.1	13	59.1	67.0
Demand for unprocessed honey	8	26.7	5	17.8	6	27.3	23.9
Lack of skill and technology	4	13.3	0	0.0	3	13.6	8.96

4.3.6 Investment/initial capital

The results in Table 8 indicate that interviewed sampled beekeepers needed a capital to buy modern hives and other gears this ranged from Tshs. 45 000 to Tshs. 200 000 with a mean of TShs. 94 750 which is enough to purchase 4-5 modern hives per season. This explains that the capital needed to run this business is not so high. Thus, if beekeepers can access credit from financial institutions they can improve honey production.

Table 8: Initial Capital(Tsh)

Initial Capital	Minimum	Maximum	Mean	Standard deviation

Initial capital	45,000	200,000	94,750	3,739.8

4.3.7 Labour requirement

Table 9 The result showed that 42.2% of the interviewed sampled beekeepers hired labour and 32.2% used family labour while 25.6% use both family and hired labour, This is due to the fact that majority of beekeepers do put hives very far from their homestead and this necessitate them to hire more labour specially during hive setting, supervision, harvesting and transportation of honey to their homestead.

Table 9: Distribution of beekeepers by labour requirement

Source of labour	Mae Village n=30		Kishisha Village n=28		Ngaroni village n=22		Overall % N=80
	Number	%	Number	%	Number	%	
Family labour	9	30.0	11	39.3	6	27.2	32.2
Hired labour	15	50.0	10	35.7	9	40.9	42.2
Combination of the above	6	20.0	7	25.0	7	31.8	25.6

4.3.8 Costs of labour in beekeeping activities

The results in the Table 10 indicate that beekeepers needed cash ranging from Tshs. 2 000 to Tshs. 100 000 to pay for labour force in beekeeping operations with a mean of Tshs. 10 666.This implies that beekeepers could hire labour force and pay which is not so high if beekeepers intend to be entrepreneurs.

Table 10: Labour in costs in beekeeping activities(man days).

Labour	Minimum	Maximum	Mean	Std. Deviation
Costs of labour in beekeeping activities	2000.00	100000.00	10666.2500	18080.78877

4.3.9 Reasons for engaging in beekeeping activities

The results presented in Table 11 show that 96.3% of the interviewed beekeepers engaged in honey production because it is more profitable, 2.5% of beekeepers engaged in honey production after being persuaded by their neighbour and 1.3% of the interviewed sampled beekeepers engaged due to government advice after being convinced by village and ward extension officers. This implies or suggests that honey production is a viable business and can make profit. More effort is required to ensure more people are engaged in Beekeeping to ensure higher production output.

Table 11: Sampled beekeepers by reasons for engaging in production

Reasons for engaging in production	Mae Village n=30		Kishisha Village n=28		Ngaroni village n=22		Overall %
	Number	%	Number	%	Number	%	N=80
Get profitable	28	93.4	28	100.0	21	95.5	96.3
Government advice	1	3.3	0	0.0	0	0.0	1.2
Persuaded by neighbours	1	3.3	0	0.0	1	4.5	2.5

4.3.10 Production challenges faced by beekeepers

4.3.10.1 Biological challenges

The Survey results reveal that 12% of the interviewed sampled beekeepers reported that lack of flowers for bees to make honey may hinder production, 16% of the interviewed beekeepers claim drought is a problem and 5% of the interviewed beekeepers mentioned weather changes as another problem faced by beekeepers (Table 12). This implies that low rainfall and drought influence production of honey due to unfavourable conditions for bees to make honey.

4.3.10.2 Financial challenges

The Survey findings show that only 3.7% of the interviewed sample beekeepers had financial constraints in honey production (Table 12).This means the sector can be promoted using funds that can be raised by household and capacity building to beekeepers on entrepreneurship and business skills and beekeepers should be linked with potential buyers in order to identify the market demands and opportunities. This will made beekeepers to start producing large quantity. Thus beekeepers will need capital to invest in the sector in order to produce large quantity and quality.

4.3.10.3 Technical challenges

The results shown in Table 12 indicate that 22.3% of the interviewed sampled beekeepers have no access to forest reserve due to low awareness or policies and strategies which favour sustainable beekeeping. Moreover 24% of the interviewed sampled beekeepers complains on invasion of insects into beehives, (10% of the interviewed sampled beekeepers said there was low production of honey and 3.7% of the interviewed sample beekeepers claimed lack of skills for honey production. Thus it can be concluded that in order to improve production technical support, like training on policies that favours beekeeping sector, training on predators of bees like insect and other wild animals that can cause fatal to bees is needed.

Table 12: Beekeepers by challenges for honey production

Challenges for honey production	Mae Village n=30		Kishisha Village n=28		Ngaroni village n=22		Overall % N=80
	Number	%	Number	%	Number	%	
Biological challenges							
Lack of flowers for bees	4	13.3	3	10.7	4	18.2	14.0
Drought	4	13.3	5	17.8	4	18.2	16.4
Weather changes	0	0.0	3	10.7	1	14.5	5.0
Financial challenge							
Lack of capital **Technical challenges**	2	6.6	0	0.0	1	4.5	3.7
Legal access to forest reserve	3	10.0	7	25.0	7	31.8	22.3
Lack skills/knowledge	1	3.3	1	3.5	1	4.5	3.7
Insects	8	26.6	8	28.5	4	18.2	24.4
Low production	8	26.6	1	3.5	0	0.0	10.0

4.3.11 Future plan of honey production

Results presented in Table 13 show that 99% of the interviewed sampled beekeepers intend to expand production in future and only 1% suggested to reduce production in the future. This implies that majority of the interviewed beekeepers aimed at increasing production in order to expand size of the business, earn more money that can be used to cater for household food, health, education and other households economic needs.

Table 13: Beekeepers' by the intent to expand production

Future plan	Mae Village n=30		Kishisha Village n=28		Ngaroni village n=22		Overall % N=80
	Number	%	Number	%	Number	%	
Expand production	29	96.9	28	100.0	22	100.0	98.7
Reduce production	1	3.1	0	0.0	0	0.0	1.3

4.3.12 Credit in honey activities

Results in Table 14 show that 91.3% of the interviewed sampled beekeepers indicated that credit is helpful and 9% said that credit is not helpful in beekeeping. This indicates that beekeepers need credit to improve honey production activities. This implies that beekeepers are eager to get credit so that they can expand the size of their businesses like owning large number of improved beehives and purchasing of modern equipments.

Table 14: Beekeepers' by the importance of credit

Opinion to credit	Mae village n=30		Kishisha village n=28		Ngaroni village n=22		Overall % N=80
	Number	%	Number	%	Number	%	
Yes	27	90.0	26	92.8	20	90.9	91.2
No	3	10.0	2	7.1	2	9.1	8.8

Results presented in Table 15 indicates that 64.7% of the interviewed sampled beekeepers said credit would help them to purchase modern beehives and 35.3% said credit will help them to purchase harvesting gears and other operational tools.

Table 15: Beekeepers' by the use of credit in honey production

Use of credit	Mae Village n=30		Kishisha Village n=28		Ngaroni village n=22		Overall %
	Number	%	Number	%	Number	%	N=80
To buy modern beehives	19	63.3	15	53.6	17	77.3	64.7
To buy harvesting and others operational tools	11	36.7	13	46.4	5	22.7	35.3

4.3.13 Trends in honey production since 2002

Table 16 of the results indicate that 93.2% of the interviewed sampled beekeepers said production of honey has increased since 2002 and 6.8% said there was decrease in production since 2002.

Table 16 Production of honey since 2002

Honey out put	Mae village n=30		Kishisha village n=28		Ngaroni village n=22		Overall %
	Number	%	Number	%	Number	%	N=80
Yes	28	93.3	28	100.0	19	86.4	93.2
No	2	6.7	0	0.0	3	13.6	6.8

Table 17 indicate that sixty three percent (63.%) of the interviewed beekeepers gave reasons for increased production was due to good weather, while 34% said this was due to market to sell their produce and 2.7% of the interviewed beekeepers said production of honey has increased due to training and extension services from CSOs, Government and other stakeholders.

Table 17: Reasons for Increased honey production since 2002

Reasons	Mae Village n=30		Kishisha Village n=28		Ngaroni village n=22		Overall %
	Number	%	Number	%	Number	%	N=80
Good weather	16	53.5	24	85.7	11	50.0	63.0
Reliable buyers	14	46.7	3	10.7	10	45.4	34.3
Extension services	0	0.0	1	3.5	1	4.5	2.7
Education							

4.4 Honey marketing channels

In order to understand how honey moves through various market channels, it is necessary to identify the roles of various market participants involved. Survey showed that there were two marketing channels of honey in the area of research were as follows (Figure 3)-

(i) Producer – consumer; consumers purchased honey directly from producers.

(ii) Producer-Wholesaler Beekeeping Cooperative Society (HABECO) reported to buy honey from beekeepers as a wholesaler and sell to a company in Arusha known as Golden Food Product (GFP). GFP resells the honey to both consumers as processed packed Honey in small containers to local market and export outside the country.

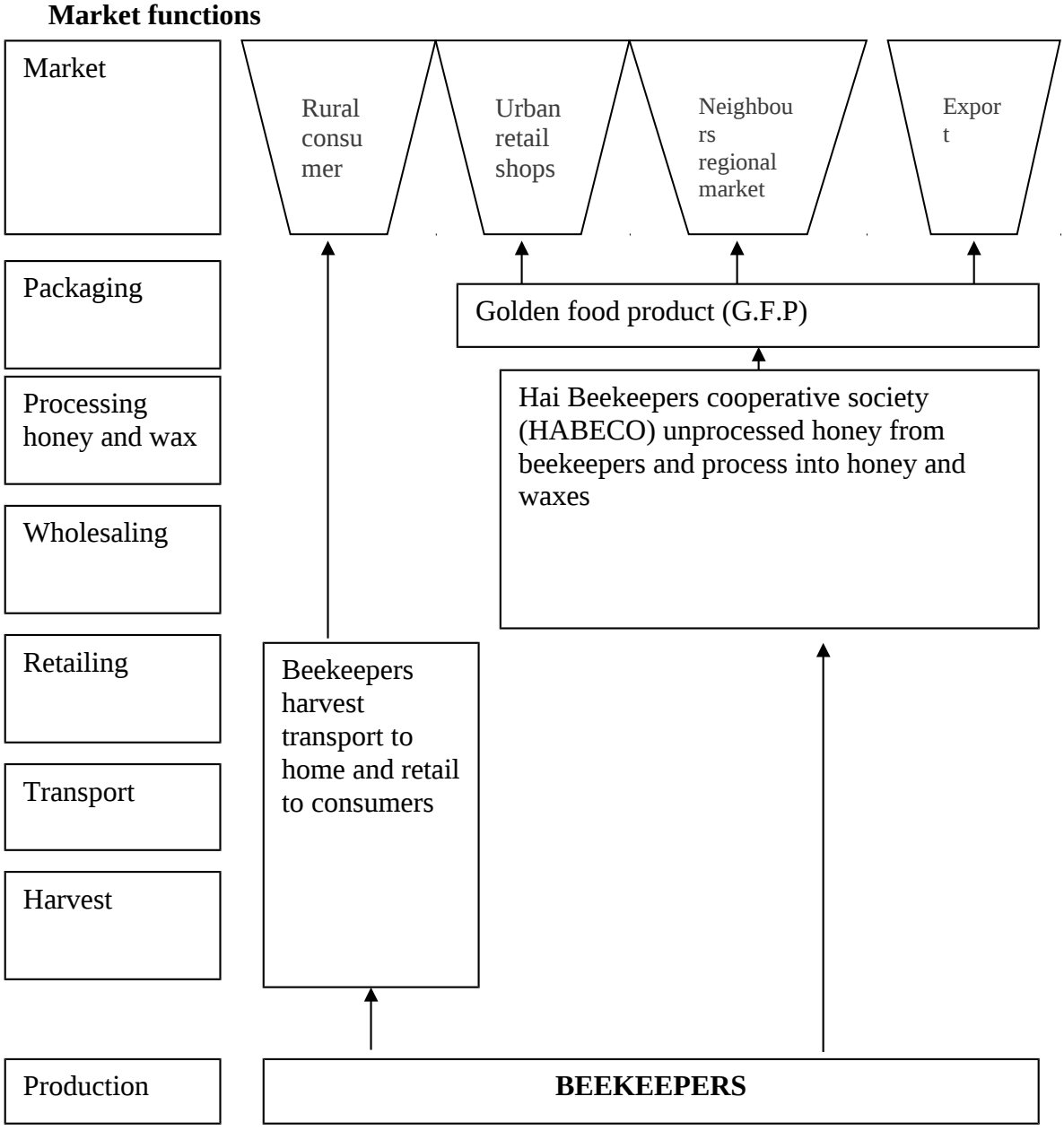

Figure 3: Market channel for honey and beeswax

Beekeepers interviewed were aware of the cost that is to be incurred by taking the product to the market. This includes storage facilities, transportation or physical distribution that involves transportation between different centres and storing the

product while in transit. However, beekeepers cannot adopt the shortest channel which is to sell directly to consumer since they cannot afford all these costs. Therefore this shows the importance of having middlemen, but not their functions. When a producer attempts to perform these functions his production costs tend to increase and this in turn may increase the price, hence affect marketing efficiency and when some of these tasks are undertaken by middlemen, the production costs tend to decrease.

4.4.1 Price information and honey production

Results presented in table 18 show that 41% of interviewed sampled beekeepers set prices after hearing from their fellow friends, 40% of the interviewed sampled beekeepers said they visit market direct, 12% of the interviewed sampled beekeepers said they got price information from NGOs, like HABECO and 7.5% of interviewed sampled beekeepers got price information from extension agents. One may conclude that majority of beekeepers sold their honey after hearing from their fellow friends or direct visit to the market.

Table 18: District of sample beekeepers and price information's

Information source	Mae Village n=30		Kishisha Village n=28		Ngaroni village n=22		Overall %
	Number	%	Number	%	Number	%	N=80
From fellow friends	5	16.7	15	53.5	12	54.4	7.5
Direct visit to the market	14	46.6	9	32.0	9 0	40.0	40.0
From extension officers	4	13.3	2	7.1		0.0	7.5
Form NGOs	7	23.3	2	7.1	1	4.5	12.5

4.4.2 Prices of honey

Table 19 indicates that prices of honey ranged from Tshs 1 500 to Tshs 7 000 per kg or litre with a mean price of Tshs 3 012.5.The honey produced in the study area is not sufficient to meet the demand of customer hence during scarcity price tends to shoot.

Table 19:Prices of honey (Tsh)

Variable	**Minimum**	**Maximum**	**Mean**	**Std. Deviation**
Prices of honey	1500.00	7000.00	3012.5000	187.95378

4.4.3 Challenges to honey marketing

According to URT (1998a), constraints faced by beekeepers in Tanzania include lack of appropriate equipments, storage facilities, packaging materials and poor technologies and the beekeeping industry in general and poor handling. Table 20 indicates that 83.4% interviewed sampled beekeeper identified there is low price of honey at farm gate and 16.6% of the interviewed sampled beekeepers said there is no reliable market for honey. Thus it can be concluded that honey marketing in Hai district is dominated by one main buyer at farm gate (HABECO) and consumer due to lack of competition HABECO may set price which they like and beekeepers do not have alternative markets to sell and are therefore forced to sell at that particular price settled by HABECO (Table 20).

Table 20 Challenges to honey marketing

Market challenges	Mae Village n=30		Kishisha Village n=28		Ngaroni village n=22		Overall % N=80
	Number	%	Number	%	Number	%	
Low prices of honey	21	70.0	25	89.3	20	90.9	83.4
No strong market to offer good prices	9	30.0	3	10.7	2	9.1	16.6

The results in Table 21 show that 41.3% of the interviewed sampled beekeepers said to have many buyers at farm gate so as for increase competition and probably prices will raise due to high demand, 30% of the interviewed beekeepers said about price increase in order to earn more per unit produce, 28.9% of interviewed beekeepers suggested the production of good quality honey in order to win for both internal and external markets. This implies that beekeepers need many buyers and high price of the product which will encourage production of honey.

Table 21: Percentage distribution of beekeepers' by solution to honey marketing

Solution to honey marketing	Mae Village n= 30		Kishisha Village n = 28		Ngaroni Village n=22		Overall % N= 80
	Number	%	Number	%	Number	%	
To have many buyers at farm get	13	43.3	12	42.8	8	36.4	41.3
To produce good quality honey	5	16.6	8	28.5	10	45.4	28.9
Price increase	12	40.0	8	28.5	4	18.2	30.0

4.5 Efficiency analysis for the honey marketing system

4.5.1 Structure Conduct Mode Performance (S-C-P)

The analytical core of the model is analytical of markets on the assumption of the two way casual and feed back relationship between it s major components; structure, conduct and performance (Ashimogo, 2006).

Market structure is defined as organizational characteristics, which determine the relations of the sellers in the market to each other, of the buyers in the market to each other, of sellers to the buyers and of sellers established in the market to other actual or potential supplies of goods including potential new participants that might enter the market (Ashimogo, 2006).

Market transparency affects the intensity of competition. If buyers or sellers do not have proper knowledge about market conditions, the intensity of competition is low despite a sufficient number of market participations to ensure competition. The most important aspect of market transparency is information transmission in the marketing systems. This implies information about prices, grades and quality and standard weights of the product in questions. In the study area the pre conditions for a high degree market transparency are poor. Buyers need to buy unprocessed honey instead of processed honey. If beekeepers would have been empowered to process in terms of training and equipments, and informed about the prices of processed honey and beeswax they would have been doing so; Also quality of honey obscure market transparency for honey. These include poor harvesting techniques which result to poor quality honey in the market. All these factors indicate that there is no market transparency in the honey marketing system.

Barriers to business entry or expansion to market reduce the threat of potential competition and therefore impede marketing efficiency. Barriers can result from limited know-how, capital requirement, institutional restrictions and non-competitive reactions of producers/sellers. 91.3% of the beekeepers reported that credit is the barrier to business expansion and poor technical know how.

In addition, beekeepers report low and unstable prices of honey as barriers to business expansion. Most of beekeepers indicated that they could expand their business if they were provided with capital in form of credit. It was observed that at present beekeepers are not deliberately targeted for credit schemes (by financial institutions and other interactions to improve their performance. Moreover, acquisition of credit from formal institutions such as bank follows very long and bureaucratic procedures. It can generally be concluded that market entry is not a serious problem because the factors mentioned do not really prevent beekeepers entering the market, these factor act as a barrier to honey trade expansion.

4.5.2 Market conduct

Market conduct refers to the patterns of behaviors which a participant follows in adapting to the markets in which they sell or buy (Ashimogo, 2006). For instance, pricing and selling tactics, producers' cooperation, and research and development activities. In the study area beekeepers organized themselves to form a cooperative known as Hai Beekeepers Cooperative Society (HABECO) which monopolized the business in the area and they are one who determines buying and selling prices or mode of payment to be adopted.

4.5.3 Market Performance

Market performance is defined as the way which market and marketing contribute to various aspects of economic performance. Honey sector is not producing efficiently in Hai District hence poor economic performance due to few numbers of modern

beehives owned by beekeepers, low prices, poor quality of both the sector and the product.

4.5.4 Gross margin analysis

The study is tries to ascertain the level of market efficiency by evaluating costs and prices at farm gate and wholesale at local/market. Gross margin were calculated and used in assessing relative profitability of the product at the different levels of the market chain, using traditional beehives as a unit because they are ones which are commonly used by majority of beekeepers.

Results presented in Table 22 indicated that beekeepers received TShs 37 850 as a Gross profit (bottom-line) per one traditional beehive from the sales of 30 kg of unprocessed honey at farm gate price (Appendix.4). This is a viable business. Moreover the use of return to investment, that is the ratio of sales value to costs of production as a business model to examine whether the business is viable or not. Here beekeepers earn six times of what s/he invested.

Hai Beekeepers Cooperative Society (HABECO) receives Tshs. 59 700 as a Gross profit from sales of 30kg of processed honey to Golden Food Product (G.F.P) per one traditional beehive (Appedix.5), which means HABECO earns more than Beekeepers. This is due added value through processing of unprocessed honey into processed honey and beeswax (Table 23). The sector has ROI of 1:19 (appendix.3) which means sector multiply nineteen times but and still this sector is economically

viable also beekeepers still could raise the Gross Margin by participating in some activities in order to reduce variable costs.

Table 22 Gross margin of honey at farm gate price

Particulars	
Quantity sold (kg)	30
Unit price per kg (TShs	1 500
Total revenue (TShs)	45 000
Variable costs (TShs)	150
Gross Margin (G.M)	37 850

Note: One Traditional beehive can produce up to 30kg of unprocessed honey.

According to the results in table 22 all levels of market chains are able to make profit, although its gross margin for the HABECO selling at Golden Food Product is higher compared to the gross margin of beekeepers selling to HABECO. This implies that the marketing costs at wholesales level are not equally shared with retail levels. The retailers' earnings were not reflecting marketing costs. Margin analysis in African Agricultural markets shows that, in most cases, traders' profit margins (gross margin) of amount to less than 10% of the selling prince (ILRI, 1995).

Table 23 Gross margin of honey after selling at Golden Food Product (G F P)

Particulars	
Quantity Sold (kg)	30
Price per unit kg (TShs)	2 000
Revenue obtained (TShs)	60 000
Waxes 3kg x (TShs) 3000	3 000
TR	63 000
Total variable costs (Tshs)	3 300
Gross Margin	59 700

4.6 Contribution of honey to household income

Different activities contribute into household income (URT, 2005b). According to research, the main source of household income in Hai district were found to be selling crops, shops, employment and other informal sectors. The mean annual household income for a household involved in coffee production was TShs. 146 437, while the mean annual household involved in honey production was TShs. 215 659. This showed that the household income was relatively higher in the households involved in honey production. The mean, minimum and maximum income per year of each source of the household income are presented in Table 23.

The results further underlined that income form honey contribute significantly to the household income. Compared to coffee sales and other informal sectors comparing to the National per capita income which is US$ 293.Income from honey sector which about TShs. 380 000, shows that beekeepers in the district are relatively better off because of the beekeeping industry than others in formal sector and coffee contributions.

Table: 24 Source of income

Source of income	Number	Mean income	Minimum	Maximum
Coffee sales	20	146 437	15 000	720 000
Informal sector	20	65 718	21 500	150 000
Honey sales	40	215 659	10 000	221 000
Overall household income	80	427 814	46 500	1 091 000

CHAPTER FIVE

CONCLUSION AND RECOMMENDATION

5.1 Conclusion

The general objective of this study was to analyze economic factors that affect honey production and marketing. The specific objectives include; to analyse profitability of honey production, assessing efficiency of honey market and role played by various market participants and evaluating contribution of beekeeper sector to household income and finally to suggest remedial intervention strategies to improve honey production and marketing. Beekeeping industry play a significant roles in contributing to social economic development of the people in Hai District from household to District leveling terms of income generation, food security, health, employment and agricultural development.

Gross Margin analysis was used to analyze honey profitability and result reveal that beekeepers earned Tshs. 37 850 as a Gross profit (bottom-line) per one traditional beehive from the sales of 30 kg of unprocessed honey. Hence beekeeping is a profitable enterprise to be undertaken by encouraging beekeepers to increase number of both traditional and modern beehives. The findings do not provide enough evidence to support the hypothesis that honey production is not economically profitable in Hai District.

An assessment of marketing channels of honey and beeswax show that there are four marketing participants; these include beekeepers, specific institution that ensured there is steady market (HABECO), wholesalers and retailers. Two marketing

channels were identified in the study area. First channel involved selling of honey direct from beekeepers to rural consumers. And second channel involved selling honey from beekeeper to cooperative (HABECO) and cooperative to Golden Food Product and finally to urban retail shops or neighbouring regional markets. Unsatisfactory low price of honey is the most limiting factor to improved incomes of beekeepers in the study area. The low price offered to beekeepers is partly due to selling of unprocessed honey.Despite the low price offered to beekeepers the contribution of beekeeping to household income in the study area is significant as compared to coffee sales and informal sources of income. Interviewed Beekeepers in Hai District earned Tshs. 215 659 as mean income from sales of honey and bees wax and earned Tshs. 146 437 as mean income from sales of coffee. Compared to National per capita income, which is US $ 293 (Tsh 380 900), it shows that beekeepers in the district are relatively better off because of beekeeping industry. This finding rejects hypothesis that contribution of honey and bees wax to household income is not significant.

Beekeeping enterprise in Hai District faced different constraints in production and marketing which limit development and sustainability of the beekeeping industry. Generally the industry plays a significant role in contributing to social economic development of the people in Hai District. The findings of this study and their subsequence recommendations will form important bases for various development sectors like policy makers, central and local government and academicians. Basing on the results of this study the following measures are recommended.

5.2 Recommendations

The following recommendations are aimed at addressing issues raised in the discussion and conclusion:

(i) There is a need of Government and CSOs to design training programmes and train beekeepers, buyers, cooperative and extension staff focusing on entrepreneurship and business skills.

(ii) Stakeholders (Government institutes at all levels, community, CSOs, informal Sector and Agents and International partners) need to facilitate beekeepers to access credit in order to buy modern beehives for product quantity and quality improvement.

(iii) The Government should provide capacity building to district extension staff, civil society organizations (CSO), producers in marketing and quality control of bee products in order to improve both quality and quantity needed to the market.

(iv) Consolidate the National Honey Show vision into a clear and realistic programme that will focus on putting in place an inclusive, representative, private sector, and member-driven institutional framework for honey stakeholders.

(v) Government and CSOs should Create Network of beekeepers to ensure they effectively participate in the policy formulation of the industry and negotiate better price for their products. National Producers Cooperative to be formed only for producers to ensure the production and quality of honey.

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APPENDICES

Appendix 1: Farmer's questionnaire for production and marketing of Honey

1. Respondent identification number……..

2. Date of interview…….. Time…….

3. Division…….Ward……..Village……

4. Occupation: ……..

5. Interview's name……..

Household Identification Variables

6.Name of household head…….

7.Marital status of household head……

{1} Married {2} single {3} Divorced {4} widowed

8.Age ……(years)

9.Household composition

Category	**Number**
Children 0 – 14 years	
Youths 15 – 17 years	
Adult males 18 years and above	
Adult Females 18 years and above	
Total HH members	

10.Sex…….{1} male {2} Female

11.Family size……..

12. Level of education……..

{1} None

{2} Adult education

{3} Primary education

{4} Secondary

{5} Other (specify)……

Beekeeping activities

13. Are you beekeeper? {1} Yes {2} No

14. How many beehives do you have……..

15. How many of these are improved ones……..

16. How many of these are traditional ones……..

17. Where did you get improved beehives?

{1} From NGO,s

{2} Fabricate yourself

{3} Others (specify)……

18. Where did you get inputs and extension services concerning honey production on the last season?

{1} Village extension officer

{2} From NGO specify……..

{3} Others specify……

19. Have you harvested honey since you have started this enterprise?

{1} Yes {2} No

20. If yes, what is the total yield from each beehive... per liter?

21. Do you have harvesting gears? {1} Yes {2} No

22. Do you process your honey? {1} Yes {2} No

23. In what form/products……..

24. If you don't process, what are the reasons…….

25 how much money you need to operate this business…….

26.in average how much did you pay for labour force in a year for beekeeping activities……..

27. To whom you sell your honey?

{1} Consumer

{2} Middlemen

{3} Other specify……..

28. Why did you choose to engage in beekeeping activities?

{1} Is more profitable
{2} Government's advice
{3} Persuaded by neighbours
{5} Others (specify)……..

29. When did you start beekeeping activities?.....

30. (a)Do you keep livestock {1} Yes {2} No

(b)If yes, mention type and number

Type	Number
……	……
……	……

(c)Do you sell any of these during the year {1} Yes {2} No

Type of livestock sold	Number	Value

……. …….

…… ……. …….

31. Do you have your own machinery/equipment for?

(i) Hives preparation {1} Yes {2} No

(ii) Harvesting gear {1} Yes {2} No

(iii) Sieving/filtration {1} Yes {2} No

(iv) Packaging {1} Yes {2} No

(v) Transport {1} Yes {2} N

(vi) Others (specify)

……..

If yes, mention the machineries and tools you own including hand equipment

Tool/Implement/Machinery Number

……..…….

…….……

……..……..

32. Do you hire equipment for carrying your operations in last season

{1} Yes {2} No

If Yes,Equipment Source Payment rate (per ha/hour)Tsh……

33.What limits your number of beehives?.....……...

……

34. What are your futures plans on honey production?

{1} Expand production

{2} Reduce production

{3} Continue producing the same

{4} Others (specify)……

Labor use and other purchased inputs

35. What are the main sources of your labour force in 2005/06 seasons?

(i) Family labour {1} Yes {2} No

(ii) Hired labour {1} Yes {2} No

(iii) Combination of the above {1} Yes {2} No

3637. How many do you pay your labour force on honey/coffee manual tasks…Tshs per day/week/month?

Farmer's problems

38. (a) What is the most critical problem in

{1} Honey production…….

{2}Honey marketing……..

(b) How do you think these problems can be solved?

{1} Honey production…….

{2}Honey marketing…….

39. What type of advice do you get from a village extension officer?.....

40. (a) In your own opinion do you think that credit is helpful?

{1} Yes {2} No

(b)If yes, why?.....

(c)If no, why?.....

Labour's problems

41. Do you experience labour shortage? {1} Yes {2} No

If yes, when

{1} Hives preparation

{2} Beehives setting

{3}Harvesting

{4} Transport from farm to home

{5} Sieving/filtration

{6} Packaging

{7} Transport to the market

{8} Others (specify)

42. How do you solve the problem of labour shortage?

{1} Hire more labour

{2} Reduce various farm operations

{3} Postponing some of the beekeeping operations

{4} Resorting to family labour

{5} Others (specify)

43. How far is the selling point from the homestead… km

Output, consumption and Marketing

44. (a) Has output (yield) of honey increased since 2002?

(i) {1} Yes {2} No

(ii)If yes, what was the most reason for the increase?

……

(b) Has output (yield) of honey decreased since 2002?

(i){1} Yes {2} No

(ii)If yes, what was the most reason for the decrease?……

45. How do you collect market informations for honey?

{1} Direct visit to the market

{2}Crosschecks with fellow farmers

{3} hear from friends

{4} from extension officers

{5} From NGO's

{6} others (specify)……

46. What has been the price for bee products produce for the last season?

{1} Increasing

{2} Decreasing

47. From 44 above, if it is increasing/decreasing, why?

{1} Few/many buyers in the market

{2} Low supply/high production

{3} High/low demand

48. Give market information as indicated for 2004/05

Amount produced	Amount consumed (if Applicable)	Amount sold	Unit price (Tshs/kg)		Revenue	Transport cost

Household's Income

49. How much money do you earn in 2004/2005 as the source of income?

Source of income	Amount sold (bags/kg/no)	Money obtained

Sales of crop		
{1} Honey		
{2} Coffee		
{3} Cash crops specify…		
Subtotal (crop)		
Livestock sales		
{1} Cattle		
{2} Goat/sheep		
{3} Chicken/poultry		
Subtotal (livestock)		
Non agricultural income		
{1} Informal sector		
{2} Salary		
{3} Remittances		
Subtotal (non agricultural)		
Grand Total		

THANK YOU FOR YOUR COOPERATION

Appendix 2: Honey production potentials and actual production in selected districts in Tanzania

High producing area			Medium producing area			Un-exploited areas		
District	**Potential (Tons)**	**Actual (tons)**	**District**	**Potential (tons)**	**Actual (tons)**	**District**	**Potential (tons)**	**Actual (tons)**
Kahama	4,000	500	Kondoa	3,000	300	Lindi	8,000	50
Mpanda	8,000	1,500	Kiteto	2,000	250	Songea	6,000	50
Sikonge	6,000	2,000	Babati	1,200	150	Iringa	5,000	40
Urambo	6,000	1,400	Kibondo	4,000	250	Biharamulo	4,000	15
Nzega	4,000	400	Handeni	3,000	150	Kasulu	4,000	5
Tabora	5,000	1,200	Kigoma	3,000	100	Newala	4,000	15
Chunya	6,000	400	Arumeru	1,500	100	Tunduru	4,000	15
Manyoni	8,000	600	Rufiji	2,500	50	Singida	3,000	5
Bukombe	5,000	800	Nkasi	1,500	50	Hai	2,500	5
Total	52,000	7,800		21,700	1,400		40,000	18

Production ratio of honey and beeswax per colony per year is estimated to be 15:1

Source: National Beekeeping Programme, 2001

Appendix 3: Return on investment (ROI)

Return on investment (ROI) = sales value

Cost of production

= 45,000

7,150

1:6

Appendix 4: Gross margin analysis of honey in Hai district Kilimanjaro region

Sell at farm gate

Description	Quantity	Price/unit	Total
A. Gross revenue			
Honey output (kg)	30	1500	45,000
B: Variable cots			
Purchasing of hanging wire (Tsh)	2kg	1500	3000
Transport home forest (Tsh)	1	1000	1000
	1	1000	1000
Hive hanging (Tsh)	1	500	500
	1	1000	1000
Harvesting (Tsh)			
			TVC 6500
Transport forest home (Tsh)			

Profit (II) = TR – TVC
= 45,000 – 6500 = 38,500

Note: This is the GM at Farm gat price when beekeeper sells to HABECO.

Appendix 5:Gross margin analysis of honey in Hai district Kilimanjaro region

Sell to Golden Food product (G. F. P.)

Description	Quantity	Price/unit	Total
A. Gross revenue			
Honey output(Kg)	25kg	2000	50000
Wax (Kg)	1kg	3000	3000
			TR=53,000
B: Variable cots			
Transport to market(Tsh)	1	1000	1000
Labour during processing(Tsh)	1	1000	1000
Loading and unloading of containers(Tsh)	1	1000	1000
			TVC=3000

Profit (II) = TR – TVC
= 53,000 – 3000 = 49,700

Gross margin=Tsh 50,000