

**OPTIONS FOR DEVELOPING BEE HONEY MARKETING FOR LUSHOTO
DISTRICT, TANZANIA**

**BY
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**A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE
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ABSTRACT

This study aimed at developing bees' honey marketing options in Lushoto district, Tanzania in order to guide beekeepers on bees honey marketing opportunities. The specific objectives were to: (i) identify and map bees honey production zones and marketing centres (ii) establish marketing options and market requirements for bees honey, (iii) match market requirements for bees honey production and marketing options, and (iv) to determine the best bees honey marketing options in the study area. A structured questionnaire was used to collect data from 80 beekeepers of Lushoto District and 15 traders who buy Lushoto honey residing in Lushoto town, Dar es Salaam, Coast and Morogoro regions. Data were analysed using qualitative and quantitative methods. The quantitative methods comprised profit margin and benefit-cost analysis. Mapping honey marketing channels were done to gauge different options/alternatives for bees honey marketing. The results indicated that, prices and profit margins obtained by different actors along the honey value chain varied significantly. Retailers obtained higher profit margin (1 538 TZS) than beekeepers, assemblers and wholesalers (940, 962, and 1 247 TZS) respectively. Inadequate market information about what and when to sell explain the low profit margin for beekeepers. There were little value adding activities at local level and the packaging type mostly used by beekeepers includes 5L, 1L, 0.5L and 0.34L as most honey consumed at local level. The study revealed that, both direct and indirect marketing options are used by beekeepers. Small scale beekeepers can maximize profit from selling directly to the ultimate consumers through roads side outlets, on farm and retailing markets, while medium and large scale beekeepers can either sell direct or indirectly. It is recommended that beekeepers should utilize opportunities of markets and product differentiation due to current high demand for organic honey at both local and international markets.

DECLARATION

I, NASSON KONGA, do hereby declare to the senate of Sokoine University of Agriculture that this dissertation is my original work and that it has not been submitted for a higher degree at any other institution.

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DEDICATION

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LIST OF ABBREVIATIONS AND SYMBOLS

ASARECA	:	Association for Strengthening Agricultural Research in Eastern and Central Africa
BCA	:	Benefit Cost Analysis
BCR	:	Benefit Cost Ratio
BoT	:	Bank of Tanzania
ELCT	:	Evangelical Lutheran Church of Tanzania
EPOPA	:	Export Promotion of Organic Products from Africa
FAO	:	Food and Agriculture Organization
GPS	:	Global Positioning System
HMF	:	Hydroxymethylfurfural
MMA	:	Match Maker Associates Limited
MNRT	:	Ministry of Natural Resource and Tourism
NBS	:	National Bureau of Statistics
NGOs	:	Non governmental organizations
NPV	:	Net Present Value
PASS	:	Private Agricultural Sector Support
SADC	:	Southern African Development Community
SMEs	:	Small and Medium Enterprises
SNAL	:	Sokoine National Agricultural Library
SUA	:	Sokoine University of Agriculture
TZS	:	Tanzania shilling
UK	:	United Kingdom
URT	:	United Republic of Tanzania
USA	:	United States of America

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background Information

Beekeeping plays a major role in socio-economic development and environmental conservation of several countries in the tropics. It is used as food (e.g. honey, pollen and brood), raw materials for various industries (e.g. beeswax candles, lubricants), medicine (honey, propolis, beeswax, bee venom) and source of income for beekeepers. Mwakatobe and Mlingwa (2005) reported that in most parts of the world natural honey is widely used in the food industry from baking to beer making and added that honey has increasingly been gaining popularity as an energy source. Thus it widely used in the manufacture of energy drinks targeting the sports market. Honey is considered as food in Europe and North America, Latin America, North Africa, the Near East and increasingly in Japan, while in most parts of Africa honey is used for brewing honey beer and to a lesser degree as medicine (Krell, 1996).

In many areas of the SADC sub region including Tanzania honey and beeswax products are viable sources of rural income (Chihongo, 1992). For example the sales of Tanzanian honey and beeswax is estimated to generate about US\$ 1.7 million annually (Mwakatobe and Mlingwa, 2005). Also Lalika and Mdachangu (2008) document that selling honey and beeswax plays a significant contribution to the income of smallholders of Kilwa and Lindi rural districts of Tanzania such that beekeepers have higher income than non beekeepers. Also Martin (2008) argues that apiculture in the wider context of agriculture is a valuable tool for enabling people to generate more food and income. Mwakatobe and Mlingwa (2005) reported beekeeping contributes significantly in improving biodiversity and increasing crop production through pollination.

Table 1: Major world honey producers and production (1000 tons)

Country & Years	2001	2002	2003	2004	2005	2006	2007	Average
China	254	267	295	298	299	305	303	289
Argentina	80	83	75	80	110	84	81	85
Turkey	60	75	70	74	82	80	74	74
Ukraine	60	51	54	58	71	76	68	63
USA	84	78	82	83	73	70	67	77
Mexico	59	59	57	57	50	56	54	56
Russia	53	49	48	53	52	55	55	52
India	52	52	52	52	52	52	52	52
Ethiopia	29	40	38	41	36	44	44	39
Iran	27	28	28	28	28	36	36	30
Brazil	20	24	30	32	34	36	35	30
Canada	32	37	34	32	36	48	31	36
Spain	32	36	35	37	27	31	31	33
Tanzania	27	27	27	27	27	27	27	27
Kenya	25	22	22	22	22	25	25	23

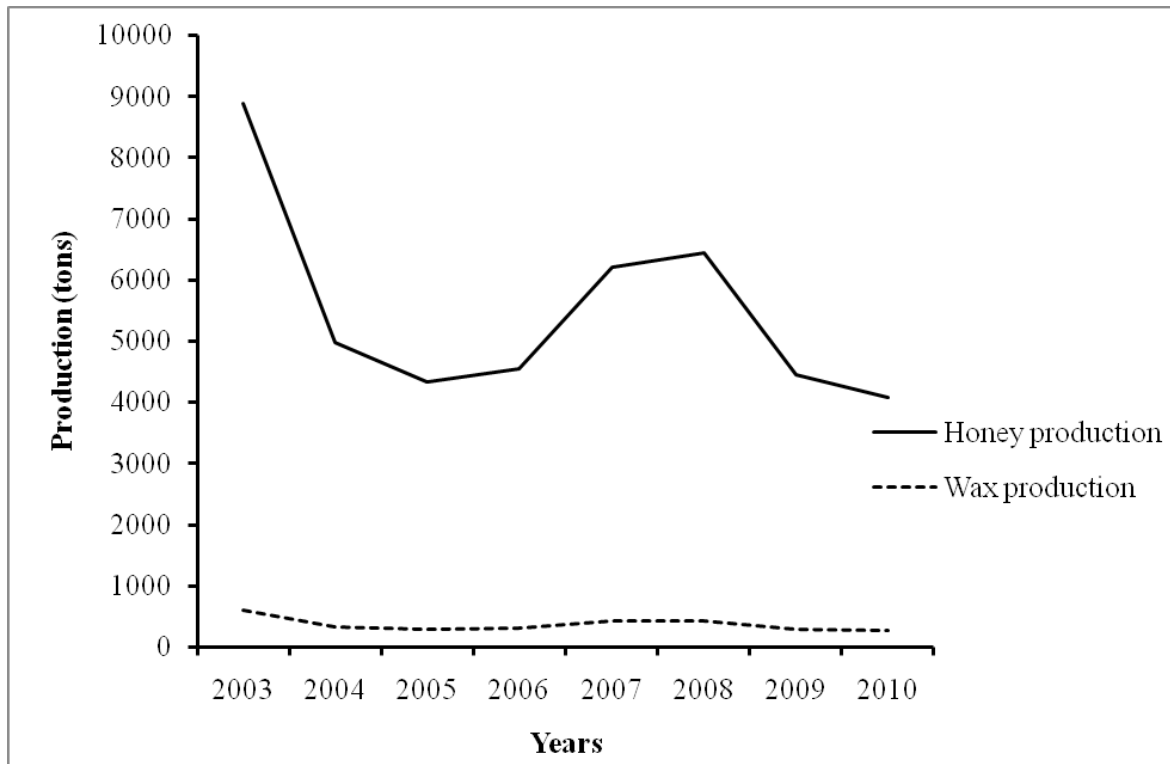
Source: FAOSTAT (2005)

At present, the annual world honey production is estimated at about 1.4 million tonnes (FAOSTAT, 2005) which is less than 1% of the total sugar production. China is currently the largest honey producing nation in the world, controlling about 40% of the world markets (Peniel, 2007). The country plays an important role in world honey production and trade. The next biggest honey producers worldwide are Argentina, Turkey, Ukraine and United States of America (Keya, 2009). Table 1 shows the major honey producers in the world.

In Africa, Ethiopia is the leading honey and beeswax producer (FAOSTAT, 2005). The high production is due to presence of substantial number of bee's colonies and surplus honey sources of flora. Assefa (2009) document that the country produces around 23.6% and 2.1% of the total African and world honey respectively. Tanzania is the second leading country in honey production after Ethiopia (Kihwele *et al.*, 2001; Mwakatobe and

Mlingwa, 2005). The high production of honey is mainly due to presence of high population of bee colonies that are estimated at 9.2 million and presence of high number of vegetation that are preferred by bees in many areas of the country (Kihwele *et al.*, 2001). Also Latham (2001) documented that presence of miombo trees contributes significantly to the high production potential of bee products in the country. Other honey producers are Kenya, Madagascar, Mozambique, Uganda, Burundi, Zambia and Rwanda producing 28 678, 25 000, 3 986, 402, 327, 206, 200 and 42 tons of honey respectively (Mmasa, 2007)

Tabora region is the chief source of honey in the country accounting for about 40% of the total honey produced (Liwenga and Masao, 2008). Others are Singida, Shinyanga, Iringa and Mbeya Regions. And the upcoming honey bee producers are Mwanza, Morogoro, Dodoma and Tanga Regions (Keya, 2009). Figure 1 presents honey and beeswax production trends in Tanzania from 2003 to 2010 in metric tonnes. This indicates that, there's fluctuation in honey production from 2003 to 2010, but generally the production is decreasing.



**Figure 1: Honey and beeswax production trend in Tanzania from 2003 to 2010
(metric tonnes)**

Source: MNRT 2010

Recently, effort to promote honey production and other bee products in Lushoto District has been undertaken by several NGO's, Donor agencies and community. With the growing population and increased threats to environmental degradation, beekeeping remains as the best option for maximizing household income and reduce income poverty in the District (URT, 2008).

The Lushoto District is sheltered by extensive forest cover and a large part of well watered land, which makes the District to have a great potential for bee keeping and production. Beekeeping being potential sub sector in Lushoto district attracts more parties to venture since it complements the agricultural development with diversification of its economy.

This dissertation is sought to evaluate and explore marketing opportunities and requirements for bee products Lushoto district, Tanzania.

1.2 Problem Statement and Justification

Lushoto district is among the areas in Tanzania with favourable environment for bee keeping and production due to existence of many plants that attract bee colonies for nectar production (URT, 2008). The existing favourable conditions for beekeeping and limited land for extensive agricultural production in the district has captured attention of many private and public institutions such as Roman Catholic Sisters, Evangelical Lutheran Church of Tanzania (ELCT), Irente farm and Department of Apiculture and Natural Resources of the District towards bee farming.

The Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA) through Sokoine University of Agriculture (SUA) is a Natural Resource Management project that aimed to contribute towards income poverty reduction through bee honey production in Lushoto District. However both the project implementation team and other stakeholders face a major snag, which is the market for the expected honey and other bee products to be produced from the beekeepers.

Available information posit that although there is abundant market for bee products in Tanzania (Peniel, 2007), several literatures have reported lack or limited and unreliable market for bee products especially honey and beeswax (Ngaga *et al.*, 2005; Mmasa, 2007; Kasongo, 2007 and Keya, 2009). On the other hand, several market studies have indicated existence of huge markets for Tanzania bee products within and outside the country. For example Mapolu (2005) stressed that the demand for Tanzania honey and beeswax in the world market is very high due to its natural state. Mwakatobe and Mlingwa (2006)

document that Tanzania honey fetches high prices on the international market for example in the year 1999/2000 one tonne of honey fetched 3 741.13 US\$ while the price for beeswax was about 1 075 US\$. One key question that proceeded formulation of this study and direct ASARECA initiatives is ‘‘do we have enough information about market requirement to guide producers?’’. Due to polar opposite opinions indicated above, the answer is no. Therefore, this research was conducted to collect and analyse data on market requirements for bee products in Lushoto District, Tanzania in order to provide information for guiding producers in the beekeeping industry on best marketing option for profit maximization.

This study will generate information to various practitioners and beneficiaries in the beekeeping sector in Lushoto District. The specific potential users and direct beneficiaries of the outputs are the beekeepers and other people who want to enter into beekeeping sub sector. These can use the findings to refurbish the sector and produce honey according to what the market demand.

1.3 Objectives of the Study

1.3.1 General objective

The general objective of the study is to establish options for sustainable bees honey marketing for Lushoto District, in Tanzania aimed at providing market information to guide producers, traders and consumers.

1.3.2 Specific objectives

Specifically the study is aimed to

- i. Identify and map bees honey production zones in the study area.
- ii. Establish marketing options and market requirements for bees’ honey

- iii. Match market requirements for bees honey production and marketing options.
- iv. Determine the best bees honey marketing option in the study area

1.4 Research Questions

The study was directed by the following questions

- i. What are the market requirements for the bee products to be produced?
- ii. Are farmer's production methods guided by the information from the market?
- iii. Does the benefit reaped compare favourably with the cost of bees honey production?

1.5 The Conceptual Frame Work of the Study

The conceptual framework (Fig. 2) shows two options as alternatives to beekeepers to market the Lushoto bees' honey. The first options are direct marketing where a producer sells his/her products directly to the ultimate consumer through on farm markets, local farmer markets or road side stands. The second option is indirect marketing where producers deal with the intermediaries rather than the ultimate final consumers. In this assemblers, wholesalers, processors and retailers sells honey for producer. Consumers often have specific requirements for product based on quality, form and quantity, including its availability. The main link among them is the information flow between these two pillars (Producers and consumers). Therefore presence of different marketing opportunities to producer help them to choose the best option, while the information obtained in the markets as well act as a guideline to the beekeepers producing bees honey commercially based on the demand available (target markets).

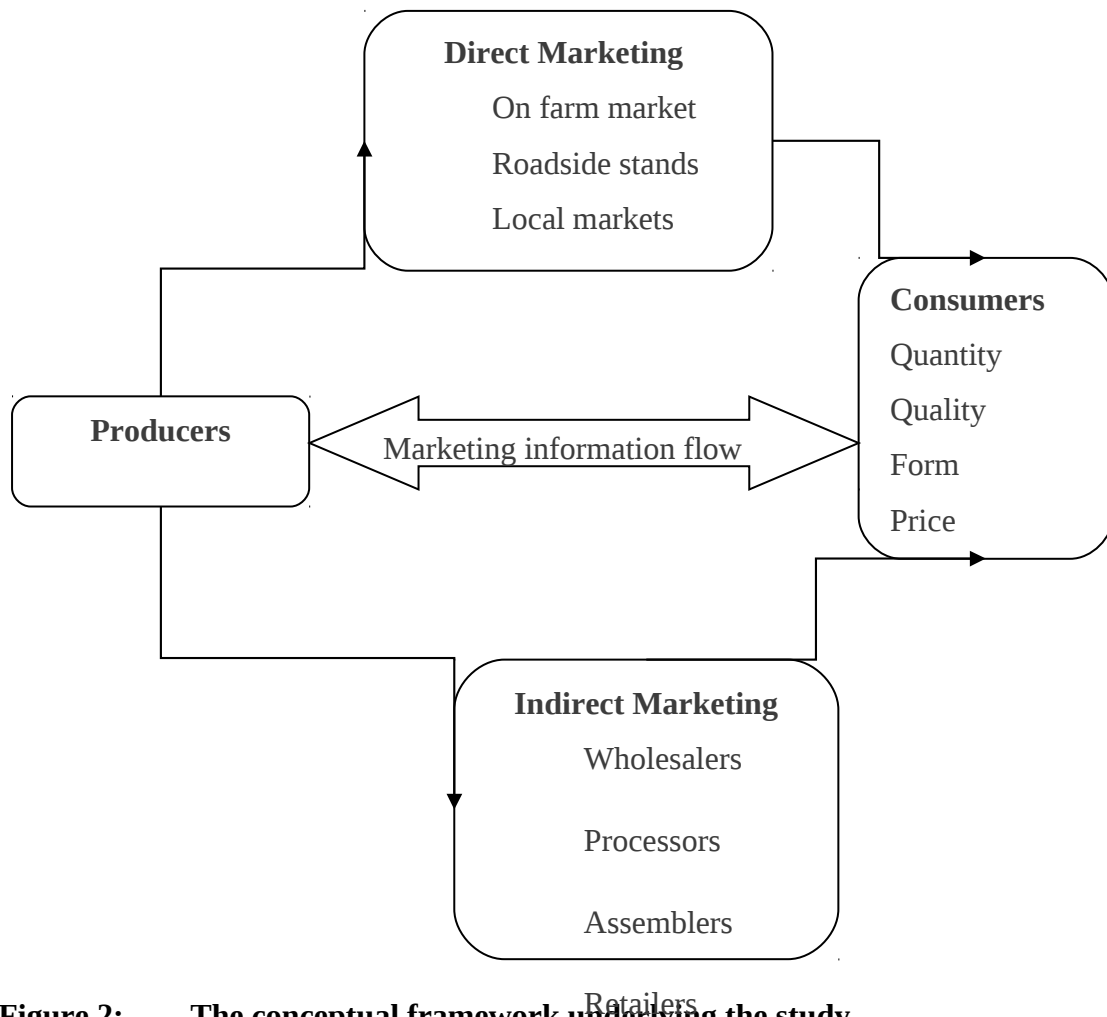


Figure 2: The conceptual framework underlying the study

1.6 Organisation of the Dissertation

This report is organized in five chapters. Chapter One contextualizes and describes the background information to the definition of the study justification, research objectives and research questions. Chapter Two provides a review of bee keeping sector and honey production, including reviewing important theories for future projection of production and marketing of bee's products. Chapter Three presents the methodology used including the description of the study area, sampling design, data collection tools and data analysis. Chapter Four presents the results and discussions, followed by Chapter Five which presents summary, conclusion and recommendations based on the findings of the study.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Basic Definitions and Concepts

2.1.1 Honey

Codex Alimentarius (2001) defined honey as unfermented, natural sweet substance produced by honey bees from the nectar of blossoms or from secretions of living parts of plants or excretions of plant-sucking insects on the living part of the plants, which honeybees collect, transform and combine with specific substances of their own, store and leave in the honey comb to ripen and mature. According to Mwakatobe (2001), good honey shall not have any objectionable flavour, aroma or taint absorbed from foreign matter during its production, harvesting, processing and storage and shall not contain natural plant toxins in an amount that may constitute hazard to health.

2.1.2 Marketing

In this study markets are where bee products are sold and consumers are able to choose and buy; in other words it is where “suppliers” (beekeepers, retailers etc) meet “demanders” (consumers, processors and/or retailers). Marketing is an important aspect in honey sub sector. The aspect is considerably undermined by many people who focus on production and then simply selling the outcome of production to final users of the products (Hilmi, 2005). Mmasa (2007) recommend for effective promotional efforts to be centred more on apiculture production and marketing as the way to preserve forest and biodiversity. Berenschot (2008) reported minimum number of stakeholders in honey marketing and pointed out that every country has only three to five exporters. On the other hand honey is consumed everywhere in the world and the market is known for its strict quality standards, especially in Europe.

Direct marketing of bees' honey is the options of selling honey directly to consumers by the producers. It includes sales at local farmers markets, on-farm markets, roadside stands, farm festival markets, pick-your-own sales, or any combination of these methods. Mapolu (2005) comments that due to low production and poor quality most bee keepers in Tanzania sells their produce locally to end users who offer better prices than the cooperative societies and /or other middlemen. Though there are no figures to quantify the extent of this enterprise in rural communities where most honey is consumed locally or sold through unofficial channels.

Indirect marketing involves bee's honey producer to deal with an intermediary rather than the final consumer (Brent, 2010). It includes the cooperative marketing, wholesaling, assembling, processors and/or Produce auctions. Most forms of indirect marketing require less time of individual producers, they usually demand more product uniformity, quality, and post harvest care. In Tanzania the common middlemen for honey and other bee products includes Fidahusen Company, Mohamed Hussein Company, Honey care and other local assemblers and wholesalers (Keya, 2009). Indirect marketing in Tanzania has been affected mostly by inadequate production and low quality (Mwakatobe and Mlingwa, 2006).

2.2 Honey Bees Production Zones in Tanzania

Beekeeping enterprise is quite adaptable to various environment and different conditions as bees can live and survive in the most arid conditions and to humid climates as well can forage flowers of different species including deep rooted trees (PASS, 2007). Tanzania is among the countries in the world endowed with favourable environment for production of honey and beeswax (Mwakatobe and Mlingwa, 2006). The country has about 33.5 million hectares of forests and woodlands that are scattered throughout the country and are ideal

for developing beekeeping industry (Ngaga et al., 2005). More than 80 000 hectares of the gazetted forest reserves consist of forest plantations that are also suitable for beekeeping. The mangrove forests of mainland Tanzania that covers about 115 500 ha are also valuable as bee fodders (Mwakatobe and Mlingwa, 2006). These areas include region such as Tabora region which is densely covered with miombo woodland that makes them potential for high quality honey and beeswax (URT, 1998). Others include some parts of Kigoma, Tanga, Mbeya and Singida regions (Berenschot, 2008).

Monela and Abdallah (2007) document that most honey in the country is produced from miombo forests. Potential zones for beekeeping are also found in agricultural land where substantial bee products can be harvested from agricultural crops including sunflower, green beans, coffee, coconut and sisal (PASS, 2007). Martin (2008) substantiate that in most part of Dodoma, Iringa and Morogoro regions during the dry season, when the land is too hard to cultivate; most farmers resort to beekeeping for two to three months and work with traditional hives made from hollowed-out logs as an alternative means of income generation. The presence of both stinging and non-stinging honey bees coupled with existence of indigenous knowledge in beekeeping is also a great potential.

2.3 Characterization of Market Requirement for Honey

2.3.1 Characteristics of bees honey markets

Local and international trade regulations and standards for honey and other bee products must be adhered. Silas (1998) document that both local and international trade regulations have requirements such as traceability and compliance to food safety requirement. While honey quality consideration is an aspect disregarded by producers and processors especially in developing economies, Mapolu (2005) reported that the quality of honey is a

key factor for both local and international markets to enable attainment of competitive premium prices and ensure human safety.

Moreover, Mwakatobe and Mlingwa (2006) document that; there is high demand for quality honey and beeswax in both domestic and foreign markets. Worldwide in beekeeping sector, there are basically two market segments. The market for table honey and the market for industrial honey; the market for table honey accounting for the bulk of honey marketed, as it is used chiefly as a spread on bread and as a natural sweetener whereas industrial honey finds its uses in baking, confectionery, cereals, beverages, honey-roasted nuts, baby foods, pharmaceutical products, and cosmetics (FAO, 2010). West Germany, USA, United Kingdom and Japan are the major world honey markets (PASS, 2007). Bulk of honey trade in these countries is in the hands of agents and importers, but in Japan most honey is imported by trading companies (FAO, 1995).

2.3.2 Local market requirements

The internal markets for honey and beeswax in Tanzania are not well established, which in turn contribute to increasing demand for honey and other bee products in the country (URT, 1998). Mmasa (2007) documents that about 83% of interviewed beekeepers in Hai district reported undue low price of honey at farm gate. This has also been supported by Mkamba (2006) in his study (marketing of bees products in Tanzania) indicated poor quality of honey affected to a greater extent the price of honey at the market About 50% of honey produced is sold locally for honey beer and honey wine production and the 10% of it are consumed locally as industrial honey in confectioneries and pharmaceutical industries (Mapolu, 2005). The potential unexploited markets in Tanzania are large towns, supermarkets, hotels, airlines and tourist centres if the products packed in proper packaging materials. Therefore the if producers are keen enough on the quality, packaging

and maintaining its natural states for honey will traps the unexploited markets within the country.

2.3.3 International market requirements

The international markets for honey and beeswax are highly competitive in terms of quality. Georgina (2009) documents that, the main important aspects during buying honey and /or that affect demand for honey in most parts of the world are taste, colour and quality. For honey and other bees product to be exported it need to comply with the international standards items such as the honey shall not have any objectionable flavour, aroma, or taint absorbed from foreign matter during its processing and storage, shall not have begun to ferment or effervesce, shall not be heated to such an extent that its essential composition and quality is impaired, have apparent reducing sugar content, required moisture, apparent sucrose content, water, insoluble solid contents, mineral content (ash), acidity, diastase activity and Hydroxymethylfurfural content (HMF). Other aspects which are less important are quantity and size of packaging, including the name of producer as these depend on the consumer him/herself. Some minimum international standards/requirements are presented in Table 2.

Table 2: International market requirements for honey

Item	Requirement
Apparent reducing sugar content (%)	
▪ Organic honey	- ≥ 65
▪ Honeydew honey	- ≥ 60
Moisture Content (%)	
▪ Organic honey	- ≤ 21
▪ Heather honey (Calluna)	- ≤ 23
▪ Clover honey (Trifolium)	- ≤ 23
Apparent Sucrose Content (%)	
▪ Organic honey	- ≤ 05
▪ Honeydew honey and blossom honey	- ≤ 10
Water Insoluble Solids Contents (%)	
▪ For honeys other than pressed honey	- ≤ 0.1
▪ Pressed honey	- ≤ 0.5
Mineral Content (ash) (%)	
▪ Organic honey	- ≤ 0.6
Diastase Activity	
▪ Hydroxymethylfurfural Content	≤ 03

Source: (Codex Alimentarius, 2001)

Since early 1960's there has been a growing market in Europe, Japan, and the US for organic honey produced in a sustainable manner and without the use of agrochemicals (Michael and James, 2007). According to Michael and James (2007) the global organic market grew from US\$ 13bn in 1998 to US\$ 25bn in 2005; this growth is due to the increasing environmental awareness of consumers mainly in European Union, Japan and the United States of America.

Europe is very dependent on honey imports since its domestic production only covers 40% of the demand hence becomes the largest market (consumer of natural honey), followed by the United States (Berenschot, 2008). The leading suppliers of organic honey to the EU are Mexico, Guatemala, Argentina, Uruguay and Chile (Michael and James, 2007). The largest honey exporters in the world are China and Argentina (exports equals to 17% of world trade of honey) followed by Germany, Hungary, Mexico, Spain, India and Germany (URT, 1998).

In 1991, Tanzania honey won by 100% the quality test for "organic honey" in the UK (Mwakatobe and Mlingwa, 2006). However, recently the quality of Tanzanian honey has shown characteristically strong and smoky taste, a relatively dark colour and often demonstrated a poor performance on technical parameters like HMF and moisture content (Berenschot, 2008). These traits were among the requirement of the international market, as others being shown in Table 2. However apart from Tanzanian honey had poor performance on some of technical parameters, PASS (2007) documents that, the export markets for Tanzania's honey and beeswax is secured in countries like Japan, the United Kingdom, Finland, and the United Arab Emirates as Table 3 depict the amount of honey and beeswax exported by Tanzania. Also URT (1998) add that the main buyers of Tanzania honey are the European Union member countries especially UK, Denmark, Germany and Netherlands. (Berenschot, 2008). also noted that imported honey to Europe from Tanzania was used as industrial or baker's honey, as an ingredient in blended table honeys or as single origin specialty honeys, which are also table honeys. For each segment, different quality standards apply, and different prices are paid. Given the unique opportunities available in the country (138 000 tones of honey) could dominate the world

market as it was the leader in exports of beeswax in the 1960s and early 1970s (PASS, 2007).

Table 3: Tanzania export of bee products from 2002/2003 to 2009/2010

Year	Honey		Beeswax	
	Volume (t)	Value (US\$)	Volume(t)	Value (US\$)
2002/2003	823	905 443	592	1 776 000
2003/2004	821	1 087 657	332	1 165 490
2004/2005	465	779 718	288	1 241 100
2005/2006	148	159 809	302	1 403 794
2006/2007	370	422 589	414	1 836 413
2007/2008	94	80 892	429	1 891 768
2008/2009	620	915 556	297	1 379 832
2009/2010	291	528 326	272	1 258 115

Source: MNRT 2010

2.4 Marketing Options for Honey in Tanzania

The roadmap that Tanzania's honey and beeswax take to reach local, urban, regional and global market is diverse (Peniel, 2007). This is due to the fact that apart from reduced consumption of honey at domestic market, there is an over-expanding export market in Europe, Japan and the Middle-East (PASS, 2007). Thus there are various routes that Tanzanian honey and beeswax take before being consumed locally or exported to the regional or other countries (Fig. 3). Peniel (2007) documents the driving forces of the honey industry in the country as follows:-

- Big buyers for conventional export market – for instance Fidahusseini, who buys honey from traders and beekeepers, undertake quality tests on site (moisture content, visual inspection) and in Dar es Salaam (further testing) prior to repacking and exporting. Other large exporters include Mohamed

Enterprises Limited, Shamshudin, Honey Care Africa (Tanzania) and Dabaga Limited.

- Small and Medium Enterprises (SMEs) accessing local and sub region markets (less volumes) but with innovative marketing strategies.
- Initiatives of support agencies through exhibitions and trade fairs (The Honey Show Limited, Saba Saba Trade Fairs etc), including the initiatives to support information sharing and exchange through annual honey show and Conference.
- Emergence of Stingless bee honey which is mainly traded as medicinal product has been sold at higher prices almost 5 times that of stinging bee honey.

Mmassa's (2007) study on the production and marketing of honey and beeswax in Hai district, Tanzania documented that, there are two options for marketing honey and beeswax within the district. The first option involves producers selling bees products directly to final consumers to nearby villages, along the roads and transport to nearby town like Moshi, Arusha and Dar es Salaam. The second option involves producer selling bee's products to wholesalers and exporters like the Fidahusseini & Company, Mohamed Enterprises Limited, Shamshudin and Honey Care Africa who export honey in bulk to foreign market. MNRT (2004) connote that there are three main marketing systems of bee products that have been reported to exist in Tanzania. These systems are producers struggling on their own to get market for their products, use of producers marketing cooperative societies and through large private enterprises.

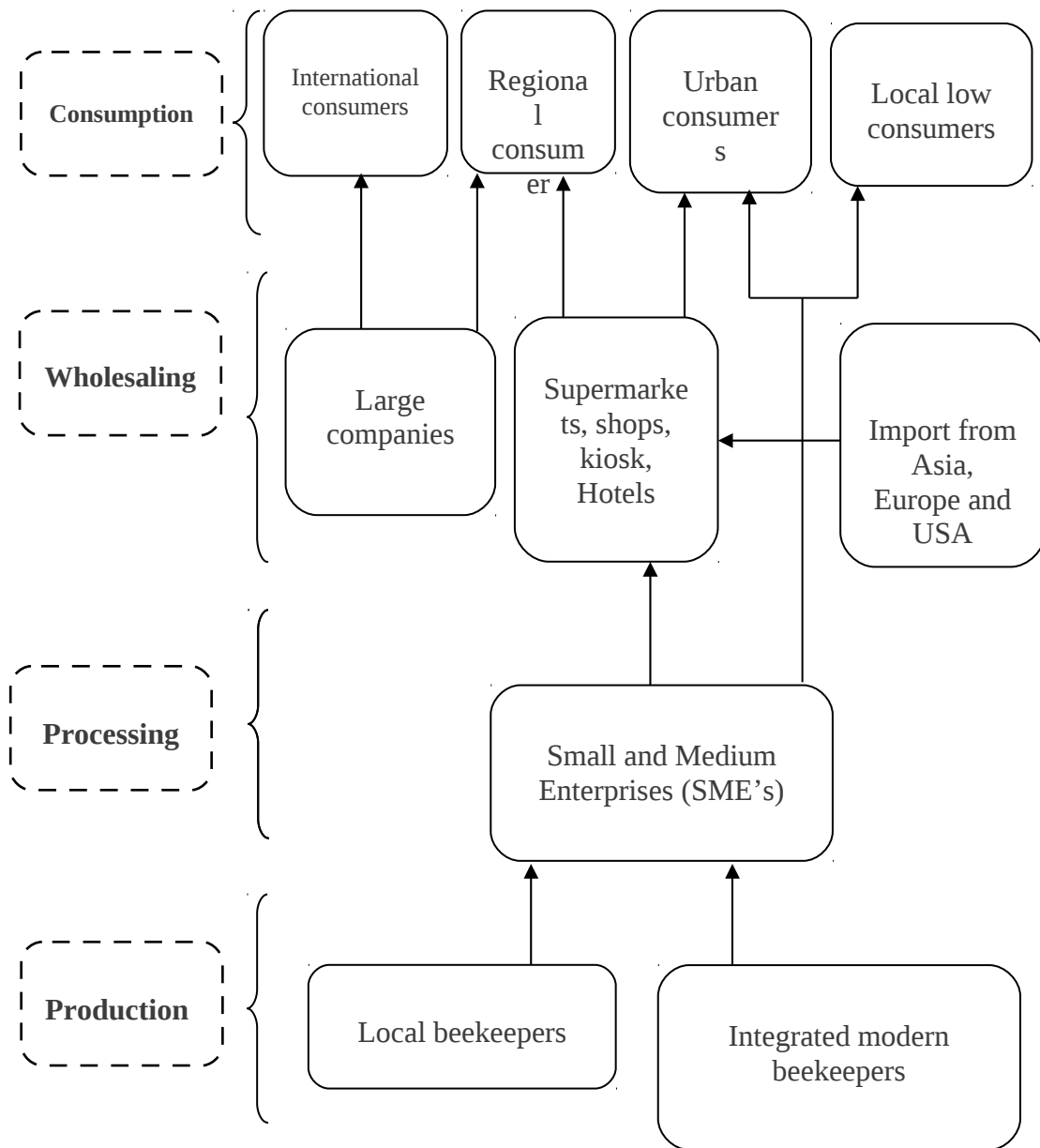


Figure 3: Existing marketing channel options for bees' products in Tanzania

Source: Peniel (2007), Honey value chain analysis

2.5 The Cost and Benefit of Producing Honey

Benefit cost analysis involves several stages, one being calculating the Net Present Value (Hanley and Spash, 1993). The discounted cash flow method is a preferred in evaluating economic worthiness of an investment, as the method considers the time value of the entire stream of net cash flows over the life of the investment (Casler *et al.*, 1993). Apart from

that Kay (1981) narrated that the use of NPV estimate the expected changes in net cash flow for each year of useful life using marginal approaches such as partial budgeting. Therefore Benefits - costs ratio (BCR) is a ratio between the present worth of the gross benefits and present worth of gross costs. Pearce *et al.* (1999) narrate that BCR is measured in human well-being i.e. benefits would increase human well-being and costs would decrease it. A cost benefit analysis finds, quantifies, and adds all the positive factors (benefits). Then it identifies, quantifies, and subtracts all the negatives (costs). The difference between the two indicates whether the planned action is advisable. The real trick to do a cost benefit analysis well is making sure you include all the costs and all the benefits and properly quantify them (Kay, 1981). The cost benefit analysis to honey production in Lushoto district assist smallholder farmers to know the exactly the cost incurred one wants to engage in the business and the expected output. Also knowing the cost and benefit from each option will increase farmers' choice on how to produce and where to sell bees products at a relatively reasonable and profitable price.

CHAPTER THREE

3.0 METHODOLOGY

3.1 Description of the Study Area

3.1.1 Location of the study area

This research was conducted in Tanga region. The region is situated at the extreme north eastern corner of Tanzania mainland along the Indian Ocean coastal belt (Fig. 4). The region occupies an area of 27,348 sq kms, being only 3% of total area of the country. Economically, the region has a typical agricultural economy with more than 90% of its population depending on agriculture. Food production to a large extent is undertaken by small holders, while cash crops production is carried out by both smallholders and large scale farmers. The research was conducted at Lushoto District (Mwangoi, Migambo, Malindi, Lushoto town and Lukozi). These areas are potential for production of honey and other bee's products as are characterized by good climatic conditions surrounded by Usambara Mountains and presence of various vegetations (fruits plants and natural vegetations) which acts as the best forages for honey bees. In addition, there is an ongoing ASARECA – SUA project on the use of apiculture as a tool to enhance conservation of natural resources management, with the main interests of capacitating, building and providing technical support to beekeepers in the district towards initiatives of promoting bee products as the alternative means of maximizing household income and reduce income poverty due to high shortage of land in the district. Moreover, the study areas are in close proximity to urban markets such as Tanga, Arusha, Moshi and Dar es Salaam where there is potential growing demand for pure honey and other bees' products.

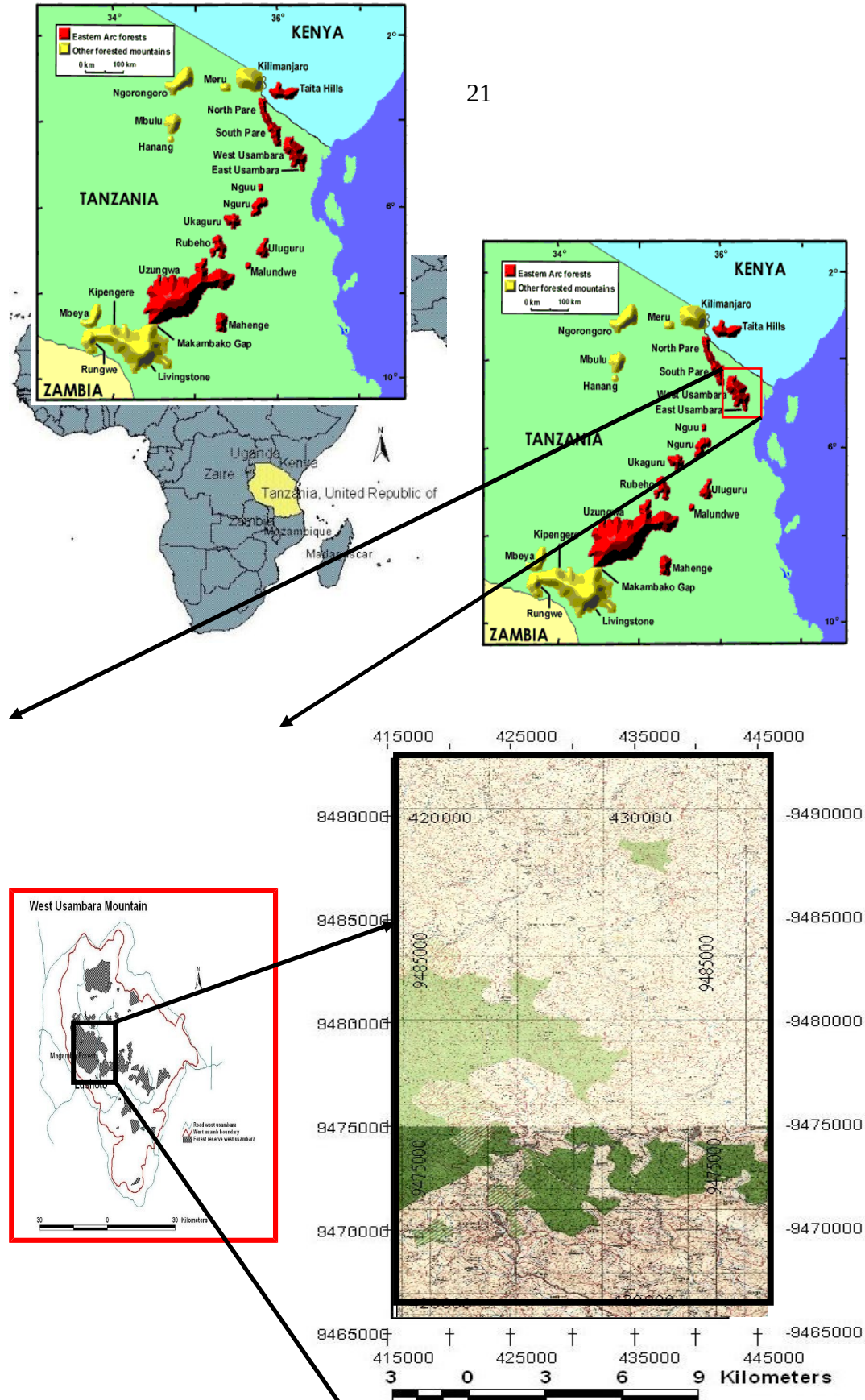


Figure 4: The location map of the study area

Source: GIS SUA

3.1.2 Climate

Lushoto District receives an annual average rainfall of approximately 1000mm, with a bimodal distribution; long rainy season falling from March through May and a short rainy season from October to January (Kaoneka, 1993; Tenge, 2005). The mean annual temperature and relative humidity are 14°C and 70%, respectively. Average daily temperature is 18°C with diurnal temperature range of 12 – 25°C.

3.1.3 Topography

Lushoto District which covers most of the west Usambara Mountains in the north eastern part of Tanzania forms part of the eastern arch mountains. These mountains consist of uplifted blocks of highly folded metamorphosed volcanic rocks rising from the surroundings plains at approximately 600m altitudes. They have irregular east ward slopping upper plateau at about 1300m to 1900m and maximum altitude of 2300m (URT, 2008).

3.1.4 Vegetation

Most parts of West Usambara Mountains are covered by mountain rain forest (Kaoneka *et al.*, 2000). The vegetation can be classified on the basis of elevation as tabulated in Table 4 below. These vegetations are potential for beekeeping and honey production.

Table 4: Vegetation classification in Lushoto district

Vegetation type	Elevation
Lowland evergreen forest	< 750 m above sea level.
Intermediate forest	750 – 1400 m above sea level.
Highland evergreen forest	> 1500 m above sea level.

Source: Kaoneka, (1993).

3.1.5 Population and Economic Activities

According to the 2002 Tanzania Population and housing census, Lushoto district had 418,652 people out of whom 45.6% were males and 54.4% females (URT, 2002). Agricultural production is the main economic activities in Lushoto district. The farming system is mixed; farmers are involved in rain fed agriculture, traditional irrigation in valley bottoms, livestock keeping and off farm activities (Tenge *et al.*, 2004).

3.2 Research Design

The research design for this study was a cross sectional, where data were collected at a single point in time. The reason for choosing this design is simply because it is flexible, economical and easy to manipulate data and information (Bailey, 1994). The limitation of this design in the study area was non response to some of the respondents which resulted for a researcher to increase numbers respondents to fill the gap.

3.3 Sampling Procedure and Sample Size

Purposive sampling procedures and random sampling design were applied in the study area. Lushoto District had been chosen purposely within the five districts in Tanga region mainly because there is an ongoing ASARECA project in the District. Then five villages namely Mwangoi, Migambo, Malindi, Lushoto town and Lukozi were also chosen purposely based on the same reason. From the five drawn villages a sampling frame of all beekeepers and honey traders was prepared. Thereafter a total of 80 beekeepers were randomly selected (this includes group based, institutions and individuals beekeepers). As well 15 traders who buy bee honey from the District were randomly selected. Finally a total of 95 respondents were interviewed as indicated in Table 5 to obtain primary

information of the study area. Table 5 below shows sample composition of the respondents as regard to bees honey production and marketing in Lushoto District.

Table 5: Sample composition for the study

District	Village/Location	Beekeeper	Trader	Total
Lushoto	Lushoto town	10	4	14
	Migambo	32	-	32
	Lukozi	12	1	13
	Mwangoi	10	-	10
	Malindi	16	2	18
Ilala	Kariakoo	-	2	2
Kinondoni	Msewe Ubungo	-	3	3
Morogoro urban	Sabasaba	-	1	1
Morogoro rural	Mikese	-	1	1
Kibaha	Maili moja	-	1	1
Total		80	15	95

3.4 Data Collection

3.4.1 Primary data

Primary data were collected using two structured questionnaires design to collect general and specific information from the sampled farmers and traders described in Section 3.3 above (Appendix 1 and 2). Both questionnaires comprised a section on background information including household size, age, gender, education and occupation of the respondents. Specifically the questionnaire for farmers was designed to collect quantitative and qualitative data on bees honey production, processing and marketing practices, production and marketing costs. On the other hand the questionnaire for traders was designed to collect information on marketing costs, source and channel of product distribution and challenges faced by traders. Apart from structured questionnaires,

physical observations and informal discussions with key informants were used to collect data to supplement the questionnaire survey data.

Tracking was done to identify the potential areas for production and marketing of bees' honey in the District. The method applied GPS to locate marketing centres and beehives owned by stakeholders (individuals, farmers groups and faith based institutions) in the study area based on the zones, for easy transfer to oziexplorer and retrieved to Arc GIS for map making.

3.4.2 Secondary data

Secondary data were collected by reviewing documents from the Lushoto District Agricultural Department, Ministry of Natural Resource and Tourism (MNRT), National Bureau of Statistics (NBS), Sokoine National Agricultural Library (SNAL) and internet.

3.5 Data Analysis

Data from the respondents were verified, compiled, coded, and summarized before being analyzed by Statistical Package for Social Sciences (SPSS) windows software.

3.5.1 Analytical technique

To achieve each specific objective, both quantitative and qualitative analysis were carried out. The analysis included descriptive statistics (i.e. mean, standard deviations, cross tabulation, ranges and frequency distribution to describe the general characteristics of the data). Simple frequencies were used to characterize the markets requirement for bees' honey production. The quantitative analysis involved the use of profit margin analysis and discounted benefit-cost analysis.

3.5.1.1 Descriptive statistics

Tracing the honey marketing channels occurred in the study area (from producers to the ultimate consumers) was done, to get real different alternatives of trading honey. Under this key actors (Producers, Assemblers, Wholesalers and Retailers) involved in the marketing were identified including the channels used to pass the product until it reaches the ultimate final consumers. The market requirements criterion bases were quality (form, packaging, colour and odour of the product), quantity and pricing.

3.5.1.2 Profit margin

In matching the market requirements for honey production and marketing options, the profit margin was used to determine the profit obtained by beekeepers through selling into different marketing's. This model; (see) (Peak, 2009) has been applied to determine the margin each actor obtained along the honey value chain.

In honey enterprises and particularly the study area, the variable costs incurred by each actor (Producers, Assemblers, Wholesalers and Retailers) were identified including production costs for producers, marketing costs (transport, processing, packaging, labelling etc), prices (buying prices) and quantity purchased while revenues come from sales of honey as well as other bees products such as beeswax.

In this study, the profit margins were used to indicate which marketing option is suitable and provide more profit in comparison to the other, and as it is assumed that, the higher the margin one get, the more profits hence the more suitable option one can apply in the district as far as the honey business is concerned.

The Profit margin model can mathematically be represented by:

$$\Pi = TR - TC \dots\dots\dots(1)$$

Where

Π = Profit Margin

TR = Total Revenue from sales of unit of honey and

TC = Total Costs incurred to produce or sale a unit litre of honey

3.5.1.3 Discounted Benefit-Cost Analysis (BCA)

Cost-benefit analysis is a theoretical approach applied to a systematic quantitative evaluation of a project, in order to determine if, and to what extent, the project is economically worthy. In this study the method will be used to analyse the cost incurred and the benefits reaped for a farmer who is engaging in a beekeeping sub sector. The main advantage of BCA as compared to other traditional discounted evaluation techniques is that externalities and observed price distortions are also considered (Gittinger, 2001).

For Benefit-cost ratio or net present worth calculations, the most appropriate rate used is the opportunity cost of capital, which will just result in all the capital in the economy being invested if all possible projects were undertaken which yielded that much or more return (Gittinger, 2001). For the purpose of analyzing farm level projects, normally market/private interest rates are used. Generally, many investment calculations consider interest rates between 5% and 15%, though the issue of discount rate is still debated (FAOSTAT, 2005). This study uses the discount rate of 20% which is the opportunity cost of capital in Tanzania as proposed by Bank of Tanzania (BoT).

The Benefit Cost Ratio

$$BCR = \frac{\sum B/(i+1)^n}{\sum C/(i+1)^n} = \frac{B_d}{C_d} = \frac{NPV(B)}{NPV(C)} \dots\dots\dots (2)$$

$$NPV = \sum B/(i+1)^n - \sum C/(i+1)^n \dots\dots\dots (3)$$

$$NPV = \sum_{n=0}^N \frac{C_n}{(1+r)^n} = 0 \dots\dots\dots (4)$$

Where

NPV (B)	=	Net Present Value of the Benefit
NPV (C)	=	Net Present Value of the Costs
BCA	=	Benefit Cost Ratio
B _d	=	Discounted benefit
C _d	=	Discounted cost
i	=	Discounting ratio
n	=	Duration (Years)
C _n	=	Cash flow in period (n,)
N	=	Total number of periods
r	=	Internal rate of return

3.5.2 Ranking the marketing options vs. marketing requirements

Ranking the marketing options against the marketing requirement for the Lushoto bees honey in the study area was based on the criterion of the profit margin, marketing margins and the proportion of the final retailing price sold to the final consumers (hence the marketing share a producer get from selling honey at different marketing nodes).

3.6 Limitation of the Study Methodology

Much of primary information was collected through interview. Error resulted from respondents in one way or another is a limiting factor, relying on the respondents to recall the honey production, cost incurred during production and price at which honey was sold, thus it was difficult to obtain the exact amount of honey harvested and cost incurred due to poor record keeping. Other things are the climatic conditions of the study area and inadequate fund made difficult to obtain the number of beekeepers intended. Benefit-cost analysis has difficulties in accommodating social and environmental tangibles and its assumption that a favourable income distribution exists does not always hold (Senkondo *et al.*, 2000). However, these limitations did not affect the results of the study because efforts were made to minimize the impact. These efforts include the use of subtle probing technique to make them give information on costs and prices explicitly, including making comparison of the data among farmers and traders. The case of climate the researcher minimizes the impact by interviewing the respondents until evening hours.

CHAPTER FOUR

4.0 RESULTS AND DISCUSSION

4.1 Bees' Honey Production and Marketing in the Study Area

4.1.1 Bees' honey production zones in the study area

There are three Agro - ecological zones which are potential for bee honey production in the study area. These include Cold Humid zone (villages of Lushoto Boma and Migambo), Cold dry zone (villages of Lukozi and Malindi) and Warm dry zone (Mwangoi village) as shown in Fig. 5.

Ecological zones have implication on production and honey quality, pricing and marketing of it. Harvest in the cold humid zone is slightly higher than other zones i.e. the yield in the cold humid zone were estimated as 4 343 litres of honey per year, while 790 and 2 287 litres for cold dry and warm dry zones. At market place consumer prefers mostly light amber honey than the dark one, where the light amber honey is relatively higher in terms of price than the dark coloured honey. Cold humid zone covers Lukozi and Malindi villages; characterized by long rainfall due to presence of Magamba forest reserves and planted fruit trees. This zone has about 40 stakeholders engaged in beekeeping which includes 27 individual's beekeepers, 1-faith based organization. Cold dry zone is branded by low rainfall, covered by forest with varieties of trees including fruits. Harvesting in this zone is twice a year during minor and major honey flows. In contrast to cold humid the production in this zone is relatively low as it was 790 litres of honey per year with average of 77 litres for individual beekeeper and 77 litres for the group. Honey from this zone is strong in flavour and slightly dark coloured.

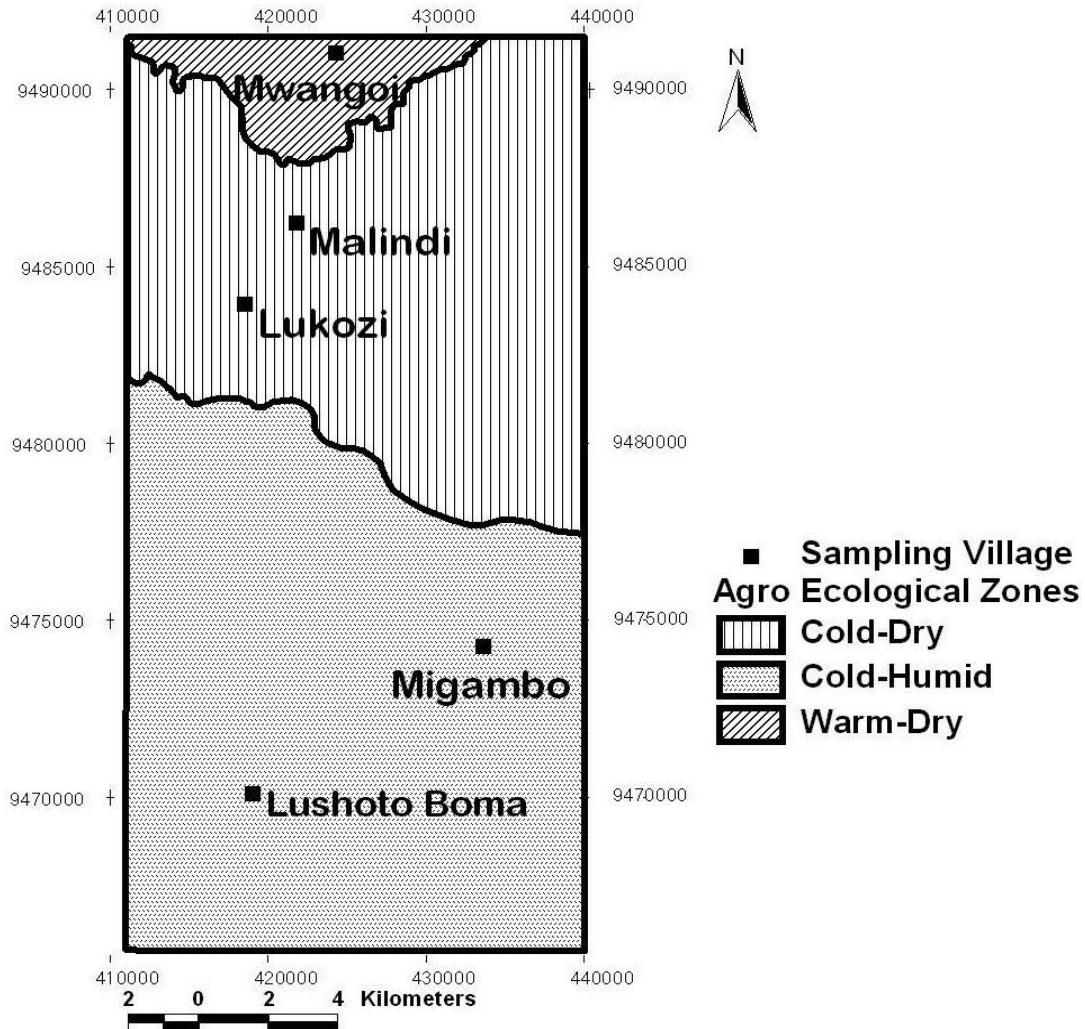


Figure 5: Agro ecological zones in Lushoto district and location of study villages

Warm dry zone is located in the low land of the district, characterised by short rainfall, covered by shrubs and herbs. The key stakeholders undertaking production were individual beekeepers and organized groups with average production of 2088 and 199 litres of honey with a maximum of 219 litres and a minimum of 72 for individual farmers while that of group was 199 litres of honey. The type of honey obtained in this zone also has strong flavour and dark coloured like the honey from the cold dry zone.

4.1.2 Bees honey producers' characteristics

Beekeepers from these zones site their hives near household, the Magamba forest reserve and their farmland. As Table 6 indicates, the average quantities produced per harvest is 1 921, 200, and 2 222 litres of honey with a mean of 148.5, 200 and 237 litres per individual beekeeper, faith based institution and farmers group respectively for cold humid zone, while that of cold dry were 713 and 77 litres for farmers groups and individual bee keepers respectively. The averages of warm dry were estimated at 2 088 and 199 litres for individual's and farmers' groups respectively.

Table 6: Quantities of bees honey production in different agro ecological zones of Lushoto District, Tanzania

Production zones	Stakeholders	Quantity produced (Litres /year)					
		N (80)	Average quantity/ stakeholder	Mean	Std	Mini	Max
Cold Humid zone	Individuals	27	1 921	149	202	6	291
	Faith based institutions	20	200	200	-	200	200
	Farmers Groups	12	2 222	238	98	168	307
Cold dry zone	Individuals	23	713	98	122	12	184
	Faith based institutions	-	-	-	-	-	-
	Farmers Groups	1	77	77	-	77	77
Warm dry zone	Individuals	15	2 088	246	245	72	419
	Faith based institutions	-	-	-	-	-	-
	Farmers Groups	1	199	199	-	199	199

4.1.3 Marketing centres in the study area

The marketing centres (Magamba coast, Malindi, Lukozi, Lushoto boma and Irente) as shown in Fig. 6, brought various consumers and traders who buys honey and other bee products. These are the places where beekeepers can bring bees' products and be certain of markets. While significant volumes of good quality honey and beeswax are available in one place, traders were interested to travel to these centres being certain of volume and quality to purchase. Most beekeepers and local traders sell their honey at roads side markets (Magamba coast, Malindi and Lukozi); the points that target mostly passengers who are on transit.

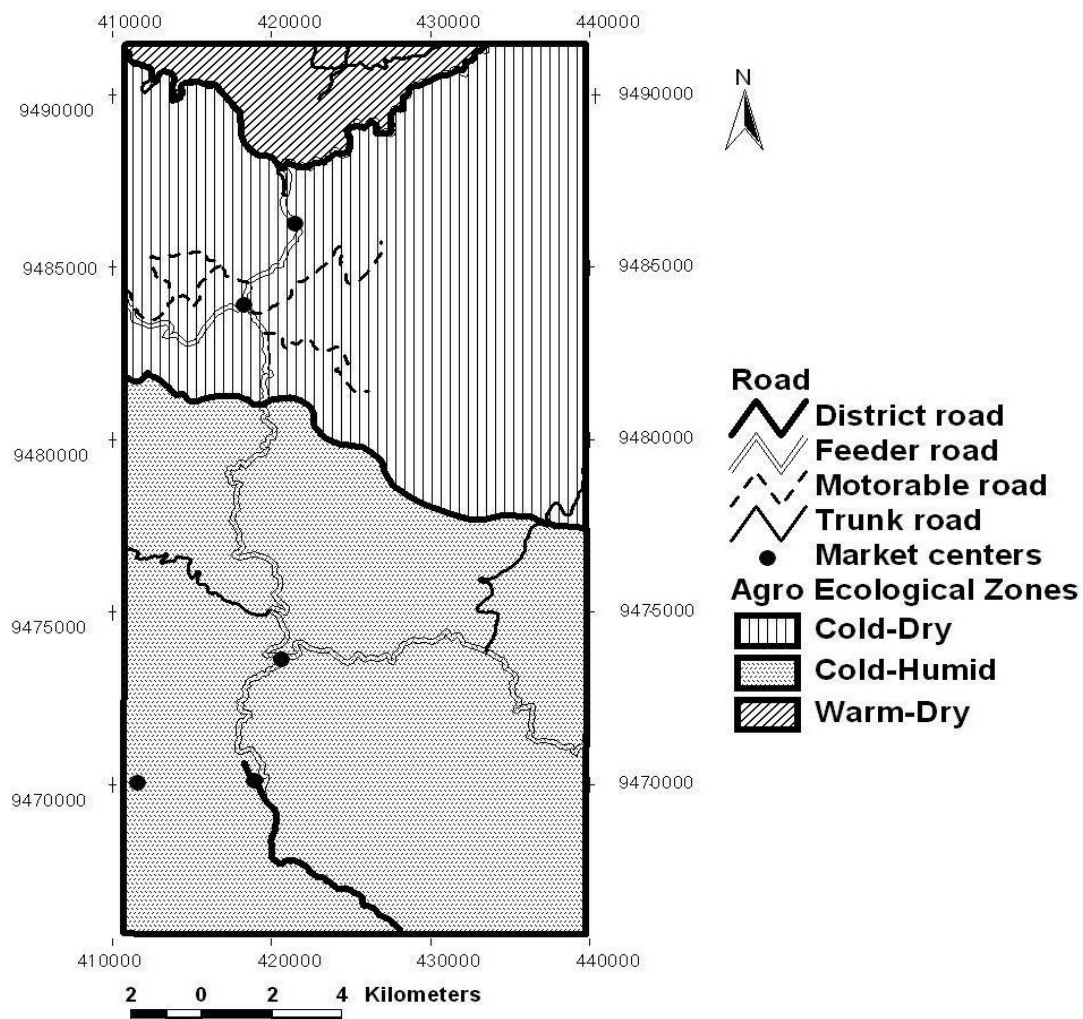


Figure 6: The Lushoto map showing marketing centres

4.2 Marketing Options and Market Requirements for Bees' Honey

4.2.1 Key actors in the study area

In the study area the main key actors involved beyond the farm gate are the middlemen who buy honey and distribute it to the ultimate consumers. Therefore the main links in honey value chain are the beekeepers, traders (local traders/assemblers, retailers and wholesalers) and finally the consumers. Table 7 shows high numbers of beekeepers (84%) with 8%, 4% and 3% for retailers, assemblers and wholesalers respectively who engage in bees honey marketing.

Table 7: Main value chain actors for Lushoto bee's honey

Location	Value chain actors							
	Beekeeper		Assembler		Retailer		Wholesaler	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Lushoto town	10	11	1	1	3	3	-	-
Migambo	32	34	-	-	-	-	-	-
Lukozi	12	13	1	1	-	-	-	-
Mwangoi	10	11	-	-	-	-	-	-
Malindi	16	17	-	-	2	2	-	-
Ilala	-	-	1	1	-	-	1	1
Kinondoni	-	-	1	1	1	1	1	1
Morogoro urban	-	-	-	-	1	1	-	-
Morogoro rural	-	-	-	-	-	-	1	1
Kibaha	-	-	-	-	1	1	-	-
Total	80	84	4	4	8	8	3	3

Note: Freq. Refers to frequency

4.2.1.1 Producers

Producers sell their honey to different buyers involved in honey in the market at village or district market centres and/or road side market. The market place that is the closest to the

residence of the farmers is the first chosen with regard to minimization of transportation costs.

4.2.1.2 Assemblers

Assemblers usually go around the beekeepers producing areas to buy pure honey directly from the producers and then sell the products directly to wholesalers, middlemen and/ or retailers.

4.2.1.3 Wholesalers

These buys honey from the beekeepers, assemblers or other wholesale traders and resale the produce to either retailers or directly to consumers. However, from the study area it was observed that there are very few individuals operating as wholesalers (Table 7). This may be due to the low production level in the District at the moment. Findings from the study show that, wholesalers hold an average of 1 200 litres of honey in 2009/2010. The study again found however these few wholesalers had low volume of honey traded and still enjoyed relatively higher marketing margins. Wholesalers also has influence on honey prices as opposed to other categories such as assemblers and retailers, this is due to the fact wholesalers tend to purchase huge volume of honey at once hence have higher bargaining power.

4.2.1.4 Retailers

Retail traders tend to buy honey from wholesalers, assemblers or beekeepers and sell the produce directly to consumers. Retail traders provide useful information to other market functionaries since they normally meet directly with the final consumers of the produce. The marketing information is necessary in both production and marketing of bees honey as

it tells the producer some of the fundamental questions in economics, i.e. what to produce, when to produce and the quantity required in the market.

4.2.2 Marketing channel options identified in the study area

The marketing options identified in the study area are diagrammatically presented in Fig. 7, involving the main key actors (beekeepers, local traders, wholesalers and retailers). Unlike backward linkages which link marketing nodes starting with farmers towards the input suppliers, the structure of linkages identified in the study area is forwards linkages as it links from the farm gate production to the ultimate consumers. Therefore, in the study area, there are no supporting market institutions like the financial services and sector specific services as processing equipments which are important in upgrading the firms in the honey value chain. According to Mendoza (1995), marketing channel option is the sequence through which the whole of honey passes from farmers to consumers. The analysis of marketing channel is intended to provide a systematic knowledge of the flow of the goods and services from their origin (produce) to the final destination (consumer).

a) Option 1: Beekeepers → Rural Consumers

This option was found to be shortest of all honey strands identified during the survey, and the most common alternative marketing channel in the study area. In this strand, farmers sell pure liquid honey to rural or household consumers. The honeys was sold at an average price of 4 000 Tshs per litre (Fig. 7). By selling directly to the final consumers, producers obtain the whole share of the final price paid by the end users of the product.

b) Option 2: Beekeepers → Local traders → Rural consumers

This is the second alternative option honey sale outlet in the study area. Under this strand a producer (beekeepers) sell honey at an average price of TZS 4 000/litre and the local traders/assemblers sell it directly at an average price of TZS 5 000/litre in urban markets (Fig. 7).

c) Option 3: Beekeepers → Local traders → Urban consumers

This is the third identified option for selling honey in the study area. As Fig. 7 indicate beekeepers sell honey to local traders and thereafter local traders sell it again to the final consumers (urban consumers). The average selling price was 4 000 and 6 000 TZS/litre of honey respectively (Fig. 7).

d) Option 4: Beekeepers → Wholesalers → Retailers → Urban consumers

Under this strand, the beekeeper sells honey to wholesalers who transport to urban markets and sell to various retailers (Lushoto town, Morogoro, Coast and Dar es Salaam markets) and who finally sell to the ultimate final end users (consumers) at a retail price. Beekeepers sells 20 litres of honey to wholesalers at an average price of TZS 80 000 which is equivalent to 4 000 TZS/litre of honey, the wholesalers again sell it to retail market at an average price of 5 500 TZS/ litre and eventually the retailers sell to the final consumers at an average price of TZS 7 000 per litre of honey (Fig. 7).

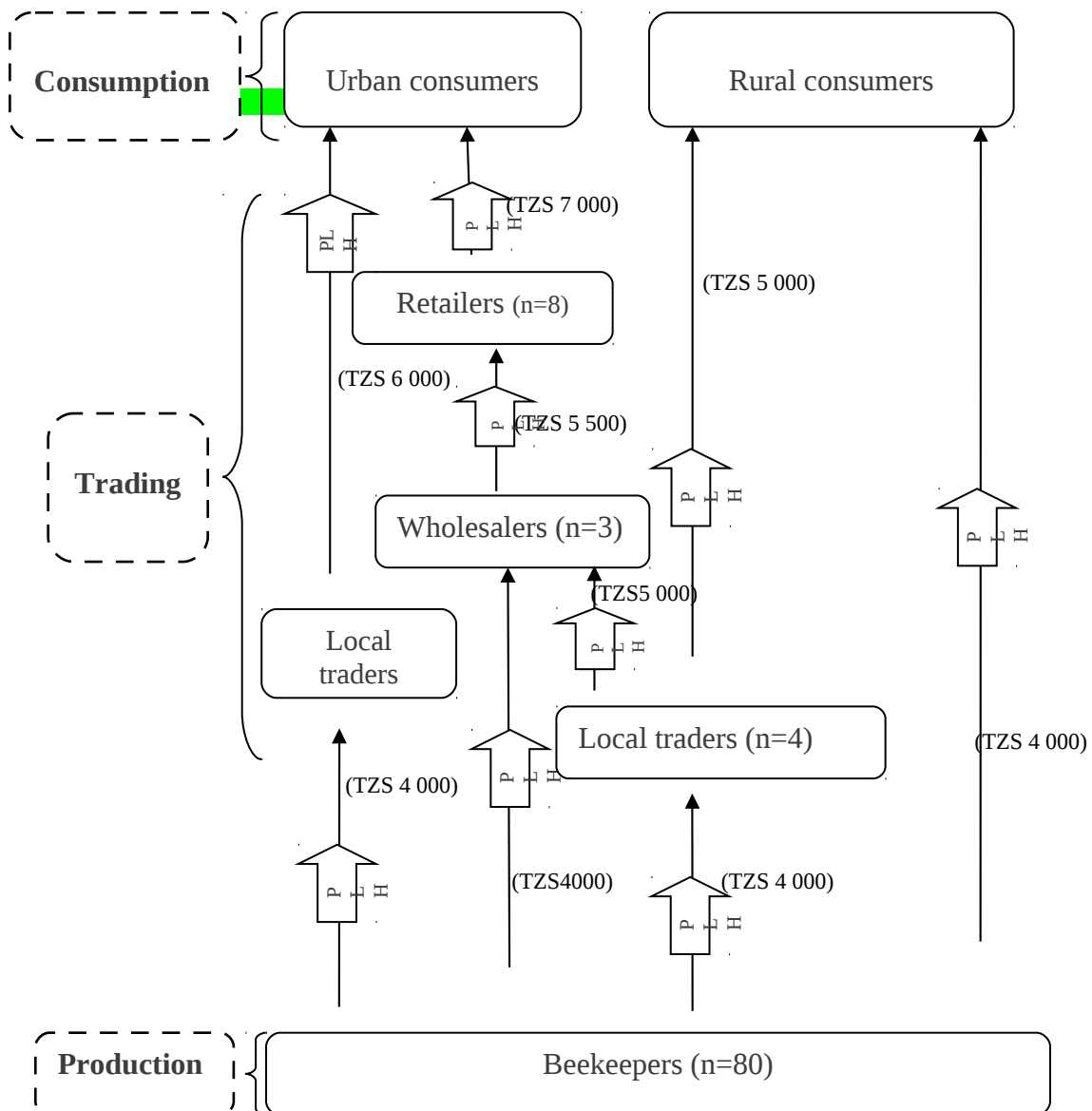


Figure 7: Identified honey marketing options in the study area

NOTE: Values in brackets are prices (TZS/litre of pure honey)

Products traded:



Pure liquid honey

4.2.3 Bees honey markets requirements

Good bees honey marketing plans start with the customer and work backwards to production. In any bees honey marketing, quantity produced, honey quality, form of the products and charged price determine the type of buyers.

4.2.3.1 Quantity produced /purchased

Potential buyers of the Lushoto bee honey last season (year 2009/2010), as shown in Fig. 8, include the retailers, assemblers and wholesalers. Data indicated that retailers and local traders purchased relatively large amount (1 325L and 1 250L of honey respectively) in comparison to the average amount of honey purchased by the wholesalers (1 200L only). There is no any significant difference among the average quantities purchased by these traders in terms of volume. Normally wholesalers requires significant volumes of produce and in some cases year round supplies, therefore as the quantity of honey produced in the study area are still low that is why there is low number of wholesalers for Lushoto honey. In this manner the potential buyers of the Lushoto honey are the retailers and the local traders. Therefore for beekeepers to attract wholesalers, they should increase production and be able to supply honey throughout the year.

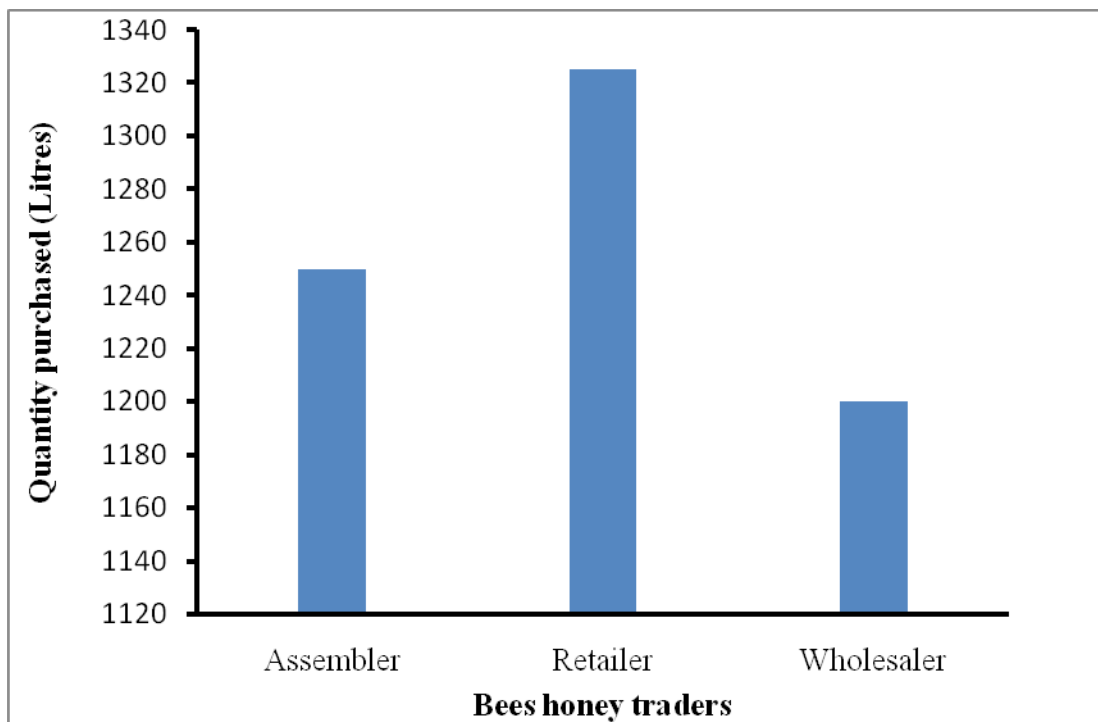


Figure 8: Average quantity of honey purchased by traders in the study area

4.2.3.2 Bees honey packaging

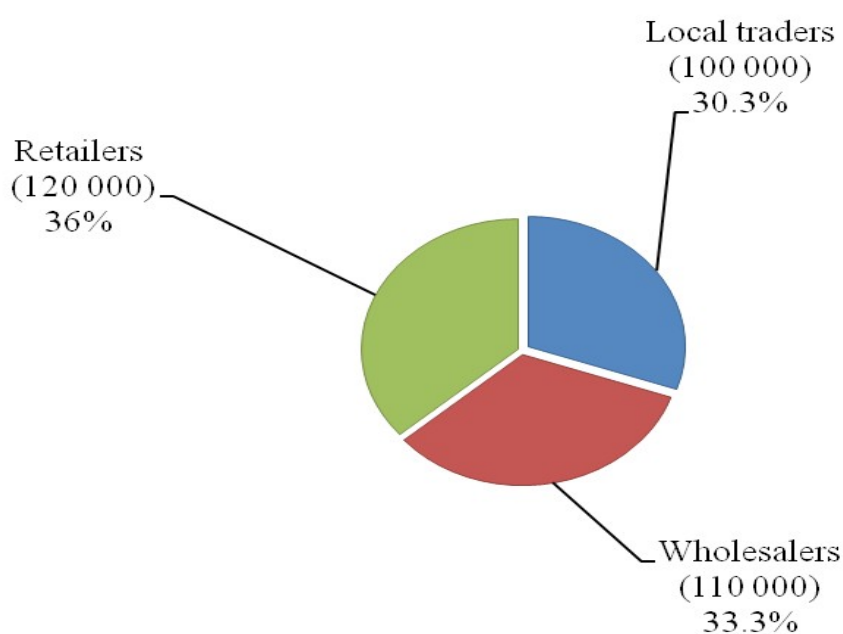
Table 8 shows different types of packages (in volume) in relation to the price charged as one of the requirement of the customers. Packaging catches attention of consumer as well as meets the particular standards. The data shows that beekeepers in the study area usually sell their honey at villages and town markets in whatever containers available. These include beer/soft drink bottles or glass/plastic jars of 340mls, 500mls, 1L, 5litres and 20L which are sold at an average of TZS 1 750, TZS 2 250, TZS 4 500, TZS 22 500 and TZS 77 500 for each type of package respectively. Consumers normally prefer containers which are light and transparent so that they can see the product easily. Glass jars are often used as containers for selling honey but are heavy, breakable and cannot be stacked together when empty, thus plastic containers are much lighter and stack well for Lushoto beekeepers to adopt. Again among the containers shown (Table 8), 5litres, 1litre and 0.5litre are more preferred by ultimate consumers at the market. Selling at retail price in packages of 0.34L, 0.5L, 1L and 5L a producer will maximize profit than selling in bulk in time.

Table 8: Types of bees honey packages in the study area and the prices charged

Packages (Litres)	Price sold (TZS)	
	Minimum	Maximum
20L	75 000	80 000
5L	20 000	25 000
1L	4 000	5 000
0.5L	2 000	2 500
0.34L	1 500	2 000

Referring to the price paid by trader per 20L of honey (75 000 to 80 000 TZS) as shown in Table 8, traders get relatively higher profit as compared to beekeepers. Figure 9 shows prices received by traders (assemblers, wholesalers and retailers) from selling 20L of honey i.e. TZS 120 000, TZS 100 000 and 110 000 for retailers, local traders and

wholesalers respectively. This indicate that selling honey per 20L, retailers receive 36% higher than that a producer got, while wholesalers and local traders receives 33.3% and 30.3% respectively. In comparison to other actors at the market retailer obtain maximum profit by selling at relatively higher price than other traders (local traders and wholesalers). In this manner opting to sell at retail price a producer will maximize more profit than at wholesale or assembling as marketing options.



Note: Values in brackets are in Tanzanian shillings

Figure 9: Average price received by traders from selling 20 litres of honey

4.3 The Cost and Benefit of Keeping Bees Honey

4.3.1 Estimated cost involved in keeping bees for honey in the study area

Beekeeping involves initial cost (cost of inputs) which includes price of bee hives, hive tools, bee groves, bee smoker, overall, gumboots, bee vail and buckets. The average price of modern bee hives is TZS 29 472 while the traditional beehive is sold at an average of TZS 16 517, the price of the former is relatively higher than the latter (Table 9). Other hive equipment are sold at the price of TZS 3 444, TZS 11 375, TZS 12 917, TZS 1 624, TZS 1

400, and TZS 8 577 for bee groves, bee smoker, overall, bucket, bee veil and gumboots respectively (Table 9). Moreover the average total cost for using improved bee hives with other hive tool was 81 409 TZS while that of traditional bee hives was 68 454 TZS. This explains that the initial capital required to commence this business is reasonably economical for people investing in the bee keeping industry. Again the result indicates a large number of farmers using improved beehives (72) as compared to 29 beekeepers who continue using traditional beehives. Thus if beekeepers access credits from financial resources they can improve and produce quality honey commercially.

Table 9: The prices of hive equipments in Lushoto district

Inputs	N	Average price (TZS)	Std. Deviation
Groves	9	3 444	3 712
Bee smoker	8	11 375	9 456
Overall	12	12 917	12 695
Bucket	17	1 624	957
Bee veil	2	14 000	1 414
Gum boot	13	8 577	6 677
Improved bee hive	72	29 472	14 634
Traditional bee hive	29	16 517	14 319

4.3.2 Estimated benefit from keeping bees for honey

The estimated benefit resulted from keeping bees for honey is obvious as it is determined by selling price per litre of honey at the market. Honey business in the study area has shown to be a paying business and most profitable to beekeepers as the benefit outweighs the cost incurred. The data shows that average price per litre of honey at the market is 4 000 TZS at farm level while 5 000 TZS to 7 000 TZS (Fig. 8).

4.3.3 Economic viability of bees honey production in the study area

The study assessed economic viability of bees honey production for a period of nine years in five villages of Lushoto District by focusing on net present value, benefit cost ratio and internal rate of return. Table 10 shows that, the net present value (NPV) in Lushoto town, Migambo, Lukozi, Mwangoi and Malindi were TZS 346, TZS 282, TZS 589, TZS 54 and TZS 236 per litre of honey respectively. The NPV for all five villages were positive indicating that, the discounted present values of benefits exceeded the discounted present values of costs. The positive values of the NPV were probably due to low operation cost in keeping bees for honey and its production in the stated villages of the Lushoto District. In comparing and realizing profit in a long run BCR and internal rate of return (IRR) were calculated to measure project worthiness in the five selected villages. The results show that, in all villages the $BCR > 1$; i.e. 1.45, 1.33, 1.44, 1.38 and 1.43 for Lushoto town, Migambo, Lukozi, Mwangoi and Malindi villages respectively. Also for all villages the calculated IRR is greater than the discounting rate of 20%. This implies that beekeeping for honey investment in Lushoto District is economically viable even in the long run.

Table 10: Summary of the NPV, BCR and IRR for keeping bees for honey

Variable/litre	Lushoto boma	Migambo	Lukozi	Mwangoi	Malindi
Fixed Capital	13 304	6 969	7 666	10 975	9 045
Labour cost	259	547	384	233	549
Processing cost	336	256	299	223	253
Loading/off loading	315	577	604	635	433
Total Costs	14 387	10 381	9 208	12 221	10 646
Discounted Costs	15 035	14 451	11 799	14 059	12 855
Benefits	5 286	4 300	3 500	4 500	3 500
Discounted Benefits	21 766	19 224	16 959	19 391	18 349
BCR	1.45	1.33	1.44	1.38	1.43
NPV	346	282	589	54	236
IRR (%)	22	23	26	20	22

Note: The discounting factor used was 20%, which is based on the commercial recommendation and all costs and benefits were measured in Tanzanian shillings.

Likewise the assessment was made on the traders for the period of three years to measure economic viability for trading the Lushoto bee's honey. As it was done for beekeepers, also in the case of traders the focus was on net present value, benefit cost ratio and internal rate of return for local traders, retailers and wholesalers. Table 11 shows that, the net present value (NPV) local traders, retailers and wholesalers obtained were TZS 2 968, TZS 3 789 and TZS 2 809 per litre of honey respectively. The NPV for all traders were positive and is higher than that of beekeepers. The BCR for assemblers, retailers and wholesalers were 1.9, 2.0 and 1.7 while the estimated IRR were 298%, 343% and 176% respectively. This implies that beekeeping, honey production and its trade as an investment in Lushoto District is economically viable even in the long run.

Table 11: Summary of the NPV, BCR and IRR for trading Lushoto bees' honey

Variables	Assemblers	Retailers	Wholesalers
Fixed Capital	1 800	3 000	3 200
Buying costs	4 000	4 000	4 000
Labour cost	138	120	22
Transport cost	63	28	63
Processing cost	138	99	220
Loading/off loading	33	28	29
Total Costs	6 172	7 280	7 534
Discounted Costs	5 617	6 417	6 704
Discounted Benefits	10 532	12 639	11 586
BCR	1.9	2.0	1.7
NPV	2 968	3 789	2 809
IRR (%)	298	343	176

Note: The costs and benefits were measured in Tanzanian shillings.

4.3.4 Profitability analysis for bee's honey

4.3.4.1 Profitability of bees honey at farm level

Table 12 compares the profit margins obtained by the sampled bee keepers in the five villages. The profit margin per person per litre was estimated to be TZS 962, TZS 1 111, TZS 976, TZS 956 and TZS 834 for Lushoto town, Migambo, Lukozi, Mwangoi and Malindi villages respectively. The price charged per litre in Lushoto town is higher than other area, with Migambo having relatively higher profit margin (1 111 TZS/L). This has been contributed with high production level in contrast to Lushoto town and other villages.

Table 12: Profit margin at farm level

Description	Lushoto town	Migambo	Lukozi	Mwangoi	Malindi
Average yield per person /year (Litre)	68	152	126	116	135
Average farm gate price (TZS)	4 100	4 000	4 000	4 000	4 000
Revenue	276 887	606 708	505 667	645 333	540 500
Fixed Costs	190 600	361 347	327 458	307 500	369 594
Transport costs	8 600	21 313	16 667	14 200	18 500
Labour costs	12 900	31 969	25 000	21 300	27 750
Processing costs	6 722	5 125	5 970	4 450	5 067
Loading/unloading costs	3 150	18 450	7 250	6 350	6 920
Total variable costs	31 372	76 856	54 887	46 300	58 237
Total Costs	221 372	438 203	382 345	353 800	427 801
Profit margin	55 514	168 505	123 322	111 533	112 699
Profit Margin per litre	962	1 111	976	959	834

Note: The costs were measured in Tanzanian shillings.

4.3.4.2 Profitability of bees honey at local trade level

Local traders buy honey from the farm. The cost incurred by them includes purchasing, packaging, transport, loading and unloading and other marketing costs (like levy etc.) which were estimated. This level receives the low profit margins as compared to retail level along the honey value chain. Table 13 shows average profit margin at local trade level was TZS 962 per litre of honey. The low profit margin was contributed by high marketing costs TZS 342/litre of honey sold at the market. As assemblers' buy raw unfiltered honey from the beekeepers, hence incur relatively high processing.

Table 13: Profit margin at assembler, retailer and wholesaler's level

Description	Traders		
	Assembler (n=4)	Retailer (n=8)	Wholesaler (n=3)
Average quantity of honey purchased per trader/year (Litre)	1 250	1 325	1 200
Average buying price/Litre	4 000	4 200	4 000
Average purchasing costs	5 000 000	5 565 000	4 800 000
Average selling price/Litre	5 000	6 000	5 500
Revenue	6 250 000	7 950 000	6 600 000
Marketing costs/litre	343	306	316
Profit Margin	3 126 650	2 037 850	1 496 400
Profit Margin/Litre	962	1 538	1 247
Marketing Margin/litre	1 000	1 800	1 500

Note: The costs, price and margin are measured in Tanzanian shillings.

4.3.4.3 Profitability of bees honey at wholesale level

Table 13 shows profit margin at the wholesale level was estimated to be TZS 1 247 per litre of honey sold at the market. The marketing margin at this level is TZS 1 500 while the marketing cost was TZS 316/litre of honey. The profit margin at whole sale level is relatively low as compared to retail and large than assemblers, due to the fact that these stakeholders denote unequal sharing marketing costs, and that wholesalers are likely to realise large total profit margins acquiring from large sales of product compared to retailers and others. The results concur with those of Mkamba (2006), who found that profit margin for retailers in Dar es Salaam was very high compared to profit margin of wholesalers at the same market area.

4.3.4.4 Profitability of bees honey at retail level

Profit margin at retail level was estimated to be TZS 1 538 per litre of honey sold at the market and the marketing margin per litre was TZS 1 800 while the marketing cost was TZS 306 (Table 13). The relatively high profit margin at retail level is due to low marketing costs incurred per litres of pure honey and also the price per litre of honey on average is high too compared to other key actors in honey value chain i.e. (TZS 6 000). The high price per litre of honey is contributed by the increased demand of the product by neighbouring market like Dar es Salaam, Tanga, Coast and Morogoro.

4.4 Best Bees Honey Marketing Option in the Study Area

Figure 10 compares the profit obtained by different actors along the honey value chain being the alternative option for marketing honey. The data depict that, producers receive smaller profit as compared to other stakeholders (assemblers, wholesalers and retailers). By selling direct to the final consumer, a producer obtained 100% of the final price paid and shares obtained by producer's decreases as the number of intermediaries' increases. Malaisamy *et al.* (2008) found the same that, little producer share in consumer price happened when the number of intermediaries involved in the channel increased, because of higher total marketing costs. Mwakatobe and Mlingwa (2005) found that, lack of market information and inaccessibility to market especially for beekeepers causes low producers' share of the final price paid at the market, hence low profit. Therefore for the Lushoto small scaled beekeepers to sell and obtain reasonable profit could better market directly to the ultimate final consumer as would obtain reasonable share of the final price paid by end user of the product at the market.

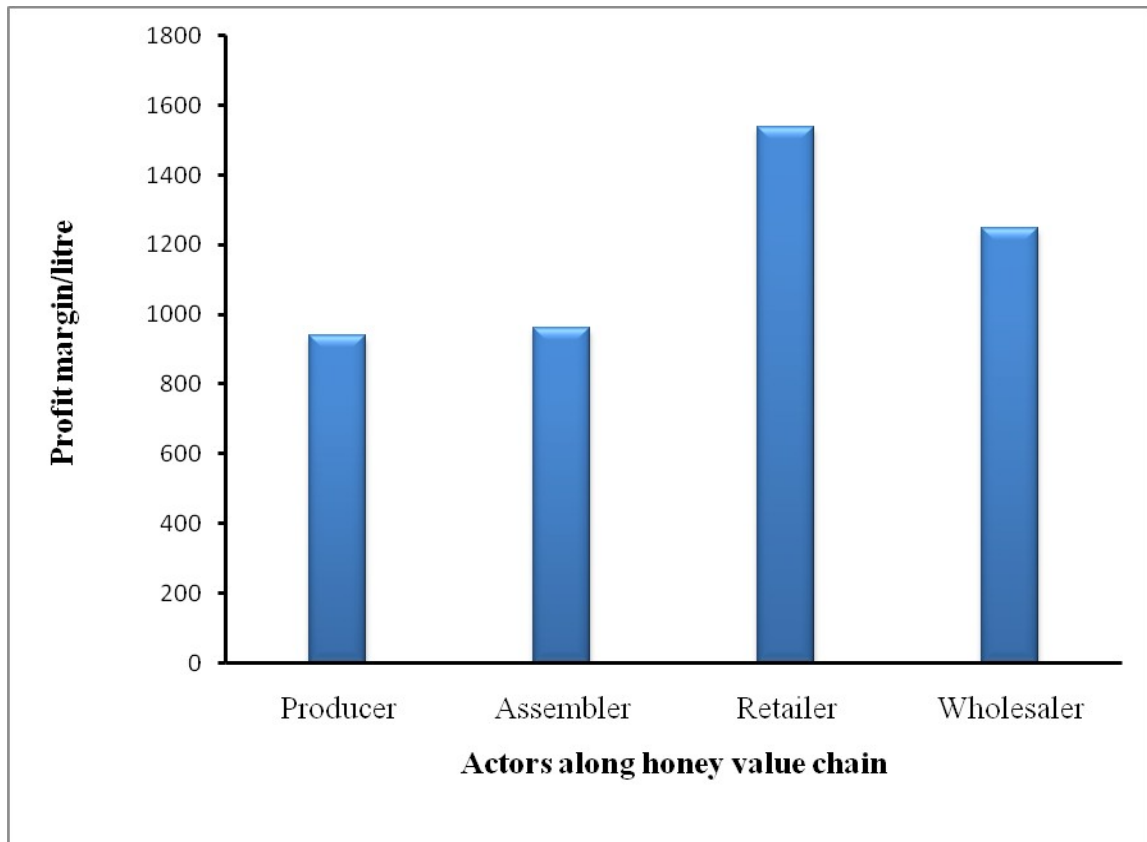


Figure 10: Comparison of the profit margin obtained by honey value chain actors

CHAPTER FIVE

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

The three ecological zones (cold humid, cold dry and warm dry zones) revealed that Lushoto District have favourable environment for beekeeping and highly marketable organic honey production due to existence of plant species that attract bee colonies for nectar production.

The key actors identified in the study area engaging in bees honey value chain include beekeepers, local traders/assemblers, wholesalers and retailers, with four marketing options for bees' honey which includes both direct and indirect marketing. The direct marketing involves beekeeper selling honey to the ultimate final consumers while the indirect marketing involves selling honey through brokers/intermediaries.

Little value addition activities (processing and packaging) were observed at local level in the study area. The packaging commonly used was 20L, 5L, 1L, 0.5L and 0.34L. The latter three (5L, 1L, 0.5L and 0.34L) were mostly preferred at retail markets while the 20L type of package were commonly used by wholesalers and assemblers.

The findings of the study indicated that beekeeping production and trading is economically viable based on the calculated NPV, BCR and IRR. Again the prices and margins obtained by different actors in the honey value chain varied significantly with the retailers and wholesalers obtaining significantly higher profit margins despite the high production costs incurred by producers. In comparing the proportional share of the final price paid by a

consumer, beekeepers obtained low share in comparison to what wholesalers, local traders and retailers obtained. By selling direct to the final consumer, a producer obtained 100% share of the final price paid and decreases with increasing number of intermediaries.

5.2 Recommendations

Based on the major findings of the study, the following are pertinent recommendations for developing bees' honey marketing in Lushoto District:

5.2.1 Increasing honey production

In order to attract the anticipated buyers including the wholesalers, beekeepers need to increase honey production through fully utilization of the ecological advantages available and the use of improved beehives as well as promotion of bulking centres for collective marketing.

Existing traditional beekeeping should be replaced by modern and commercialized beekeeping including improved postharvest, processing and packaging methods for marketable quality honey.

5.2.2 Improving the availability and accessibility of market information

Lack of market information was one of the factors affecting profitability of honey at farm level. Lack of market information from outside farmers' calls for creation of market centres and communication networks involving multistakeholders.

Farmers can be supported by getting current prices information from urban markets through strengthened district planning, economic and trade agencies.

5.2.3 Best options for marketing honey

The study recommends that, both direct and indirect marketing options should be used by beekeepers due to their cost effectiveness. Small scale beekeepers can maximize profit from selling directly to the ultimate consumers through roads side market outlets, on farm and retailing due to their low capital investment. The medium and large scale beekeepers in the study area are recommended to sell at both wholesale and retail markets as they have relatively high capital investment.

The study recommends formalization and strengthening of beekeeper's groups, including engaging in contracts with traders which will enhance market accessibility with the available markets and bargain power.

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APPENDICES

Appendix 1: Questionnaires for Bee keepers in Lushoto District

Questionnaire number.....Name of respondents.....

Date of interview.....Name of enumerator.....

District.....Division.....

Ward.....Village/Street.....

A. BASIC INFORMATION

1. Age of the respondent (Years).....

2. Gender of the respondent..... 1=Male 2=Female

3. Marital status..... 1= married, 2= single, 3= widow, 4= divorced

Education level of the respondent.....1=No formal education, 2= Primary education,
3=Secondary education, 4= Post secondary education.

4. What is your primary occupation? (Circle the appropriate) 1= farming, 2= employed,
3= business, 4= others (specify).....

5. What is your secondary occupation? (Circle the appropriate) 1= farming, 2= employed, 3=
business, 4= others (specify).....

6. Household size and composition (number of people living together and sharing the same
kitchen).....

Age group	Number
Below 18 years	
18-50 years	
Above 50 years	

B. BEE KEEPING/ PRODUCTION

1. Are you a bee keeper? 1= Yes 2= No

2. For how long have you been in bee keeping/ production?.....

3. How many bee hives do you have? Please specify.....
4. How many of these are improved ones?
5. How many of these are traditional ones?
6. Where did you get improved bee hives?
1= NGO's, 2= Government agencies, 3= others- specify.....
7. Where did you get other inputs and extension services concerning honey production on the last season? Specify.....
8. What are the prices for the inputs used during production?

In puts	Duration for its use	Price/ input(Tshs.)	Total
Bee hives			
• Modern			
• Traditional			
Bee groves			
Bee smoker			
Overalls			
Gum boots			
Straw hat			
Hive tool			
Other inputs			
Total cost			

9. What is the production cost of one litre of honey for three years consecutively?

Item	Cost per unit in a year			Overall Costs
	Year 1	Year 2	Year 3	
Harvesting				
Processing				
Packaging				
Transportation				

Preservation				
Labour				
Storage				
Others (specify)				
Total costs				

10. Have you harvested honey since you have started this enterprise? 1=Yes, 2= No

11. If yes what is the total yield from each bee hive (per litre) in last three seasons? Fill the table below.

Year	Production /hive in litre	Amount sold(ltr)	Price TZS/ltr
2007			
2008			
2009			

12. How long does it takes from investment to the time you harvest first products?.....

13. How many times harvested per year and quantity per harvest/hive?

1.times a year

2. Quantity

14. Do you have harvesting gears? 1= Yes, 2= No

15. How long does it takes for a bee hive to start deteriorate/lose its efficiency?.....

C. PROCESSING INFORMATION

16. Do you process your honey? 1= Yes, 2= No

17. If the answer is yes in what form/products? Specify

.....

18. If you do processing why?

.....

19. If you don't process what are the reasons? Specify

.....

20. What type of processing do you do?

Type of processing	Inputs used	Price of the input/unit	Product formed	Price of the processed product/unit

D. MARKETING INFORMATION

21. Where do you sell your bee products?

1=Food vendors, 2= collectors/assemblers, 3= Supermarket, 4= along the road,

5= others-specify.....

22. What kind of bee products are you trading? (Specify).....

23. Who are your customers for the bee products? Specify.....

24. Among them who are your main/potential customers for your products?

.....

25. What prices are they paid for each product?

Type of product	Unit	Price sold	
		Maximum	Minimum
Honey			
Beeswax			
Propolis			
Royal jelly			
Others			

26. Who set the price for the bee products? 1= Government, 2= Yours/Bee keepers

3= Cooperatives, 4= Traders/collectors/retailers/wholesalers

27. What is the best price will you be willing to receive per unit (kg/Ltr)?

Product	Minimum price	Maximum price
Honey		
Beeswax		
Propolis		
Others-specify		

28. In your products which item is most preferred by customers?

Item	Level of preference			
	Low	Moderate	High	Don't know
Colour				
Absence of impurities				
Adour				
Price				
Packaging				
Volume				

29. Do you know price of honey at other market places? 1= Yes, 2= No

30. If the answer is yes is there any difference between the prices that you receive and that at the market place? 1= Yes, 2= No

31. What is the price of bee products at the market place?

Product	Market Place	Maximum Price Sold	Minimum Price Sold
Honey			

Beeswax			
Propolis			
Royal jelly			
Others			

32. Do you export honey and other bee products outside Tanzania? 1=Yes, 2= No

33. If the answer is yes to the above, mention the countries your exporting honey and other bee products			
Country	Products	Price sold/unit	
		Minimum price	Maximum price

34. What is the quality specification do the export market wants?

.....

35. What is the constraints facing the export of the bee products?.....

36. What factors that influence demand of the bee products?.....

37. How would you describe the bee keeping sub sector?.....

Thanks Very Much for your Attention

Appendix 2: Questionnaire for Traders (Assemblers, wholesalers and retailers)

Section A. General Information

A2. Date form filled

--	--	--	--	--	--	--	--

A3. Name of the
numerate

A4. Name of the
village/location

A5. District/division

Socio-demographic Information

A6. Respondent's Name		A7. Age		<input type="text"/>
A8. Relation to the head of household	<input type="checkbox"/> 1 Head	<input type="checkbox"/> 5 Mother/Father	<input type="checkbox"/> 6 Other Relative <input type="checkbox"/> 7 Non Relative	
	<input type="checkbox"/> 2 Spouse (wife/husband)			
	<input type="checkbox"/> 3 Daughter/Son			
	<input type="checkbox"/> 4 Sister/Brother			
A9. Marital Status	<input type="checkbox"/> 1 Married	<input type="checkbox"/> 4 Divorced	<input type="checkbox"/> 5 Separated	
	<input type="checkbox"/> 2 Single			
	<input type="checkbox"/> 3 Widowed			
A10. Respondent's gender	<input type="checkbox"/> 1 male	<input type="checkbox"/> 2 female		
A11. Respondent's highest level of education	<input type="checkbox"/> 1 none	<input type="checkbox"/> 5 college / Univ.		
	<input type="checkbox"/> 2 primary	<input type="checkbox"/> 6 technical		
	<input type="checkbox"/> 3 secondary	<input type="checkbox"/> 7 other (specify)		
	<input type="checkbox"/> 4 high School			
A12. How many people belong to your family and share the same kitchen?			<input type="text"/>	<input type="text"/>
A13. What is your main occupation?	<input type="checkbox"/> 1 farmer	<input type="checkbox"/> 6 private business	<input type="checkbox"/> 7 government service	
	<input type="checkbox"/> 2 farm laborer			
	<input type="checkbox"/> 3 trader			
	<input type="checkbox"/> 4 handy man			
	<input type="checkbox"/> 5 artisan/ craftsman			
	<input type="checkbox"/> 8 student	<input type="checkbox"/> 9 unemployed		
	<input type="checkbox"/> 10 housewife			
	<input type="checkbox"/> 11 other			
	(specify).....			
A14. Ethnicity				

A15. Do you belong to any organization	<input type="checkbox"/> 0 No	<input type="checkbox"/> 1 Yes
A16. If yes to A15 Which type of organization	<input type="checkbox"/> 1 Farmers' Org <input type="checkbox"/> 2 Political Org <input type="checkbox"/> 3 Cooperative <input type="checkbox"/> 4 Microfinance org <input type="checkbox"/> 5 Women group	<input type="checkbox"/> 6 NGO <input type="checkbox"/> 7 Community based <input type="checkbox"/> 8 other (specify)_

Section B. Business Information

B1. Which one of these describes the best your activity (In relation to bee products) <i>Tick all that apply.</i>	<input type="checkbox"/> 1 I trade groceries at the market/retail <input type="checkbox"/> 2 I trade honey in the street, or along the road <input type="checkbox"/> 3 I own a grocery store <input type="checkbox"/> 4 I collect honey <input type="checkbox"/> 5 I wholesale honey <input type="checkbox"/> 6 I am a bee keeper <input type="checkbox"/> 7 other (specify)_____
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B2. If in honey business how many years have you been dealing with honey trade?	Years
B3. What bee products do you trade commercially? <i>Tick all that apply.</i>	<input type="checkbox"/> 1 honey <input type="checkbox"/> 2 Propolis <input type="checkbox"/> 3 pollen <input type="checkbox"/> 4 beeswax <input type="checkbox"/> 5 candle wax <input type="checkbox"/> 6 Royal Jelly <input type="checkbox"/> 7 other (specify)_____
B4. Do you collaborate with other traders when dealing with bee products?	<input type="checkbox"/> 0 no <input type="checkbox"/> 1 yes
B5. If "yes", how do you collaborate? <i>Tick all that apply.</i>	<input type="checkbox"/> 1 share price/ market information <input type="checkbox"/> 2 share transport <input type="checkbox"/> 3 share storage facilities <input type="checkbox"/> 4 lend/borrow money <input type="checkbox"/> 5 supply bee products to others when supply is lacking <input type="checkbox"/> 6 purchase bee products (or inputs) together <input type="checkbox"/> 7 other (specify) _____
B6. How many traders do you collaborate with?	

B7. During the past year, did you have more than one supplier of bee products?	<input type="checkbox"/> 0 no	<input type="checkbox"/> 1 yes
B8. From which of the following groups have you bought the honey and other bee products? Indicate the number of agents per group.	Farmers	
	Collectors/Assemblers	
	Transport contractors/middlemen	
	Wholesalers	

B9. Do you usually harvest the honey from the field?	<input type="checkbox"/> 0 no	<input type="checkbox"/> 1 yes
B10. How are these honey and other bee products packaged when you receive them? <i>Tick all that apply.</i>	Packaging type	
	<input type="checkbox"/> 1 plastic bottle	
	<input type="checkbox"/> 2 glass bottles	
	<input type="checkbox"/> 3 buckets	
	<input type="checkbox"/> 4 sadolins (of 4ltr)	
	<input type="checkbox"/> 5 other (specify) _____	
B11. Do you repackage them?	<input type="checkbox"/> 0 no (go to B14)	<input type="checkbox"/> 1 yes

B12. If “yes”, how are they repackaged? <i>Tick all that apply.</i>	Packaging type	Quantity	Price sold
	<input type="checkbox"/> 1 plastic container		
	<input type="checkbox"/> 2 glass container		
	<input type="checkbox"/> 3 buckets		
	<input type="checkbox"/> 4 sadolins (of 4Ltr)		
	<input type="checkbox"/> 5 other (specify if different from B11)_____		
B13. Do you transport the bee products from your suppliers?	<input type="checkbox"/> 0 no	<input type="checkbox"/> 1 yes	
B14. How do you usually transport the honey and other bee products? <i>Tick all that apply.</i>	Type	Quantity per load (in Kg/ltr)/year	Cost per load
	<input type="checkbox"/> 1 horse/ ox cart		
	<input type="checkbox"/> 2 private car		
	<input type="checkbox"/> 3 own pickup truck		
	<input type="checkbox"/> 4 donkey cart		
	<input type="checkbox"/> 5 public transport		
	<input type="checkbox"/> 6 motorcycle/ bicycle		
	<input type="checkbox"/> 7 hired vehicle		
	<input type="checkbox"/> 8 Walking		
	<input type="checkbox"/> 9 other (specify) _____		

B15. Do you have any contract arrangement with the trading partner(s) you normally transact with?	<input type="checkbox"/> 0 no (go to B17)	<input type="checkbox"/> 1 yes
B16. If “yes”, is this contract based on a written agreement?	<input type="checkbox"/> 0 no	<input type="checkbox"/> 1 yes

B17. During the past year, did you sell your honey and other bee products to more than one trading partner?	<input type="checkbox"/> 0 no	<input type="checkbox"/> 1 yes
B18. How many trading partners did you sell your bee products to?	Transport contractors/ middlemen	
	Collectors/Assemblers	
	Wholesalers	
	Processors	
	Hotel/Restaurants	
	Retailers	

B19. What is the maximum distance and time honey travel from your supplier(s) to your retail outlet? <i>Fill all that apply.</i>			
a. Farmer	Where	Km	Hr
b. Middlemen	Where	Km	Hr
c. Collector/assembler	Where	Km	Hr
d. Wholesaler	Where	Km	Hr
e. Processor	Where	Km	Hr
f. Other (specify)	Where	Km	Hr

Section C. Marketing Information of the bee products

C1. In terms of contribution to your total turnover, which products do you consider the top two most important ones (in order of importance)		
1 Honey		
2 Beeswax		
3 Royal jelly		
4 Propolis		
5 Value added products (i.e. candle, cream etc)		
Product	Variety name and description	Main area(s) sourced
1. <input type="text"/>		
2. <input type="text"/>		

C2. Do you export honey and other bee products outside Tanzania?			
1. Yes <input type="checkbox"/>		2. No <input type="checkbox"/>	
C3. If the answer is yes to C2 mention the countries your exporting honey and other bee products.			
Country	Products	Price sold/unit	
		Minimum price	Maximum price

C4. What is the quality specification do the export market wants?

C5. What is the constraints facing the export of the bee products?

Section D. Processing

D1. Do you normally process any of the bee products before trading?	<input type="checkbox"/> 0 no	<input type="checkbox"/> 1 yes
D2. If « yes », which products do you process? <i>Tick all that apply.</i>	<input type="checkbox"/> 1 honey <input type="checkbox"/> 2 beeswax <input type="checkbox"/> 3 propolis <input type="checkbox"/> 4 Royal jelly	<input type="checkbox"/> 5 other (specify)_____
D3. Which type of processing do you do (specify)		
D4. How much does this processing cost?	Processing type	Average time of processing per Kg/Ltr
D5. How do you sale them after processing (form and unit)?	Form	Price per unit
	<input type="checkbox"/> 1 candle	
	<input type="checkbox"/> 2 cream	
	<input type="checkbox"/> 3 poison	
	<input type="checkbox"/> 4 others (specify)	
D6. What is the price of the bee products after processing? (unit price)	Form	Average Sales Price/unit
	<input type="checkbox"/> 1 candle	
	<input type="checkbox"/> 2 cream	
	<input type="checkbox"/> 3 poison	
	<input type="checkbox"/> 4 others (specify)	

Section E. Attitude on Bee Product

E1. Would you like to sell more bee products than what you are currently selling now?	<input type="checkbox"/> <input type="checkbox"/> 0 no	<input type="checkbox"/> <input type="checkbox"/> 1 yes
E2. If “yes”, what is currently preventing you from selling more of them? Tick all that all apply	<input type="checkbox"/> <input type="checkbox"/> 1 Lack of capital/ limited access to credit <input type="checkbox"/> <input type="checkbox"/> 2 No available good quality bee hives <input type="checkbox"/> <input type="checkbox"/> 3 Lack of manpower <input type="checkbox"/> <input type="checkbox"/> 4 Poor infrastructure system <input type="checkbox"/> <input type="checkbox"/> 5 Market price is comparably low <input type="checkbox"/> <input type="checkbox"/> 6 Existing food taboos <input type="checkbox"/> <input type="checkbox"/> 7 Too many sellers and very few buyers <input type="checkbox"/> <input type="checkbox"/> 8 Climatic reason <input type="checkbox"/> <input type="checkbox"/> 9 Others (specify) _____	

E3. In general, do your buyers think the following traits related to honey are important?				
Colour	<input type="checkbox"/> 0 No	<input type="checkbox"/> 1 Yes	<input type="checkbox"/> 9 don't know	
Price	<input type="checkbox"/> 0 No	<input type="checkbox"/> 1 Yes	<input type="checkbox"/> 9 don't know	
Adour	<input type="checkbox"/> 0 No	<input type="checkbox"/> 1 Yes	<input type="checkbox"/> 9 don't know	
Volume	<input type="checkbox"/> 0 No	<input type="checkbox"/> 1 Yes	<input type="checkbox"/> 9 don't know	
Freshness/organic nature	<input type="checkbox"/> 0 No	<input type="checkbox"/> 1 Yes	<input type="checkbox"/> 9 don't know	
Packaging	<input type="checkbox"/> 0 No	<input type="checkbox"/> 1 Yes	<input type="checkbox"/> 9 don't know	
E4. What do your customers really want from the bee products you're selling?				

Thank you for your collaboration.

Appendix 3: Discounted Cash flow for Lushoto town

Description	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
Fixed Capital	13 304								
Labour cost	259	208	157	157	157	157	157	157	157
Transport cost	173	139	122	122	122	122	122	122	122
Processing cost	336	336	336	336	336	336	336	336	336
Loading /off loading	315	315	315	315	315	315	315	315	315
Total Costs	14 387	998	930	930	947	947	947	947	947
Discount Factor (20%)	0.83	0.69	0.58	0.48	0.4	0.33	0.28	0.23	0.19
Discounted Costs	11 989	693	538	448	381	317	264	220	184
Sum (A)	15 035								
Revenue	5 286	5 375	5 444	5 444	5 444	5 444	5 444	5 444	5 444
Discounted Revenue	4 405	3 733	3 151	2 626	2 188	1 823	1 519	1 266	1 055
Sum (B)	21 766								
BCR	1.4								
Net cash flow	9 101	4 377	4 514	4 514	4 497	4 497	4 497	4 497	4 497
Disc Cash outflow	7 584	3 039	2 613	2 177	1 807	1 506	1 255	1 046	872
NPV	346								
IRR	22%								

Appendix 4: Discounted Cash flow for Migambo village

Description	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
Fixed Capital	6 969								
Labour cost	1 547	619	533	533	533	533	533	533	533
Transport cost	1 032	413	434	434	434	434	434	434	434
Processing cost	256	256	256	256	256	256	256	256	256
Loading /off loading	577	577	577	577	577	577	577	577	577
Total Costs	10 381	1 865	1 800	1 800	1 800	1 800	1 799	1 799	1 799
Discount Factor (20%)	0.83	0.69	0.58	0.48	0.40	0.33	0.28	0.23	0.19
Discounted Costs	8 651	1 295	1 042	868	723	603	502	419	349
Sum (A)	14 451								
Benefits									
Revenue	4 300	4 500	5 000	5 000	5 000	5 000	5 000	5 000	5 000
Discounted Revenue	3 583	3 125	2 894	2 411	2 009	1 674	1 395	1 163	969
Sum (B)	19 224								
BCR	1.3								
Net cash flow	(6 081)	2 635	3 200	3 200	3 200	3 200	3 200	3 200	3 200
Disc Cash outflow	(5 068)	1 830	1 852	1 543	1 286	1 072	893	744	620
NPV	282								
IRR	23%								

Appendix 5: Discounted Cash flow for Lukozi village

Description	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
Fixed Capital	7 666								
Labour cost	384	227	218	218	218	218	218	218	218
Transport cost	256	151	172	172	172	172	172	172	172
Processing cost	299	299	299	299	299	299	299	299	299
Loading/ off loading	604	604	604	604	604	604	604	604	604
Total Costs	9 208	1 280	1 293	1 293	1 293	1 293	1 292	1 292	1 292
Discount Factor (20%)	0.83	0.69	0.58	0.48	0.40	0.33	0.28	0.23	0.19
Discounted Costs	7 674	889	748	624	520	433	361	301	251
Sum (A)	11 799								
Revenue	3 500	4 000	4 500	4 500	4 500	4 500	4 500	4 500	4 500
Year	2 917	2 778	2 604	2 170	1 808	1 507	1 256	1 047	872
Sum (B)	16 959								
BCR	1.4								
Net cash flow	(5 708)	2 720	3 207	3 207	3 207	3 207	3 207	3 207	3 207
Disc Cash outflow	(4 757)	1 889	1 856	1 547	1 289	1 074	895	746	622
NPV	589								
IRR	26%								

Appendix 6: Discounted Cash flow for Mwangoi village

Description	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
Fixed Capital	10 975								
Labour cost	233	162	167	167	167	167	167	167	167
Transport cost	155	108	114	114	114	114	114	114	114
Processing cost	223	299	299	299	299	299	299	299	299
Loading/ off loading	635	635	635	635	635	635	635	635	635
Total Costs	12 221	204	1 214	1 214	1 214	1 214	1 214	1 214	1 214
Discount Factor (20%)	0.83	0.69	0.58	0.48	0.40	0.33	0.28	0.23	0.19
Discounted Costs	10 184	836	703	586	488	407	339	282	235
Sum (A)	14 059								
Revenue	4 500	4 500	5 000	5 000	5 000	5 000	5 000	5 000	5 000
Discounted Revenue	3 750	3 125	2 894	2 411	2 009	1 674	1 395	1 163	969
Sum (B)	19 391								
BCR	1.4								
Net cash flow	(7 721)	3 297	3 786	3 786	3 786	3 786	3 786	3 786	3 786
Disc Cash outflow	(6 434)	2 289	2 191	1 826	1 521	1 268	1 057	880	734
NPV	54								
IRR	20%								

Appendix 7: Discounted Cash flow for Malindi village

Description	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
Fixed Capital	9 045								
Labour cost	549	369	267	267	267	267	267	267	267
Transport cost	366	246	220	220	220	220	220	220	220
Processing cost	253	299	299	299	299	299	299	299	299
Loading/off loading	433	433	433	433	433	433	433	433	433
Total Costs	10 646	1 346	1 218	1 218	1 218	1 218	1 218	1 218	1 218
Discount Factor (20%)	0.83	0.69	0.58	0.48	0.4	0.33	0.28	0.23	0.19
Discounted Costs	8 872	934	705	587	490	408	340	283	236
Sum (A)	12 855								
Revenue	3 500	4 200	5 000	5 000	5 000	5 000	5 000	5 000	5 000
Discounted Revenue	2 917	2 917	2 894	2 411	2 009	1 674	1 395	1 163	969
Sum (B)	18 349								
BCR	1.4								
Net cash flow	(7 146)	2 854	3 782	3 782	3 782	3 782	3 782	3 782	3 782
Disc Cash outflow	(5 955)	1 982	2 189	1 824	1 520	1 267	1 055	880	733
NPV	236								
IRR	22%								