

THE UNITED REPUBLIC OF TANZANIA MINISTRY OF NATURAL RESOURCES AND TOURISM FORESTRY AND BEEKEEPING DIVISION

ESTABLISHMENT OF BEE PRODUCTS PROCESSING AND PACKING INDUSTRIES IN TANZANIA

ASSESSMENT OF VIABILITY AND CRITERIA FOR DECISION MAKING

NOVEMBER, 2019



THE UNITED REPUBLIC OF TANZANIA MINISTRY OF NATURAL RESOURCES AND TOURISM FORESTRY AND BEEKEEPING DIVISION

ESTABLISHMENT OF BEE PRODUCTS PROCESSING AND PACKING INDUSTRIES IN TANZANIA

ASSESSMENT OF VIABILITY AND CRITERIA FOR DECISION MAKING

NOVEMBER, 2019

PREFACE

The main aspiration of the Fifth Phase Government is an Industrialized Economy "Uchumi wa Viwanda", an ambition that requires speed in budget execution and elimination of all structural, policy, legal and regulatory challenges. The Government is also obliged and committed at ensuring that the wealth of the Nation is optimally harnessed and efficiently utilized for the development of Tanzanian rather than being misused. The beekeeping sub-sector was identified by the Ministry of Natural Resources and Tourism (MNRT) as an area that can spearhead the industrialization agenda on account of its existing high potential which is under-exploited. Currently, Tanzania has limited processing industries that preserves the quality of bee products. Thus, the MNRT has taken a bold decission of building honeybee products processing industries in all important beekeeping areas in Tanzania. The anticipated outcomes being to improve people's livelihood and the contribution of beekeeping subsector to the economy through increased market outlets. However, scientific evidences were required to support this initiative and guide the whole process.

Thus, in 2019 MNRT formed a team of experts to study and advice the government on where to build bee products processing and packing plants, establish criteria of selection of the sites and provide the cost to be involved. The team was also required to test viability by undertaking cost benefit analysis for small scale, medium and large-scale industries and propose ownership and management model to ensure profitability and sustainability of the proposed industries.

In this extensive report the team uses the findings to propose establishment of beekeeping processing industries in Kibondo (Kigoma), Sikonge (Tabora), Mlele (Katavi) and Bukombe (Geita). Actually, for the first time, answers to pertinent questions related to ownership, size, level of financing, management mode and skills required to run a bee products processing industry are provided. The rigorously undertaken researches have policy relevance; the Ministry is keen to ensure that it is used effectively to contribute to the day-to-day dynamics and long-term development of our country and the sub-sector.

I urge all stakeholders where these industries will be built to use them diligently.

The Ministry will as it has been the case, continue to support the growth of this important subsector. I trust that you will enjoy reading this report, which is the first part of what promises to be an exciting and insightful journey in developing the beekeeping sub-sector in the country.

Prof. Adolf F. Mkenda Permanent Secretary Ministry of Natural Resources and Tourism

ACKNOWLEDGMENTS

We would like to sincerely thank the Minister for Natural Resources and Tourism Honourable Dr. Hamisi A. Kigwangalla (MP) and the Permanent Secretary Prof. Adolf F. Mkenda for supporting and trusting the team to undertake this noble assignment.

This task was undertaken by a team of experts led by Mr. Daniel C. Pancras, Acting Assistant Director Beekeeping Development from MNRT. Other members of the team were: Dr. Mkabwa Manoko, Head of Department of Crop Science and Beekeeping of the University of Dar es Salaam; Dr. Innocent Pantaleo working with the University of Dar es Salaam, Department of Economics; Mr. Stephen Msemo from Tanzania Forest Fund (TaFF); Ms. Mwanahamis Mapolu from Tanzania Forest Services Agency (TFS); Mr. Lameck Sangula from the Ministry of Industry and Trade (MIT) and Ms. Magdalena Muya from MNRT. We are grateful for the commitment and expertise shown by the members of the team which led to the successful completion of this assignment.

The assignment involved travelling to eight regions namely Tabora, Singida, Rukwa, Geita, Shinyanga, Dodoma, Coast and Dar es Salaam. We are therefore very grateful to the District Executive Directors, beekeepers and the owner of bee processing plants in the visited districts for providing needed data and sharing with the team their experiences and wide knowledge related to bee processing industries. The acknowledged stakeholders include Hon. Mizengo P. Pinda, the former Prime Minister, TFS - headquarter, Small Industries Development Organisation, The Tanzania Trade Development Authority, Ministry of Industry and Trade, Moshi Cooperative University- Dodoma centre, Beekeeping Training Institute - Tabora, Tanzania Bureau of Standards – headquarter and Association for the Development of Protected Areas Project, Kitunda who provided their time and shared their knowledge and experiences regarding bee processing plants and beekeeping.

We appreciate the financial support from Tanzania Forest Fund (TaFF) under the leadership of Dr. Tuli Msuya through which it was easier to facilitate and make the team accomplish the assignment on time. Lastly and not least, we would like to thank every person who contributed directly or indirectly to the successful accomplishment of this assignment.

Dr. Ezekiel E. Mwakalukwa Director of Forestry and Beekeeping Division Ministry of Natural Resources and Tourism

EXECUTIVE SUMMARY

Beekeeping is a long time established traditional economic activity in Tanzania contributing to source of food, raw materials for various industries, medicine, and source of income for beekeepers and employment to about 2 million people. There are beekeepers in each region in Tanzania though the largest potential is recorded in 10 regions namely Tabora, Kigoma, Katavi, Shinyanga, Geita, Kagera, Rukwa, Songwe, Mbeya, and Singida. Tanzania has extensive potential for bee products that has not been fully utilized. Estimates show that the production potential of bee products in the country is about 138,000 tons of honey and 9,200 tons of beeswax per annum from 9.2 million honeybee colonies. However, the national honey and beeswax current production is estimated to be about 30,393 tons of honey and 1,843 tons of beeswax, which is only about 24.6% of the available potential.

Exists also other good environment in Tanzania that favour beekeeping as a carrier. Tanzania has five plant geographical areas each with different unique plant communities and different levels of endemism thus able to produce honey of different chemical and physical properties. In addition, it is estimated that Tanzania has 48.1 million hectares of forests and woodlands that can be used for beekeeping development. Likewise, sustainability of beekeeping in Tanzania is predictable because it is now mainly practiced in protected areas which are also an opportunity to produce organic honey. Beekeeping is one of the activities that extract forest resources without depleting it but rather increasing its genetic diversity and ensuring its existence through provisioning of pollination services.

Tanzanian beekeepers, businessmen and other stakeholders are given opportunities to exhibit their products globally, regionally and locally through government networks and facilitation. This is normally done by the government to expose them to advances in beekeeping knowledge and technologies that they can tap. Many have enjoyed this opportunity. Conversely to the existence of all these opportunities, beekeeping subsector contribution to GDP has continued to be comparatively low. Constraints that hinder development of the sub-sector continue to exist, one of them being lack of adequate and appropriate processing and storage facilities for bee products. This explains the failure of Tanzania to maintain its market share in the European market because poor and an unhygienic processing affects negatively the quality and cannot ensure stable supplies and product consistence.

Recognizing this necessity, the Ministry of Natural Resources and Tourism formed a Task Force to carry out a quick study and provide recommendations to guide government's decision of building beekeeping processing industries in the ten regions with highest potential. The specific objectives of the study were to: (i) identify place, location and situation of existing honey processing industries in Tanzania; (ii) identify size, place and location where the new industries may be established; (iii) identify the best approach that would be employed in collecting raw materials from beekeepers to the proposed industry; (iv) recommend place and location to construct new honey collection canters; (v) identify type of machinery/equipment and their related costs for a micro, small, medium and large sized industries; (vi) identify construction costs for micro, small, medium and large sized industries; (vii) assess the existing situation of beekeeping Cooperative societies in Tanzania; (viii) undertake Cost and Benefit Analysis of the proposed industries; (ix) recommend the best approach to construct, supervise and operate the proposed industries taking into account the PPP agenda; and (x) undertake any other issues that may seem necessary in the establishment of the new industries.

The Task Force systematically selected 8 regions namely Tabora, Singida, Rukwa, Geita, Shinyanga, Dodoma, Pwani and Dar es Salaam to carry out the study. In each of these regions, one district was selected based on the existing beekeeping potential. Kigoma despite being one of the regions with high production potential was not visited due to the presence of recent report which covered most of the information needed. In each district data were collected from Councils management teams, beekeeping businessmen and businesswomen, existing industries owners, beekeeping cooperative societies, groups and individuals and Agencies. From each group data were collected using pre-prepared group specific check list with key issues. Data were also collected from literature and field observations to compliment the checklists. The following key results were observed:

- i. Tanzania has extensive potential for bee products production that has not been fully utilized. The production potential of bee products in the country is estimated at about 138,000 tons of honey and 9,200 tons of beeswax per annum from 9.2 million honeybee colonies, with only 24.6 percent of the estimated potential being produced. This underutilization is accounted to poor technology, poor infrastructure for market and inadequate processing industries.
- ii. Most of the existing bee products processing industries in Tanzania regardless of their size operate below their capacity mainly due to inadequate working capital to purchase raw materials. Tanzania has a total of 21 Bee Products processing industries located in different regions and with varied sizes. Most of these industries are small sized with only one large sized. Most of these are running below their capacity due to inadequate capital to buy raw material and limited skilled personnel to run the machineries. Some industries such as Honey King Processing industry closed due to challenges in accessing its target China market since honey and beeswax are not included into a list of agricultural products allowed to be imported to China from Tanzania.
- iii. Most of existing industries are privately owned and few are owned by government and cooperative societies. The existing industries are owned and operated under different modes namely 66.7% are privately own and operated, 14.3% owned and operated by the Government (2 TFS and 1 for SIDO Singida), 14.3% owned and operated by beekeeper's cooperatives society and only 4.7% owned by cooperative but operated though joint cooperation between Cooperative and Private Company.
- iv. As per cost benefit analysis, purchase of full-fledged machinery for micro, small, medium and large sized industries require TZS. 4,250,600.00, TZS. 198,520,395.00, TZS. 319,553,620.00 and TZS 893,764,210.00 respectively. Machinery is assumed to have a life-span of 10 years before they become obsolete.
- v. Basing on NPV and BCR, except for a micro sized industry which failed sensitivity analysis; it is profitable to invest on the project at any type

and size of industry. Returns on sales and break-even sales value were also satisfactory. The project can pay back within two to three years.

With the above observation and basing on three major criteria namely current production of raw material and final products; the status of the existing bee processing industries; and status of local and international market the following recommendations are made:

- i. Support establishment of new medium sized industry in Sikonge District and a small sized industry in Bukombe District. These are areas where production is high and there is apparently no vibrant existing bee processing industry.
- ii. Enhance the capacity of the existing industry in Kibondo District which is owned by UKI, the industry in Manyoni owned by TFS and the industry in Mlele District owned by Vijana SACCOSS. The Kibondo industry should be supported by providing funds for rehabilitation of the existing building and provision of processing machineries with a capacity of medium sized industry. For the TFS Manyoni industry, support should be directed to providing funds to construct new small sized industrial building and purchase some of the missing processing machineries in the entire chain of bee processing industrial layout. For Mlele Vijana Industry support should be directed to purchasing some of missing processing machineries in the whole chain of bee processing industrial layout including construction of raw material receiving rooms.
- iii. Consider that new or strengthened industries need to be owned and operated under different modes. For government owned industries, it is proposed that improved arrangements be made to secure their obligation outside the Government system that will allow for them to operate as business entities that will make them able to isolate financial management risks. Thus, a Special Purpose Company mode of operation is recommended for Sikonge and Bukombe Districts Proposed Industries and that of TFS. For Kibondo industry it is recommended that this industry be operated under Cooperative's system. The details of ownership and operation for the five proposed industries is as follows: (i) Sikonge industry to be

owned by District (DED) and operated by *Special Purpose Company* (SPC) in collaboration with Beekeeper's cooperative. The SPC will be monitored by DED; Bukombe industry be owned again by District (DED) and operated by *Special Purpose Company* (SPC) in collaboration with Beekeeper's cooperatives; (iii) Kibondo industry proposed to be owned and operated by beekeeper's cooperative (UKI); (iv) Mlele industry proposed to be owned by DED and operated by Vijana SACCOS and (v) Manyoni industry to be owned and operated by TFS through Special Purpose Company (SPC) in collaboration with beekeeper's cooperatives. The presence of cooperatives will assure the availability of raw materials (honey and beeswax) to run the industries.

- iv. Provide the existing and new industries with either funds or soft loans as revolving funds to support working capital. Most of existing industries are underperforming on account of lack of working capital to compete with foreign bee product dealers in purchase of raw materials. Under the assumptions made in financial analysis, a working capital of TZS 40,156,448.00, TZS 2,356,674,187.00, TZS 4,714,301,185.00 and TZS 5,886,649,515.00 for micro, small, medium and large sized industries is required respectively for smooth running of the industries.
- v. Collaborate with other stakeholders to strengthen extension services and intensify beekeepers' cooperatives and promote use of existing collection centers in order to maximize production and facilitate market linkages. To assure quality of bee products and reliable market for beekeepers, strengthening extension services, promoting use of existing and establishment of new honey collection centers and establishment of new beekeeping production zones within high production potential area is inevitable. If the existing and new industries manage to operate under full capacity, the current production will not be able to cater for full production and export market.

ABBREVIATIONS

ADAP	Association for the Development of Protected Areas	
AQRB	Architects and Quantity Surveyors Registration Board	
B/C	Benefit/Cost	
BCR	Benefit Cost Ratio	
BDP	Beekeeping Development Project	
BKG	Bee Keeping Groups	
CBA	Cost Benefit Analysis	
CB0	Community Based Organization	
CRMP	Critical Residue Monitoring Plan	
DC	District Council	
DED	District Executive Director	
DITF	Dar es Salaam International Trade Fair	
DRC	Democratic Republic of Congo	
EAITE	East Africa International Trade Exhibition	
EIA	Environmental Impact Assessment	
EU	European Union	
FAO	Food and Agriculture Organization	
FBD	Forest and Beekeeping Division	
FR	Forest Reserve	
GCA	Game Controlled Area	
GMP	Good Manufacturing Practices	
GR	Game Reserve	
НАССР	Hazard Analysis Critical Control Points	
HMF	Hydroxyl Methyl Furfural	
ISO	International Organization for Standardization	
ITC	International Trade Centre	
LGA	Local Government Authority	
МІТ	Ministry of Industry and Trade	
MNRT	Ministry of Natural Resources and Tourism	
MRL	Maximum Residue Levels	

MP	Member of Parliament
NGOs	Non-Government Organizations
BIPK	Beekeeping Improvement Project Kigoma
NPV	Net Present Value
PPP	Public Private Partnership
SACCOS	Savings and Credit Co-Operative Society
SADC	Southern African Development Community
SIDO –HQ	Small Industries Development Organization – Head Quarter
SPC	Special Purpose Company
SYECCOS	Singida Youth Entrepreneurs and Consultants Cooperative Society
TABEA	Tanzania Beekeepers Associations
	Tanzania Beekeepers Cooperative Union
TABEDO	Tanzania Beekeeping Development Organization
TaFF	Tanzania Forest Fund
TANESCO	Tanzania Electrical Supplies Company
TARURA	Tanzania Rural Roads Agency
TAWA	anzania Wildlife Management Authority
TBCS	Tabora Beekeepers Cooperative Society
TBS	Tanzania Bureau of Standard
TCRS	Tanzania Christian Relief Services
TFS	Tanzania Forest Services Agency
TOR's	Terms of References
TPA	Total Present Value
TZS	Tanzania Shilling
UDSM	University of Dar es Salaam
UK	United Kingdom
UKI	Ushirika wa Ufugaji Nyuki Kibondo
USA	United States of America
USD	United States Dollar
UWAKI	Ushirika wa Wafugaji Nyuki Kifura
WMA	Wildlife Management Area

TABLE OF CONTENTS

PR	REFACE	ii
	KNOWLEDGMENTS	iv
EX	ECUTIVE SUMMARY	vi
AB	BREVIATIONS	xi
LIS	ST OF FIGURES	xvii
LIS	ST OF APPENDICES	viii
CH/	IAPTER ONE	1
1.	INTRODUCTION	1
1.1	Background Information	1
1.2	Rationale for Establishment of the Bee Products Processing Industries	4
1.3	Objectives	6
1.4	Limitation of the Report	6
1.5	Organization of the Report	7
СН	IAPTER TWO	8
2.	METHODOLOGY	8
21	Study Area	8

2.1 Study Area	8
2.2 Implementation design	.8
2.3 Data collection	.9
2.3.1 Desk – work	.9
2.3.2 Literature Review	9
2.3.3 Interviews	.9
2.3.4 Field observations	11

CH/	APTER THREE	15
3. RAW MATERIAL PRODUCTION, DISTRIBUTION CHANNELS, MAR		
	AND MARKET REQUIREMENTS	15
3.1	Overview of the Chapter	15

3.2. Overview of Honeybee Products Production	16
3.2.1. Statistics for Honeybee Products Production (Global, Regional and	
National)	16
3.2.2.Beekeeping Production Area in Tanzania	19
3.2.3.Size, Location and Ownership of Beekeeping Production Area	20
3.2.4.Beekeeping Calendar	22
3.2.5.Type and Number of Beehives used in Tanzania	24
3.3. Market Situation of Bee Products	25
3.3.1. Global Market (price, demand, type of products, level of processing)	25
3.3.2.Honey Quality requirement at Global markets	25
3.3.2.1. General Food and safety requirement	26
3.3.2.2. Honey quality standards and labelling	26
3.3.3.Tanzania export of Honey and Beeswax	27
3.3.4. Availability of local and regional market for honey and beeswax	28
3.3.5.Opportunity for Beekeeping Up scaling	29

CHA	CHAPTER FOUR		
4.	REQUIREMENTS FOR ESTABLISHMENT OF BEE PRODUCTS PROCESSIN INDUSTRIES	G . 31	
4.1	Land for Industrial Establishment in the proposed Regions	31	
4.2	Status of Beekeeping Cooperative Societies and Collection Centers	. 32	
<mark>4.2</mark> .1	Beekeeping Cooperative Societies	. 32	
4.2.2	2 Current Status of existing Beekeepers Cooperative Societies in visited		
	areas	.34	
4.2.3	3 Current Status of existing Beekeepers Groups	. 36	
4.2.4	4 Current Status of existing Savings and Credit Cooperative Society		
	(SACCOS)	. 36	
<mark>4.</mark> 2.!	5 Honey collection Centers	. 37	
4.3	Situation of existing Bee Products Processing industries	. 39	
4. <mark>3.</mark> 1	Size, Location, Ownership and Operation Management of Industries	. 39	
4.3.2	2 Sources of Raw Materials, Type of Plant and Machinery	.44	

СНА	HAPTER FIVE	
5.	TECHNOLOGIES AND COSTS FOR INDUSTRIES ESTABLISHMENT	48
5.1	Type of Machineries	.48
5.2	Bee product processing Industry Layouts	.50
5.3	Human Resource Requirement	51
5.4	Cost Benefit Analysis (CBA)	. 52
5 <mark>.4.1</mark>	Net Present Value (NPV)	<mark>. 5</mark> 2
5.4.2	2 Benefit Cost Ratio (BCR)	.54
5.4.	3 Assumptions for conducting CBA	. 55
5.5	Cost Analysis	. 61
5.6	Financial Evaluation	. 62
<mark>5.6</mark> .1	Profitability	. 62
5.6 .2	2 Net Present Value	. 62
5.6.	3 Financial Ratios and Break-even analysis	. 63
5.6.4	4 Payback Period	.64

CHA	PTER SIX	.65
6.	CONCLUSION AND RECOMMENDATIONS	.65
6.1	CONCLUSION	. 65
6.2	RECOMMENDATIONS	. 67
6.2.1	Proposed Selected Sites for establishment of Bee Products Processing	
	Industries	. 67
6.2.2	2 Size and estimated Cost of proposed Bee Product Processing Industries	.68
6.2.	<mark>3 Mode o</mark> f Ownership, Supervision and Operation of proposed Bee Produc	t
	Processing Industries	.70
6.2.4	4 Improvement of Honey Production	71
6.2.	5 Strengthening Honey Collection Center	. 72
6.2.	6. Strengthening Existing Bee Product Industries	. 72
6.3	Time line of actions	. 72
APF	PENDICES	.74

LIST OF TABLES

Table 1: Selection criteria of the visit	ted Regions12
Table 2: Districts visited and category	of stakeholders held meeting with13
Table 3: Global Honey Producing Count	ries 201717
Table 4: Global Beeswax Producing Cou	untries in the World 201717
Table 5: SADC Region Honey and Bees	wax Producing Countries 201718
Table 6: Honey production potential Tanzania	s and actual production in selected districts in
Table 7: The status of Beekeeping A districts	reas, Size, Ownership and Location of selected
Table 8: Tanzania Honey and Beeswax	Calendar 23
Table 9: Number and type of beehives	in visited Regions24
Table 10: Demarcated Land for Industr	ial Development in Selected Regions
Table 11: Overview of the Beekeepers'	Associations and Cooperatives in Tanzania 33
Table 12: Existing Beekeeping Coopera	tive Societies in Region Visited
Table 13: Status of Existing Collection	Centers in the visited Region
Table 14: Categories of Industries in Ta	nzania40
Table 15: Numbers of Bee Products Pro Size and State of Operation	ocessing and Packaging Industries: By Region,
Table 16: Ownership Status of existing Industries	Bee Products Processing and Packaging
Table 17: Pros and Cons of each type or Processing and Packaging Ind	f ownership of the existing Bee Products
Table 18: Scenario of building, Managinindustries	ng and Running Bee Products Processing
Table 19: Summary of Key Issues for Es Industries	stablishment and Operation of Existing
Table 20: Equipment Needed for a Ful	ly-Fledged Bee Product Processing Industry49

Table 21: Estimated Staffing Costs in TZS	52
Table 22: Annual Production Program (Kgs)	57
Table 23: Estimated Machinery Costs in TZS	59
Table 24: Estimated Annual Power Requirement, KWh	60
Table 25: Estimated Total Investment in TZS	61
Table 26: Annual Production Costs at Full Capacity, TZS Million	62
Table 27: CBA at full capacity honey and wax as bee products processed	63
Table 28: Return on Sales Ratio and Breakeven Sales Value	64
Table 29: Site Ranking in regions visited	68
Table 30: Size and estimated Cost of proposed Bee Products Processing Industries	69
Table 31: Proposed Ownership, Supervision and Operation of proposed Bee Products Processing Industries	70

LIST OF FIGURES

Figu	ure 1: Trend of Honey and Beeswax Production (tons) in Tanzania for the	
	period of 2013-2017. Source: FAOSTAT, 2019	18
Figu	ure 2: Trend of honey and Beeswax export from Tanzania from 2004/5 to 2018/19	. 28
Figu	ure 3: Sample Layout of a Processing Building and Compound	. 50
Figu	ure 4: Processing and Packing equipment layout	51

LIST OF APPENDICES

Appendix 1:	DODOSO: TAARIFA KUTOKA KWA WAKALA NA MAMLAKA ZA USIMAMIZI	74
Appendix 2:	DODOSO LA WAFANYABIASHARA	82
Appendix 3:	DODOSO LA WENYE VIWANDA	85
Appendix 4:	DODOSO: TAARIFA ZA WAFUGAJI NYUKI NA USHIRIKA	89
Appendix 5:	ANNUAL PRODUCTION COSTS AT FULL CAPACITY, HONEY AND BEESWAX PROCESSED, MICRO '000'000	.91
Appendix 6:	ANNUAL PRODUCTION COSTS AT FULL CAPACITY, HONEY AND WAX AS PROCESSED, SMALL '000'000	. 92
Appendix 7:	ANNUAL PRODUCTION COSTS AT FULL CAPACITY, HONEY AND BEESWAX PROCESSED, MEDIUM '000'000	. 93
Appendix 8:	ANNUAL PRODUCTION COSTS AT FULL CAPACITY, HONEY AND BEESWAX PROCESSED, LARGE '000'000	. 94
Appendix 9:	INCOME STATEMENTS '000, MICRO INDUSTRY	94
Appendix 10:	INCOME STATEMENTS '000'000, SMALL INDUSTRY	95
Appendix 11:	INCOME STATEMENTS '000'000, MEDIUM INDUSTRY	95
Appendix 12:	INCOME STATEMENTS '000'000, LARGE INDUSTRY	96
Appendix 13:	INCOME FLOW, MICRO INDUSTRY	96
Appendix 14:	INCOME FLOW, SMALL INDUSTRY	97
Appendix 15:	INCOME FLOW, MEDIUM INDUSTRY	98
Appendix 16:	INCOME FLOW, LARGE INDUSTRY	99
Appendix 17:	COST BENEFIT ANALYSIS OF A MICRO INDUSTRY (NPV APPROACH), 000'000	100
Appendix 18:	COST BENEFIT ANALYSIS OF A SMALL INDUSTRY (NPV APPROACH) 000'000	.101
Appendix 19:	COST BENEFIT ANALYSIS OF A MEDIUM INDUSTRY (NPV APPROACH),	102
Appendix 20:	COST BENEFIT ANALYSIS OF A LARGE INDUSTRY (NPV APPROACH), 000'000	103

Appendix 21:	CBA AT FULL CAPACITY HONEY AND WAX AS BEE PRODUCTS PROCESSED	104
Appendix 22:	CBA AT FULL CAPACITY HONEY AS THE ONLY BEE PRODUCTS PROCESSED	104
Appendix 23:	CBA AT HALF CAPACITY HONEY AND WAX AS BEE PRODUCTS PROCESSED	104
Appendix 24:	CBA AT HALF CAPACITY HONEY AS THE ONLY BEE PRODUCTS PROCESSED	104
Appendix 25:	WORKING CAPITAL MICRO INDUSTRY, '000	.105
Appendix 26:	WORKING CAPITAL SMALL INDUSTRY, '000'000	.106
Appendix 27:	WORKING CAPITAL MEDIUM INDUSTRY, '000'000	.107
Appendix 28:	WORKING CAPITAL LARGE INDUSTRY, '000'000	.108

CHAPTER ONE

1. INTRODUCTION

1.1 Background Information

Beekeeping in Tanzania plays an important role in socio-economic development of both rural and urban people because it directly contributes to their income. Beekeeping is a source of food and raw materials for cosmetics, food and pharmaceutical industries, textile industries to mention just a few. It also contributes to environmental conservation as it extracts resources economically and valuably while leaving the forests structurally and functionally intact¹. Honey bee pollination contributes to existence and diversification of plants through provisioning of pollination services. Beekeeping is thus a viable income generating activity that is friendly to the environment. Through pollination beekeeping contributes to agricultural productivity because of their ability to visit one plant amass at one time.

Tanzania has favourable climatic conditions with varying potentials for making beekeeping an enterprise to support livelihood and income generation. Tanzania has five distinctive plant geographical regions, recognisable by their species composition (Phytochorion) namely Afromontane Archipelago-like zone, Lake Victoria region mosaic, Swahilian regional centre of endemism, Somali-Masai Centre of endemism and Zambesian center of endemism. Each of this is made up of different plant communities with varying level of species endemism. For example, Swahilian regional centre of endemism phytochorion has eight communities and 40 percent of the flowering plants are endemic. The Somali-Masai center of endemism phytochorion on the other hand is made up of six vegetation communities namely; Acacia -Commiphora deciduous bushland and thicket with several species including Acacia mellifera, Acacia-Commiphora deciduous wooded grassland, Combretum - Terminalia secondary wooded grassland, Evergreen forests on narrow or discontinuous riverine forest, Scrub Forest community and Masai Riparian Forest. About 10 percent of flowering plant in the latter phytochorion are endemic. These are raw materials for production of

Nepstad DC, Schwartzman S (1992) Non-timber products from tropical forests: evaluation of a conservation and development strategy. Advances in Economic Botany, vol 9. New York Botanical Garden, New York, NY

diverse type of honey brands because what characterizes honey is mainly its floral origin.

In total, Tanzania has 48.1 million hectares of forests and woodlands that are ideal for beekeeping. Additionally, beekeeping in Tanzania is mainly done in protected areas that are forest reserves and game reserves. Protected areas do not allow other human activities making the honey produced in such areas likely to qualify for organic certification. Based on structure of the vegetation Tanzania has six ecological zone which mostly fit in the six phytochoria each represent one of the ecological zones i.e. Coastal forest, Afromontane Forests, *Brachystegia –Julbernadia* wood Acacia- Savanah and grassland and Acacia *Comiphora thornbush*. The latter two fall in one phytochoria namely the Somali-Masai Centre of endemism.

It is estimated that Tanzania has about 9.2 million honeybee colonies whose production potential is about 138,000 tons of honey and 9,200 tons of beeswax per annum. Beekeeping is practiced in all regions in Tanzania and the sector employs around two million people at different stages along the value chain.

Globally and regionally Tanzania is an active member of different organizations such as African Beekeeping Platform and Apimondia to mention but a few. Forest and Beekeeping Division (FBD), Tanzania Forest Services (TFS) Agency and other beekeepers attend local and global events organized by these organizations. There is also a well-established link between the government and stakeholders in beekeeping sub-sector at local level. National Beekeeping policy was established in 1998 followed by the Act no 15 of 2002 and regulations. Also, several Government Notes (GNs) have been enacted to guide beekeeping in the country.

Tanzania has institutions responsible for beekeeping training and research. On the other hand, beekeeping is practiced in forest reserves, bee reserves, game reserves, game-controlled areas and public land. These areas and proper Management of bee and bee fodder resources for sustainable socio-economic development and enhanced environmental conservation indicates that there is conducive environment for beekeeping in Tanzania probably than other many countries. However, the contribution of the sector to the national economy is still low. Several reasons explain the situation; One of the constrains that have been identified to hinder beekeeping development in Tanzania is lack of adequate and appropriate processing and storage facilities for bee products. The latter, is reason for limited export of honey to Europe and the United States of America (USA) because proper processing equipment and technology are basic conditions for production of quality products.

Also, there is a problem of maintaining quality of products, marketability and predictability of products especially where export is the targeted market. The solution to this problem was proposed in the Commercial Beekeeping Strategy of 2018 which requires Tanzania to build appropriate honey and beeswax processing facilities. The proposal made in the Tanzania Commercial Strategy of 2018 reflects Tanzania Vision 2025 which envisages that by 2025 Tanzania will be a semi-industrialized country led by modernized and highly productive agricultural activities which are effectively integrated and supported by supportive industrial and service activities in the rural and urban areas. The Ministry of Natural Resources and Tourism (MNRT) has the responsibility of conserving natural and cultural resources as well as development of tourism. Nevertheless, the Ministry also has obligation to contribute to the realization of the national Vision.

In strengthening the beekeeping sub-sector, the MNRT in its capacity proposed to establish bee products processing industries initially in 10 regions that are known to have the highest beekeeping potential in Tanzania. These regions are Tabora, Kigoma, Katavi, Shinyanga, Geita, Kagera, Rukwa, Songwe, Mbeya, and Singida which if put together produces over 70% of all honey and beeswax produced in Tanzania. Improving beekeeping in these regions is anticipated to bring positive changes to all actors along the value chain. Since proper processing of honey and beeswax ensures maintenance of good quality of products, establishing bee products processing industries is expected to upgrade marketing of bee products from Tanzania which reciprocally increase production of bee products.

This report provides technical inputs required, capacity, cost and benefit analysis for and recommendations of the number, size and location for constructing bee products processing and packing industries. In addition, the report also recommends where and how the proposed industries will be constructed, owned, managed and operated.

1.2 Rationale for Establishment of the Bee Product Processing Industries

In Tanzania the main honey processing methods are pressing, straining and in some instances boiling. Some of these technologies not only compromise the quality of honey but may affect safety too. Honey that fails quality standards and safety requirements cannot be exported to some markets like the European Union which have stringed legislation on food and food products. In addition, it has been established several times that businessmen in Tanzania secure markets of honey in Europe. However, beekeepers have always not been able to supply honey of same quality but also, they have not been able to collect the required amount because of inadequate established place where honey is processed in bulk with both quality and quantity ensured. Quality of products can also be affected by type of processing equipment used. Honey is mainly used as food thus must be processed and stored in food grade facilities however such facilities are missing or limited in many honey producing areas.

In fact, data available suggest that about 90 percent of bee and honey bee product processing in Tanzania is done by traditional beekeepers that mostly use less improved technology and facilities. The bottom line however is that products produced must after processing exhibit quality characteristics that meet the consumers' needs. On the other hand, under globalized market are secured through competition. A system of quality control that can be enforced and assurance of products in bulk is mandatory. It includes for example, compliance with sanitary standards, food safety standards, the Good Manufacturing Practices (GMP) and the system of Hazard Analysis and Critical Control Points (HACCP). The integrity and safety of any food products is ensured through the identification and assessment of all units of operations throughout the process length which prevents potential contamination and adulteration that could expose consumers to health risks. It is difficult to use or enforce such a system in current honey processing state in Tanzania.

The involvement of stakeholders in conservation and promotion of natural products is among the strategies to ensure sustainable development. Some interventions have been undertaken in beekeeping sub-sector that range from improving production technology, micro-processing to marketing of products.

Specifically, MNRT have provided top bar hives to communities adjacent to protected areas, have built capacity and facilitate beekeepers and bee products dealers exhibit their produces during Dar es Salaam International Trade Fair (DITF) (*Saba Saba*), Farmers'' day (*Nane nane*), SIDO show, the East Africa International Trade Exhibition (EAITE) (Jua Kali), Urithi Festival, and other international events. However, majority of visitors to these exhibitions were observed to seek for quality products, origin of the products and some wanted a bulk supply that was a challenge for exhibitors to meet the demand. In addition, buyers participated to international event organised by International Federation of Beekeepers – Apimondia were interested with Tanzania honey and quantity demanded has not been met. The buyers from Europe, America and Asia have requirements to be met before entering in the contract to supply, and this is still a challenge for the Tanzania bee products exporters because of inconsistency in quality and quantity supplied.

Establishment of bee products processing and packing industries will facilitate to tackle existing methodological and technological gaps to improve her beekeeping industry that goes from production, through processing to marketing especially in regions of higher beekeeping potential. The outcome will likely be far reaching that includes not only improved quality, quantity and marketing of bee products but may induce new entrants in the industry especially youth who seem to doubt the profitability of beekeeping. This may also encourage beekeepers to organise themselves into cooperatives, improve consistency in quantity and quality and may encourage investors and buyer's business relationship, and most importantly promote domestic and international trade. Thus, the government move towards establish bee products processing plants and ensure that they are operational cannot be overemphasized.

The priority regions are significantly known to produce honey and beeswax that are traded in other parts of the countries especially in cities and towns where there are registered dealers of bee products. In addition, the industries will support improvement of quality, processing and packing to attract niche markets and allow fair competition that will help beekeepers on fair price.

1.3 Objectives

The overall objective of the assignment was to undertake a quick assessment that will enable MNRT make informed decision on the viability of establishing bee products processing and packing industries that will in turn contribute to improved productivity, quality, value addition and marketing of bee products. Specifically, the Task Force was assigned to:

- a) Identify place, location and situation of existing honey processing industries in Tanzania;
- b) Identify size, place and location where the new industries will be established;
- Identify the best approach that would be employed in collecting raw materials from beekeepers to the proposed industry;
- d) Recommend place and location to construct new honey collection centres;
- e) Identify type of machinery/equipment and their related costs for a micro, small, medium and large sized industries;
- f) Identify construction costs for micro, small, medium and large sized industries;
- g) Assess the existing situation of beekeeping Cooperative societies in Tanzania;
- h) Undertake Cost and Benefit Analysis of the proposed industries;
- Recommend the best approach to construct, supervise and operate the proposed industries taking into account the PPP agenda; and
- j) Undertake any other issues that may seem necessary in the establishment of the new industries.

1.4 Limitation of the Report

This report is produced based on a quick assessment due to limited time and financial resources. The team thus selected only five of the intended regions in which up to three districts were visited. As often expected, stakeholders do not provide all information especially those related to income so we relied and verified the data with information documented in literature. It was also not possible to visit beekeeping areas in each district visited. Nevertheless, the assumptions used in making the cost benefit analysis, the criteria used to select places for building of industries, managing and running, the size of industry to be built and the capital investment required may be adopted with minor modification if government wants to build the same in other regions not visited.

1.5 Organization of the Report

This report covers the introduction as Chapter One followed by Methodology in Chapter Two. Raw Material Production, Distribution Channels and Market are explained in Chapter Three while the Requirement for establishment of bee products processing industries is in Chapter Four. Chapter Five explains the Technology and Cost for Industrial Establishment and Chapter Six provides Recommendation and the way forward.

CHAPTER TWO

2. METHODOLOGY

This chapter presents the methods used to gather information as per given Terms of References (TOR's). Three methods that are Literature review, Interviews and Field observation were used.

2.1 Study Area

This study was implemented in five regions namely Tabora, Geita, Katavi, Singida and Kigoma.

2.2 Implementation Design

This assignment was implemented in accordance with an approved work plan. The work plan entailed:

- Preparation of work plan and review of ToR;
- ii. Desk work
 - Development of data collection tools;

Box 1: Key Issues in Chapter 2:

- i. Three approaches were used for data collection namely Literature Review, Interviews and Field observations.
- ii. Given the limited time and financial resources, the team visited only 5 out of the 10 proposed regions. Regions that met the selection criteria were Tabora, Geita, Katavi, Singida and Kigoma.
- iii. The criteria used for selection of regions for visiting were availability of beekeepers' cooperatives, potential of beekeeping, presence of collection centers and availability of data.
- iv. The Task Force interviewed LGA officials, businessmen and businesswomen, owners of existing industries, beekeepers, beekeeping cooperative societies and groups, regulatory authorities and selected key informants.
- Collection and review of key literature, and
- Preliminary data analysis.
- iii. Consultation: Consulting key stakeholders;
- iv. Fieldwork: visiting selected regions for the purpose of triangulating preliminary information based on consultation with key informants and secondary data.
- v. Detailed data analysis, report preparation and submission

8

2.3 Data collection

2.3.1 Desk -work

For the purpose of this assignment published and unpublished literature were collected from various sources and analysed.

2.3.2 Literature Review

The Task Force reviewed several documents that can be divided into six groups:

- Honey processing technology, related equipment and prices; i.
- ii. Beekeeping honey processing plant layout;
- iii. Requirements for establishment of bee processing facility;
- iv. Facility ownership management and operation options;
- v. Cooperatives and operation procedure; and
- vi. Infrastructure requirement.

The information was obtained from published work, gray literature, equipment's producers' websites, equipment manufacturers catalogues, Tanzania Bureau of Standard (TBS), construction cost estimates established by Architects and Quantity Surveyors Registration Board (AQRB), and Regional Economic Profiles and Investment Opportunities.

2.3.3 Interviews

The Task Force conducted interview to various stakeholders and key informants using a pre-prepared specific check list with key issues as elaborated below;

a) District Management

District management team included the following officers; Planning officer, District Beekeeping Officer, Beekeeping Officer under Tanzania Forest Services (TFS) Agency, Land Officer, District Natural Resources Officer, Natural Resources and Environment Officer, District Forest Officer, District Tanzania Electrical Supplies Company (TANESCO) Manager, District Community Development Officer, District Cooperative Officer, District Tanzania Rural Roads Agency (TARURA) Manager, Game Officer under Tanzania Wildlife Management Authority (TAWA) and District Trade Officer (**Appendix 1**).

Key issues were: Preparedness of district to participate in industrial development beekeeping industries, policy of the 5th government, availability of areas for keeping bees, raw materials, presence of land designated for industries establishment, related infrastructure and utilities as well as status of existing bee processing industries in the district, size and whether effectively working, working below capacity or dormant.

b) Businessmen

Small- and large-scale businessmen and businesswomen were interviewed from various visited areas (**Appendix 2**).

Key issues were: Source of raw materials, availability, quality and amount of bee products (honey and beeswax) bought per year, means of collection, local, regional or global markets and their sizes, buying and selling prices and storage.

c) Industries owners

Key issues were: Reason of establishing industry, ownership, status (working or dormant), source of raw materials, their quantity and quality, existence of infrastructure, utilities, requirements and related costs, means of collection of raw materials, existence and use of collection centers, local or foreign competitors, size of industry (small, medium or large) and source of capital (**Appendix 3**).

d) Beekeeping Cooperatives, Beekeeping groups and Beekeepers

Key issues were: Presence of areas designated for beekeeping, ownership (public or protected) of the area and size, existence use, collection centers, existence of market of bee products, prices, existence of beekeeping cooperative and their strength and whether they are running or not, if not

reasons and or challenges and existence of beekeeping processing plant(s) in the area and its ownership (**Appendix 4**).

e) Agency and Regulatory Authorities

Key issues were: Preparedness to support beekeeping processing industries, status of local, regional and international trade of beekeeping products. All groups were asked their opinion on whether or not government should support the construction of beekeeping processing industries, issues related to ownership management and running whether Government, Public Private Partnership (PPP) and Cooperatives or special purpose company.

f) Experienced Stakeholders and other Government Institutions

The Task Force held discussions with the former Prime Minister Hon. Mizengo Kayanza Peter Pinda on the plan of the government to support the construction bee products processing industries in Tanzania and its ownership and management. Also, Moshi University College of Cooperatives Dodoma centre was consulted on the issue of status of Cooperatives in Tanzania, advantages of Savings and Credit Co-Operative Society (SACCOS), need for training of Cooperative Leaders, modes of beekeeping processing industries ownership that includes Cooperatives and Private sector with different modes. Furthermore, the team held discussions with officers from several other Government Institutions including Beekeeping Training Institute - Tabora, Small Industries Development Organization – Head Quarter (SIDO –HQ), Tanzania Bureau of Standards (TBS), Tan-trade, Tanzania Forest Service (TFS) Agency headquarter and other stakeholders like Coordinator of Association for the Development of Protected Areas (ADAP).

2.3.4 Field observations

The priority of the government is to support construction of bee processing and packing industries in 10 regions which are Geita, Kagera, Katavi, Kigoma, Mbeya, Tabora, Shinyanga, Singida, Rukwa and Songwe. However, due to time and financial resource limitations, the Fask Force decided to select five (5) out 10 regions to visit. Four criteria were used during the selection and only those that scored the highest were selected (Table 1). The selected regions were Tabora, Geita, Katavi Singida and Kigoma. However, the Task Force did not visit Kigoma region due to already presence of recent report with most of the information required.

Region	Cooper- ative (s)	Opportu- nity	Collec- tion center	Exist- ence of data	Total Score	Select	Ranking
Kigoma	1	1	1	1	4	No	Highly ranked but recently visited by similar team
Kagera	0	1	0	0	1	No	Limited opportunity
Tabora	1	1	1	1	4	Yes	Highly ranked
Shinyanga	0	1	1	0	2	No	Existence of industry
Geita	1	1	0	1	3	Yes	Highly ranked
Katavi	1	1	1	1	4	Yes	Highly ranked
Rukwa	0	1	0	0	1	No	Low ranked
Mbeya	0	1	0	0	1	No	Low ranked
Songwe	0	1	0	0	1	No	Low ranked
Singida	1	1	1	0	3	Yes	Highly ranked
Dodoma	0	1	1	0	2	Yes	Scored low, but key stakeholders are found in this region

Table 1: Selection Criteria of the visited Regions

In addition, the team purposefully visited Dodoma, Pwani and Dar es Salaam region due to existence of bee product processing industries, bee products dealers and Government Regulatory Authorities. Table 2 presents the selected regions and stakeholders visited. The team managed to visit honeybee processing and packaging industries and in each observed types of processing facilities used and capacities, layout of equipment, products produced, packaging materials and premises.

Table 2: Districts visited and category of stakeholders held meeting with

S/N	Region	Visited Districts	Groups visited
1.	Tabora	Tabora Municipality	 Tabora Municipality Management team Beekeepers dealers Caritas board at Kipalapala Honey Processing industry Tabora Beekeeping Training Institute TFS Western Zone
		Sikonge District Council	 Sikonge District Council Management team Mlogolo Honey Collection Centre managed by Tanzania Beekeepers Cooperative Union (TABECU) Ipole Wildlife Management Areas (WMA) management team (Community Based Organizations (CBO)) (own 2 collection centres) Beekeepers from four villages and Dealers at Lugula Kitunda
			ADAP management, Kitunda
2.	Singida	Singida Municipality	 Singida Municipality management team SIDO Singida Youth Entrepreneurs and Consultancy Cooperative Society (SYECCOS) honey Processing Factory
		Manyoni District Councils	 TFS Manyoni Processing plant Manyoni District Management team Four Beekeeping groups Singida Pural District Council Management Team
		District Councils	
3.	Shinyanga	Kahama District Councils	AfriLife Beekeeping Processing Factory
		Ushetu District councils	 Ushetu District Council Management Team Four Beekeepers groups
4.	Geita	Bukombe District Council	 Bukombe District Council Management Team Beekeepers groups Beekeeping Products Dealers
5.	Katavi	Mlele District Council	 Mlele District Council Management team Mlele Vijana SACCOS Honey processing factory management team Inyonga Beekeepers Association Management team

S/N	Region	Visited Districts	Groups visited
6.	Dodoma	Dodoma Municipality	 Pinda Honey Processing Plant Central Park Honey Processing Plant Management Igembensabo Honey processing factory Moshi University of Cooperative Dodoma branch Tanzania Beekeeping Development Organisation (TABEDO)
7.	Coast	Kibaha District Council	Honey King Honey Processing Industry
8.	Dar es Salaam	Ilala Municipality	 Fida Hussein Honey and Beeswax processing plants Miyombo Honey Processing Plant SIDO TBS anTrade TFS Honey King LTD

Findings of the study are presented in chapters 3, 4 and 5. In each chapter, detailed analysis and interpretation is made. Findings provides data on raw material productions, channels of distribution, market and market requirement through requirements for establishment of beekeeping processing industries to technology and cost for industry establishment.

CHAPTER THREE

3. RAW MATERIAL PRODUCTION, DISTRIBUTION CHANNELS, MARKETS AND MARKET REQUIREMENTS

3.1 Overview of the Chapter

For establishment of sustainable industries, one needs to ascertain availability of raw materials, final products distribution, marketing channels, type of existing and future technology and human resources for managing all the chain of production. In this chapter the status of honey and beeswax production, production technology, distribution channels, demand and supply at local, regional and global levels, market requirements and opportunity of up-scaling of honeybee and beeswax are well explained.

Box 2: Key Issues in Chapter 3:

- i. The world demand for honey is expected to increase over the next four decades on account of increased population and shift in consumer demand towards organic and healthy related products.
- ii. Tanzania ranks 11th and 7th largest producer for honey and beeswax respectively and is leading for the two products among SADC Countries.
- iii. Mpanda and Manyoni districts have the highest potential of honey production in Tanzania (8,000 tons) but the actual production is 500 and 600 tons respectively while Sikonge district lead in Tanzania with actual production of 2,000 tons per annum.
- *iv.* The currently production of 93,070 tons of honey is only a third of Tanzania approximately 138,000 tons of honey per annum potential.
- v. Tanzania has set aside and is managing 506 forest reserves for beekeeping where 69,613 ha are under protection as National Bee Reserves by TFS.
- vi. The beekeeping calendar show that for most regions beekeepers engage in major harvesting between May to August. This is then the appropriate time for industries to collect raw materials.
- vii. On average mostly used traditional beehives produces 7 kg of honey while box hives produce up to 12 kg hence a need for promoting box beehives.

3.2. Overview of Honeybee Products Production

3.2.1. Statistics for Honeybee Products Production (Global, Regional and National)

The global production of bee products especially honey and beeswax are increasing over the years due to increased demand of honey in particular. The increase in demand is attributed to two reasons; first worldwide increase of human population and second preferences of majority consumers towards natural and healthier products. The world demand for honey is expected to increase over the next four decades to match the world's population which is forecasted to increase by 2 billion people and exceed 9 billion people by 2050¹. Also, the trend of consumers shifting towards organic and healthier products is expected to continue rising due to new variants and flavored honey-based food products such as baby products, yogurts and drinks. Moreover; honey contains antioxidants, minerals, vitamins and proteins making itself an appealing ingredient as compared to artificial sweeteners².

The world total honey production is estimated to be 1.3 million tons a year³. According to FAOSTAT (2019) in 2017, the larger honey producing countries are China followed by Turkey, Russia, Mexico, USA, India, Iran, Ukraine and Ethiopia. Developing countries produce about 47 percent of the total world's honey production. Tanzania is 11th largest producer (Table 3).

The World's largest producer of beeswax is Ethiopia followed with Argentina, Turkey, Korea Republic, Kenya and Angola. With the production of 1,843 tons per annum, Tanzania is the 7th largest bees wax producer. Table 4 shows the World's top twelve beeswax producers. The position of Tanzania on sales of beeswax can however be debated because honey sold to neighboring countries is sold as unprocessed honey (crude honey).

¹ UN(2017). World Population Prospects: The 2017 Revision

² ITC (2014). TANZANIA: Honey Sector Synthesis Report & Development Road Map, December

³ Teklu G, and Dinku N, **(2016)** Honeybee production system, challenges and opportunities in selected districts of Gedeo zone, southern nation, nationalities and peoples regional state, Ethiopia
	Country	2017 (Tons)	% contribution of production
1.	China	551,476	47
2.	Turkey	114,471	10
3.	Russia	65,678	6
4.	Mexico	51,066	4
5.	USA	66,968	6
6.	India	64,981	6
7.	Iran	69,699	6
8.	Ukraine	66,231	6
9.	Ethiopia	50,000	4
10.	Canada	39,180	3
11.	Tanzania	30,393	3

Table 3: Global Honey Leading Producing Countries 2017

Source: FAOSTAT, 2019. FAO Statistical Database

	Country	2017 (Tons)	% of total Production				
1.	Ethiopia	5,626	17				
2.	Argentina	4,942	15				
З.	Turkey	4,393	13				
4.	Korea Republic	3,449	10				
5.	Kenya	2,503	8				
6.	Angola	2,307	7				
7.	Tanzania	1,843	6				
8.	Brazil	1,762	5				
9.	Mexico	1,618	5				
10.	USA	1,611	5				
11.	Spain	1,519	5				
12.	Uganda	1,313	4				

Table 4: Global Beeswax Producing Countries in the World 2017

Source: FAOSTAT (2019). FAO Statistical Database

There is a limited information on production of honey and beeswax in SADC countries. Having no data implies that many SADC member countries do not collect data on the production of honey, or that the contribution of the sector to the countries is yet to be recognized. According to FAO, Tanzania produced about 30,393 tons of honey in 2017 which made it the leading country in the SADC region followed by Angola, Madagascar, South Africa, Zambia and Mozambique (Table 5).

	-		
	Country	Honey (Tons)	Beeswax (Tons)
1.	Tanzania	30,393	1,843
2.	Angola	23,439	2,307
3.	Madagascar	4,000	414
4.	South Africa	1,088	0
5.	Zambia	815	32
6.	Mozambique	595	86

Table 5: SADC Region Honey and Beeswax Producing Countries 2017

Source: FAOSTAT, 2019. FAO Statistical Database

The statistics on Tables 3, 4 and 5 however do not reflect the Tanzania potential of producing 138,000 tons of honey and 9,200 tons of beeswax each year. It is evident that Tanzania can become the leading country in honey and beeswax production in the region and among the best globally if the existing potential is tapped. Figure 1 indicates the non-appreciable increase trend of production of honey and beeswax in Tanzania between 2013 and 2017.



Figure 1: Trend of Honey and Beeswax Production (tons) in Tanzania for the period of 2013-2017. Source: FAOSTAT, 2019.

3.2.2. Beekeeping Production Area in Tanzania

Tanzania is endowed with a favorable environment for the production of honey, beeswax and other bee products. Tanzania has 48.1 million hectares that can be used for beekeeping. Out of these, 20.5 million hectares are unreserved forests and woodlands, while 13 million hectares of forest and woodland are forest reserves. Within the protected forest more than 70,917 hectares are of forest plantations and 115,500 hectares are mangrove forests which are habitats and source of fodder for honeybees. A larger proportion of these areas provide an opportunity to produce organic honey and beeswax as they are away from crop production thus away from source of agricultural pollution. In fact, due to its organic nature, Tanzanian honey is of high demand in Germany, Holland, England, Belgium and other countries in the world⁴.

The main beekeeping and honey production regions are Western zone (Tabora, Shinyanga, Rukwa and Kigoma), Southern Zone (Lindi, Mbeya, Iringa and Ruvuma), Central Zone (Singida and Dodoma), Eastern Zone (Morogoro, Dar es Salaam and Coast) and North Eastern Zone (Manyara, Arusha, Tanga and Kilimanjaro). Table 6 presents estimated potential and actual production of honey from important selected districts starting with districts with highest potential.

High producing area			Medium producing area			Un-exploited areas		
District	Po- tential (Tons)	Actual (tons)	District	Potential (tons)	Actual (tons)	District	Potential (tons)	Actual (tons)
Kahama	4,000	500	Kondoa	3,000	300	Lindi	8,000	50
Mpanda	8,000	1,500	Kiteto	2,000	250	Songea	6,000	50
Sikonge	<mark>6,0</mark> 00	2,000	Babati	1,200	150	Iringa	5,000	40
Urambo	6,000	1,400	Kibondo	4,000	250	Biharamulo	4,00 <mark>0</mark>	15
Nzega	4,000	400	Handeni	3,000	150	Kasulu	4,000	5
Tabora	5,000	1,200	Kigoma	3,000	100	Newala	4,000	15
Chunya	6,000	400	Arumeru	1,500	100	Tunduru	4,000	15
Manyoni	8,000	600	Rufiji	2,500	50	Singida	3,000	5
Bukombe	<mark>5,0</mark> 00	800	Nkasi	1,500	50	Hai	2,500	5
Total	52,000	7,800		21,700	1,400		40,000	180

Table 6: Honey production potentials and actual production in selected districts in Tanzania

Source: URT, 20015.

4 Match Maker Associates 2007. Honey value Chain in Tanzania. Traidcraft.

5 URT 2001. National Beekeeping Program. Ministry of Natural Resource and Tourism.

Mpanda and Manyoni districts have the highest potential of honey production in Tanzania (8,000 tons each) but the actual production is 1,500 and 600 tons respectively which is below Sikonge that has the potential of 6000 tons but actually produces 2,000 tons per annum. The nine (9) districts that are categorized as high producing districts if summed together has the potential of producing 52,000 tons of honey but produces only 7,800 per annum which is just 15% of their potential.

The nine (9) districts whose production potential is categorized as medium have an estimated annual production potential of 21,700 tons. In this group the leading district is Kibondo district (4,000 tons) followed by Kigoma and Handeni districts with a production potential of 3,000 tons each. The top producers in this category is Kondoa district (300 tons) followed by Kiteto and Kibondo at 250 tons each. These produce only 6.5% of their potential.

The nine districts categorized as having an un-exploited potential have the potential of producing 40,000 tons. However, the actual production in this category is only 180 tons. Lindi potential compares to Mpanda and Manyoni. Whereas Mpanda and Masnyoni produce 1,500 tons and 600 tons respectively, Lindi produces only 50 tons. Songea potential compares to Sikonge, and Urambo which produce 2000 tons and 1400 respectively but Songea produces only 50 tons. The potential of these 27 districts put together is approximately 113,700 tons per annum which is equivalent to 3 times the current actual production. *These data though may not exactly represent the current situation, serves to show that despite the existing potential in different districts the actual production is still far below expectations. Proposition of establishment of processing industries thus need to consider this as an important issue.*

3.2.3. Size, Location and Ownership of Beekeeping Production Area

Tanzania has set aside and is managing 506 forest reserves for beekeeping where 69,613 ha are under protection as National Bee Reserves by the Ministry of Natural Resources (MNRT) through Tanzania Forest Service (TFS) Agency . Beekeeping activities are performed under different land tenure statuses such as Open land, Village land, Game Reserve (GR), Bee reserve (BR), Forest Reserve (FR), Game Controlled Area (GCA) and Wildlife Management Areas (WMA) covering almost all the country except the National Parks and the urban areas.

The National Beekeeping Policy on the other hand encourages private ownership of apiaries and bee reserves. There are four types of bee reserves namely national bee reserves, private bee reserves, local government bee reserves and village bee reserves. Chapter four of the Beekeeping legislation (Beekeeping Act No. 15 of 2002) provides for the procedure of establishing bee reserves. In line with this Act, is the village land Act number 5 of 1999 which provides for community based natural resources management. The Act empowers the local community at village level through the village council to demarcate land for common use and/or natural resource management. Based on this, through village land use management system beekeepers can thus be allocated land for beekeeping development. In Tanzania beekeeping can be carried out by individuals, Community Based Organizations (CBOs), Non-Government Organizations (NGOs) and Government Institutions. Table 7 provides details on forest ownership and management rights and location of forests used by beekeepers in areas visited by the Task Force.

It is estimated that more than 50 percent of indigenous plants in Tanzania are bee fodder which are suitable for beekeeping which provide nectar, pollen, propolis or both. Honeybees also collect nectar and /or pollen from cultivated crops like sunflower, legume species, citrus species, sisal, coffee, avocado, banana and maize to mention but a few.

Region	District	Some of Potential Beekeeping Areas	Size of the area	Ownership	Location
KATAVI	MLELE	Mulele Hills	86,189	TFS	Mlele and Nsimbo District Council
		Nyahua Mbuga	672,000	TFS	
	SIKONGE	Inyonga East	142,000	TFS	Sikonge District
		Itulu Hill	384, 000	TFS	
		Iswangala	268,000	TFS	
		Ugunda	128,000	TFS	
TABORA		Ipembampazi	133,120	Sikonge DC	
		Walla	128,720	TFS	
		Sikonge	56, 320	TFS	
		Ugala Game Reserve	391,599	TAWA	Sikonge, Mlele and Urambo District
	UYUI	Uyui Kigwa Rubuga	133,632	TFS	Uyui Districts

 Table 7: The status of Beekeeping Areas, Size, Ownership and Location for selected districts

Region District		Some of Potential Beekeeping Areas	Size of the area	Ownership	Location	
		Magasai	627	Village		
		Makanda	554	Councils	Manyoni District	
		Mpola	591			
		Sasilo	820			
SINGIDA	MANYONI	Nkonko	900			
		Hika	404			
		Sukamahela	1,109			
		Londoni	3640			
		Agondi Bee Reserve	2700	TFS		
		Ushetu ubangwe	52,000	Ushetu DC	Ushetu DC	
SHINYANGA	USHETU	Usumbwa	36,000	Ushetu DC		
		Mpunze	38, 000			
KIGOMA, TABORA, GEITA & SHINYANGA		Moyowosi- Kigosi	1,300,000	TAWA	Kasulu, Kibondo, Kakonko, Bukombe, Mbogwe, Biharamulo, Ushetu, Kaliua and Ushirombo	
		Kahama	14,000	TFS	Kahama	
GEITA	BUKOMBE	Ushirombo	6,000	Dukomba		
GEINT	DOROMBE	Bukombe – 5,000		DC	Bukombe DC	

3.2.4. Beekeeping Calendar

A calendar for beekeeping is a time-table that indicates to the beekeepers when different beekeeping activities are to be performed and the approximate date and duration of the blossoming periods for the important honeybee forage in their area. Beekeeping calendar thus indicates the time of the year that is suitable for siting of hive, honey flow period and time of harvesting. A beekeeping calender is a beekeeper's planning tool with a series of beekeeping activities which give beekeeper opportunity to be involved in other economic activities in an orderly manner. Beekeeping calendar is not only useful to a beekeeper but it is also an important planning tool for extensionists. It enables them to plan extension messages intended for stakeholders along the beekeeping value chain. Beekeeping in any specific area cannot develop without an understanding of the calendar, and for migratory beekeeping, special calendars for the different foraging zones along the migration route are required.

Beekeeping in Tanzania, as in many other developing countries mainly is done by the "let alone method". This implies that beekeeper's site their hives and leave them unattended until the harvesting period. Beekeepers use various general or area specific indicators to determine when it is time to harvest. The commonly used indicators to determine the harvesting period are: i) When field crops such as millet start to ripen; ii) Rainy season ends and the dry season starts iii) Dead drone honeybees found at hive entrances (iii) The intensity of sound made by foraging bees decreases and (iv) The activity of foragers at the hive entrance significantly decreases or stops altogether.

However, these indicators are not perfect and sometimes where they have been used without proper investigation of ripening of honey, beekeepers have ended up harvesting unripen honey. Table 8 summarizes the beekeeping calendar in regions that the team visited.

Region	Aug - October	Nov – Dec	Jan – April	May – July
Tabora	Semi processing of honey, rendering	Honey flow and minor harvest, semi processing of honey	Minor harvest, inspection of hives	Major harvest, semi processing of honey,
Katavi	beeswax;	rendering bees wax	Honey flow	Tendering Dees wax
Kigoma	Hive preparation, siting and			
Shiyanga	swarming of bee Colonies			
Geita				
Singida	Hive preparation, siting and swarming of bee	Honey flow and minor harvest, semi processing of honey,	Harvest, semi processing of honey, rendering	Harvest, semi processing of honey, rendering bees wax;
Dodoma	Colonies	renuering bees wax	inspection of hives	inspection of fives

Table 8: Tanzania Honey and Beeswax Calendar

Therefore, the findings show that beekeepers in most regions do major harvesting between the months of May and August. This is also the period when honey is extracted and beeswax rendered. August to October is a preparatory time where beekeepers prepare new hives and do siting. New apiaries may be established within these months. November and December are minor harvesting periods whereas January to April beekeepers are expected to continue with normal colony inspection. Bee product dealers use this calendar to plan when to collect honey and beeswax for processing. Generally, the bee calendar is a planning tool even for the proposed beekeeping processing industries.

3.2.5. Type and Number of Beehives used in Tanzania

The number of Beekeepers in Tanzania is approximately 0.82 million owning a total of 1,506,345 traditional hives and 23,650 box hives. On average traditional beehives produces 7 kg of honey while box hives produce 12 kg of honey. Table 9 summarizes the number of hives in areas where the Task Forces visited.

	Location	Numbera	and Type of Beehives		
Region	District	Top bar (Box)	Local (log or bark hives)		
		Beehives			
Shinyanga	Ushetu	4,688	27, 011		
	Kahama	216	220		
Geita	Bukombe	2,193	169,575		
Katavi	Mlele	17,300	57,840		
Tabora	Municipal	2,601	3,633		
	Kaliua	577	26,889		
	Sikonge	10,545	84,137		
Singida	Municipal	1,425	1,257		
	Singida DC	2,527	10,155		
	Manyoni	930	5,683		
Kigoma	Kasulu	3,546	21,410		
	Kibondo	4,022	61,011		
	Kakonko	619	35,566		
Grand Total		51,189	477,376		

Table 9: Number and type of beehives in visited Regions

Source: Field observation

Based on data collected in the 13 visited districts, the larger number of hives used by beekeepers 477, 376 (90.3%) are traditional hives (log or bark hives) and only 9.6 percent are box hives. These findings indicate that, majority of beekeepers continue to use traditional technologies which have a relative low productivity compared to box hives. Much advocacy is needed in this area to attract beekeepers to adopt modern beekeeping methods.

3.3. Market Situation of Bee Products

3.3.1. Global Market (price, demand, type of products, level of processing)

The global market of natural honey reached USD 7,678 million in 2018 and is estimated that will generate around 10,336 million by 2025 at a compound annual gross rate of 4.8% between 2019 and 2025⁶. The use of honey in food and beverage is predicted to dominate the global market the reason being the increase of awareness of health benefit of honey that is energy source, immunity system builder and as a weight loss source compared to sugars and artificial sweeteners. Globally, China was the leading country holding up to 41.3% of world market share in 2018 followed by Turkey 6.9%, Russia 5%, Islamic Republic of Iran 5% and others 41 percent⁷. The largest importers in 2018 was European at USD 1.2 billion which is 52.3 percent of the global total, North America 23.8% and Asia 20 percent. This suggests that up to 50 percent of Europe's consumption of honey needs is met through honey imports. In 2015 the amount of honey imported by Europe amounted to 339,000 tons in 2015. Germany is the largest honey importer accounting to over 26 percent of honey that was imported and this is 26 percent of the total volume of European imports in 2015⁸. Other major importers in Europe are the UK (12%), France (10%), Spain (8%) and Poland (7%) of total European consumption. The whole sale price at world market between 2016 -2018 ranged from 2.3-3.9 USD/kg. The price of the honey depends on the certification of the origin. The market value of Organic honey which was at USD 500 in 2017, is expected to increase up to USD 910 million by 2023⁹. Organic honey fetches higher market value compared to conventional honey.

3.3.2. Honey Quality requirement at Global market

Honey exported to global market must meet market quality standards. For EU markets honey exported must comply with general food and safety regulations and honey quality standards and labeling.

⁶ www.globenewswire.com/news-release/2019/04/25/1809300/0/eng/Global-Honey-Markert-Reach-Will-USD10-336-Mill-By-2015-Zion-Research.html

⁷ www.statista.com

⁸ CBI 2009. Honey and other Bee products market in the EU. CBI market survey.

⁹ Shahbandeh, 2019 https://www.globenewswire.com/news-release.

3.3.2.1. General Food and safety requirement

Legislation of the European Union prohibits honey imported from countries that has not established systems for chemical residue monitoring and can effectively prevent honey exports which are not in compliance with European Union requirements. Tanzania has that system in place and is one of the countries that are listed in the third country list which is a list of countries allowed to export honey to Europe¹⁰. In addition to this qualification, EU requires honey exporting countries to observe food safety standards provided by European Union Food Legislation. EU Legislation for honey also require existence of traceability plan to allow backward and forward verification of information about the products throughout the entire supply chain and defining Hazard Analysis Critical Control Points (HACCP) which also performs hazard analysis. Tanzania has both honey traceability system and HACCP inspectors that have been trained. Section 20 (1) of the Beekeeping (General) Regulation require each dealer and all apiary products or bee products to be tested for compliance with the quality standards as per HACCP principles¹¹. There is also a requirement that each batch of honey to be accompanied by health certificate which in Tanzania is provided by Ministry of Livestock and Fisheries in collaboration Tanzania Forestry Services (TFS). That is to say Tanzania has the capability to implement procedures based on Hazard Analysis Critical Control Point (HACCP) principles. The EU has also has set Maximum Residue Levels (MRLs) for pesticides and for antibiotics in honey which sets the highest levels of antibiotics and pesticides Regulation (EC) 470/2009, Regulation 396/2005¹². In addition, adoption of the procedures for quality and safety products as per International Organization for Standardization (ISO): ISO 7001 and ISO 220000 is an advantage for increasing European market share. For any third county to be allowed to export honey to the EU it must also implement Critical Residue Monitoring Plan (CRMP). Tanzania meets all these requirements and thus can export honey to EU countries.

3.3.2.2. Honey quality standards and labelling

Honey will be accepted in EU only if it complies with directive (EC) 110/2001 which set European requirements for honey quality standards and labeling. EC 110/2001 set standard about Fructose and glucose content, Sucrose content, Moisture

10 CBI 2009. Honey and other Bee products market in the EU. CBI market survey

¹¹ URT 2005. The Beekeeping general regulations. Government Printers. Dar es Salaam.

¹² https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=celex%3A32005R0396.

content, Water-insoluble content, Electrical conductivity, Free acid, Diastase activity and hydroxyl-methyl-furfural content (HMF) determined after processing and blending.

Another factor that favors marketing of honey at the world market is the authentication and characterization of botanical and geographic origin (GI) of honey. This is a form of intellectual property right which increases the price of honey.

3.3.3. Tanzania export of Honey and Beeswax

Tanzania is the 11th country in honey production second in Africa with production share of 1.7%. Globally the top exporter of honey is New Zealand followed by China¹³. Tanzania rank 71th in export of honey though has a very high Revealed Comparative Advantage of 0.96. The amount of honey being exported from Tanzania is only 5% of total production. However, this does not cover the amount of honey sold to neighboring countries such as Kenya, Rwanda, Burundi and Congo DR. European countries that import honey from Tanzania are Germany, the Netherland, UK, Belgium and Norway. Others are China, Japan, USA, Oman and United Arab Emirates (Dubai).

The Africa share of global annual import is 19 percent, Morocco holds the largest share 8% and Tanzania share is below 0.1 percent. Honey export from developing countries increased significantly between 2011 and 2015, amounting to 199,000 tons (€ 466 million). This represents 59 percent of total honey exports directed to Europe. For beeswax, Tanzania ranked 9th globally with beeswax production share of 2.8%. In Africa the leading country is Ethiopia (8.3 percent), followed by Kenya (3.8) and Angola (3.5). In fact, between 2003 -2009 Tanzania beeswax received the second-best price of beeswax in European market behind Australia¹⁴.

Figure 2 presents data of honey and beeswax exported from Tanzania. The highest export of honey was reported in 2007/08 (620 tons) followed by 2018/19 when 611.4 tons were exported. From 2008/9 the trend of honey export has been declining likely due to increased domestic consumption. Similar trend is also exhibited by export of beeswax. Generally, amount of beeswax export is above that of honey

¹³ https://ec.europa.eu

¹⁴ CBI 2009. Market survey. The honey and other bee products Market in the EU.

with the exception of three seasons that is 2004/04, 2007/08 and 2018/19. The peak of beeswax export was in 2010/11 (543 tons) and lowest in 2017/18 when it was 203 tons (Figure 2).



Figure 2: Trend of honey and Beeswax export from Tanzania from 2004/5 to 2018/19

3.3.4. Availability of Local and Regional Market for Honey and Beeswax

It has been reported that over 90 percent of honey produced in the country is consumed locally and that only 5 percent is exported. The market of honey and beeswax in Tanzania falls in four market channels¹⁵ ¹⁶ ¹⁷ namely; **Channel I** composed of international markets accessed by larger companies; **Channel II** made up of cities such as Dar es Salaam, Mwanza and Arusha; **Channels III** comprised of regional markets (EA and SADC) countries; and **Channel IV** made up of local lower income consumers in rural areas. Others¹⁸ have collapsed channel I and li into one. This illustrates existence of price differences between regions, being lucrative in some regions and in other areas beekeepers and traders fetching lower prices. The whole scenario not only discourages beekeepers but also new entrants in beekeeping industry especially women and the youth. Astonishing however, a substantial amount that goes through the said channels is passed

Source: TFS Dar es Salaam.

¹⁵ Mwakatobe, A. and Mlingwa, C. (nd)Tanzania-The status of Tanzanian honey Trade- Domestic and International Markets

¹⁶ ITC 2005. Tanzania: Honey sector synthesis report and development roadmap. Geneva.

¹⁷ Match Marker associates Limited 2007. Honey and beeswax value chain analysis in Tanzania.

¹⁸ URT 2001. National Beekeeping Programme 2001-2010.

without proper processing. In the region honey is sold in Burundi, DRC, Rwanda, Uganda and Kenya through middle men who buy honey from beekeepers and escorts to borders of such countries. In 2014 it was estimated that honey sold to Eastern Africa region was above 500 tons¹⁹.

The following are barriers that are known to restrict marketing of honey:

- a) Ineffective product quality control and inspection mechanism;
- b) Inadequate reliable market data and information on supply, demand and market prices for bee products;
- c) Lack of appropriate packaging materials for honey and beeswax;
- d) Inadequate working capital for traders of bee products;
- e) Underperformance of public and private sector institutions involved in marketing Bee Products;
- f) Poor performance of most bee products processing firm due to shortage of standard storage (collection centers), processing and packaging materials that leads to deficiency of quality processed Bee Products that is required in the market; and
- g) Inadequate bee products marketing research and intelligence which inhibits timely availability of data and information necessary for decision making.

3.3.5. Opportunity for Beekeeping Up scaling

The beekeeping sector in Tanzania is estimated to employs two million people, most of them living in rural areas. The government and other stakeholders have been undertaking various interventions to support beekeepers through provision of hives, establishment of market linkages and functional demonstration apiaries. Through these initiatives beekeepers get opportunities to learn by doing. This has opened a new window which if sustained and monitored may lead to an increase of new entrants into the sector. These initiatives are closely coordinated by TFS, an agency mandated for overseeing the development of forests and honeybees and bee fodder in the country. For instance, during 2012/2015 period alone, TFS supplied more than 14,076 top bars hives to local beekeepers. However, adoption of beekeepers is slow and, in some places, donated hives were not used as intended.

¹⁹ ITC 2014. Tanzania honey sector synthesis report and development roadmap.Geneva.

The presence of both stinging and non-stinging honeybees coupled with existence of indigenous knowledge in beekeeping makes Tanzania an important country in Beekeeping. The prospect for increasing production of honey and beeswax is thus high though little has been achieved at the moment.

The following are the existing opportunity for beekeeping up-scaling in Tanzania:

- i. Presence of more than 9 million bee colonies in the country;
- Presence of more than 2 million people who are employed in beekeeping subsector;
- iii. Internal and external demand of bee products (honey, beeswax, royal jelly, bee venom, etc.) due to their unlimited health, cosmetics and food benefits;
- iv. Presence of bee fodder plants and areas across the country that are suitable for beekeeping activities;
- Increased awareness to farmers on commercialization of beekeeping for productivity and profit maximization;
- vi. Presence of Beekeeping Training and Research Institutions to support the industry;
- vii. Presence several Incentives like bee hives from Government and grants for beekeeping projects from Tanzania Forest Fund;
- viii.Involvement of Tanzania Forest Agency (TFS) in beekeeping activities which is expected to increase the country's production capacity;
- ix. Existence of the five phytochoria each with different plan communities capable of producing unique honeys that can be branded accordingly;
- x. Existence of international and regional collaborations;
- xi. Willingness of the government to fully support different beekeeping activities; and
- xii. Existence of legal framework to guide beekeeping activities in Tanzania.

CHAPTER FOUR

4. REQUIREMENTS FOR ESTABLISHMENT OF BEE PRODUCTS PROCESSING INDUSTRIES

4.1 Land for Industrial Establishment in the proposed Regions

Based on field visits it was found that various districts/Municipal Councils have already allocated land for industrial development. It was found that, a total 7622.94 ha have been set aside for industrial developments in nine visited Districts (Mlele 2.84 ha; Sikonge District Council (DC) 1,390.63 ha; Tabora Municipal Council 320 ha; Singida Municipal Council 2,341.80 ha; Manyoni DC 1,909 ha; Bukombe DC 126 ha; Ushetu DC 56 ha; Kahama 517 ha;) as it stipulated in Table 10.

Most of the allocated land by districts/ Municipal Councils are still owned by the communities and therefore needs for compensation. The presence and development of important physical infrastructure such as road, rail and utilities for proposed area for industry establishment vary from one district to another.

Box 3: Key Issues in Chapter 4:

- i. Nine visited districts/Municipal Councils have already allocated a total 7622.94 ha of land for industrial development. However, majority of this land still need compensation and setting up the required infrastructure.
- ii. Three out of eight beekeepers cooperative Societies in Tanzania are dormant due to mismanagement, lack of qualified personnel and lack of fund. The current performance of cooperatives has implications on attracting new members.
- iii. Similarly existing groups and SACOSS that support the sector, also experience mismanagement, lack of qualified personnel and lack of fund.
- iv. Despite their importance as center of marketing and distribution of bee products, collection centers are not properly managed though are still needed in some areas with high potential.
- v. Although bee products from Tanzania are demanded to EU market currently the country (excluding exports to Kenya, Rwanda, Burundi and Congo DR) exports only 5 percent of her production. The export trend has been a decline since 2007. Poor processing is one of the factors that explain the trend.
- vi. Most bee products processing industries are performing below capacity a fact that can be explained by poor management and lack of working capital. Raw materials are mainly sourced in Tanzania, if all industries perform to their capacity raw materials will not suffice.

Table 10: Demarcated Land for Industrial Develo	opment in Selected Regions
---	----------------------------

Region	Council Name	Size of allocated Land (ha)	Compensation Status	Status of Infrastructure	Land Acquisition Costs Per Sq.
	Municipal	320	unpaid	Presence of Road, rail and electricity	
labora	Sikonge	8.5	paid	Presence of Road and electricity	5,000
	Municipal	2,341.80	unpaid	Presence of Road, water and electricity	5,000
Singida	Manyoni	1,909	unpaid	Presence of Road, rail and electricity	4,000
	District Council	2,341.80	unpaid	Presence of Road, water and electricity	5,000
Shinyanga	Kahama	517	Prospecting people are required to only pay commitment fee	Presence of Road, water and electricity	5000
	Ushetu	56	unpaid	Presence of Road, rail and electricity	5,000
Geita	Bukombe	126	unpaid	Presence of Road, water and electricity	5,000
Katavi	Mlele	2.84	unpaid	Presence of Road, water and electricity	1,500

Source: Quick Assessment Survey, 2019

4.2 Status of Beekeeping Cooperative Societies and Collection Centers

4.2.1 Beekeeping Cooperative Societies

Since independence, beekeepers have been associated into informal groups and formal associations or cooperatives or community-based organizations. The roles of the associate, among others were to work together during siting of hives, inspection of bee colonies, harvesting, rendering beeswax and carrying products to home. Some beekeepers have been working together for the purpose of combining efforts to seek for funds or markets for their products. However, many beekeepers' organizations faced various leadership and organizational challenges that has resulted to a failure in achieving the purposes of their establishments. For instance; Tabora Beekeepers Cooperative Society Limited was established (1970's) in order to operate Honey Processing Plant. The Cooperative society collected, processed, packed and sold bee products from the members (the beekeepers). The cooperative was operated by a committee formed with the representatives from beekeepers' groups that by then constituted branches in Tabora, Urambo, Kibondo, Kahama, Chunya, Manyoni and Mpanda districts. The beekeepers in a cooperative society benefited because the Plant assured them market of honey and beeswax; system of collection and payment (centers established in each branch), and at the end of the year were receiving dividend. However, market dynamics and poor management led to the collapse of the Plant and leaving beekeepers in dilemma.

The survey of beekeepers' cooperatives in the regions indicates that there are 35 registered beekeepers' cooperative societies, 3 Savings and Credit Cooperative Society (SACCOS) and one beekeeper's cooperative union. In addition, there are about 11 beekeepers' associations registered under Society Act and or Non-Government Organization (NGO) Act and 2 beekeeping umbrellas registered under Company Act. Table 11 shows the distribution, type and functions of the beekeeping organizations.

S/N	Category of Coop- erative	Type of Reg- istration	Function	Location	Number Coopera- tive	Current Situ- ation
1	Primary Cooperative Societies, Kigoma region	Cooperative	serving beekeeping groups	Kibondo, Kasulu, Kakonko, Uvinza	7	Operating
2	Primary Cooperative Societies, Tabora region	Cooperative	serving beekeeping groups	Kaliua, Urambo, Uyui, Tabora, Sikonge, Nzega,	27	Only four are in operation
3	Primary Cooperative Societies, Tabora region	Cooperative	Support youth entrepreneurs and consultants	Singida	1	Operating
4	Saving and Credit Cooperative Societies (SACCOS), Geita Region	Cooperative	serving beekeeping group members	Bukombe	3	1 is dormant

Table 11: Beekeepers' Associations and Cooperatives in Tanzania, visited regions

S/N	Category of Coop- erative	Type of Reg- istration	Function	Location	Number Coopera- tive	Current Situ- ation
5	Beekeepers Associations/ Societies	Society Act	Support beekeepers' activities	Arusha, Meru, Mlele, Handeni, Kigoma	8	Only 2 operating others dormant
6	Beekeepers Associations/ Societies	NGO Act	Support beekeepers' activities	Mbeya, Mlele	2	1 operating in Mlele
7	**Tanzania Beekeeping Cooperative Union	Cooperative	Umbrella, National formed to coordinate Beekeeping Cooperative Societies	Tabora	1	Dormant. Earlier expanded to other region
8	**Tanzania Beekeepers Associations (TABEA)	Society Act	National to link 56 members in technology and market	Countrywide office in Dar es Salaam	1	Dormant
9	**Tanzania Beekeeping Development Organization (TABEDO)	Company Act	Apex for beekeeping stakeholders,	Dodoma with corporate 33 body members national wide	1	Yet to meet its objects
10	**Tanzania Honey Council	Company Act	Serving individual beekeepers, bee product dealers and expertise (140 members)	Dar es salaam with members country wide	1	Operating

Note: **	Organization	with	members	national	wide
----------	--------------	------	---------	----------	------

4.2.2 Current Status of existing Beekeepers Cooperative Societies in visited areas

The aim of establishing Beekeepers' Cooperative Society is to support small beekeepers by bringing them together to share their experience, benefit and opportunities of beekeeping potential found within their society. Based on the current quick survey it was founded that three out of eight beekeepers cooperative Societies found in visited regions in Tanzania are dormant (Table 12). One of the dormant is Tabora Beekeepers Cooperative Society (TBCS). This was one of the strongest beekeepers' cooperatives in Tanzania with membership spanning throughout Tabora region and parts of Mbeya and Rukwa Regions. The major reason for dormancy is the mismanagement and lack of fund. Most of the leaders of the cooperative lacked proper management and financial skills to run cooperatives. Failure of cooperatives in Tanzania has scared many people including from joining Cooperatives.

S/N	Region	District	Type of Cooperative	#	Reason for formation	Status	Function
1.	Kigoma	Uvinza	Cooperative Society	2	Influence from Beekeeping Improvement Project-Kigoma (BIPK)	Operating	Working together in beekeeping and own collection centre
2.	Kigoma	Kasulu	Cooperative Society	2	Influence from BIPK	Operating	Working together in beekeeping
З.	Kigoma	Kibondo	Cooperative Society	3	Influence from BIPK, Beekeeping Development Project (BDP), Tanganyika Christian Refugee Services (TCRS)	Operating	Working together in beekeeping. Own collection centre
4	Kigoma	Kakonko	Cooperative Society	1	Influence from BIPK	Operating	Working together in beekeeping. Own collection centre
5	Geita	Bukombe	SACCOS	3	Beekeepers' initiatives	Operating except 1	Means of saving and Financing beekeeping
6	Tabora	Sikonge	Cooperative Society	4	Influence from Traid Craft – TABECU, WMA	Dormant	Working together. Own collection centre
7	Tabora	Tabora Municipality	Cooperative Society	1	Influence from Church	Dormant	Running honey processing plant
8	Tabora	Tabora Municipality	Cooperative Union	1	Influence from Traid Craft	Dormant	Apex for Beekeeper Cooperative Societies

Table 12: Existing Beekeeping Cooperative Societies in Regions Visited by the team

Note: BIPK - Beekeeping Improvement Project Kigoma,

BDP - Beekeeping Development Project,

TCRS – Tanzania Christian Relief Services

WMA - Wildlife Management Area

4.2.3 Current Status of existing Beekeepers Groups

There are number of beekeeping groups that are recognized by the District Council either through issuing of certificate or a recognition letter. Their functions are to organise beekeepers to meet requirements of specific agenda such as facilitation from the Government and organize to meet buyer's requirements. Beekeeping groups also face similar constraints like those exhibited by Beekeeping Cooperative Societies. They include limited leadership skills, managerial ability and limited power to bargain with buyers. In Tabora Region, most groups were not sustainable and collapsed after the completion of projects since they were established by developmental projects objectives. In Kigoma Region, some of the cooperatives (i.e. UKI and Busunzu) are still strong and functioning well and currently owns collection centres and have also established an agreement with buyer on quantity of crude honey to be purchased and price per kilogramme. In Bukombe District, there are 38 beekeeping groups and 3 SACCOS that have bank accounts although are not effective in supporting beekeepers to market their products. In Singida and Manyoni districts there are about 48 beekeeping groups, in Sikonge 18 groups and Mlele District 17 groups. These groups if organized and their members trained in necessary skills can easily convert into functional Cooperatives Societies. Those in Bukombe have a plot where they want to build honey processing plant.

4.2.4 Current Status of existing Savings and Credit Cooperative Society (SACCOS)

There are beekeeping groups having SACCOS that operate to serve the members on financial aspect. This indicates that improvement of SACCOS in beekeeping groups and beekeeping cooperative societies is a mechanism to improve functions and capital for establishment relationship with buyers as well as connection to bee products processing and packing industries. Operating SACCOS is guided with Cooperatives Act and their transactions are well monitored and controlled.

Challenges in beekeeping groups and cooperative societies are mainly lack of managerial skills and ability, support or promise induced objectives of its establishment, inadequate capacity to establish connection and networks for market access, limited capital to buy bee products from the beekeepers and past event records of the failure of the Tabora Beekeepers Cooperative Society. Another challenge is associated with poor extension services as beekeepers in cooperatives lack technical knowhow. The knowhow is supposed to be offered by Cooperative Officer, Community Development Officer and Beekeeping Officers from the respective District.

4.2.5 Honey collection Centers

These are centers where beekeepers can bring in their products and be certain of a common market. When significant volumes of good quality honey and beeswax are available in one place, traders will be interested to travel to remote areas, being certain of the volume and quality they will be able to collect. These Centers function as a means of collecting honey and beeswax from beekeepers and then arranging its onward sale, either locally, within the nation, or for export. Collection centers may be owned and managed by a co-operative, an NGO or private individuals.

The centers sometimes help beekeepers by providing them with lidded plastic containers for honey and beeswax collection. Depending on the area covered, the centre may need to organize the collection of buckets from specified collection sites throughout the area. In order to meet this, collection centre must own or hire vehicles to reach the collecting sites. Depending upon the market available for the honey and beeswax, the centre may carry out further processing of products; sell to dealers, or package for retail sale.

The collection Centers need secure storage space for honey and beeswax, buckets, weighing scales, honey refractometers, simple processing equipment, and transport and communication facilities. Personnel are required to manage the centers, with skills in measuring honey quality and handling of honey and beeswax, and with extra staff during the honey buying seasons. In most of visited area the Task Force found that formal and informal collection centers are used to collect honey from beekeepers. These collection centers lack appropriate facilities for initial processing and storing the honey as well as lack personnel with adequate skills in measuring honey quality and handling honey and beeswax. Table 13 below shows some of the formal collection centers found in the visited regions.

S/N	Region	District	Village	Ownership	Status	Reasons
1.	Kigoma	Uvinza	Ilagala	Ushirika wa Wafugaji Nyuki Ilagala	Dormant	Not completed due to lack of capital, members not active in
2.	Kigoma	Uvinza	Uvinza	Kazaroho Beekeepers Cooperative Society	Operational	Buyers used the premises
3.	Kigoma	Uvinza	Uvinza	Kikundi cha Ufugaji Nyuki Nguruka Honey	Operational	Members process and sell their own products
4.	Kigoma	Kasulu	Kasulu Town	Kasulu Beekeepers Cooperative Society	Operational	Members process and sell their products
5.	Kigoma	Kasulu	Kagerankanda	Kagerankanda Beekeepers Cooperative Society	Dormant	Members and leaders are not active, problem of management
6.	Kigoma	Kibondo	Busunzu	Vijana Beekeeping Group Busunzu	Operational	There is an agreement with a buyer
7.	Kigoma	Kibondo	Kifura	Ushirika wa Wafugaji Nyuki Kifura (UWAKI)	Operational	There is an agreement with a buyer
8.	Kigoma	Kibondo	Kibondo Mjini	Ushirika wa Ufugaji Nyuki Kibondo (UKI)	Operational	There is an agreement with buyers. The centre is also utilized by buyers to process honey and beeswax
9.	Kigoma	Kakonko	Kakonko Mjini	Kakonko Beekeepers Cooperative Society	Dormant	Members and leaders are not active - conflicts among leaders
10.	Tabora	Sikonge	Mlogolo	TABECU	Dormant	Operations were solely project dependent but the project has ended
11.	Tabora	Sikonge	Ipole	Ipole CBO for WMA	Dormant	Capital and leadership
12.	Tabora	Sikonge	Utemile	Ipole CBO for WMA	Dormant	Capital and leadership

Table 13: Status of Existing Collection Centers in the visited Regions

Based on the analysis of the existing collection centers and the production potential in the visited area the Task Force suggests that there is a need to construct new in the areas where there is no collection center and production potential is high. For example, in areas like Kitunda, Kiloleli and Inyombo (Sikonge District), Mwamagembe (Itigi DC), Malongwe and Goweko (Uyui), Inyonga and Ilunde (Mlele) and Kambikatoto (Chunya) beekeepers produce large amount honey but they do not have formal collection centers.

The following are the challenges facing collection centers and means of collection in the regions visited:

- Inadequate knowledge and expertise of beekeeping groups/cooperatives societies to operate collection centre as business entity;
- Limited coordination among beekeepers to a one voice bargaining and negotiation;'
- iii. Lack of facilities to support extraction, straining and storage of bee products ready for market;
- iv. Behaviour of buyers and middlemen to buy bee products directly from individual beekeepers;
- Inadequate extension services to improve operation and ownership of collection centers to beekeepers; and
- vi. Limited collaboration and relationship between beekeepers and processors.

4.3 Situation of existing Bee Products Processing industries

4.3.1 Size, Location, Ownership and Operation Management of Industries

Since independence, a number of Bee Products processing industries have been established and located in regions that are known for beekeeping as well as in Dar es Salaam and Coast Region on account of market proximity. The existing industries were found during field visit to be of different size and at different operation and management status. Based on the Tanzania SME Policy, industries are categorized in four major groups namely Micro, Small, Medium and Large Industries. The categorization depends on the number of employees and capital investment used in purchasing machinery (see Table 14)

Category	Employee	Capital Investment in Machinery (TZS)
Micro Enterprise	1-4	Up to 5,000,000
Small Enterprise	5-49	5,000,000 - 200,000,000
Medium Enterprise	50-99	200,000,000-800,000,000
Large Enterprise	100+	Above 800,000,000

Table 14: Categories of Industries in Tanzania

NB. In the event of an enterprise falling under more than one category, then the level of investment will be the deciding factor.

Basing on capital used for purchase of equipment and machinery, most of the existing industries owned by beekeepers are micro-industries mainly concentrating at natural way of pressing honey for the purpose of selling raw honey. There are also few small, medium and large size industries (Table 15).

		• 1				
Region/Size	SMALL	MEDIUM	LARGE	OPERATIONAL	DORMANT	WHY DORMANT
Arusha	1	0	0	1	0	
Dodoma	2	1	0	3	0	
Dar es Salaam	5	0	0	5	0	
Iringa	2	0	0	2	0	
Katavi	1	0	0	1	0	
Kigoma	2	0	0	2	0	
Kilimanjaro	1	0	0	1	0	
						Problem of market in China (China
Pwani	0	0	1	0	1	regulation do not
						allow to import honey from Tanzania)
Shinyanga	0	1	0	1	0	
Singida	2	1	0	2	1	Machine Breakdown
Tabora	0	1	0	0	1	Mismanagement
Total	16	4	1	18	3	

 Table 15: Numbers of Bee Products Processing and Packaging Industries: By

 Region, Size and State of Operation

The dormant industries are Kipalapala Processing Plant in Tabora, Honey King in Kibaha, Pwani and SIDO Singida Honey Processing Plant. The main causes of dormancy of Kipalapala Processing plant is mainly insufficient running capital and lack of skilled labor i.e. factory running and financial management skills. For SIDO

Singida Honey Processing Plant was established to serve as training as well as serve entrepreneurs who wants to process honey at affordable price. However, currently some part of its machinery has rust and thus can no longer be used to process food. *In addition, the management of Honey King Industries informed the team that, the industry was established for processing honey only for China market. However, after initial production they found that honey from Tanzania was not one of the products in list of products that are allowed to be imported into China. Therefore, the industry failed to continue with its production due to lack of targeted market.*

Moreover, it has been observed that most of the Bee Products Processing and Packing Industries are located in Dar es Salaam region, and the rest are concentrated and located in beekeeping regions (Table 15). Notably, this imply that location of Bee Product Processing and Packing Industries does not necessarily require the industry to be located in a beekeeping region, probably on account of ease of transporting raw honey to any destination.

In terms of ownership (Table 16), about 67% of the industries are privately owned and few are owned by the government and under joint venture arrangements. Contrary to expectation, cooperative societies own few of these industries either as sole owners or jointly, probably as a result of lack of ambitious management.

Region/Type of Ownership	Private	Government	Beekeepers Cooperative	Private & Government	Private & Beekeepers Cooperative	Government & Beekeepers Cooperative
Arusha	1	0	0	0	0	0
Dodoma	3	0	0	0	0	0
Dar es Salaam	5	0	0	0	0	0
Iringa	1	1	0	0	0	0
Katavi	0	0	1	0	0	0
Kigoma	1	0	0	0	1	0
Kilimanjaro	0	0	1	0	0	0
Pwani	1	0	0	0	0	0
Shinyanga	1	0	0	0	0	0
Singida	1	2	0	0	0	0
Tabora	0	0	1	0	0	0
Total	14	3	3	0	1	0

Table 16: Ownership Status of existing Bee Products Processing and Packaging Industries

It was found that, each type of ownership has its advantages and disadvantages. Table 17 shows the advantage and disadvantage of each type of ownership practiced in the existing industries.

Type of Ownership	Pros	Cons
Private	- Allow quick decision	- Lack enough capi <mark>tal</mark>
	- More flexible	- Lack of skilled p <mark>ersonnel</mark>
		In adequate facilities (Machineries)
		- In adequate Proper financial Management
Government	- Availability financial resources	- Delay of making decision due to Government procurement procedures
	- Presence of skilled personnel	- Lack committed personnel
	- Availability of facilities (Machineries)	Lack quick flexibility (Need consultation at different level)
	Proper financial Management	
<mark>Beekeep</mark> ers	- Sensitize beekeepers to join	- Lack enough capital
Cooperative	into cooperative	
	- Beekeepers benefit direct from the cooperative	- In adequate Proper financial Management
	- Assurance of the industry to get raw material	- In adequate facilities (Machineries)
		- Lack committed personnel
		- Lack quick flexibility (Need consultation at different level)
Private &	- Sensitize beekeepers to join	- Lack committed personnel
Beeke epers	into cooperative	
Cooperative	- Beekeepers benefit direct from the cooperative	- Lack quick flexibility (Need consultation at different levels)
	- Assurance of the industry to get raw material	- Lack enough capital

Table 17: Pros and Cons of each type of ownership of the existing Bee Products
Processing and Packaging Industries

In addition, the respondents were probed on who should build, own, manage and run bee products processing industries. Table 18 presents response of stakeholders for each scenario.

Table 18: Scenario of building, Managing and Running Bee Products Processing industries

SNO		Scenario/Possibili	ty	Score
	Building*	Managing**	Running***	
1	Government	Government	Beekeeping Cooperatives union	1
2	Church and Government	Church and Government	Church and Government	1
3	Government	Government	Government	2
4	Government	Government	Government and Private Sector	7
5	Cooperative	Cooperative and Government	Beekeeping Cooperatives Union	2
6	Government and Private sector	Government and Private sector	Government and Private sector	3
7	Private	Government and Private sector	Government and Private sector	1
8	Beekeeping Cooperative Union	Government	Government and Beekeeping Cooperative Union	1
9	Government	Private	Private	2
10	Government	Special Purpose Company	Special Purpose Company	1
11	Government	Cooperative Society	District council and Beekeeping Cooperative union	1
12	Government	Government and Beekeeping Cooperatives Union	Government and Beekeeping Cooperative Union	1
13	Government	Government	Cooperative	1
14	Government	Government	Private	1
15	Government	Government	Special Purpose Company	1

* Building means putting up of the industrial shed and structure, acquisition of equipment and provision of capital.

** Management means a body or a person who oversees and ensures that the bee products processing and packing industries achieves its objective in a progressive manner.

****** * Running means supervision and carrying out daily activities.

Based on the data collected, majority of stakeholders (18) proposed that industries be built by government whereas 3 stakeholders proposed that industries be built by cooperative and 1 partnership between Church and Government. In the area of management, 14 proposed that management of bee products processing and packing industries be managed by the government, 4 proposed that management be undertaken by partnership between government and private sector, 3 Beekeeping cooperative society and government and 1 proposed management to be held by Church and government, 1 Cooperative union on their own and 1 Special Purpose Company.

In the areas of running of bee product processing and packing industry majority 13 proposed a form partnership between the government and the private sector, 4 beekeeping Cooperative union, 3 government including local and Cooperative union, 2 special Purpose company and 2 private sector.

4.3.2 Sources of Raw Materials, Type of Plant and Machinery

For an industry to fully process bee product a number of equipment are required. The existing industries differ in levels depending on the type of equipment/parts owned within the required full layout of the honey processing industry. These parts are sourced from different manufacturers and for Tanzania the well-known are from China and Lyson of Poland. However, except for Honey King, TFS Manyoni and Vijana Inyonga SACCOS, most of visited industries were found to lack some of machinery to ensure a full-fledged chain of production.

Most of the existing industries sources raw materials from within the country and mainly from Tabora, Katavi, Singida, Rukwa, Geita and Shinyanga. Agents and bee products dealers are mainly used in collecting raw materials from individual beekeepers, beekeeper's groups and cooperative societies. Some of the industries have contract of using Collection centers owned by the Cooperative Society.

Looking at Table 19 these industries though have the capacity to process an average of 4 tons per day yet they can only source an average of 30 tons per annum as raw materials. This indicates that most of these industries are producing under their capacity. In addition, most of these industries do not have their own apiaries for honey production, and for those that own the production capacity from their apiaries fall far below the production capacity of the industries. On the other hand, due to lack of enough funds and proper system to collect honey, these industries fail to compete with Bee Products Dealers, who are targeting export market of raw honey.

Except for their backward and forward linkages, as per Table 19 most of the Bee products Processing Industries of all sizes are not labor intensive. On average they employ between 6 -15 active employees at any moment.

221	ווואר ירו פו	init of weathand	ט בשנשטובו וט	וווופוור מו	וח סלבי חיויסיו	ט באושנוווץ ווומשטוונס			
	Company Name	Source of Raw Materials	Electricity Costs/Units	Water Costs	Construction Costs	Type and Cost of Machinerv	Running Costs	Staff Numbers	Location
-	Igembe Nsabo	From Beekeepers through Contract. Mainly from Kilolo, Sikonge, Nzega, Ushetu, Bukombe and Kakonko. Total raw material is 20 tons per annum.	180 per month	100 units per month	TZS. 70,000,000	Dropping Receiving Tank (TZS. 38 m) including Installation Costs. Capacity 6 tons per day from China with 10 useful life.		G	Dodoma
7	Central Park	From Beekeepers through Bee Products Dealers and agents. Mainly from Tabora, Manyoni, Mafinga and Njombe. Total raw material is 37 tons per annum.	843 per month	50 units per month	TZS. 200,000,000	Lyson (EURO 120,000) including Plant, Installation, Testing and Training Costs. Capacity 6-8 tons per day			Dodoma
m	Tanzania Forestry Services Agency (TFS)	From TFS Apiary in Manyoni 6 tons per annum.	TZS. 840,000 per month (1500 Units)	15 units per month	TZS. 63,000,000	Acceptable Food Grade, TZS. 80,000,000 including Plant, Installation, Testing and Training Costs. Capacity 0.5 tons per day from China and Poland.	30m-100m per annum	2	Manyoni
4	Inyonga Vijana SACCOS	From Beekeepers at Mlele District.			TZS. 70,000	TZS 150,000,000/= including Plant, Installation, Testing and Training Costs. Capacity 1 tons per day		2	Mlele

Table 19. Summary of Key Issues for Establishment and Operation of Existing Industries

Location	Singida	Tabora	Dodoma	Dar es Salaam	Kahama
Staff Numbers	m	11		σ	2
Running Costs		TZS. 105,400,000			
Type and Cost of Machinery	TZS 150,000,000/= including Installation Costs. Capacity 8 tons per day from China.	TZS 405,000,000/= including Installation Costs. Capacity 8 tons per day.	Lyson from Poland with Capacity 6 tons per day.	TZS 60,000,000/= including Installation Costs. Capacity 0.8 tons per day.	Sachet, Capacity 1 tons per day from China with 5 useful life.
Construction Costs		Renovation TZS. 659,000,000 (Estimates)			
Water Costs	10 units per month				100 units per month
Electricity Costs/Units	309 per month				100 per month
Source of Raw Materials	From Own Apiary and other Beekeepers at Singida. Total raw material is 27 tons per annum.	From cooperatives in 6 regions Tabora, Kigoma, Shinyanga, Rukwa, Katavi and Mbeya.	From Beekeepers Group at Manyoni, Mpanda, Tura and Own Farms.	From Beekeepers mainly from Tabora, Songea, Dodoma.	From Beekeepers mainly from Kigosi- Moyowosi and Ushetu. Total raw material is 30 tons per annum.
Company Name	<mark>Singida</mark> Honey Processing Industry	Kipalapala	Pinda Honey	Miyombo Golden Honey	Afrilife Company Ltd
	ъ	G	7	œ	თ

Company S Name N	512	source of Raw Aaterials	Electricity Costs/Units	Water Costs	Construction Costs	Type and Cost of Machinery	Running Costs	Staff Numbers	Location
Honey King Agents a	Agents al Product C	nd Bee Jealers	TZS. 2,000,000 per month	15 units per month		USD 1 Million including Plant, Installation, Testing and Training Costs. Capacity 10 tons per day from China.	Working Capital USD 1 Million	10	Dar es Salaam
From Bee Hussein located in	From Bee through a located in	ekeepers agents 1 Tabora				USD 20,000, Installation, Testing and Training Costs. Capacity 0.2 tons per day from China.		7	Dar es Salaam
Average/ Tabora, S Katavi ar Shinyang	Tabora, S Katavi ar Shinyang	ingida, Id ;a (30 Tons)	586.4 Units per month	66.4 Units per month	TZS. 248,000,000	4 Tons		9	

CHAPTER FIVE

5. TECHNOLOGIES AND COSTS FOR INDUSTRIES ESTABLISHMENT

5.1 Type of Machineries

There are many different types of machineries that are available depending of the size and type of product that need to be produced. To have a sustainable production system, several factors should be considered before purchase of the equipment. These factors include

- i. How robust is the equipment?
- ii. How simple is it to service, clean and perform maintenance?
- iii. How easier it is to obtain spare parts?
- iv. How long will it take to get replacement parts?

Depending on the envisaged processing levels, some of the equipment are optional and some are essential for honey processing. The process requires extraction, filtration, evaporation, cooling and storage, filling and packing. Table 20 provides a guide of equipment that may be necessary and optional for a fullyfledged honey product processing industry.

Box 4: Key Issues in Chapter 5:

- i. For a fully-fledged industrial site and for attaining all regulatory bodies' requirements, a Bee Product Processing Industry need to at least have the following: Administration Office, Packaging Area, Processing Area, Receiving Area, Store, Dispatch Area, Changing Room, Workshop, Laboratory and Toilets.
- *ii.* NPV and other financial ratios have been used test test viability of different industry sizes.
- iii. An 8-hour single shift is assumed for all sizes, in which a micro sized is assumed to have a capacity to produce 70 kg of honey, a small sized 4 tons of honey, a medium sized 8 tons and large sized more than 10 tons and a company is assumed to be targeting local markets.
- iv. Machinery are assumed to have a life-span of 10 years before they become obsolete and to purchase full-fledged machinery for micro, small, medium and large sized industries is st at TZS 4, 250,600, TZS 198,520,395, TZS 319,553,620 and TZS 893,764,210 respectively.
- v. A working capital of TZS 40,156,448, TZS 2,356,674,187, TZS 4,714,301,185 and TZS 5,886,649,515 for micro, small, medium and large sized industries are pproposed respectively.
- vi. Basing on NPV and BCR, except for a micro sized which failed sensitivity analysis, it is profitable to invest on the project at any type and size of industry. Return on sales and break-even sales value was also satisfactory. The project can pay back within two to three years.

Table 20: Equipment Needed for a Fully-Fledged Bee Product Processing Industry

SN	Type of Machinery	Description	Need
514		Machine to extract	NCC4
1	Honey Extractor	honey from honeycombs. This can be manual or electrical	Optional depending on the nature of honey received
2	Honey Pressing Machine	Machine that separate liquid honey and combs	Optional depending on the nature of honey received
3	Honey Melting Machine	_	Compulsory
4	Pre-heating Machine	-	Compulsory
5	Thick/Fine Filtering Machine	Machine that filter	Compulsory
6	Concentrating Machine	liquid honey	Compulsory
7	Conveying Machine		Compulsory
8	Storage/Settling Tank	Store honey	Compulsory
9	Honey Filling Machine	Filling and packaging	Optional depending on the market
10	Bottle Drying and Sterilizing Machine	⁻ Machine	Optional
11	Packing Machine		Optional
12	Honey Ripener	Regulate moisture in honey	Optional
13	Honey Reflactometer	Measure water content and sugar level	Compulsory
14	Wax Extracting Tank	Extract beeswax	Optional depending on the level of processing
15	Stainless Steel Table	Support packing process	Compulsory
16	Freezer	For storage of propolis and pollen	Optional
17	Propolis Extractor Tank	Extract propolis	Optional depending on the level of processing
18	Wax Sheet Production	Making foundation sheet	Optional depending on the level of processing
19	Bee wax foundation roller	Making foundation sheet	Optional depending on the level of processing
20	Pollen Dryer	Pollen production	Optional depending on the level of processing
21	Tweezers	For initial cleaning of pollen	Optional depending on the level of processing
22	Pallets	To impede the products and packaging to be in direct contact with the ground.	Compulsory

5.2 Bee products Processing Industry Layouts

For a fully-fledged industrial sites and for attaining all regulatory bodies' requirements, a bee product processing industry need to at least have the following areas Administration Office, Packaging Area, Processing Area, Receiving Area, Store, Dispatch Area, Changing Room, Workshop, Laboratory and Toilets (Figure 3).



Figure 3: Sample Layout of a Processing Building and Compound

The Machineries should be installed such that the critical path of the production processes does not hinder all the quality control aspects. Figure 4 provides the indicative layout of the packaging and processing area.





Figure 4: Processing and Packing equipment layout

5.3 Human Resource Requirement

For effective operation of the Bee Products Processing Industry a number of key staffs are supposed to be in place. The required staff should be able to ensure the whole production line is running smoothly starting from purchase of raw material, receiving, processing, marketing and payments, to mention a few. The required staffs include:

- i. Factory/Plant Manager: To manage the Factory/Plant on day to day;
- ii. Secretary: To assist the Manager on secretarial services;
- Human Resources Officer: To manage all personnel matters of the employees;
- iv. Accountant: To handle all financial and tax matters of the Company;
- Marketing and Sales Manager: To handle all issues related to market of the final products and sourcing of raw materials;
- vi. Purchase Officers: To be stationed in areas where the Company sources raw materials;
- vii. Sales Officers: To handle all retail marketing of the product;
- viii. Cashier: To oversee payments of suppliers of raw materials, in particular;
- ix. Production Supervisor: To oversee all matters related to production;
- x. Quality Control: To oversee quality checks and maintenance;
- xi. Machine Operator: To operate machine and sorting all mechanical maintenance;
- xii. Store Keeper: To manage receiving and storage of raw materials and final products;

- **xiii. Driver:** To drive the factory car for delivering all immediate issues.
- xiv. Security Guard: To ensure security of the compound; and
- **xv. Cleaner:** For maintaining cleanness at the factory and compound.

Table 21 provides the estimated annual costs for each category of the industry per size of the industry i.e. micro, small medium or large.

Tuble 21. Estimated Staffing Costs in 125				
Staffing Requirement	MICRO	SMALL	MEDIUM	LARGE
Factory/Plant Manager	6,000,000	12,000,000	18,000,000	24,000,000
Secretary	-	-	3,600,000	3,600,000
Human Resources Officer	-	-	-	7,200,000
Accountant	-	-	-	7,200,000
Marketing and Sales Manager	-	-	10,800,000	10,800,000
Purchase Officers	3,600,000	7,200,000	10,800,000	14,400,000
Sales Officers	-	-	3,600,000	3 <mark>,600,000</mark>
Cashier	-	3,600,000	3,600,000	3,600,000
Production Supervisor	-	-	5,400,000	5,400,000
Quality Control	-	-	-	3,600,000
Machine Operator	3,600,000	5,400,000	3,600,000	7,200,000
Store Keeper	-	-	-	3,600,000
Driver	-	-	2,400,000	2,400,000
Security Guard	-	-	1,200,000	1,200,000
Cleaner	-	1,800,000	1,200,000	1,200,000

Table 21: Estimated Staffing Costs in TZS

5.4 Cost Benefit Analysis (CBA)

Cost Benefit Analysis for the envisaged Project will follow the Net Present Value (NPV) and Benefit Cost Ratio. The unit measure of Costs and Benefits is decided a priori for these methods and the NPV in this case is calculated using the steps below.

5.4.1 Net Present Value (NPV)

The Net Present Value calculation follows five (5) basic steps. These are:

Step 1: Identify and measure the annual average costs and benefits that are incurred in the project for a stream of years. Negative assets (liability),
disposal of waste, clearing the environment should be treated as costs. When the project is terminated, whatever scrap value remaining should be treated as benefits. Streams of costs and benefits could be summed up as C1, C2, C3, ... Cn and B1, B2, B3, ... Bn.

- Step 2: Determine the discount rate. The discount rate converts the stream of future costs and benefits into their value today. For a private firm, the discount rate is simply the rate of return on an investment with a similar risk as the proposed project. Unfortunately, there is no consensus on how governments should determine their discount rate.
- Step 3: Compute and aggregate the present values of costs by using the normal statistical discounting methods.

$$PV_{\cos ts} = \frac{C_1}{(1+r)^1} + \frac{C_2}{(1+r)^2} + \frac{C_3}{(1+r)^3}, \dots + \frac{C_t}{(1+r)^t}$$
(1)

Then the Total Present Value of Costs in year t will be given by,

$$TPV_{\cos ts} = \sum_{t=1}^{t} \frac{C_t}{(1+r)^t}$$
 (2)

Step 4: Compute and aggregate the present value of benefits by using the normal statistical discounting methods.

$$\mathbf{P}V_{benefits} = \frac{B_1}{(1+r)^1} + \frac{B_2}{(1+r)^2} + \frac{B_3}{(1+r)^{13}}, \dots + \frac{B_n}{(1+r)^n}$$

Then the Total Present Value of Benefits in year t will be given by,

$$TPV_{benefits} = \sum_{t=1}^{t} \frac{B_t}{(1+r)^t} \dots (3)$$

Step 5: Compare the Present Value of Cost and the Present Value of Benefits to obtain the NPV. After calculating a net present value for each alternative, determine which alternative has the highest net present value. If only monetary costs and benefits were included in the calculation, then consider whether the non-monetary costs and benefits justify selecting another alternative. This is given as,

$$NPV = \sum_{t=1}^{t} \frac{B_t}{(1+r)^t} - \sum_{t=1}^{t} \frac{C_t}{(1+r)^t}$$
 (4)

Which can be summed up to,

Some texts include the discount of costs and benefits in year zero (possibly at the start of the project/investment and obtain discounted costs and benefits as BO and Co. This makes the formula for the NPV to be,

$$NPV = B_0 - C_0 + \sum_{t=0}^{t=T} \frac{B_t - C_t}{(1+r)^t}$$
 (6)

Where

t = the time

N = the total time of the project

r = the discount rate

Ct = the net cash flow (Bt - Ct) at time t. CO is commonly placed to the left of the sum to emphasize its role as the initial investment.).

Decision Criteria

When **NPV** > **0**, the investment would add value to the firm and the project may be accepted.

When **NPV** < **0**, the investment would subtract value from the first and the project should be rejected.

When **NPV** = **0**, that means, the investment would neither gain nor lose value for the firm. This project adds no monetary value. Decision should be based on other criteria, such as strategic positioning or other factors not explicitly included in the calculation.

If you have more than one project, then the decision criteria is to take the project with highest NPV.

5.4.2 Benefit Cost Ratio (BCR)

A Benefit-Cost Ratio (BCR) is an indicator, used in the formal discipline of costbenefit analysis, which attempts to summarize the overall value for money of a project or proposal. A BCR is the ratio of the benefits of a project or proposal, expressed in monetary terms, relative to its costs, also expressed in monetary terms. All benefits and costs should be expressed in discounted present values.

First, we compute the present value of benefits B,

$$B = B_0 + \frac{B_1}{1+r} + \frac{B_2}{(1+r)^2} + \dots + \frac{B_T}{(1+r)^T}$$
(7)

And then the present value of Costs C

$$C = C_0 + \frac{C_1}{1+r} + \frac{C_2}{(1+r)^2} + \dots + \frac{C_T}{(1+r)^T}$$
(8)

And then express the BCR as,

Admissibility requires that a project's benefit cost ratio exceed one. That is, B/C > 1. This implies that B - C > 0, which is equivalent to the present criterion for admissibility.

Decision Criteria

The decision rule for the B/C criterion is that one passes projects where B/C>1. The reason that the ratio must be greater that 1 is that K (initial capital cost) is on the denominator; so one wants to ensure that one has gross benefits greater that this amount on the numerator ratio. In practice, the ratio of NPV to expenditure is expressed as a BCR. BCRs have been used most extensively in the field of transport cost-benefit appraisals.

5.4.3 Assumptions for conducting CBA

To undergo the Cost-Benefit analysis of investing in Bee Products Processing Industry, the following assumptions are made.

i. Plant Capacity

We expect the factories to be funded by the government to be either small, medium or large. Basing on Table 13 and for the purpose of this work, four types of CBAs are conducted for envisaged funded industries namely micro, small, medium and large. For micro sized industry, a capacity of 70 kg per day is considered as benchmark, for small a capacity of 4 tons per day is considered, and 8 tons per day as medium while a capacity of 10 tons per day is considered for large industry.

A single shift of eight hours per day is considered to be satisfactory and the working days are assumed at 264 days¹ per annum.

The computational prices for machineries are based on the current existing World Market Prices (at the TZS 2400 exchange rate).

ii. Raw materials

Although factories may start from different processing levels, for the sake of this work we assume that the companies will start from processing raw comb honey **"asali ya masega".** The amount of raw comb honey needed for production to ensure industries working at full capacity, it is assumed that 80% refined honey in average will be extracted. The price for raw comb honey is estimated at an average of TZS. 70,000/= at farm gate price of a 22 kg bucket, equivalent to TZS 3182 per kilogram. We are assuming a 2% increment on the price. It is also assumed that the owners of industry are not involved in owning or beekeeping that all materials are sourced from other producers.

Besides the raw comb honey, different auxiliary materials are considered including sanitary chemicals, filter aids, filling and packing materials, drums for bulk honey to mention a few. Raw material mobilization period will be 60 days after completion of construction, thus in the first year of operation work will be done 60 days below the estimated working days capacity. It is also assumed that supply of raw material is not a problem, beekeepers guarantee consistent supply such that whenever the industry wants the material can be easily collected and industries can withstand raw material purchase competitions from bee product dealers.

iii. Production Program

On account of initial difficulties in obtaining raw materials and changing community behavior and thereafter penetrating the market, the operation will

¹ We assume the factory will be working 22 days per month and the rest will be for service, maintenance and weekends.

start in year 1 at 75 percent of its rated capacity, reaching 90 percent in year two and 100 percent from year three. Table 22 provides the Annual Production Program.

	9		
	Year 1	Year 2	Year 3 onwards
Micro Industry	10,710	16,632	18,480
Small Industry	612,000	950,400	1,056,000
Medium Industry	1,224,000	1,900,800	2,112,000
Large Industry	1,530,000	2,376,000	2,640,000

Table 22: Annual Production Program (Kgs)

iv. Environmental consideration

No pollutants are expected to be emitted by the plant. It is assumed that the factories will be built in industrial designated areas however will be required to undertake Environmental Impact Assessment (EIA) and thus costing for EIA will be set.

v. Land, Buildings and Civil Works

During field survey the Task Force found that, most districts have set aside Industrial Areas but for building factory, investors are required to purchase the land from these surveyed areas. It is assumed that all types of industrial size will thus acquire the land for construction of the plant. The total area of land required for the envisaged project is 200 m² (100 m² built-up area) for micro, 600 m² (350 m² built-up area) for small, 1,200 m² (600 m² built-up area) for medium and 2,400 m² (1000 m² built-up area) for large.

It is assumed that buildings are not rented and no interest on capital. The land acquiring costs is estimated at TZS 5000, the indicative price stated in most of the visited district as the price for acquiring 1 m² of industrial land.

The construction cost of buildings and civil works is estimated at a rate of TZS 550,000. This is an indicative rate for establishing the cost of building 1 m² of industrial building as per Architects and Quantity Surveyors Registration Board (AQRB).

Land acquisition and construction and machinery installation period is estimated at 1 year after acquiring fund and operation will start immediately after construction.

vi. Revenue Estimation

Revenue is estimated basing on the current price of TFS final purified honey which is at TZS 10,000 per kilogram. We are assuming a 2% increment on the price. A total sale is calculated at 80% of the total kilograms of raw comb honey, with an allowance of 1 percent loss of the final product at packing processes. The final products are assumed that they will be sold at the factory implying that no cost for transport of final products will be considered. It is also assumed that the product will be sold locally.

Also, it is assumed that the company will be selling wax as by products from raw comb honey and for every bucket of 22 kilograms; 1.5 kilograms of wax will be extracted. The price of wax at factory price is estimated at TZS 11,000.

vii. Life Span of Machinery

The machineries are expected to be obsolete and needing total replacements after 10 years. However, a 10 percent depreciation rate is assumed. In the first five years a 1 percent of the machinery costs will be taken as service cost increasing to 10 percent thereafter to cater for maintenance costs.

Estimated costs for each category of industry at an exchange rate of TZS 2,350 per 1 US\$ is provided in Table 23.

Machinery	MICRO	SMALL	MEDIUM	LARGE
Honey Extractor	-	-	-	-
Honey Pressing Machine	211,500	47,906,160	79,843,600	159,687,200
Honey Melting Machine/Honey Sump	-	13,218,750	22,031,250	44,062,500
Pre-heating Machine	-	7,755,000	15,510,000	46,530,000
Thick/Fine Filtering Machine	-	7,755,000	15,510,000	46,530,000
Concentrating Machine	-	7,755,000	15,5 <mark>10,000</mark>	46,530,000
Honey Pump		3,818,750	3 <mark>,818</mark> ,750	22,912,500
Honey Filter		17,404,335	34,808,670	46, <mark>411,560</mark>
Conveying Machine	-	3,525,000	14,100,000	211,500,000
Storage/Settling Tank	352,500	2,961,000	5,922,000	17,766,000
Honey Filling/Packing Machine	2,350,000	18,325,300	18,32 <mark>5,</mark> 300	18,325,300
Bottle Drying and Sterilizing Machine	-	-	-	-
Honey Ripener	533,450	-	-	-
Honey Refractometers	500,000	500,000	500,000	1 <mark>,500,000</mark>
Labeling Machine		51,324,000	51,324,000	102,648,000
Wax Extracting Tank/Melter	303,150	14,772,100	14,772,100	88,632,600
Stainless Steel Table	-	-	-	-
Freezer	-	1,500,000	1,500,000	1,500,000
Propolis Extractor Tank	-	-	1,407,650	4,222,950
Wax Sheet Production	-	-	-	-
Bee wax foundation roller	-	-	4,695,300	9,390,600
Pollen Dryer	-	-	2,820,000	8,460,000
Tweezers	-	-	-	-
Pallets	-	-	-	-
Honey Dehydrator	-	-	17,155,000	17,155,000

Table 23: Estimated Machinery Costs in TZS

viii. Discount rate

The discount rate is estimated at both 10% and at 15% annually. We consider the normal range of the discount rate that is used for private projects. Normally, the higher the discount rate, the lower the present value with the varying time period. For the public projects, the discount rate is normally between 5% and 10% and for the private projects; the discount rate is usually higher than the one for the public project. The rule of thumb for the private projects is between 10% and 20%. Since the envisaged product will be owned by public but managed using private

approach, the discount rate used is chosen between the private and the publicly suggested rates.

ix. Utilities

Total units of electricity are estimated basing on the total capacity of the proposed machineries. Total units will be established basing on the number of hours the machinery will be operating and that 1 Unit is equivalent to 1Kwh and that 1 Kwh is equivalent to 1000 Vah/Watt hour. Prices per unit of electricity and water are charged at current prices and assumed to remain the same for the period of analysis. Table 24 provides estimated annual power requirement for each category of industry.

Electricity Use	Micro	Small	Medium	Large
Honey Pressing Machine	-	6,970	11,616	13,939
Honey Melting Machine/Honey Sump	-	2,788	4,646	5,576
Pre-heating Machine	-	12,672	25,344	29,568
Honey Pump	-	10,560	10,560	10,560
Honey Filter	-	2,344	4,689	5,470
Conveying Machine	-	106	211	317
Storage/Settling Tank	-	1,204	1,204	1,204
Honey Filling/Packing Machine	-	845	845	845
Labelling Machine	-	3,485	3,485	3,485
Wax Extracting Tank/Melter	-	792	1,584	2,112
Electricity for other uses and lighting	1,460	1,825	3,650	5,475
Total	1,460	43,590	67,834	78,550

 Table 24: Estimated Annual Power Requirement, KWh

Other assumptions include;

- i. The industry will hold 30 days Raw material as part of inventory;
- ii. The industry will hold 30 days finished products as part of inventory;
- iii. The industry will keep 30 days salary, utility and service costs;
- The industry assumes 30 days equivalent revenue of finished products as receivables;
- The industry will hold 5 days equivalent of miscellaneous cost as Cash in hand;
- vi. Raw material as part of inventory;

- vii. 10 percent of machinery cost is depreciation rate;
- viii. The industry will hold 1-day Raw material as part work in progress; and
- ix. Repair and maintenance is estimated at 1% of machinery cost in the first five years and after 5th year at 10%.

5.5 Cost Analysis

5.5.1 Total Initial Investment Costs

Table 25 provides the Initial Investment Costs and this include the estimated working capital. The analysis is conducted for each category of industries. From the total investment cost the highest share is accounted by initial working capital.

	MICRO	SMALL	MEDIUM	LARGE
TOTAL INITIAL INVESTMENT	108,957,048	2,781,569,582	5,421,354,805	7,426,913,725
Fixed Investment				
Machinery	4,250,600	198,520,395	319,553,620	89 <mark>3,764,210</mark>
Land Acquisition	1,000,000	3,000,000	6,000,000	12,000,000
Building Cost	55,000,000	192,500,000	330,000,000	550,000,000
Service Work incl. Furniture	5,500,000	19,250,000	33,000,000	55,000,000
Site Work	2,750,000	9,625,000	16,500,000	27,500,000
Sub-total	68,500,600	422,895,395	705,053,620	1,538,264,210
Pre-operating Costs				
Government Regulatory Fees	300,000	2,000,000	2,000,000	2,000,000
Working Capital	40,156,448	2,356,674,187	4,714,301,185	5,88 <mark>6,649,515</mark>

 Table 25: Estimated Total Investment in TZS

The annual production cost at full operation capacity (Table 26) is estimated at TZS 120 million, TZS 2,585 million, TZS 5,162 million and TZS 6,553 million for Micro, Small, Medium and Large industries, respectively. The major contributor of the costs is raw material. All years under consideration are presented under Appendix 5- 8.

DESCRIPTION	MICRO	SMALL	MEDIUM	LARGE
Raw Material	45	2,434	<mark>4</mark> ,868	6,086
Staffing Requirement	13	30	64	99
Bucket	0	2	4	5
Packaging material &labels (1/2kg bottle)	0	20	40	50
Electricity Use	0	10	16	18
Advertisement	0	2	5	13
Water	0	0	1	1
Repair and Service of Machinery	0	2	3	9
Total Variable Cost	60	65	128	183
Depreciation	0	20	32	89
Total Production Costs	120	2,585	5,162	6,553

Table 26: Annual Production Costs at Full Capacity, TZS Million

5.6 Financial Evaluation

5.6.1 Profitability

Based on the projected profit and loss statement (**Appendix 9 - 12**), the project under all industry category will generate profit throughout its operation life. Annual net profit after tax will be growing. In addition, at the end of the project life the accumulated net cash flow amounts to at TZS 1,103 million, TZS 271,894 million, TZS 143,932 million and TZS 58,955 million for Micro, Small, Medium and Large industries respectively (**Appendix 13 - 16**).

5.6.2 Net Present Value

Following the information from the Table 27, we estimate the Cost Benefit Analysis through the Net Present Value (NPV). The entire computation is attached as **Appendix 17 – 20.** The key findings from the analysis are summarized as follows:

For sensitivity analysis, the Net Present Value was done at two different discount rates. The first NPV was done at the discount rate of 10% and the second one at the discount rate of 15%.

	MICRO INDU	ISTRY	SMALL IND	USTRY	MEDIU INDUST	M RY	LARGE INDU	JSTRY
	PV	NPV	PV	NPV	PV	NPV	PV	NPV
	TZS		TZS		TZS '000'000		TZS '000'000	
NPV at 10%	218	1.25	20,358	1.48	40,776	1.48	50,274	1.47
NPV at 15%	-40	0.96	5,635	1.13	11,330	1.13	13,467	1.13

 Table 27: CBA at full capacity honey and wax as bee products processed

Our analysis shows a positive NPV both at the discount rate and as of 10%, which stands at TZS 218 million, TZS 20,358 million, TZS 40,776 million and TZS 50,274 million for Micro, Small, Medium and Large sized industries respectively, whereas at the discount rate of 15%, the NPV is also positive except for micro at the rate of TZS 40 million, TZS 5,635 million, TZS 11,330 million and TZS 13,467 million for Micro, Small, Medium and Large industries, respectively. In view of this, *it is profitable to invest on the project at any type of industry as it has a positive Net Present Value (NPV).*

If there is enough fund, it will be beneficial to invest in Large Sized Industry, Medium sized and small sized Industries respectively since they result in higher NPV. The micro industry fails the sensitivity analysis.

Sensitivity analysis by varying the capacity levels to half and by assuming that the industries produce honey only does not alter the conclusions of the analysis (Appendix 21 - 24).

Basing on Benefit-Cost Ratio each project (bee product processing industry regarding the size) is viable.

5.6.3 Financial Ratios and Break-even analysis

In financial analysis financial ratios and efficiency ratios are used as an index or yardstick for evaluating the financial position of a firm. It is also an indicator for the strength and weakness of the firm or a project. In this work, we calculate return on sales (computed by dividing net income by revenue) and *find it satisfactory across industry type*. In addition, break even sales value (computed as Fixed Cost plus Financial Cost dividing by Variable Margin ratio) which establishes a relationship between operation costs and revenue is computed and is *found satisfactory*. Table 28 provides results of the ratios.

	Micro	Small	Medium	Large
Variable Margin Ratio	0.51	0.37	0.37	0.37
Break Even Sales Value	1,413,721	57,139,958	98,924,153	273,076,401
Return on Sales	0.34	0.44	0.44	0.43

Table 28: Return on Sales Ratio and Breakeven Sales Value

5.6.4 Payback Period

The pay- back period, also called pay – off period is defined as the period required for recovering the original investment outlay through the accumulated net cash flows earned by the project. Accordingly, based on the projected cash flow (Appendix 13 - 16) it is estimated that except for micro and large industries whose payback period is three years, small and medium sized industries will recover their project's in itial investment in within 2 years.

The results changes by adding one year for each category, when analysis is made by assuming half capacity production and when the only product is wax.

CHAPTER SIX

6. CONCLUSION AND RECOMMENDATIONS

6.1 CONCLUSIONS

Deeper understansing of existence of raw materials, market and prices, market channel, and viability of the proposed development are elements successful establishment to of before industries. More scrutiny establishment of bee products processing industries is inevitable especially with the understanding that similar undertaking in the past in some places did not manage to stand. This called for the MNRT to form a team of experts to study the sector and advise the government on where to build bee products processing and packing plants, establish criteria of selection of the sites and provide the cost to be involved.

The assignment involved traveling to eight regions Tabora, Singida, Rukwa, Geita, Shinyanga, Dodoma, Pwani and Dar es Salaam.

This chapter present the conclusions that are based on the evidence gathered and analyzed and presented in the previous three chapters. The team concludes that:

Box 5: Key Issues in Chapter 6

- i. Availability of Land for building, Readiness of the LGA, Size of Beekeeping Area, Availability of Raw materials, Availability of Transport networks and utilities, Existence of Beekeeping Cooperatives/BKG, Honey marketing linkages, Existence of honey processing industry were the criteria for choosing a district for supporting.
- ii. Basing on the weighted sum of the above criteria five districts namely Bukombe, Kibondo, Mlele, Sikonge and Manyoni were recommended.
- iii. Small sized in Bukombe, Mlele and Manyoni Districts, and medium sized industries in Sikonge and Kibondo are proposed to be established respectively. No large scale is proposed on account of less raw material to suffice full operation.
- iv. Bukombe and Sikonge needs newly established industries while Kibondo, Manyoni (TFS) and Mlele needs upgrading of the existing facilities to meet proposed size.
- v. For supported industries to operate as business entities and be able to isolate financial management risk, it is proposed that their obligation be secured outside the Government/Cooperative processes, through a Special Purpose Company mode of operation
- vi. Extension services should be strengthened and beekeepers' cooperatives intensified in order to increase production of raw materials.
- vii. Existing honey collection centers need to be strengthened to facilitate storage and market linkages.
- viii. Both existing and newly supported industries need to be supported in soliciting working capital and in enhancing human resources capacity.

- i. Tanzania has extensive potential for bee products production that has not been fully utilized. It is estimated that the production potential of bee products in the country is about 138,000 tons of honey and 9,200 tons of beeswax per annum from 9.2 million honeybee colonies. Though this data is not recent evidence gathered in the areas visited indicated clearly that the current production which rests at 24.6 percent (about 34,393 tons of honey and 1,843 tons) suggests that the potential has not been full exploited. Effective extension services, improved production technology and infrastructure, maintainance of quality and availability of stable markets will no doubt revistlize production.
- ii. Exist areas in Tanzania that have more beekeeping potential than others. These areas should be places for establishment of bee products processing industries but only if they meet other requirements of establishing such an industry that include existence of infrastructure, readness of stakeholders and availability of land to build the industry and attractive investment environment in general.
- iii. Most of the existing bee products processing industries in Tanzania regardless of their size operate below their capacity mainly due to inadequate working capital to purchase raw materials. A total of 21 Bee Products processing industries have been established and are located in either in regions with higher beekeeping potential or larger market proximity such as in Dar es Salaam and Coast region. Out of these 21 Bee product processing industries, 16 are small sized, 4 medium sized and only one large sized. However larger proportion of these beeproducts processing industries run below their capacity mostly due to lack of capital to purchase raw materials, limited skilled personnel to eun machinery and mismanagement. Poor or lack of research at the initial stages of establishment of the industry is another factor. Honey King Processing industry closed because it failed to export honey to its target China market since honey and beeswax are not included into a list of agricultural products allowed to be imported to China from Tanzania.
- iv. Most of existing industries are privately owned and few are owned by government and cooperative societies. The existing industries are owned and operated under different modes namely; 66.7 percent are privately own and operated, 14.3 percent owned and operated by the Government

(2 TFS and 1 for SIDO Singida), 14.3% owned and operated by beekeeper's cooperatives society and only 4.7% owned by cooperative but operated though joint between Cooperative and Private Company. Some industries have failed because of the mode of ownership and operation.

- v. Most of bee products processing industries had no evidence of information on cost benefit analysis of their undertaking suggesting that viability of these undertaking was established before the beginning of the investment. As per cost benefit analysis purchase of full-fledged machinery for micro, small, medium and large sized industries require TZS 4, 250,600, TZS. 198,520,395, TZS 319,553,620 and TZS 893,764,210 respectively. Machinery is assumed to have a life-span of 10 years before they become obsolete.
- vi. Basing on NPV and BCR, except for a micro sized industry which failed sensitivity analysis; it is profitable to invest on the project at any type and size of industry. Return on sales and break-even sales value were also satisfactory. The project can pay back within two to three years.

Based on the above conclusions the following recommendations are being made:

6.2 RECOMMENDATIONS

6.2.1 Proposed Selected Sites for establishment of Bee products Processing Industries

In order to select the appropriate site for establishment of the bee products processing Industries the following criteria were used Availability of land for building the factory, Readiness of the LGA, Availability of area for conducting beekeeping, Availability of raw materials, existence of transport networks, Existence of Beekeeping Cooperatives/Beekeeping Groups (BKG), presence of honey marketing linkages, Existence of utilities i.e. electricity, Water and Existence of honey processing industry. The site was ranked based on the above-mentioned criteria (see Table 29) and as a result five districts namely Bukombe, Kibondo, Mlele, Sikonge and Manyoni were chosen as they scored the highest in that order

					Sc	ores p	er Crit	eria			
District	Α	В	С	D	Е	F	G	Н	I	J	Total Score
Bukombe DC	3	3	3	3	3	3	2	3	2	1	26
Kibondo DC	З	3	З	3	2	З	2	2	3	2	26
Mlele DC	2	2	3	3	2	З	2	З	2	2	24
Sikonge DC	З	3	З	3	З	2	2	2	1	1	23
Tabora MC	2	3	1	3	З	2	2	З	3	1	23
Manyoni DC	2	2	2	3	3	2	2	2	2	З	23
Dodoma CC	2	2	1	2	З	З	2	З	2	2	22
Kibaha TC	2	2	2	1	З	1	2	3	3	2	21
Singida MC	2	2	1	2	З	2	2	З	2	2	21
Kahama TC	З	2	1	1	З	1	2	З	2	2	20
Ushetu DC	2	2	З	3	2	2	2	2	1	1	20
Singida DC	1	2	2	2	З	1	2	2	2	1	18
Kasulu DC	1	1	З	З	2	2	2	1	1	1	17
Kakonko DC	1	1	З	З	2	2	2	1	1	1	17
Ilala CC	1	1	1	1	3	1	2	3	2	2	17

Table 29: Site ranking in regions visited

Note: A – Land; B – Road; C – Apiary; D – Honey; E – Transport; F - Beekeeping Group; G – Market; H – Electricity; I – Water; J - Industry

6.2.2 Size and estimated Cost of proposed Bee Product Processing Industries

The size and cost of the proposed industries in the proposed site were established based on number of factors including cost analysis results. The criteria in Table 29 were critically analyzed in relation to current production of raw material and final products, local and international market situation and current status of the existing bee processing industries. Table 30 describe size and estimated cost of proposed industries. Although cost benefit analysis indicates that all categories of industries are viable, yet the current production of raw material does not suffice full operation of large scaled industries.

Therefore, small sized in Bukombe, Mlele and Manyoni Districts, and medium sized industries in Sikonge and Kibondo are proposed to be established respectively. Sikonge district produces the largest amount honey than any other district in Tanzania, is second in use of box hives among the selected districts (with 10,545 box hives) and have 18 active beekeeping groups which suggests existence of level of organization. On the other and Kibondo though is considered to have medium potential and production is lower the district has the most organized system and is the only district where beekeepers through their Cooperative Society have secured markets in Europe. Kibondo have from time to time been considered a good example of a successful and organized Cooperative Society. Currently Kibondo utilizes collection centers efficiently and strain their honey using dripping method which is not efficient.

Moreover, the proposed estimated construction cost and machineries depends on the status of industries in the proposed sites. For instance, Bukombe and Sikonge needs newly established industries while Kibondo, Manyoni (TFS) and Mlele needs upgrading of the existing facilities to meet proposed size. It is proposed that the first-year focus on support construction and installation of machineries. In subsequent year the constructed industries should be supported for working capital, since it was revealed that existing industries failed to operate at full capacity due to lack of working capital. The estimated working capital for each category is illustrated in the Appendix 21-24.

Region	Proposed #of In- dustries	Location	Proposed Size of Industry	Estimated Con- struction Cost	Estimated Ma- chinery Cost	Estimated Working Cap- ital	Remarks
Tabora	1	Sikonge DC	Medium	385,500,000	319,553,620	4,704,353 <mark>,140</mark>	Year 1 -construction and machinery installation
Kigoma	1	Kibondo DC	Medium	189,750,000	319,553,620	4,704,353,140	Year 1 - Rehabil- itation of the building (50% of building cost, minus land ac- quisition).
Geita	1	Bukombe DC	Small	224,375,000	198,520,395	2,351,285,402	Year 1 -construction and machinery installation.
Katavi	1	Mlele DC	Small	110,687,500	<mark>80,358,010</mark>	2,351,285,402	Year 1- Rehabilitation and installation of missing machinery.
Singida	1	Manyoni DC (TFS)	Small	221,375,000	17,733,100	2,351,285,402	Year 1-Construc- tion and instal- lation of missing machinery.

Table 30: Size and estimated Cost of proposed Bee Product Processing Industries

6.2.3 Mode of Ownership, Supervision and Operation of proposed Bee Product Processing Industries

The analysis of ownership, supervision and operation of existing Bee Product Processing Industries indicate that, there are many challenges that exist if industry is managed by Government, Cooperative or Private only. Therefore, the report proposes a model that can mitigate the current challenges. Table 31 provides the proposed ownership, supervision and operation of each proposed Bee Product Processing Industries. However, since the proposed industries are to operate as business entities, in order to isolate financial management risk and make their obligation secured outside the Government processes a Special Purpose Company is recommended.

 Table 31: Proposed Ownership, Supervision and Operation of proposed Bee

 Product Processing Industries

Region	District	Ownership	Supervision	Operation
Tabora	Sikonge DC	District	Special Purpose Company (SPC)	SPC & Cooperatives
Kigoma	Kibondo DC	Kibondo Beekeepers Cooperative Society (UKI)	District & Cooperatives	Cooperatives
Geita	Bukombe DC	District	Special Purpose Company (SPC)	SPC & Cooperatives
Katavi	Mlele DC	District	District & Vijana SACCOS	Vijana SACCOS
Singida	Manyoni DC	TFS	Special Purpose Company (SPC)	SPC & Cooperatives

Since ownership, supervision and operation of proposed Bee Product Processing Industries falls under different stakeholders, the following roles and responsibilities are recommended for each actor:

- A. The District Executive Director will be responsible to:
 - i. Monitor activities of the established industry;
 - ii. Establish SPC to operate the industry;
 - iii. Promoting production and marketing of bee products;
 - iv. Mobilizing beekeepers into formal groups/cooperative societies;

- v. Participate to the Advisory Board of the established Industry; and
- vi. Provide extension services to beekeepers.
- B. Beekeepers Cooperatives will be responsible to:
 - i. Mobilizing beekeepers into formal groups/cooperative societies;
 - Supplying of raw materials (honey and beeswax) to the established industries;
 - iii. Capacity building of members;
 - iv. Participate to the Advisory Board of the established Industry.
- C. TFS will be responsible to;
 - i. Monitor activities of the established industry;
 - ii. Establish SPC to operate the industry;
 - iii. Promote local and international markets of bee products;
 - iv. Assist distribution of products produced from established industries;
 - v. Provide extension services to beekeepers;
 - vi. Promote formulation of functional beekeeper's formal groups/ cooperatives; and
 - vii. Participate to the Advisory Board of the Established Industries.
- D. SPC or Cooperative/SACCOS operating the industry will be responsible to: i.Implement day to day activities of the established industry;
 - ii. Mobilize raw materials for the established industry;
 - iii. Maintain and Service the Building and Machineries;
 - iv. Keep records of necessary information (Source of raw material, Products and Sales);
 - Comply with standards and other requirement set by Regulatory Authorities;
 - vi. Promote products of the established industry; and
 - vii. Link with other stakeholder to insure distribution of products; and
 - viii. Prepare Report.

6.2.4 Improvement of Honey Production

For sustainability of the existing and established industries, collaboration of the government with other stakeholders in strengthening extension services and intensifying beekeepers' cooperatives in order to maximize production is necessary.

6.2.5 Strengthening Honey Collection Center

In order to assure quality of bee products and reliable market for beekeepers, the Ministry in collaboration with other stakeholders needs to strengthen existing honey collection centers and establish new ones in Districts where there is high production potential and closer to the proposed industries. It is proposed that new collection centers to be established in Bugomba and Bulugwa at Ushetu, Uyovu at Bukombe, Kitunda and Kiloleli at Sikonge, Ilunde at Mlele and Mwamagembe at Itigi DC. Also, this should go hand in hand with intensify beekeeping camps which are located within forest reserve, bee reserve or game reserves managed by TFS and TAWA respectively.

6.2.6. Strengthening Existing Bee Product Industries

During field visit it was found that some industries fail to continue with production due to various reasons including failure to access China market, inadequate working capital and insufficient processing facilities. Therefore, it is recommended that the owners of the existing industries be assisted in order to overcome the challenges by either providing them with fund or soft loan which will be as revolving fund.

6.3 Time line of actions

In order to succeed any investiment must be guided by clear timelines and milestone to be achieved. The Task Force proposes that the time-line below be used as an action plan and follow up.

				0	019/20	120						2020	/2021		
Activities	Oct	Νον	Dec	Jan	Feb	March	Apr	May	June	July	Aug	Sept	Oct	Νον	Dec
Study completion and submission of Quick Assessment Report															
Decision of the Ministry based on the recommendation															
Ministry share with key Stakeholders in the selected areas for establishing the industries															
Verification of the Sites															
Negotiation with the partners															
Procurement Process															
Building and Installation															
Mobilization of resources															
Operation commencement															
Monitoring and Evaluation															

APPENDICES

Appendix 1: DODOSO: TAARIFA KUTOKA KWA WAKALA NA MAMLAKA ZA USIMAMIZI

Ta<mark>asisi.....</mark>

Wahusika: TBS, OSHA, TanTrade, SIDO, TBA na TEMDO

Utangulizi

Wizara ya Maliasili na Utalii imedhamiria kuendeleza sekta ndogo ya ufugaji nyuki kwa kuwezesha uanzishwaji wa viwanda vya kuchakata na kufungasha mazao ya nyuki ili vichangie kutoa ajira na kipato kwa wananchi. Katika kufanikisha azma hii Wizara imeunda kikosi kazi kitafanya uchambuzi wa kina na waharaka (*Quick Assessment*) na kuandaa mapendekezo ya jinsi ya uanzishwaji wa viwanda vya kuchakata na kufungasha asali nchini. Kikosi kazi kimeandaa dodoso kwa ajili ya kupata maoni ya wadau mbalimbali. Yafuatayo ni maswali ambayo yanahitaji ufafanuzi wako;

1. Kuainisha maeneo vitakapojengwa viwanda kulingana na upatikanaji wa malighafi na miundo mbinu iliyopo hasa kwenye mikoa ya kip<mark>aumbele</mark>

- i. Malighafi -(H3&H4 zitasaidia H1)
- ii. -Soko lengwa ni lipi?
- iii. -Miundombinu
 - Usafirishaji-barabara, reli, ndege, maji,
 - Nishati ya umeme wa gridi au mbadala wa kuaminika na unaotosheleza mahitaji ya kiwanda,
 - Mfumo wa usambazaji wa maji ya kutumia viwandani na ubora wake,
 - Uwepo wa ardhi kwa ajili ya kusimika viwanda,
 - Utayari wa dhana ya viwanda katika eneo husika,
- iv. Tishio la kupungua kwa au kutoweka kwa fursa iliyopo

- 2. Kuainisha utaratibu utakaotumika kukusanya na kuhifadhi mazao ghafi ya nyuki kutoka kwa wafugaji nyuki kwa ajili ya kupelekwa kwenye viwanda husika.
 - Kujua utaratibu wa sasa unaotumika na chanzo chake,
 - Kujua changamoto na mafanikio ya utaratibu wa sasa,
 - Kutafuta kichocheo kwa mfumo pendekezwa (incentive za kutumia kuwashawishi wafugaji kupeleka asali yao kwenye viwanda kwa kuzingatia uwepo wa soko huria

3. Kuainisha vyanzo vya malighafi kwa ajili ya viwanda hivyo.

- Uzalishaji wa asali,
- Aina/level ya malighafi/asali lengwa,

4. Kuainisha kiwango cha uzalishaji wa mazao ya nyuki katika maeneo pendekezwa.

- Takwimu za uzalishaji na maeneo yanayozalisha,
- Fursa za kuongeza uzalishaji,
- Kuangalia eneo linaweza kutundikwa mizinga mingapi na kuweza kuzalisha kwa ufanisi (carrying capacity

5. Kuainisha maeneo vilipo vituo vya kukusanyia mazao ya nyuki, hali zake na mapendekezo ya vitakapojengwa vituo vipya.

- Mahali vilipo vituo na usahihi wa eneo vilipojengwa,
- Sifa na sababu ya uwepo wa kituo husika mahali husika,
- Hali ya kituo (operational, dormant, ubora wa jengo, shughuli zinazoendelea),
- Miundombinu na vifaa ndani ya jengo la kukusanyia,
- Mfumo wa Umiliki na usimamizi wa kituo,
- Uhitaji wa kituo cha kukusanyia mazao ya nyuki,
- Vituo vilivyopo vinatosheleza katika eneo husika,
- Mgharamiaji wa ujenzi wa kituo.

6. Kubainisha hali ya viwanda vilivyopo vya kuchakata mazao ya nyuki.

- Mahali vilipo viwanda na usahihi wa eneo vilipojengwa,
- Sifa na sababu ya uwepo wa kiwanda katika eneo husika,

- Gharama za ujenzi, mitambo iliyopo kiwandani na uendeshaji,
- Origin/Upatikanaji wa mitambo iliyopo viwandani, taratibu za ununuzi na usimikaji wa mitambo hiyo na changamoto za uendeshaji wa mitambo),
- Kukidhi taratibu za mamlaka zinazohitajika katika ujenzi na uendeshaji wa kiwanda
- Hali ya kiwanda (operational, dormant, ubora wa jengo, shughuli zinazoendelea),
- Uwezo/capacity wa mitambo kuzalisha na hali halisi kinavyozalisha
- Miundombinu muhimu iliyopo na inayohitajika hasa ndani ya kiwanda (mf. maabara/mbadala wake, sehemu ya kuhifadhi/store,
- Chanzo cha malighafi na namna ya upatikanaji wake,
- Taratibu za kutunza kumbukumbu,
- Ni mazao gani yanazalishwa na kiwanda husika,
- Soko na aina ya bidhaa inayofikishwa kwa mteja,
- Namna anavyopata wateja na anavyofikisha bidhaa,
- Umiliki na usimamizi wa kiwanda,
- Makadirio ya mtaji, namna ulivyopata,
- Mahitaji ya wafanyakazi wa kiwanda
 - Muundo wa uendeshaji
 - Idadi, aina na sifa za watumishi;
 - Mahitaji ya mafunzo ya ujuzi muhimu; na
 - Makadilio ya mshahara ya kila fani.
- Viwanda vilivyopo vinatosheleza katika eneo husika,
- Viashiria hatarishi (risks) wanavyokutana navyo.

7. Kuainisha aina ya ukubwa wa viwanda vilivyopo na vile vipya vitakavyojengwa kulingana na upatikanaji wa malighafi

- Kwa kutumia tafsiri ya MITI kuainisha ukubwa wa viwanda vilivyopo na vitakavyojengwa;
- Kubainisha ukubwa wa viwanda vitakavyojengwa kulingana na tafsiri ya MITI.

8. Kubainisha aina ya Mitambo itakayohitajika na gharama zake kwa aina tofauti za viwanda (Kidogo, cha kati na kikubwa)

- Kubainisha mitambo na gharama zake katika kiwanda vidogo, cha kati na vikubwa,
- Ubora wa mitambo inayohitajika, namna ya kusimika, upatikanaji wa vipuri na utaalamu wa uendeshaji,
- Vyanzo/origin ya mitambo hiyo,
- Ainisha sifa ya jengo kwa ajili ya kusimika mtambo husika (layout & BOQ),
- Kubainisha life span ya mtambo baada ya kusimikwa, regular maintenance costs, major repairs, depreciation level for operation.
 Kujua mtambo unakuwa obsolete baada ya muda gani,

9. Kubainisha gharama za ujenzi wa Kiwanda na gharama zake kwa aina tofauti za viwanda (Kidogo, cha kati na kikubwa)

- Ainisha sifa na gharama za ujenzi wa jengo la kiwanda kwa ajili ya kusimika mtambo husika,
- Layout ioneshe mahitaji yote ya uzalishaji (kutoka upokeaji wa malighafi hadi kutoa bidhaa ya mwisho),
- Kuainisha gharama za mahitaji yote uzalishaji (kutoka upokeaji wa malighafi hadi kutoa bidhaa ya mwisho) –fixed na variable costs.
- Gharama za ardhi
- Vibali vya ujenzi

10. Kubainisha gharama za kufundisha wataalam wa kuendesha mitambo

- Kutambua aina za utaalamu unaohitajika kulingana na mitambo iliyopendekezwa,
- Kuainisha aina ya mafunzo, yanapotolewa, na muda wa mafunzo husika,
- Kubainisha gharama kwa muda wa mafunzo,
- Kubainisha mafunzo yanayoweza kutolewa na taasisi za ndani ya nchi (Vyuo vikuu, SIDO, VETA, TBS na DIT)

11. Kupendekeza namna bora ya uanzishaji, usimamizi na uendeshaji wa kila viwanda vitakavyoanzishwa katika misingi endelevu na jinsi ya kushirikisha sekta binafsi (PPP)

- Kuainisha nani mwenye miliki ya kiwanda kinachojengwa,
- Chanzo cha mtaji wa kuanzisha kiwanda,
- Utaratibu wa usimamizi,
- Utaratibu wa uendeshaji/utendaji wa kila siku,
- Aina ya ubia unaoweza kuingiwa,
- Utaratibu wa ufuatiliaji na uperembaji katika uanzishaji, usimamizi na uendeshaji wa viwanda vitakavyoanzishwa.

12. Kubainishagharamazauendeshaji, Mapatoghafinafaidaitakayopatikana kutokana na viwanda (Cost benefit analysis) tangu kuanzishwa kwa kiwanda. (kuomba nakala za business plan)

- Kuainisha CBA kwa viwanda vidogo, vya kati na vikubwa,
- Kujua uanzishwaji wa viwanda vilivyopo kama ulizingatia CBA,
- Je, viwanda vilivyopo vina business plan,
- Kupendekeza outline ya business plan template/model ya viwanda vya mazao ya asali kwa ajili ya kufanyiwa kazi zaidi (consultancy),
- Kuainisha mtaji, mapato na matumizi ya viwanda viwanda vidogo, vya kati na vikubwa,
- Kufanya sensitivity analysis

13. Kubaini idadi na hali ya vyama vya ushirika vya ufugaji nyuki

- Kuangalia aina ya vyama vya ushirika na mahali vilipo,
- Kubainisha mifumo mingine ya usajili wa wafugaji nyuki,
- Jukumu la maafisa ushirika na maafisa maendeleo ya jamii kwenye vyama vya ushirika vilivyopo,
- Ufahamu wa wanaushirika kuhusu umuhimu, majukumu na faida ambazo wanaushirika,
- Jinsi ushirikia unavyonufaisha wanachama wake

14. Kubainisha na masuala mengine ambayo yataonekana kuwa ni muhimu katika kufanikisha azma ya kuanziasha viwanda vya kuchakata asali nchini

- Utaratibu wa upatikanaji wa maeneo ya kufugia,
- Kuainisha maeneo ya sera na sheria ambayo yatawezesha uanzishaji na uendelezaji wa viwanda vya ufugaji nyuki,
- Kuangalia utaratibu ulioko wa kujenga uelewa kwa umma kuhusu umuhimu wa uzalishaji na ujenzi wa viwanda vya kuchakata asali,

1<mark>5. Kuf</mark>anya uchambuzi wa masoko ya ndani, kikanda na kimatatifa

- Kuangalia hali ya upatikanaji wa masoko ya ndani na kikanda (EAC, SADC, etc) ikijumuisha mfumo wa bei na uzaishaji wa mazao ya nyuki.
- Kuangalia hali ya kidunia ya uzalishaji, matumizi na bei ya mazao ya nyuki kwa kipindi cha miaka 5-10 iliyopita
- Kuangalia hali ya viwanda vya mazao ya nyuki ilivyo sasa duniani (uwezo wake, uzalishaji, kiwango cha matumizi na bei),
- Kuangalia matarajio ya mahitaji na rakisi ya mazao ya nyuki kidunia kwa miaka 5 ijayo (ongezeko la mahitaji, uzalishaji na bei),
- Fursa za mgawanyo/upanuzi (market share) wa soko la ndani, kikanda na duniani zilizopo kwa ajili ya viwanda,
- Kutambua aina ya soko tarajiwa la viwanda (na ukubwa wa kila aina),
- Mahitaji ya ubora wa asali kwa kila aina ya soko,
- Kubainisha vikwazo vya kibiashara ya asali vinavyotegemewa katika masoko tarajiwa,
- Kuainisha mikakati ya kibiashara, uhamasishaji na mifumo ya usambazaji wa mazao ya nyuki.

16. Kuchambua rasilismali za mazao ya nyuki

- Kufanya mapitio ya programu mbalimbali na machapisho juu ya uanzishaji wa viwanda vya asali,
- Maelezo ya kina ya ubora na uwingi wa rasilismali za mazao ya nyuki na fursa za matumizi kibiashara (possible commercial products)

17. Tathmini ya teknolojia

- Uchambuzi wa teknolojia za uchakataji wa mazao ya nyuki zilizopo (faida na hasara) na kigezo cha kuchagua aina ya teknolojia pendekezwa,
- Kuandaa mchoro (flow diagram) wa kiwanda cha kuchakata asali,
- Maelezo kamili ya teknolojia itakayotumika kwenye uchakataji wa asali,
- Uchaguzi wa uwezo na ukubwa wa mitambo kwa kuzingatia tija (economies of scale) (kidogo, kati na kikubwa);
- kuzingatia uongezaji wa thamani ya mazao mengine ya nyuki katika kiwanda pendekezwa
- Matakwa ya ubora kwa walaji mbalimbali;
- Malighafi nyingine zinazohitajika kwa ajili ya uendeshaji wa kiwanda pendekezwa (wingi na Ubora);

18. Tathmini ya uwepo wa mahitaji ya undeshaji wa kiwanda (Assessment of Availability of Plant Utilities)

- Nishati ya Umeme (makadilio ya umeme unaohitaji, chanzo cha nishati na gharama za nishati umeme)
- Kama umeme unatoka kwenye gridi ya Taifa na uko umbali gani na kutoka kwenye eneo tarajiwa la ujenzi wa kiwanda na una nguvu (voltage) kiasi gani?
 - Maji
- Makadilio ya maji yanayohitajika kwa matumizi ya kiwanda.
- Chanzo cha maji na mfumo wa uhifadhi na usambazaji
- Ubora wa maji (if water treatement necessary, what is the proposed method?)

19. Gharama pendekezwa za Ujenzi wa Kiwanda

Gharama za uwekezaji

- Ardhi (Upatikanaji na utayarishaji),
- Mitambo ya uchakataji (ununuzi, usafirishaji, kodi na ushuru, msamaha wakodi, usimikaji na gharama za mafunzo ya usimikaji)
- Huduma muhimu (maji na umeme)

- Gharama za ujezi wa jengo na huduma muhimu za jengo,
- Ulinzi
- Gharama nyingine
- Gharama za marejesho

Gharama za uendeshaji

- Ununuzi wa malighafi,
- Malipo ya huduma muhimu (maji na umeme ya kila mwezi),
- Mafuta na vilainishi,
- Vitenganishi
- Vipuli
- Mtaji wa uendeshaji (Capital expenditure);
- Mishahara
- Gharama za kiutawala;
- Huduma za kifedha,
- Gharama za matengenezo mbalimbali

Appendix 2: DODOSO LA WAFANYABIASHARA

Wahusika: Wafanyabiashara

Utangulizi

Wizara ya Maliasili na Utalii imedhamiria kuendeleza sekta ndogo ya ufugaji nyuki kwa kuwezesha uanzishwaji wa viwanda vya kuchakata na kufungasha mazao ya nyuki ili vichangie kutoa ajira na kipato kwa wananchi. Katika kufanikisha azma hii Wizara imeunda kikosi kazi kitafanya uchambuzi wa kina na waharaka (*Quick Assessment*) na kuandaa mapendekezo ya jinsi ya uanzishwaji wa viwanda vya kuchakata na kufungasha asali nchini. Kikosi kazi kimeandaa dodoso kwa ajili ya kupata maoni ya wadau mbalimbali. Yafuatayo ni maswali ambayo yanahitaji ufafanuzi wako;

- i. Wewe kama mfanyabiashara wa mazao ya nyuki, nini kilikuhamasisha kuingia kwenye biashara hii?
- ii. Je ni njia gani unazotumia kukusanya na kuhifadhi mazao kutoka kwa wafugaji nyuki?
 - Hali ya upatikanaji wa mazao hayo ikoje?
 - Mazao hayo unayatoa wapi? (bei, wastani/kiasi unachonunua kwa mwaka, washindani katika ununuzi, mfumo rasmi wa soko na kalenda ya upokeaji wa mazao), unatumia vituo vya kukusanyia asali? na nini kiboreshwe katika vituo hivyo?
 - Je, unajihusisha pia na ufugaji wa nyuki kama sehemu ya chanzo cha mazao kwa ajili ya biashara yako? Kama ndiyo: (ukubwa wa manzuki, lipo wapi, usimamizi wa manzuki, uwezekano wa kuongeza uzalishaji, kalenda ya ufugaji nyuki, idadi na aina ya mizinga,);
 - Unapata mazao kiasi gani kwa mwaka na yenye ubora gani?
 - o Utaratibu unaotumika kukusanya na kuhifadhi mazao (ghala),
 - o Mafanikio ya utaratibu wa huo,
 - o Changamoto za utaratibu huo,

- o Nini kimefanyika/kifanyike ili kuchochea mafanikio ya utaratibu wa sasa?
- iii. Je kuna jambo lolote ambalo linaweza kukwamisha upatikanaji na masoko ya mazao unayouza?
- iv. Je, unaweza kutupatia taarifa mbalimbali za kuwezesha kuanzisha biashara ya mazao ya asali?
 - Gharama za ujenzi wa eneo la kuhifadhia na kufanyia biashara,
 - Aina ya vifaa unavyohifadhia na kuuzia asali na bei ya kununulia vifaa,
 - Mahali vinapopatikana vifaa hivyo na taratibu za ununuzi,
 - Taratibu za mamlaka za usimamizi ulizofuata wakati wa kuanzisha na kufanya biashara ya mazao ya nyuki,
 - Angalia: Miundombinu muhimu iliyopo na inayohitajika hasa ndani ya ghala (mf. maabara/mbadala wake, sehemu ya kuhifadhi/store,
 - Taratibu za kutunza kumbukumbu,
 - Je, una mpango wowote wa kuongeza aina ya mazao unayouza
 - Hali ya soko la mazao unayouza (aina ya mazao yanayofikishwa kwa mteja, wanunuzi/wateja, matakwa ya ubora kwa walaji mbalimbali, bei ya asali, mfumo rasmi wa soko),
 - Namna anavyopata wateja na anavyofikisha bidhaa,
 - Wafanyakazi
 - Muundo wa uendeshaji
 - Idadi, aina na sifa za watumishi;
 - Mahitaji ya mafunzo ya ujuzi muhimu; na
 - Changamoto za uendeshaji wa kiwanda.
- v. Je, unaweza kutueleza utaratibu wa biashara yako tangu unavyokusanya mazao hadi kuyafikisha kwa mteja?
- vi. Je, ulipataje mtaji wa kuanzisha biashara yako? Mahitaji ya mtaji uliyajuaje?
 - Uliandaa mpango wa biashara (Business plan)?

vii. Je, una maoni gani kuhusu uanzishwaji wa viwanda vya uchakataji na ufungashaji wa asali?

viii. Je, utaratibu gani unaotumia katika umiliki, usimamizi na uendeshaji wa biashara yako?

- Je, unaridhika na utaratibu huo?
- Je, upo tayari kuingia kwenye utaratibu tofauti na huu wa sasa?

ix. Je, unapataje fursa za kibiashara na masoko ya ndani, kikanda na kimataifa?

- Je, umewahi kupata masoko au kuuza mazao yako nje ya nchi?
- Kama ndio: Kuna masharti gani ya kuuza nje ya nchi? ni kwa uzito/ ujazo upi?
- Mahitaji ya ubora wa asali kwa kila aina ya soko,
- Vikwazo vya kibiashara vya soko la asali,
- Je, una mkakati wowte wa kukuza biashara yako?

Appendix 3: DODOSO LA WENYE VIWANDA

Wahusika: Wamiliki wa viwanda

Utangulizi

Wizara ya Maliasili na Utalii imedhamiria kuendeleza sekta ndogo ya ufugaji nyuki kwa kuwezesha uanzishwaji wa viwanda vya kuchakata na kufungasha mazao ya nyuki ili vichangie kutoa ajira na kipato kwa wananchi. Katika kufanikisha azma hii Wizara imeunda kikosi kazi kitafanya uchambuzi wa kina na waharaka (*Quick Assessment*) na kuandaa mapendekezo ya jinsi ya uanzishwaji wa viwanda vya kuchakata na kufungasha asali nchini. Kikosi kazi kimeandaa dodoso kwa ajili ya kupata maoni ya wadau mbalimbali. Yafuatayo ni maswali ambayo yanahitaji ufafanuzi wako;

x. Wewe kama mmiliki wa kiwanda, ni nini kilikuhamasisha kuanzisha kiwanda cha kuchakata mazao ya nyuki?

(Ulizia)

- Sifa na sababu ya uwepo wa kiwanda katika eneo husika,
- Hali ya umiliki wa eneo kilipo viwanda ikoje?
 - Ukubwa wa eneo,
 - Kama ni lako je, una hati ya umiliki na je lilihitaji fidia? (kama fidia: kiasi gani)? Gharama ya kununua eneo ni kiasi gani? (Kama ni la kukodi: je gharama ya pango ni kiasi gani)?
 - Hali ya kufikika kwenye kiwanda (barabara, reli etc),
 - Makadirio ya umeme unaohitaji, chanzo cha nishati na gharama za nishati umeme,
 - Makadirio ya maji yanayotumika kwa ajili ya kiwanda na mfumo wa usambazaji wa maji ya kiwanda,

xi. Je ni njia gani zinazotumika kukusanya na kuhifadhi malighafi kutoka kwa wafugaji nyuki kwa ajili ya kiwanda?

 Hali ya upatikanaji wa malighafi kwa ajili ya kuendeshea kiwanda chako ikoje?

- Malighafi hiyo inatoka wapi? (bei, washindani katika ununuzi, mfumo rasmi wa soko na kalenda ya upokeaji wa malighafi), unatumia vituo vya kukusanyia asali?na nini kiboreshwe katika vituo hivyo?
- Je, unajihusisha pia na ufugaji wa nyuki kama sehemu ya chanzo cha malighafi ya kiwanda chako? Kama ni mfugaji: (ukubwa wa manzuki, lipo wapi, usimamizi wa manzuki, uwezekano wa kuongeza uzalishaji, kalenda ya ufugaji nyuki, idadi na aina ya mizinga,);
- Unapata malighafi kiasi gani kwa mwaka na yenye ubora gani?
 - o Utaratibu unaotumika kukusanya na kuhifadhi malighafi,
 - o Mafanikio ya utaratibu wa huo,
 - o Changamoto za utaratibu huo,
 - o Nini kimefanyika/kifanyike ili kuchochea mafanikio ya utaratibu wa sasa?

xii. Je kuna jambo lolote ambalo linaweza kukwamisha upatikanaji wa malighafi na masoko ya bidhaa unazozalisha?

xiii.Je, unaweza kutupatia taarifa mbalimbali za kuwezesha kuanzisha kiwanda?

- Gharama za ujenzi,
- Aina ya mitambo anayotumia na gharama zake,
- Mahali ilipopatikana mitambo hiyo, taratibu za ununuzi na usimikaji wa mitambo hiyo
- Uwezo/capacity wa mitambo kuzalisha na hali halisi kinavyozalisha,
- Upatikanaji wa vipuri na utaalamu wa uendeshaji,
- Muda wa mitambo kabla ya kupoteza uwezo wa kuzalisha (life span),
- Taratibu za mamlaka za usimamizi ulizofuata wakati wa ujenzi na uendeshaji wa kiwanda,
- Miundombinu muhimu iliyopo na inayohitajika hasa ndani ya kiwanda (mf. maabara/mbadala wake, sehemu ya kuhifadhi/store,
- Taratibu za kutunza kumbukumbu,
- Ni mazao gani yanazalishwa na kiwanda chako, je, una mpango wowote wa kuongeza aina ya bidhaa unazozalisha
- Hali ya soko la mazao unayozalisha (aina ya bidhaa inayofikishwa kwa mteja, wanunuzi, matakwa ya ubora kwa walaji mbalimbali, bei ya asali, mfumo rasmi wa soko),

- Namna anavyopata wateja na anavyofikisha bidhaa,
- Wafanyakazi wa kiwanda
 - Muundo wa uendeshaji
 - Idadi, aina na sifa za watumishi;
 - Mahitaji ya mafunzo ya ujuzi muhimu; na
 - Makadilio ya mshahara ya kila fani.
- Viashiria hatarishi (risks) unavyokutana navyo,
- Changamoto za uendeshaji wa kiwanda.

xiv. Je, unafikiri kiwanda chako kinaweza kuwekwa kwenye kundi gani la ukubwa (kidogo, kati au kikubwa? kwa nini?)

- xv. Je, unaweza kutueleza mpangilio wa kiwanda chako tangu kunapokea hadi kutoa bidhaa ya mwisho? (Omba ramani ya kiwanda na set-up ya mitambo),
- xvi. Kwa wastani, unafikiri gharama zako za uendeshaji wa kiwanda kwa mwaka ni kiasi gani? (kutoka upokeaji wa malighafi hadi kutoa bidhaa ya mwisho – fixed na variable costs).
- xvii. Je, kuna utaratibu wowote wa mafunzo kwa waajiriwa wako? **Kama ndio:** Ni mafunzo ya aina gani yanayohitajika kwa mitambo iliyopo? Je, yanapatikana wapi? na wastani wa gharama za mafunzo ni kiasi gani?
- xviii. Je mfumo gani unaotumia katika uanzishaji, umiliki, usimamizi na uendeshaji wa kiwanda chako?
 - Je, unaridhika na mfumo unaoutumia kwa sasa?
 - Je, upo tayari kuingia kwenye mfumo tofauti na huu wa sasa?

xix. Je, ulipataje mtaji wa kuanzisha kiwanda chako? Mahitaji ya mtaji uliyajuaje?

- Uliandaa mpango wa biashara (Business plan),
- Ulifanya upembuzi yakinifu.

Kiambatisho: Gharama pendekezwa za Ujenzi wa Kiwanda

• Gharama za uwekezaji

- Ardhi (Upatikanaji na utayarishaji)
- Mitambo ya uchakataji (ununuzi, usafirishaji, kodi na ushuru, msamaha wakodi, usimikaji na gharama za mafunzo ya usimikaji)
- Huduma muhimu (maji na umeme)
- Gharama za ujezi wa jengo na huduma muhimu za jengo
- Ulinzi
- Gharama nyingine
- Gharama za marejesho

Gharama za uendeshaji

- Ununuzi wa malighafi
- Malipo ya huduma muhimu (maji na umeme ya kila mwezi)
- Mafuta na vilainishi
- Vitenganishi
- Vipuli
- Mtaji wa uendeshaji (Capital expenditure)
- Mishahara
- Gharama za kiutawala
- Huduma za kifedha

Gharama za matengenezo mbalimbali
Appendix 4: DODOSO: TAARIFA ZA WAFUGAJI NYUKI NA USHIRIKA

Wahusika: TABEDO, TABECU, TABEA, THC, Chuo cha Ushirika na Wafugaji nyuki.

Utangulizi

Wizara ya Maliasili na Utalii imedhamiria kuendeleza sekta ndogo ya ufugaji nyuki kwa kuwezesha uanzishwaji wa viwanda vya kuchakata na kufungasha mazao ya nyuki ili vichangie kutoa ajira na kipato kwa wananchi. Katika kufanikisha azma hii Wizara imeunda kikosi kazi kitafanya uchambuzi wa kina na waharaka (Quick Assessment) na kuandaa mapendekezo ya jinsi ya uanzishwaji wa viwanda vya kuchakata na kufungasha asali nchini. Kikosi kazi kimeandaa dodoso kwa ajili ya kupata maoni ya wadau mbalimbali. Yafuatayo ni maswali ambayo yanahitaji ufafanuzi wako;

 Kutokana na fursa za ufugaji nyuki zilizopo nchini, Je ninyi mmejipangaje katika kutumia fursa hiyo?

(Ulizia)

- Hali ya upatikanaji wa mazao ya nyuki (Takwimu za uzalishaji wa mazao ya nyuki);
- Uwepo wa maeneo ya kufugia (Umiliki, hati ya umiliki, Ukubwa wa eneo, wapi, usimamizi wa maeneo, idadi ya wafugaji, uwezekano wa kuongeza uzalishaji, kalenda ya ufugaji nyuki, idadi na aina ya mizinga);
- Hali ya soko la mazao ya nyuki (wanunuzi (wa nje au ndani ya nchi), bei ya asali, mfumo rasmi wa soko)
- ii. Ni mfumo gani mnaotumia kukusanya, kutafuta masoko na kuuza mazao yenu?
- iii. Je kuna wajumbe wenye viwanda vyovyote vya kuchakata na kufungasha mazao ya nyuki katika ushirika wenu?
 - Viwanda vilivyopo vina hali gani (operational, dormant, ubora wa jengo, shughuli zinazoendelea),
 - Viwanda vilivyopo vinatosheleza katika eneo husika,
- iv. Kama Serikali, Halmashauri au taasisi ya umma ikiamua kujenga kiwanda cha kuchakata na kufungasha mazao ya nyuki katika eneo lenu, ni mfumo gani wa umiliki, usimamizi na uendeshaji mnaona unafaa? (mna mtazamo gani mwingine?)

- v. Je, mnapata huduma za ugani na mafunzo kutoka kwa wataalam wa ushirika na ufugaji nyuki? Zitaje.....
 - Kwa wanachama ambao ni wafugaji nyuki:
 - i. Je, kwenye eneo lako kuna kituo cha kukusanyia mazao/kiwanda: je, unatumia kituo kukusanyia mazao yako? kama hukitumii: kwa nini?
 - ii. Je, wewe ni mwanachama wa kikundi au chama chochote cha ushirika? kama sio: kwa nini?
 - iii. Ni nini kifanyike ili kuhamasisha wafugaji nyuki kujiunga na ushirika na kutumia vituo vya kukusanyia mazao?

Kwa viongozi wa vyama vya ushirika:

- i. Hali ya chama chenu cha ushirika ikoje? (Hai/kimekufa)
- ii. Ushirika wenu unawanachama wangapi?
- iii. Hali ya usimamizi na uendeshaji wa ushirika ikoje? (viongozi wanachaguliwaje? mikutano, muda wa uongozi)
- iv. Je, mnaona mfumo wa usimamizi mlionao kwa sasa unafaa?
- v. Kwanini mliamua kuunda ushirika?
- vi. Mwitikio wa wanachama kujiunga na ushirika ukoje?
- vii. Hali ya kifedha ya ushirika wenu ikoje?
- viii. Je, ushirika wenu una akaunti ya benki?
- ix. Je, mlishapata mafunzo ya ushirika?
- x. Je, utaratibu wa udhibiti wa mapato na matumizi ya fedha ukoje?
- xi. Je, ushirika wenu unamiliki manzuki, kituo cha kukusanyia mazao au kiwanda cha kuchakatia mazao ya nyuki? (kama wana kituo cha kukusanyia mazao/kiwanda: je, kinatumika? kinatumiwa na nani? je, kama mtu si mwanachama wa ushirika, anaweza kutumia kituo kwa namna yoyote ile?
- xii. Kama hawana, je kuna uhitaji/utayari wa kuwa na manzuki, kituo cha kukusanyia mazao au kiwanda cha kuchakatia asali?
- xiii. Je, mnazani mfumo gani wa umiliki utumike?
- xiv. Ni nini kifanyike ili kuhamasisha wafugaji nyuki kujiunga na ushirika na kutumia vituo vya kukusanyia mazao?
- xv. Je, kuna changamoto zozote mnazokutana nazo katika usimamizi na uendeshaji wa ushirika wenu?
- xvi.Je, chama chenu cha ushirika ni cha msingi au kikuu?

Appendix 5: ANNUAL PRODUCTION COSTS AT FULL CAPACITY, HONEY AND BEESWAX PROCESSED, MICRO '000'000

	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11
Raw Materials	45	45	70	78	78	78	78	78	78	78
Staffing Requirement	13	13	13	13	13	13	13	13	13	13
Bucket	0	0	0	0	0	0	0	0	0	0
Packaging material & labels (1/2kg bottle)	0	0	0	0	0	o	0	O	0	0
Electricity Use	0	0	0	0	0	0	0	0	0	0
Advertisement	0	0	0	0	0	0	0	0	0	0
Water	0	0	0	0	0	0	0	0	0	0
Machinery Repair and Services	0	0	0	0	0	0	0	0	0	0
Total Variable Cost	60	60	85	93	93	93	63	93	93	93
Depreciation	0	0	0	0	0	0	0	0	0	0

Appendix 6: ANNUAL PRODUCTION COSTS AT FULL CAPACITY, HONEY AND WAX AS PROCESSED, SMALL '000'000

ANNUAL PRODUCTION COSTS AT FULL CAPACITY	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Raw Material	2,434	3,780	4,200	4,200	4,200	4,200	4,200	4,200	4,200	4,200
Staffing Requirement	30	30	30	30	30	30	30	30	30	30
Bucket	2	2	2	2	2	2	2	2	2	2
Packaging material & labels (1/2kg bottle)	20	20	20	20	20	20	20	20	20	20
Electricity Use	10	10	10	10	10	10	10	10	10	10
Advertisement	2	2	2	2	2	2	2	2	2	2
Water	0	0	0	0	0	0	0	0	0	0
Repair and Service of Machinery	2	2	2	2	20	20	20	20	20	20
Total Variable Cost	65	65	65	65	83	83	83	83	83	83
Depreciation	20	20	20	20	20	20	20	20	20	20

Appendix 7: ANNUAL PRODUCTION COSTS AT FULL CAPACITY, HONEY AND BEESWAX PROCESSED, MEDIUM '000'000

ANNUAL PRODUCTION COSTS AT FULL CAPACITY	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11
Raw Materials	4,868	7,560	8,400	8,400	8,400	8,400	8,400	8,400	8,400	8,400
Staffing Requirement	64	64	64	64	64	64	64	64	64	64
Bucket	4	4	4	4	4	4	4	4	4	4
Packaging material & labels (1/2kg bottle)	40	40	40	40	40	40	40	40	40	40
Electricity Use	16	16	16	16	16	16	16	16	16	16
Advertisement	5	5	5	5	5	5	5	5	5	5
Water	1	-	1	1	1	1	1	1	-	1
Repair and Service of Machinery	£	£	£	З	32	32	32	32	32	32
Total Variable Cost	128	128	128	128	157	157	157	157	157	157
Depreciation	32	32	32	32	32	32	32	32	32	32

Appendix 8: ANNUAL PRODUCTION COSTS AT FULL CAPACITY, HONEY AND BEESWAX PROCESSED, LARGE '000'000

Raw Material $6,086$ $9,451$ $10,501$ $10,$	ANNUAL PRODUCTION COSTS AT FULL CAPACITY	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11
Staffing Requirement 99 90 Bucket 5	Raw Material	6,086	9,451	10,501	10,501	10,501	10,501	10,501	10,501	10,501	10,501
Bucket 5 <t< td=""><td>Staffing Requirement</td><td>66</td><td>66</td><td>99</td><td>99</td><td>66</td><td>66</td><td>66</td><td>66</td><td>66</td><td>99</td></t<>	Staffing Requirement	66	66	99	99	66	66	66	66	66	99
packaging material F labels (1/2kg 50	Bucket	5	5	5	5	5	5	5	5	5	5
Electricity Use 18 13	packaging material & labels (1/2kg bottle)	50	50	50	50	50	50	50	50	50	50
Advertisement 13	Electricity Use	18	18	18	18	18	18	18	18	18	18
Water 1 <td>Advertisement</td> <td>13</td>	Advertisement	13	13	13	13	13	13	13	13	13	13
Repair and Service of Machinery 9 9 9 89 <	Water	1	1	1	1	1	1	1	٦	1	1
Total Variable Cost 183 183 183 263	Repair and Service of Machinery	6	9	9	9	89	89	89	89	89	89
Depreciation 89	Total Variable Cost	183	183	183	183	263	263	263	263	263	263
	Depreciation	89	89	89	89	89	89	89	89	89	89

Appendix 9: INCOME STATEMENTS '000, MICRO INDUSTRY

INCOME STATEMENT	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11
Sales Revenue	116	180	200	200	200	200	200	200	200	200
Less Variable Costs	60	60	85	66	93	93	93	93	93	93
Less Fixed Costs	1	٦	1	L	1	1	1	1	1	1
Gross Profit	55	120	115	107	106	106	106	106	106	106
Income Tax	17	36	34	25	32	32	32	32	32	32

INCOME STATEMENT	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11
Sales Revenue	6,688	10,291	11,435	11,435	11,435	11,435	11,435	11,435	11,435	11,435
Less Variable Costs	2,501	3,847	4,267	4,267	4,285	4,285	4,285	4,285	4,285	4,285
Less Fixed Costs	21	21	21	12	21	21	21	21	21	21
Gross Profit	4,166	6,423	7,146	7,146	7,129	7,129	7,129	7,129	7,129	7,129
Income Tax	1,250	1,927	2,144	2,144	2,139	2,139	2,139	2,139	2,139	2,139
Net Profit	2,916	4,496	5,003	2,003	4,990	4,990	4,990	4,990	4,990	4,990

Appendix 10: INCOME STATEMENTS '000'000, SMALL INDUSTRY

Appendix 11: INCOME STATEMENTS '000'000, MEDIUM INDUSTRY

INCOME STATEMENT	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11
Sales Revenue	13,376	20,582	22,869	22,869	22,869	22,869	22,869	22,869	22,869	22,869
Less Variable Costs	5,002	7,694	8,534	8,534	8,563	8,563	8,563	8,563	8,563	8,563
Less Fixed Costs	37	37	37	37	37	37	37	37	37	37
Gross Profit	8,337	12,851	14,298	14,298	14,269	14,269	14,269	14,269	14,269	14,269
Income Tax	2,501	3,855	4,289	4,289	4,281	4,281	4,281	4,281	4,281	4,281
Net Profit	5,836	8,996	10,009	10,009	9,989	9,989	9,989	9,989	686'6	9,989

Appendix 12: INCOME STATEMENTS '000'000, LARGE INDUSTRY

INCOME STATEMENT	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11
Sales Revenue	16,720	25,728	28,586	28,586	28,586	28,586	28,586	28,586	28,586	28,586
Less Variable Costs	6,281	9,646	10,696	10,696	10,777	10,777	10,777	10,777	10,777	10,777
Less Fixed Costs	102	102	102	102	102	102	102	102	102	102
Gross Profit	10,336	15,979	17,788	17,788	17,707	17,707	17,707	17,707	17,707	17,707
Income Tax	3,101	4,794	5,336	5,336	5,312	5,312	5,312	5,312	5,312	5,312
Net Profit	7,235	11,185	12,451	12,451	12,395	12,395	12,395	12,395	12,395	12,395

Appendix 13: INCOME FLOW, MICRO INDUSTRY

CASH FLOW	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11
Inflow Funds	69					'		ı			
Inflow Operation		116	180	200	200	200	200	200	200	200	200
Other Income			1		ı		ı	ı		I	
TOTAL CASH INFLOW		116	180	200	200	200	200	200	200	200	200
TOTAL CASH OUTFLOW		118	72	76	70	70	70	70	70	70	70
Increase in Fixed Assets		-		-		-				1	
Increase in Current Asset		41	8	9	ı	ı		ı	ı	•	
Operating Costs (Variable Costs)	ı	60	60	85	63	63	69	6	93	66	63
Advertisement		0	0	0	0	0	0	0	0	0	0
Income Tax	-	17	36	34	32	32	32	32	32	32	32
Loan Repayment		1	-	-	I	1	ı	1		-	
SUPLUS (DEFICIT)	•	(2)	108	125	130	130	130	130	130	130	130
CUMMULATIVE CASH BALANCE		(2)	106	230	360	490	620	750	880	1,010	1,139
NET CASH FLOW		(2)	108	125	130	130	130	130	130	130	130
CUMMULATIVE NET CASH	(69)	(69)	39	164	294	424	553	683	813	943	1,073

Appendix 14: INCOME FLOW, SMALL INDUSTRY

CASH FLOW	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11
Inflow Funds	425										1
Inflow Operation	ı	6,688	10,291	11,435	11,435	11,435	11,435	11,435	11,435	11,435	11,435
Other Income	ı	I	I		I	I		I	-	ı	I
TOTAL CASH INFLOW	425	6,688	10,291	11,435	11,435	11,435	11,435	11,435	11,435	11,435	11,435
TOTAL CASH OUTFLOW	425	6,114	6,220	6,724	6,412	6,425	6,425	6,425	6,425	6,425	6,425
Increase in Fixed Assets	425	-	ı		ı	ı		1		ı	ı
Increase in Current Asset	ı	2,362	445	312	I					I	I
Operating Costs (Variable Costs)	1	2,501	3,847	4,267	4,267	4,285	4,285	4,285	4,285	4,285	4,285
Advertisement	1	2	2	2	2	2	2	2	2	2	2
Income Tax	ı	1,250	1,927	2,144	2,144	2,139	2,139	2,139	2,139	2,139	2,139
Loan Repayment	ı	-	I		I	I		I	-	ı	I
SUPLUS (DEFICIT)		574	4,071	4,710	5,022	5,010	5,010	5,010	5,010	5,010	5,010
CUMMULATIVE CASH BALANCE		574	4,645	9,355	14,377	19,387	24,397	29,407	34,417	39,427	44,437
NET CASH FLOW		574	4,071	4,710	5,022	5,010	5,010	5,010	5,010	5,010	5,010
CUMMULATIVE NET CASH FLOW	(425)	149	4,220	8,930	13,952	18,962	23,972	28,982	33,992	39,002	44,012

Appendix 15: INCOME FLOW, MEDIUM INDUSTRY

CASH FLOW	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11
Inflow Funds	<i>207</i>	-	1	-	-		1	-		-	ı
Inflow Operation		13,376	20,582	22,869	22,869	22,869	22,869	22,869	22,869	22,869	22,869
Other Income	-	I	I	-	I	I	I	I		ı	T
TOTAL CASH INFLOW	707	13,376	20,582	22,869	22,869	22,869	22,869	22,869	22,869	22,869	22,869
TOTAL CASH OUTFLOW	707	12,232	12,445	13,452	12,828	12,849	12,849	12,849	12,849	12,849	12,849
Increase in Fixed Assets	707	I	ı	-	I	I	I	ı	ı	ı	ı
Increase in Current Asset		4,724	891	624	I					ı	I
Operating Costs (Variable Costs)	-	5,002	7,694	8,534	8,534	8,563	8,563	8,563	8,563	8,563	8,563
Advertisement	I	ß	5	5	5	ß	ß	ß	5	5	D
Income Tax		2,501	3,855	4,289	4,289	4,281	4,281	4,281	4,281	4,281	4,281
Loan Repayment	-	I	ı	-	I	ı	ı		-	ı	I
SUPLUS (DEFICIT)		1,144	8,137	9,417	10,041	10,020	10,020	10,020	10,020	10,020	10,020
CUMMULATIVE CASH BALANCE		1,144	9,281	18,697	28,738	38,759	48,779	58,800	68,820	78,841	88,861
NET CASH FLOW	(707)	1,144	8,137	9,417	10,041	10,020	10,020	10,020	10,020	10,020	10,020
CUMMULATIVE NET CASH	(707)	437	8,574	17,990	28,031	38,052	48,072	58,093	68,113	78,134	88,154

Appendix 16: INCOME FLOW, LARGE INDUSTRY

CASH FLOW	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11
Inflow Funds	1,540.3				1	-	'		1	-	ı
Inflow Operation	ı	16,720.0	25,727.6	28,586.3	28,586.3	28,586.3	28,586.3	28,586.3	28,586.3	28,586.3	28,586.3
Other Income	ı	ı	-	I	ı	I	ı		ı	I	I
TOTAL CASH INFLOW	1,540.3	16,720.0	25,727.6	28,586.3	28,586.3	28,586.3	28,586.3	28,586.3	28,586.3	28,586.3	28,586.3
TOTAL CASH OUTFLOW	1,540.3	15,300.7	15,566.5	16,825.5	16,045.6	16,101.9	16,101.9	16,101.9	16,101.9	16,101.9	16,101.9
Increase in Fixed Assets	1,540.3			I		ı	ı			I	I
Increase in Current Asset	I	5,905.5	1,113.5	779.8	ı	I	I	ı	ı	I	I
Operating Costs (Variable Costs)	ı	6,281.3	9,646.3	10,696.4	10,696.4	10,776.8	10,776.8	10,776.8	10,776.8	10,776.8	10,776.8
Advertisement	1	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0
Income Tax	ı	3,100.9	4,793.7	5,336.3	5,336.3	5,312.1	5,312.1	5,312.1	5,312.1	5,312.1	5,312.1
Loan Repayment	ı	I	I	I	I	I	ı	I	I	I	I
SUPLUS (DEFICIT)		1,419.3	10,161.1	11,760.8	12,540.6	12,484.3	12,484.3	12,484.3	12,484.3	12,484.3	12,484.3
CUMMULATIVE CASH BALANCE		1,419.3	11,580.5	23,341.2	35,881.9	48,366.2	60,850.5	73,334.8	85,819.2	98,303.5	110,787.8
NET CASH FLOW	(1,540.3)	1,419.3	10,161.1	11,760.8	12,540.6	12,484.3	12,484.3	12,484.3	12,484.3	12,484.3	12,484.3
CUMMULATIVE NET CASH FLOW	(1,540.3)	(120.9)	10,040.2	21,801.0	34,341.6	46,825.9	59,310.2	71,794.6	84,278.9	96,763.2	109,247.5

Appendix 17: COST BENEFIT ANALYSIS OF A MICRO INDUSTRY (NPV APPROACH), 000'000

Discount- ed Net Benefit at 15%	-60	19	31	30	27	24	21	19	17	15	13	155		
Discount- ed Net Benefit at 10%	-63	21	35	36	33	١£	29	27	25	53	12	218		
Dis- counted Benefit at 15%	0	88	121	117	104	92	81	72	64	57	50	845		
Discount- ed Cost at 15%	63	75	103	103	96	89	82	76	71	99	61	885	1.25	0.96
Dis- counted Benefit at 10%	0	96	138	139	129	120	111	103	96	89	82	1103	218	-40
Discount- ed Cost at 10%	63	75	103	103	96	89	82	76	71	66	61	885	NPV at 10%	NPV at 15%
Net Benefit	-69	26	46	53	54	55	56	57	58	59	61	456		
Dis- count Rate (15%)	0.9	0.8	0.7	0.6	0.5	0.4	0.4	0.3	0.3	0.2	0.2			
Discount Rate (10%)	0.9	0.8	0.8	0.7	0.6	0.6	0.5	0.5	0.4	0.4	0.4			
Incre- mental Bene- fit(2% of Total Initial Benefit)	0	116	184	204	208	212	217	221	225	230	234			
Total Incre- mental Cost	69	06	137	151	154	158	161	164	167	170	174	la		
Incremen- tal Cost (2% up to end pro- ject)	0	06	137	151	154	158	161	164	167	170	174	Tot		
Benefit at Initial Esti- mates	0	116	180	200	200	200	200	200	200	200	200			
Cost Initial Esti- mates	69	06	135	148	148	148	149	149	149	149	63			
Year	-	2	m	4	D	9	7	œ	٩	10	11			

Appendix 18: COST BENEFIT ANALYSIS OF A SMALL INDUSTRY (NPV APPROACH) 000'000

JeV betruoted Vet Benefit at 15%	(69E)	1,666	2,267	2,193	1,945	1,725	1,530	1,357	1,204	1,068	947	15,533		
teV betruozeiO %Of ta titene8	(386)	1,821	2,590	2,620	2,429	2,253	2,089	1,937	1,796	1,665	1,544	20,358		
Discounted 851 15 113en98	-	5,057	6,902	6,668	5,915	5,246	4,653	4,127	3,660	3,247	2,880	48,355		
Discounted 81 15 150	386	3,706	5,296	5,346	4,958	4,597	4,263	3,953	3,665	3,399	3,151	42,720	1.48	1.13
Discounted %0f 36 1î9en98	-	5,527	7,886	7,966	7,387	6,850	6,351	5,889	5,461	5,064	4,696	63,078	20,358	5,635
betnuoseiO %Of 16 teoD	386	3,706	5,296	5,346	4,958	4,597	4,263	3,953	3,665	3,399	3,151	42,720	at 10%	at 15%
Net Benefit	(425)	2,204	3,448	3,836	3,912	3,991	4,070	4,152	4,235	4,319	4,406	38,147	NPV	NPV
Discount Rate (%2r)	0.87	0.76	0.66	0.57	0.50	0.43	0.38	0.33	0.28	0.25	0.21			
9taX truoseiO (%0r)	0.91	0.83	0.75	0.68	0.62	0.56	0.51	0.47	0.42	0.39	0.35			
lıstnemertel Benefit(2% of Total litial Benefit)	ı	6,688	10,497	11,663	11,896	12,134	12,377	12,625	12,877	13,135	13,397			
Total Incremen- too let	425	4,484	7,049	7,828	7,984	8,144	8,307	8,473	8,642	8,815	8,991	Total		
Incremental Cost (2% up to end project)	I	4,484	7,049	7,828	7,984	8,144	8,307	8,473	8,642	8,815	8,991			
-inl ts třiðen98 Setemits3 lsit	ı	6,688	10,291	11,435	11,435	11 <mark>,43</mark> 5	11,435	11,435	11,435	11,435	11,435			
-cal laitinl Ec- cost lnitial Es-	425	4,484	6,911	7,674	7,674	7,669	7,669	7,669	7,669	7,669	7,669			
ısəY	1	2	m	4	ъ	9	7	8	σ	10	11			

Discounted Net Benefit at ٦5%	(615)	3,324	4,526	4,379	3,884	3,445	3,056	2,710	2,404	2,132	1,891	31,136		
Discounted Net Benefit at 10%	(643)	3,633	5,171	5,231	4,851	4,498	4,171	3,868	3,586	3,325	3,084	40,776		
Discounted Benefit at 15%		10,114	13,804	13,337	11,829	10,492	9,306	8,254	7,321	6,493	5,759	96,710		
bətnuossiQ %2f 15 tsoD	643	7,422	10,601	10,701	9,923	9,201	8,532	7,911	7,336	6,802	6,30 <mark>8</mark>	85,380	1.48	1.13
Discounted 8enefit at 10%	ı	11,055	15,773	15,932	14,774	13,699	12,703	11,779	10,922	10,128	9,391	126,156	40,776	11,330
bətnuozsiQ %Of ts t2oD	643	7,422	10,601	10,701	9,923	9,201	8,532	7,911	7,336	6,802	6,308	85,380	NPV at 10%	NPV at 15%
tifənəB təN	(707)	4,396	6,883	7,659	7,812	7,969	8,128	8,291	8,456	8,625	8,798	76,310		
Discount Rate (%21)	0.9	0.8	0.7	0.6	0.5	0.4	0.4	0.3	0.3	0.2	0.2			
Discount Rate (%01)	0.9	0.8	0.8	0.7	0.6	0.6	0.5	0.5	0.4	0.4	0.4			
lncremental Benefit(2% of Total Initial Benefit)	ı	13,376	20,994	23,326	23,793	24,269	24,754	25,249	25,754	26,269	26,795			
letoT Incremental SoSt	707	8,980	14,111	15,667	15,981	16,300	16,626	16,959	17,298	17,644	17,997			
lncremental Cost (2% up to end project)	I	8,980	14,111	15,667	15,981	16,300	16,626	16,959	17,298	17,644	17,997			
Benefit Isitinl ts Estimates	I	13,376	20,582	22,869	22,869	22,869	22,869	22,869	22,869	22,869	22,869	_		
lsitinl tso) sətsmits3	707	8,980	13,834	15,360	15,360	15,351	15,351	15,351	15,351	15,351	15,351	Total		
Year	-	2	m	4	Ъ	9	7	00	Б	0	1			

Discounted Net Benefit at 15%	(1,339)	4,142	5,646	5,464	4,847	4,299	3,813	3,382	2,999	2,660	2,360	38,272				
Discounted Net 801 16 179098	(1,400)	4,527	6,451	6,528	6,053	5,613	5,204	4,826	4,475	4,149	3,848	50,274				
Discounted %2f 16 JT9n98		12,643	17,255	16,671	14,787	13,115	11,632	10,318	9,151	8,117	7,199	120,887				
Discounted Cost at 15%	1,400	9,291	13,265	13,388	12,414	11,511	10,674	9,898	9,178	8,510	7,892	107,421	1.47		1.13	
bətnuoseiD 00 און און מ		13,818	19,716	19,915	18,467	17,124	15,878	14,724	13,653	12,660	11,739	157,695	50,274		13,467	
Discounted Cost at 10%	1,400	9,291	13,265	13,388	12,414	11,511	10,674	9,898	9,178	8,510	7,892	107,421	NPV at	10%	NPV at	15%
titene£ teN	(1,540)	5,478	8,587	9,557	9,748	9,943	10,142	10,345	10,552	10,763	10,978	94,552				
Discount Rate (15%)	0.87	0.76	0.66	0.57	0.50	0.43	0.38	0.33	0.28	0.25	0.21					
Oiscount Rate (10%)	0.91	0.83	0.75	0.68	0.62	0.56	0.51	0.47	0.42	0.39	0.35					
lacremental Benefit(2% of Total Initial Benefit)		16,720	26,242	29,158	29,741	30,336	30,943	31,562	32,193	32,837	33,493					
atnemercementa Cost	1,540	11,242	17,655	19,601	19,993	20,393	20,801	21,217	21,641	22,074	22,515					
lncremental Cost (2% up to end project)	1	11,242	17,655	19,601	19,993	20,393	20,801	21,217	21,641	22,074	22,515					
Benefit at Initial Estimates	,	16,720	25,728	28,586	28,586	28,586	28,586	28,586	28,586	28,586	28,586					
lsitinl tzoJ zətsmitz3	1,540	11,242	17,309	19,217	19,217	19,193	19,193	19,193	19,193	19,193	19,193					
Year	-	2	m	4	5	9	7	∞	م	10	1	Total				

ш
S
in
M
2
0
2
5
S
2
5
2
5
2
C
ш
ш
3
-
S
-
-
×
2
P
>
-
Z
7
-
>
111
Щ
۳
ONE
IONE
HONE
Y HONE
LY HONE
TV HONE
CITY HONE
ICITY HONE
ACITY HONE
PACITY HONE
APACITY HONE
APACITY HONE
CAPACITY HONE
L CAPACITY HONE
LL CAPACITY HONE
JLL CAPACITY HONE
ULL CAPACITY HONE
FULL CAPACITY HONE
T FULL CAPACITY HONE
AT FULL CAPACITY HONE
AT FULL CAPACITY HONE
A AT FULL CAPACITY HONE
3A AT FULL CAPACITY HONE
BA AT FULL CAPACITY HONE
CBA AT FULL CAPACITY HONE
: CBA AT FULL CAPACITY HONE
11: CBA AT FULL CAPACITY HONE
21: CBA AT FULL CAPACITY HONE
x 21: CBA AT FULL CAPACITY HONE
ix 21: CBA AT FULL CAPACITY HONE
dix 21: CBA AT FULL CAPACITY HONE
ndix 21: CBA AT FULL CAPACITY HONE
endix 21: CBA AT FULL CAPACITY HONE
pendix 21: CBA AT FULL CAPACITY HONE
pendix 21: CBA AT FULL CAPACITY HONE
Phendix 21: CBA AT FULL CAPACITY HONE

DUSTRY	NPV		1.47	1.13
LARGE INC	PV	000,000, SZ1	50,274	13,467
DUSTRY	NPV		1.48	1.13
MEDIUM INC	Ъ	000,000, SZL	40,776	11,330
_				
USTRY	NPV		1.48	1.13
SMALL IND	ΡΛ	000,000, SZL	20,358	5,635
	۲۷		25	96
STRV	Z			o.
MICRO INDU	Ъ	000,000, SZL	218	-40
			NPV at 10%	NPV at 15%

Appendix 22: CBA AT FULL CAPACITY HONEY AS THE ONLY BEE PRODUCTS PROCESSED

TRY	ΝΡV		1.47	1.13
LARGE INDUS	Р۷	000,000, SZL	50,274	13,467
USTRY	NPV		1.19	0.91
MEDIUM IND	ΡΛ	000,000, SZL	18,068	- 8,855
TRY	NPV		1.40	1.08
SMALL INDUS	РЛ	000,000, SZL	16,576	3,115
TRY	NPV		1.08	0.83
MICRO INDUS	PV	000,000, SZL	73	-162
			NPV at 10%	NPV at 15%

Appendix 23: CBA AT HALF CAPACITY HONEY AND WAX AS BEE PRODUCTS PROCESSED

	MICRO IN	DUSTRY	SMALL INDUS	STRY	MEDIUM IN	DUSTRY	LARGE INDUS	STRY
	PV	NPV	PV	NPV	PV	NPV	PV	NPV
	000,000, SZL		12S '000'000		TZS '000'000		12S '000'000	
NPV at 10%	43	1.09	9,613	1.46	40,776	1.48	50,274	1.47
NPV at 15%	- 85	0.83	2,321	1.11	11,330	1.13	13,467	1.13

Appendix 24: CBA AT HALF CAPACITY HONEY AS THE ONLY BEE PRODUCTS PROCESSED

	Ň	AICRO IND	USTRY	SMALL INDI	USTRY	MEDIUM INDU	STRY	LARGE INDUS	TRY
	đ	>	NPV	PV	NPV	PV	NPV	PV	NPV
	10, SZT	00,000		000,000, SZL		TZS '000'000		000,000, SZL	
NPV at 10%		28	0.95	7,771	1.38	40,776	1.48	50,274	1.47
NPV at 15%	ı	144	0.72	1,103	1.05	11,330	1.13	13,467	1.13

Appendix 25: WORKING CAPITAL MICRO INDUSTRY, '000

Working Capital (Net)	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11
Current Asset	41,339	49,607	55,118	55,183	55,183	55,183	55,183	55,183	55,183	55,183
Inventory										
Raw Materials	6,658	7,990	8,878	8,878	8,878	8,878	8,878	8,878	8,878	8,878
Finished Products-honey	16,112	19,335	21,483	21,483	21,483	21,483	21,483	21,483	21,483	21,483
Finished Products-wax	1,511	1,813	2,014	2,014	2,014	2,014	2,014	2,014	2,014	2,014
Accounts Receivable										
Finished Products-honey	15,593	18,711	20,790	20,790	20,790	20,790	20,790	20,790	20,790	20,790
Finished Products-wax	1,462	1,754	1,949	2,014	2,014	2,014	2,014	2,014	2,014	2,014
Cash in hand	4	4	4	4	4	4	4	4	4	4
Current Liabilities	1,183	1,183	1,183	1,183	1,566	1,566	1,566	1,566	1,566	1,566
Accounts Payable	1,183	1,183	1,183	1,183	1,566	1,566	1,566	1,566	1,566	1,566
Salary (1 Month)	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100
Utilities (1 Month)	41	41	41	41	41	41	41	41	41	41
Repair & Service of	43	43	43	43	425	425	425	425	425	425
Machinery (1 mnt)										
Net Working Capital	40,156	48,424	53,935	54,000	53,617	53,617	53,617	53,617	53,617	53,617

Appendix 26: WORKING CAPITAL SMALL INDUSTRY, '000'000

Working Capital (Net)	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 2	Year 3	Year 4
Current Asset	2,362	2,807	3,119	3,119	3,119	3,119	3,119	3,119	3,119	3,119	3,119	3,119	3,119
Inventory		-			-	-	-	-					ı
Raw Materials	380	430	477	477	477	477	477	477	477	477	477	477	477
Finished Products- honey	921	1,105	1,228	1,228	1,228	1,228	1,228	1,228	1,228	1,228	1,228	1,228	1,228
Finished Products-wax	86	104	115	115	115	115	115	115	115	115	115	115	115
Accounts Receivable	ı	ı	I		ı	ı	ı	I	ı	ı	I	I	I
Finished Products(Honey)	891	1,069	1,188	1,188	1,188	1,188	1,188	1,188	1,188	1,188	1,188	1,188	1,188
Finished Products-wax	84	100	111	111	111	111	111	111	111	111	111	111	111
Cash in hand	0	0	0	0	0	0	0	0	0	0	0	0	0
Current Liabilities	ы	ы	ы	ы	23	23	23	23	23	23	23	23	23
Accounts Payable	5	5	ß	2	23	23	23	23	23	23	23	23	23
Salary (1 Month)	£	£	ſ	ſ	£	£	E	E	£	E	£	ſ	m
Utilities (1 Month)	1	-	-	1	1	1	1	1	1	1	1	1	۲-
Repair and Service of Machinery(1 mnt)	2	2	2	2	20	20	20	20	20	20	20	20	20
Net Working Capital	2,357	2,802	3,114	3,114	3,096	3,096	3,096	3,096	3,096	3,096	3,096	3,096	3,096

Appendix 27: WORKING CAPITAL MEDIUM INDUSTRY, '000'000

		;		;	;					
working Lapital (Net)	Year 2	Year 3	Year 4	Year 5	Year b	Year /	Year 8	Year y	Year 1U	Year 11
Current Asset	4,724	5,615	6,239	6,239	6,239	6,239	6,239	6,239	6,239	6,239
Inventory	1	ı	1		1		1	1	,	1
Raw Materials	761	859	955	955	955	955	955	955	955	955
Finished Products-honey	1,841	2,210	2,455	2,455	2,455	2,455	2,455	2,455	2,455	2,455
Finished Products-wax	173	207	230	230	230	230	230	230	230	230
Accounts Receivable	ı	I	-	-	I	I	ı	ı	ı	ı
Finished Products-honey	1,782	2,138	2,376	2,376	2,376	2,376	2,376	2,376	2,376	2,376
Finished Products-wax	167	200	223	223	223	223	223	223	223	223
Cash in hand	0	0	0	0	0	0	0	0	0	0
Current Liabilities	10	10	10	10	39	39	39	39	39	39
Accounts Payable	10	10	10	10	39	39	39	39	39	39
Salary (1 Month)	S	ß	5	5	ъ	ŋ	ъ	ъ	ъ	ъ
Utilities (1 Month)	-	-	٢	-	-	۲.	r.	-	1	-
Repair and Service of Machinery (1 mnt)	E	E	З	Е	32	32	32	32	32	32
Net Working Capital	4,714	5,605	6,229	6,229	6,200	6,200	6,200	6,200	6,200	6,200

Appendix 28: WORKING CAPITAL LARGE INDUSTRY, '000'000

Working Capital (Net)	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 9	Year 10	Year 11
Current Asset	5,905	7,019	7,799	7,799	7,799	7,799	7,799	7,799	7,799	7,799	7,799	7,799	7,799
Inventory		·				-				ı			'
Raw Materials	951	1,074	1,193	1,193	1,193	1,193	1,193	1,193	1,193	1,193	1,193	1,193	1,193
Finished Products- honey	2,302	2,762	3,069	3,069	3,069	3,069	3,069	3,069	3,069	3,069	3,069	3,069	3,069
Finished Products-wax	216	259	288	288	288	288	288	288	288	288	288	288	288
Accounts Receivable				-	-	-							
Finished Products- honey	2,228	2,673	2,970	2,970	2,970	2,970	2,970	2,970	2,970	2,970	2,970	2,970	2,970
Finished Products-wax	209	251	278	278	278	278	278	278	278	278	278	278	278
Cash in hand	0	0	0	0	0	0	0	0	0	0	0	0	0
Current Liabilities	19	19	19	19	66	66	66	66	66	66	66	66	66
Accounts Payable	19	19	19	19	66	66	66	66	66	66	66	66	66
Salary (1 Month)	8	8	8	8	8	8	8	8	8	8	8	8	8
Utilities (1 Month)	2	2	2	2	2	2	2	2	2	2	2	2	2
Repair and Service of Machinery(1 mnt)	6	6	6	6	89	89	89	89	89	89	89	89	89
Net Working Capital	5,887	7,000	7,780	7,780	7,700	7,700	7,700	7,700	7,700	7,700	7,700	7,700	7,700

Director of Forestry and Beekeeping Division Ministry of Natural Resources and Tourism

Government City, Mtumba Area P. O. Box 1351, DODOMA, TANZANIA Email: dfob@maliasili.go.tz