63. PROFILE ON APICULTURE EQUIPMENT

TABLE OF CONTENTS

I. SUMMARY

This profile envisages the establishment of a plant for the production of 4,000 pcs of beehives per annum.

The current demand for the proposed product is estimated at 4,082 pcs per annum and it is projected to reach 6,979 pcs by the year 2015.

The plant will create employment opportunities for 16 persons.

The total investment requirement is estimated at Birr 2.35 million, out of which Birr 420,840 is required for plant and machinery.

The project is financially viable with an internal rate of return (IRR) of 27% and a net present value (NPV) of Birr 2.75 million, discounted at 10.5%.

II. PRODUCT DESCRIPTION AND APPLICATION

Apiculture equipment are articles used by bee keepers to increase the output and quality of honey. These include items such as beehive, smoker, a hive tool, extractors, etc. For the purpose of this project profile only moveable frame or langstroth hive is considered as this is the most demanded by most modern bee keepers to replace the old traditional bee hives.

Moveable-frame or Langstroth hives are the hives used in modern "high-tech" bee-keeping. In these hives, the bees construct comb in frames which contain an embossed sheet of beeswax foundation. The foundation serves as a "pattern" to ensure straight, centered combs in the frames. These hives are constructed so that there is a bee space between the frames themselves and between the frames and the box holding them.

Several communicating hive boxes can be stacked one above another, and that the queen can be confined to the lowest, or brood, chamber, by means of a queen excluder. In this way, the upper chambers (called supers) can be reached only by the workers, and therefore contain only honey-comb. This made hive inspection and many other management practices possible, and turned the art of beekeeping into a full-scale industry. Almost all commercial hives in use today operate on the Langstroth pattern, although they may contain from 10 to 13 frames.

III. MARKET STUDY AND PLANT CAPACITY

A. MARKET STUDY

1. Past Supply and Present Demand

Current demand for modern apiculture equipment such as improved bee hives is met through import and some local production by research institutions engaged in apiculture development. Upto now, there is no private plant that manufactures improved apiculture equipment in BGRS. However, recently, the regional rural technology center has started production with the objective of promoting the product among farmers. Although this is a positive start the centre's long term objective is not to produce on a commercial basis.

On the other hand, the BGRS is one of the known potential areas in the country for honey production due to the existence of diverse agro-ecologies. However, the use of modern apiculture equipment is almost non existent. The average annual output of honey from traditional, intermeiate and modern hives is about 5 kg, 15kg and 25 kg, respectively. This marked difference, which is about 20 kg per hive, is believed to attract peasants to shift from traditional beehives to modern and improved beehives. The investment to be made in the modern bee hive can be paid back with in one year from the additional production. However, arrangement for credit access to buy the improved hive have to be given due attention by concerned institution.

In order to determine the present demand for improved bee hives data on the existing number of traditional bee hives and number of households has been considered. According to the Resource Potential Assessment conducted for the region by IPS (2003), there are a total of 136,074 traditional bee hives owned by 116,000 households. These traditional bee hives have to be replaced by modern bee hives, if the required results are to be obtained in improving the living standard of the rural population. Hence, proper extension activities have to be carried out by the concerned organizations of the regional government.

If we assume that the existing traditional bee hives have to be replaced with modern bee hives in the coming 20 years, on the average it is necessary to disseminate about 6,804 modern bee hives or 5% of the existing traditional bee hives. However, to be conservative, only 3% of the existing traditional bee hives is assumed to be replaced annually for the first five years. Hence, the present effective demand for modern beehives is estimated at 4,082 pcs per annum.

2. Projected Demand

The method used to determine the present effective demand is used for demand projection for the first five years. But after the first five years, as awareness of farmers is believed to increase annual replacement of 5% is assumed (see Table 3.1).

Table 3.1

PROJECTED DEMAND FOR IMPROVED BEE HIVES

Year	Projected Demand (No.)
2005	4,086
2006	4,500
2007	4,725
2008	4,961
2009	5,209
2010	5,469
2011	5,742
2012	6,029
2013	6,330
2014	6,647
2015	6,979

3. Pricing and Distribution

Current price of improved bee hives ranges from Birr 350 to Birr 450. For this project the ex-factory price is assumed to be Birr 400 per pcs.

The product can be distributed through existing agricultural inputs and equipment distributing enterprises throughout the region. A close contact with the Bureau of Agriculture is necessary in order to promote the product,

B. PLANT CAPACITY & PRODUCTION PROGRAMME

1. Plant Capacity

Based on the demand projection indicated, the proposed plant will have a capacity to produce 4,000 pcs of bee hives per annum. Parallel to the bee hives the plant can also produce other apiculture equipment such as honey extractors, decapping-knives, trays, etc. where currency to order these from abroad cannot be obtained easily by local beekeepers.

The plant is envisaged to operate in one shift of 8 hours per day for 264 days per year. This capacity is relatively low considering the national demand. However, the output can be stepped up considering the demand conditions by increasing the working shifts. However, it is also possible to work in two shifts based on actual market conditions.

2. Production Programme

The fact that the process of bee hives manufacturing is similar to wooden furniture manufacturing, it may take only a short time to develop the skills and knowhow to produce quality bee hives. However, it is recommended to start at relatively lower capacity to get enough time to penetrate existing local market. The unutilized capacity can be used to

manufacture wooden furniture, doors and windows, which practically requires similar raw materials. Hence, the production build-up programme is, hence, made to start at relatively lower (80%) and then gradually rise to full capacity in the 3rd year of operation. The production programme is given in Table 3.2 below.

Table 3.2
PRODUCTION PROGRAMME

Year of Production	1st Year	2nd Year	3rd Year
Production in %	80%	90%	100%
Bee hives	3200	3600	4000

IV. MATERIALS AND INPUTS

A. MATERIALS

The raw materials required to prepare commercial bee hive is mainly wood. The wood must be termite-proof, resistant to the rotting effect of the sun and rain, warp-proof, and non-bee repellent.

The detailed breakdown of material requirement and cost at full operation capacity of the plant is given in Table 4.1.

Table 4.1
LIST OF RAW MATERIALS REQUIREMENT AND COSTS

Sr. No.	Description	Unit of Measure	Qty	Costs in Birr
1.	Seasoned wood	mcub	233	465,750
2.	Glue	kg	400	5,600
3.	Nails	kg	600	3,000
4.	Others			71,000
	Grand Total			**545,350**

B. UTILITIES

The plant will use electrical energy and water as main utilities. Estimated annual utility consumption along with corresponding cost is indicated in Table 4.2.

Table 4.2

UTILITY CONSUMPTION AND COST OF THE PLANT AT FULL CAPACITY (BIRR)

Utility	Unit	Consumption	Unit Cost	Total Cost
Electrical energy	KWh	39,100	0.4736	18,518
Water	m^3	740	1.67	1,236
Grand Total				**19,754**

V. TECHNOLOGY AND ENGINEERING

A. TECHNOLOGY

1. Production Process

A properly selected and seasoned wood is cut into sizes to produce the different components of the bee hive. This includes cutting the wood to fit the size of the container's opening. The width of the wood must be exactly 32 millimeters. This is a crucial measurement. The tropical honeybee builds a comb which has a thickness of 25 millimeters. This comb is usually attached to the center of the top-bar. A space of 3.5 millimeters is, thus, left at either side of the comb. When two or more top-bars fixed with combs are placed side by side, the inner space becomes 7 mm (i.e. 3.5 mm plus 3.5 mm). This space, vital to the bees, is usually referred to as the "bee space". These bee spaces are also found between the combs and the hive body. They serve the bees as paths in which they can move freely. such intricate construction demands relatively good quality wood and expertise in carpentry.

2. Source of Technology

The machinery required to manufacture bee hive are conventional wood working machinery. All necessary machinery can be purchased from local importers.

B. ENGINEERING

1. Machinery and Equipment

The list of required machinery and equipment is indicated in Table 5.1. The total cost of machinery and equipment is estimated at Birr 420,840, of which Birr 350,700 is required in foreign currency.

Table 5.1

MACHINERY AND EQUIPMENT

Sr. No.	Machine / Equipment Description	Qty
1	Circular saw	1
2	Thickness planner	2
3	Drilling machine	3
4	Bench grinder	1
5	Set of carpentery tools	3
6	Sheet metal shearing machine	1
7	Sheet metal folding machine	1
8	TIG welding machine	1
9	Oxy-acetiline welding	1

2. Land, Building and Civil Works

The required area for both building and open space for the envisaged plant is estimated to be 1,100 m^2, out of which 600 m^2 will be a built-up area. The total cost of civil works at the rate of Birr 1,500 per m^2 is estimated to be Birr 900,000. The total land lease cost for 70 years of land holding is estimated to Birr 192,500. Thus, the total investment cost for land, building ad civil works assuming that the total land lease cost will be paid in advance is estimated at 1,092,500.

3. Proposed Location

Based on availability of infrastructure and utility, Assosa town is proposed to be the location of the envisaged plant.

VI. MANPOWER AND TRAINING REQUIREMENT

A. MANPOWER REQUIREMENT

The plant will require about 16 workers at the beginning of the plant operation. The breakdown of manpower allocation and corresponding labour cost is indicated in Table 6.1

Table 6.1

MANPOWER REQUIREMENT AND ANNUAL LABOUR COST (BIRR)

Sr. No.	Position Description	Qty.	Salary	Monthly	Annual
1	Plant manager	1	1,500	1,500	18,000
2	Finance & Admin. manager	1	1,000	1,000	12,000
3	Accountant & cashiesr	1	800	800	9,600
4	Production & Techn. Dept.	1	1,000	1,000	12,000
5	Operators	4	400	1,600	19,200
6	Prod. & Tech. helpers	3	300	900	10,800
7	Commercial Dept. Mgr.	1	1,000	1,000	12,000
8	Sells & purchase Officer	1	500	500	6,000
9	Store Keeper	1	400	400	4,800
10	Driver	2	500	1,000	12,000
	Sub-total	**16**		**9,700**	**116,400**
11	Workers benefit 25% of basic salary			2,425	29,100
	Grand total	**16**		**12,125**	**145,500**

B. TRAINING REQUIREMENT

Producing apiculture equipment using conventional wood working machines is not such a new and complicated process. However, it is recommendable to train the Production and Technical Manager on developing designs for apiculture equipment and selection of appropriate wood and metals to produce quality equipment. This can be made at local training institutes and may cost upto Birr 6,000.

VII. FINANCIAL ANALYSIS

The financial analysis of apiculture project is based on the data provided in the previous chatpers and the following assumptions:-

Construction period	2 years
Source of finance	30% equity
	70% loan
Tax holidays	3 years
Bank interest	10.5%
Discounted cash flow	10.5%
Repair and maintenance	5% of Plant machinery and equipment
Accounts receivable	30 days
Raw material (local)	60 days
Work in progress	3 days
Finished products	30 days
Cash at hand	5 days
Accounts payable	30 days

A. TOTAL INITIAL INVESTMENT COST

The total initial investment cost of the project including working capital is estimated at Birr 2.35 million, out of which about 14.9% will be required in foreign currency. Details are indicated in Table 7.1.

Table 7.1

INITIAL INVESTMENT COST ('000 BIRR)

Sr. No.	Cost Items	Foreign Currency	Local Currency	Total
1	Land	-	192.00	192.00
2	Building and Civil Work	-	900.00	900.00
3	Plant Machinery and Equipment	350.70	70.14	420.84
4	Office Furniture and Equipment	-	100.00	100.00
5	Vehicle	-	250.00	250.00
6	Pre-production Expenditure*	-	357.57	357.57
	Total Investment Cost	**350.70**	**1869.71**	**2220.41**
7	Working Capital	-	139.06	139.06
	Grand Total	**350.70**	**2008.77**	**2359.47**

B. PRODUCTION COST

The annual production cost at full operation capacity of the plant is estimated at Birr 982,050 (see Table 7.2). The material and utility cost accounts for 57.54 per cent while repair and maintenance take 2.14 per cent of the production cost.

---

* Pre-*production expenditure include interest during construction (Birr295,574), training (Birr 6,000) and cost of registration, licensing and formation of the company including legal fees, commissioning expenses, etc.*

Table 7.2

ANNUAL PRODUCTION COST

('000 BIRR)

Items	Year			
	3	**4**	**7**	**10**
Raw Material and Inputs	436.28	490.83	545.36	545.36
Labour Direct	55.87	62.86	69.84	69.84
Utilities	15.80	17.78	19.75	19.75
Maintenance and repair	16.83	18.94	21.04	21.04
Labour overheads	23.28	26.19	29.10	29.10
Administration cost	37.25	41.91	46.56	46.56
Total operating costs	**585.32**	**658.50**	**731.65**	**731.65**
Depreciation	146.83	146.83	146.83	114.834
Cost of Finance	172.61	155.35	103.57	51.78
Total Production Cost	**904.76**	**960.68**	**982.05**	**898.26**

C. FINANCIAL EVALUATION

1. Profitability

According to the projected income statement, the project will start generating profit in the first year of operation. Important ratios such as the percentage of net profit to total sales, net profit to equity (return on equity) and net profit plus interest to total investment (return on total investment) will show an increasing trend throughout the production life of the project. The income statement and other profitability indicators show that the project is viable.

2. Break-even Analysis

The break-even point of the project is estimated by using income statement projection.

$$Be = \frac{\text{Fixed Cost}}{\text{Sales-Variable Cost}} = 17\ \%$$

3. Pay-Back Period

The investment cost and income statement projection are used to project the pay-back period, the project will fully recover the initial investment and working capital within 4 years time.

4. Internal Rate of Return and Net Present Value

Based on the cash flow statement, the calculated IRR of the project is 27 % and the net present value at 10.5% discount rate is Birr 2.75 million.

D. ECONOMIC BENEFITS

The project can create employment opportunities for 16 persons. In addition to supply of the domestic needs, the project will generate Birr 26.49 million in terms of tax revenue. Moreover, the Regional Government can collect employment, income tax and sales tax revenue.