

208. PROFILE ON BEE HIVE FRAME

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I. SUMMARY

This profile envisages the establishment of a plant for the production of bee hive frame with a capacity of 2,000 pieces per annum.

The present demand for the proposed product is estimated at 42,420 pieces per annum. The demand is expected to reach at 76,396 pieces by the year 2020.

The plant will create employment opportunities for 18 persons.

The total investment requirement is estimated at about Birr 1.81 million, out of which Birr 90,000 is required for plant and machinery.

The project is financially viable with an internal rate of return (IRR) of 16 % and a net present value (NPV) of Birr 476,820 discounted at 8.5 %.

II. PRODUCT DESCRIPTION AND APPLICATION

Modern bee keeping equipment comprises of beehives, Bee smoker, Queen Extractor, Wax press Honey extractor and protective clothing, etc. In this study only moveable frame of Langs froth hive is considered, as this is the most demanded by modern bee deeper to replace the old traditional beehives.

In moveable-frame hives, the bees construct comb in frames which contain an embossed sheet of beeswax foundation which 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.

Communicating hive boxes can be stacked one above another, and that the queen can be confined to the lowest chamber (brood), by means of a queen extruder. In this way, the upper chambers (called supers) can be reached only by the workers and therefore contain only honeycomb. This made hive inspection and many other management practice

possible. Commercial hives operating on the Langsfroth pattern may contain 10 to 13 frames.

III. MARKET STUDY AND PLANT CAPACITY

A. MARKET STUDY

1. Past Supply and Present Demand

Beehive frame is used for bee keeping in a safe way and with better handling. Currently, the demand for the product is met through domestic production. The Southern Nations and Nationalities Region (SNNR) is one of the most know potential areas for bee keeping in the country. According to the resource potential study, the region has a total of 1,114,303 beehives, of which 1,060,512 are traditional, 50,980 are modern and 2,811 are intermediate. The annual honey output of these hives is about 9,384 tons, of which about 72% is obtained from traditional hives.

On the average, traditional, intermediate and modern hives respectively yield about 5 kg, 15 kg and 25 kg of honey annually. This marked difference in output is likely to induce farmers to replace traditional beehives with modern and improved ones. In determining the present demand for beehive frames, following the study of apiculture equipment conducted for the region, the existing traditional beehives are conservatively assumed to be replaced with modern ones in the coming 25 years. The present effective demand for beehive frames is thus estimated at 42,420 pieces per annum (i.e. 4% of the existing traditional beehives).

2. Demand Projection

The method used to determine the present effective demand is applied in projecting the demand for beehive frame. The projected demand for the product is shown in Table 3.1.

Table 3.1
PROJECTED DEMAND FOR BEEHIVE FRAME (PIECES)

Year	Projected Demand
2007	42420
2008	44117
2009	45882
2010	47717
2011	49626
2012	51611
2013	53675
2014	55822
2015	58055
2016	60377
2017	62792
2018	65304
2019	67916
2020	70633
2021	73458
2022	76396

3. Pricing and Distribution

According to knowledgeable source, the price of beehive frame is about Birr 375 per piece. This price is adopted for the product of the envisaged plant.

The product can get its market outlet through the existing agricultural inputs and equipment distributing enterprises throughout the region. Close collaboration with the Region's Bureau of Agriculture is imperative to promote the product.

B. PLANT CAPACITY AND PRODUCTION PROGRAMME

1. Plant Capacity

The annual production capacity of beehives production project is 2,000 pieces, based on 300 working days and a single shift of 8 hours per day. This capacity can be increased by increasing the number of working hours per day.

2. Production Programme

Table 3.2 shows the production programme of the envisaged project. At the initial stage of the production period, the plant requires some years to penetrate into the market. Therefore, in the first and second year of production, the capacity utilization rate will be 70% and 85%, respectively. In third year and thereafter, full capacity production shall be attained.

Table 3.2
PRODUCTION PROGRAMME

Sr. No.	Product	Production Year		
		2007	2008	2009-2016
1.	Beehives (pcs)	1400	1700	2000
2	Capacity Utilization (%)	70	85	100

IV. RAW MATERIALS AND INPUTS

A. RAW MATERIALS

Raw materials of the project are seasoned wood (Timber), glue, nails and others. The wood should be termite proof, resistant to the rotting effect of the sun and rain, warp-proof and non-bee repellent. The total annual cost of raw materials is estimated at Birr

191,440.00. Table 4.1 indicates the annual requirement of raw materials of the proposed project.

Table 4.1
RAW MATERIALS REQUIREMENT AND COST
(AT FULL CAPACITY)

Sr. No.	Raw Material	Unit of Measure	Qty.	Cost ('000 Birr)
1.	Seasoned wood/Timber	m ³	120	180.840
2.	Glue	Kg	200	4
3.	Nails	Kg	300	3
4.	Others	LS		3.6
Total				191.44

B. UTILITIES

Electricity and water are the principal utilities of the project. The annual utilities requirement and cost are indicated in Table 4.2.

Table 4.2
UTILITIES REQUIREMENT AND COST

Sr. No.	Utility	Unit of Measure	Qty.	Cost ('000 BIRR)
1	Electricity	kWh	20,000	9.472
2	Water	m ³	600	6
Total				15.472

V. TECHNOLOGY AND ENGINEERING

A. TECHNOLOGY

1. Production Process

Seasoned wood/Timber is cut into sizes to produce the different components of the beehives. The width of the wood must be exactly 32mm. The tropical honeybee builds a comb which has a thickness of 25mm. The comb is usually attached to the center of the top-bar. A space of 3.5mm 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. This space, vital to the bees, is usually called as the “bee space”. These bee spaces are also found between the combs and the hive body. They serve the bees as path in which they can move freely, such intricate construction demands relatively good quality wood and expertise in carpentry.

2. Source of Technology

Selam Technical and vocational college

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Addis Ababa

Ethiopia

B. ENGINEERING

1. Machinery and Equipment

The list of machinery and equipment is indicated in Table 5.1. The total cost of machinery is estimated at Birr 90,000. The plant needs vehicles (one pick-up) for transportation of finished product and for office activities. The total cost of the vehicles is estimated at Birr 320,000.

Table 5.1
LIST OF MACHINERY AND EQUIPMENT REQUIRED

Sr. No.	Raw Material	Qty.
1.	Circular saw	1
2.	Thickness planner	1
3.	Drilling machine	2
4.	Bench grinder	1
5.	Set of carpentry tools	2
6.	Set of c-clamps	3
7.	Set of parallel clamps	3
8.	Work bench	4

2. Land, Building and Civil works

The plant requires a total of 1000m² area of land out of which 500 m² is built-up area which includes manufacturing area, raw material stock area, offices etc. Assuming construction rate of Birr 1500 per m², the total cost of construction is estimated to be Birr 1.5 million. The total cost, for a period of 80 years with cost of Birr 1 per m², is estimated at Birr 1000. The total investment cost for land, building and civil works is estimated at Birr 1,501,000.

3. Proposed Location

According to the resource potential study of the region, the raw material is identified in Woredas like Masha and Konta special woreda. Based on the availability of raw material infrastructure, utility and market out let Masha town of Masha woreda is selected and recommended to be the location of the envisaged plant.

VI. MANPOWER AND TRAINING REQUIREMENT

A. MANPOWER REQUIREMENT

The manpower requirement of the envisaged project is 18 persons. The list of manpower is indicated in Table 6.1. The total annual labour cost including fringe benefits is estimated at Birr 148,500.

Table 6.1
MANPOWER REQUIREMENT AND LABOUR COST

Sr. No.	Description	Req. No.	Monthly Salary (Birr)	Annual Salary (Birr)
1.	General Manager	1	2,000	24,000
2.	Secretary/cashier	1	700	8,400
3.	Production Head	1	1,200	14,400
4.	Operators	4	2,400	28,800
5.	Fitters	4	1,600	19,200
6.	Labourers	5	1,500	18,000
7.	Guard	2	500	6,000
	Sub-Total	18	9,900	118,800
	Benefits (25% BS)		2,475	29,700
	Grand Total		12,375	148,500

B. TRAINING REQUIREMENT

Currently, government, private and other institutions are training several students on wood work. In addition, experienced operators and fitters can be assigned for the job. Therefore, there is no need of training arrangement for the envisaged project.

VII. FINANCIAL ANALYSIS

The financial analysis of the bee hives frame project is based on the data presented in the previous chapters and the following assumptions:-

Construction period	1 year
Source of finance	30 % equity
	70 % loan
Tax holidays	3 years
Bank interest	8%
Discount cash flow	8.5%
Accounts receivable	30 days
Raw material local	10 days
Work in progress	2 days
Finished products	30 days
Cash in hand	5 days
Accounts payable	30 days

A. TOTAL INITIAL INVESTMENT COST

The total investment cost of the project including working capital is estimated at Birr 1.81 million, of which 23 per cent will be required in foreign currency.

The major breakdown of the total initial investment cost is shown in Table 7.1.

Table 7.1
INITIAL INVESTMENT COST

Sr. No.	Cost Items	Total Cost (‘000 Birr)
1	Land lease value	80
2	Building and Civil Work	1,500.00
3	Plant Machinery and Equipment	90.00
4	Office Furniture and Equipment	25
5	Vehicle	0
6	Pre-production Expenditure*	75
7	Working Capital	40.74
	Total Investment cost	1,810.7
	Foreign Share	23

* *N.B Pre-production expenditure includes interest during construction (Birr 133.04 thousand) and Birr 150 thousand costs of registration, licensing and formation of the company including legal fees, commissioning expenses, etc.*

B. PRODUCTION COST

The annual production cost at full operation capacity is estimated at Birr 599,800 (see Table 7.2). The material and utility cost accounts for 34.5 per cent, while repair and maintenance take 4.17 per cent of the production cost.

Table 7.2**ANNUAL PRODUCTION COST AT FULL CAPACITY ('000 BIRR)**

Items	Cost	%
Raw Material and Inputs	191.44	31.92
Utilities	15.47	2.58
Maintenance and repair	25	4.17
Labour direct	71.28	11.88
Factory overheads	23.76	3.96
Administration Costs	47.52	7.92
Total Operating Costs	374.47	62.43
Depreciation	101.5	16.92
Cost of Finance	123.83	20.65
Total Production Cost	599.80	100

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 profit to total sales, net profit to equity (Return on equity) and net profit plus interest on total investment (return on total investment) show an increasing trend during the life-time of the project.

The income statement and the other indicators of profitability show that the project is viable.

2. Break-even Analysis

The break-even point of the project including cost of finance when it starts to operate at full capacity (year) is estimated by using income statement projection.

$$\text{BE} = \frac{\text{Fixed Cost}}{\text{Sales} - \text{Variable Cost}} = 27 \%$$

3. Payback Period

The investment cost and income statement projection are used to project the pay-back period. The project's initial investment will be fully recovered within 6 years.

4. Internal Rate of Return and Net Present Value

Based on the cash flow statement, the calculated IRR of the project is 16 % and the net present value at 8.5 % discount rate is Birr 478,820.

D. ECONOMIC BENEFITS

The project can create employment for 18 persons. In addition to supply of the domestic needs, the project will generate Birr 486,510 in terms of tax revenue. The establishment of such factory will have a foreign exchange saving effect to the country by substituting the current imports.