

210. PROFILE ON PRODUCTION OF CANDLE

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I. SUMMARY

This profile envisages the establishment of a plant for the production candle with a capacity of 100 tones per annum.

The present demand for the proposed product is estimated at 2000 tones per annum. The demand is expected to reach at 2960 tones by the year 2022.

The plant will create employment opportunities for 8 persons.

The total investment requirement is estimated at about Birr 1.3 million, out of which Birr 0.5 million is required for plant and machinery.

The project is financially viable with an internal rate of return (IRR) of 19 % and a net present value (NPV) of Birr 578,170 discounted at 8.5%.

II. PRODUCT DESCRIPTION AND APPLICATION

Candle is an illuminating device made of a fiber wick enclosed in a cylinder of wax or fatty material. Beeswax candles were used by the Romans, and tallow (animal fat) candles have been made in Europe since the Middle Ages. In the 18th century, spermaceti, a wax obtained from the heads of whales, was introduced for candles. Since the mid-19th century, ordinary candles have been made from mixtures of paraffin wax, stearic acid (a solid fatty acid), and beeswax. Hydrogenated vegetable oils and other waxes are also used.

It is highly desirable in rural areas where there is no electric light. Candles are also used in traditional and religious ceremonies and also in hotels and restaurants.

III. MARKET STUDY AND PLANT CAPACITY

A. MARKET STUDY

1. Past Supply and Present Demand

The source of supply of candles is both domestic production and imports. Candles that are supplied to the Ethiopia market from domestic production and import is given in Table 3.1.

Table 3.1

SUPPLY OF CANDLE FROM IMPORT AND DOMESTIC PRODUCTION (TON)

Year	Import	Domestic	Total
1999/00	326.0	769	1,095
2000/01	1230.8	559	1,789.8
2000/02	92.0	677	769.0
2000/03	1986.3	614	2,600.3
2000/04	669.8	437	1,106.8
2000/05	1967.5	310	2,277.5

Source: - Customs Authority for import and Statistical Abstract of Ethiopia (CSA) for domestic production.

As could be seen from Table 3.1 import of candles in the past six years has been highly erratic showing a big decline and increase from year to year without any trend. Despite the high fluctuation the annual average level of import was calculated to be 1045 tons.

With regard to domestic production the quantity has declined from 769 tons in the year 1999/00 to 310 tons by the year 2004/05. On the other hand, the total consumption (import and domestic) during the period considered generally indicates an increasing

trend. For instance, the yearly average consumption during the period 1999/00-2001/02 was about 1218 tons while during the period 2002/03 -2004/05 is about 2000 tons.

To determine the current effective demand the recent three years average apparent consumption has been considered. Accordingly, current demand for candles in Ethiopia is estimated at 2000 tons.

2. Demand Projection

One of the uses of candles is for lighting in areas where there is no electricity. In addition, candles are used in traditional and religious ceremonies, hotels, restaurants and the like for illuminating occasions. Hence, its demand will exist even if other types of lightings are available whether in rural or urban areas. The past supply trend also reveals that consumption has been increasing in the past few years. By associating with population and the service sector on annual average growth rate of 4% is taken to forecast the future demand (See Table 3.2).

Table 3.2
FORECASTED DEMAND FOR CANDLES (TON)

Year	Import	Domestic	Total
2008	2080	310	1770
2009	2163	310	1853
2010	2250	310	1940
2011	2340	310	2030
2012	2433	310	2123
2013	2530	310	2220
2014	2632	310	2322
2015	2737	310	2427
2016	2846	310	2536
2017	2960	310	2650

Due to the existence of wide unsatisfied demand a number of small to medium scale plants can be established in the region.

3. Pricing and Distribution

The average producer's price per ton of candle during 2004/05 is Birr 21,275. Allowing for cost increase Birr 20,000 per ton is taken for sales revenue projection.

The product will find its market outlet through the existing general merchandize wholesalers.

B. PLANT CAPACITY AND PRODUCTION PROGRAMME

1. Plant Capacity

The proposed annual processing capacity of the envisaged plant only taking a share of 5.6 % to the forecasted demand of the year 2008 is 100 tones candles, based on 300 working days a year and a single shift of 8 hours per day. The capacity can be increased by increasing the number of working hours per day.

2. Production Programme

The production programme is indicated in Table 3.3. Therefore, in the first and second year of production, the capacity utilization rate will be 75% and 85%, respectively. In third year and thereafter, full capacity (100%) production shall be attained.

Table 3.3
PRODUCTION PROGRAMME

Sr. No.	Product	Production Year		
		2008	2009	2010-2017
1.	candles (tones)	75	85	100
2.	Capacity utilization (%)	75	85	100

IV. MATERIALS AND INPUTS

A. RAW & AUXILIARY MATERIALS

The major raw materials used in candle making are paraffin wax, stearin acid, beeswax and dyes. Except beeswax, all the other raw materials have to be imported. It is believed that paraffin wax can be easily obtained from refineries in the neighboring Sudan.

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

Sr. No.	Raw & Auxiliary Material	Unit of Measure	Qty.	Cost ('000 Birr)		
				FC	LC	Total
1	paraffin wax	ton	89.25	429.09	75.72255	504.817
2	beeswax	ton.	5.25	-	207.92	207.92
3	Wick	ton	2	-	78.12	78.12
4	stearin acid	ton	10.5	31.26	5.517	36.78
5	dyes	kgs.	5	637.5	112.5	750
Grand Total				1097.85	479.77955	1577.637

B. UTILITIES

The major utilities of the envisaged project are electricity and water. The annual consumption and cost of utilities is indicated in Table 4.2. The total annual cost of utilities is estimated at Birr 275,832.

Table 4.2
ANNUAL UTILITIES REQUIREMENT AND COST

Sr. No	Utility	Unit of Measure	Qty.	Unit cost	Total cost
1	Electricity	kWh	24,000	0.4736	11,366
2	Water	m ³	1,000	3.1	3,100
	Total				14,466

V. TECHNOLOGY AND ENGINEERING

A. TECHNOLOGY

1. Production Process

Candle making involves simple operations, i.e., mixing of the ingredients, melting, molding, and insertion of wicks, cooling, ejection and packing. The manufacturing process can be described briefly as follows:

Paraffin wax is melted over slow fire in a melting pan. In the meanwhile, the 'wick' is tied in the mould and the parts of the mould closed tightly with clamps. When the wax has melted, it is poured with small tumbler having the upper rim bent like a lap, into the moulds cavities up to the rim. Then these moulds are transferred to cooling trays where the wax hardens in about 15 minutes.

The moulds are then opened, wicks cut with sharp knives and unnecessary wax is stripped off from the upper portion of the mould.

In the above, however, if colored candles are desired, wax soluble dyes may be added to the molten wax. When the candles are ready, they are packed in cardboard boxes before sending to the market for sale.

2. Source of Technology

The equipments and moulds required by the envisaged project can be obtained from locally available workshops those capable of manufacturing a product as per products specification.

B. ENGINEERING

1. Machinery and Equipment

The list of equipments of the project is indicated in Table 5.1. The total cost of machinery and equipment is estimated at Birr 0.5 million, all are in local currency.

Table 5.1
LIST OF MACHINERY AND EQUIPMENT

Sr. No.	Item description	Qty.
1.	Melting pot of aluminum with electric heater	1
2.	moulds	10
3.	Weighing scale	2
4.	tools	set
5.	bucket	10

2. Land, Building and Civil works

The total land requirement of the project is about 500m², out of which built-up area is 200m². The total construction cost of building assuming a construction rate of Birr 1800 per m² is estimated at Birr 360,000. The lease value of land, at the rate of 0.10 Birr / m², and for 80 years of land holding, is Birr 4,000. The total cost of building and civil works is about Birr 364,000.

3. Proposed Location and Site

Tapi town at Yeki woreda is proposed as a location for the envisaged candle making plant.

VI. MANPOWER AND TRAINING REQUIREMENT

A. MANPOWER REQUIREMENT

The envisaged project requires 8 work forces. The list of manpower for the envisaged project is indicated in Table 6.1. The annual cost of labour including fringe benefits is estimated at Birr 62,640.

Table 6.1**MANPOWER REQUIREMENT AND ANNUAL LABOUR COST**

Sr. No.	Description	Req. No.	Monthly Salary (Birr)	Annual Salary (Birr)
1	General Manager	1	1,200	14,400
2	Accountant	1	750	9,000
3	chemist	1	900	10,800
4	Laborers	4	1200	14,400
5	Guards	1	300	3,600
	Sub-Total	8	4,350	52,200
	Benefits (20% BS)		870	10,440
	Grand Total		5,220	62,640

B. TRAINING REQUIREMENT

The training of chemist will take place for about two weeks during the supplier and erection. Laborers shall be trained by in-house staff during commissioning. The cost of training is estimated at Birr 10,000.

VII. FINANCIAL ANALYSIS

The financial analysis of the candle 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	years
Bank interest	8%
Discount cash flow	8.5%
Accounts receivable	30 days
Raw material local	30days
Raw material, import	90days
Work in progress	5 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 9.73 million, of which 49 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	4
2	Building and Civil Work	360.00
3	Plant Machinery and Equipment	500.00
4	Office Furniture and Equipment	75
5	Vehicle	0
6	Pre-production Expenditure*	75
7	Working Capital	286.7
	Total Investment cost	1,300.7
	Foreign Share	49

* *N.B Pre-production expenditure includes interest during construction (Birr 75.67 thousand) training (Birr 10 thousand) and Birr 65 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 1.82 million (see Table 7.2). The material and utility cost accounts for 85 per cent, while repair and maintenance take 2.74 per cent of the production cost.

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

Items	Cost	%
Raw Material and Inputs	1,537.68	84.22
Utilities	14.47	0.79
Maintenance and repair	50	2.74
Labour direct	31.32	1.72
Factory overheads	10.44	0.57
Administration Costs	20.88	1.14
Total Operating Costs	1,664.79	91.19
Depreciation	90.5	4.96
Cost of Finance	70.43	3.86
Total Production Cost	1,825.72	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 3) is estimated by using income statement projection.

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

3. Pay Back 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 5 years.

4. Internal Rate of Return and Net Present Value

Based on the cash flow statement, the calculated IRR of the project is 19 % and the net present value at 8.5% discount rate is Birr 578,170.

D. ECONOMIC BENEFITS

The project can create employment for 8 persons. In addition to supply of the domestic needs, the project will generate Birr 473,020 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.