

**195.      PROFILE ON THE PRODUCTION OF WATER  
                 HEATER**

**TABLE OF CONTENTS**

	<b><u>PAGE</u></b>
I. SUMMARY	195-2
II. PRODUCT DESCRIPTION & APPLICATION	195-2
III. MARKET STUDY AND PLANT CAPACITY	195-3
A. MARKET STUDY	195-3
B. PLANT CAPACITY & PRODUCTION PROGRAMME	195-5
IV. MATERIALS AND INPUTS	195-6
A. RAW & AUXILIARY MATERIALS	195-6
B. UTILITIES	195-6
V. TECHNOLOGY & ENGINEERING	195-7
A. TECHNOLOGY	195-7
B. ENGINEERING	195-8
VI. HUMAN RESOURCE & TRAINING REQUIREMENT	195-12
A. HUMAN RESOURCE REQUIREMENT	195-12
B. TRAINING REQUIREMENT	195-12
VII. FINANCIAL ANALYSIS	195-14
A. TOTAL INITIAL INVESTMENT COST	195-14
B. PRODUCTION COST	195-15
C. FINANCIAL EVALUATION	195-16
D. ECONOMIC AND SOCIAL BENEFITS	195-18

## **I. SUMMARY**

This profile envisages the establishment of a plant for the production of water heater with a capacity of 15,000 units (225 tons) per annum. Water heater is a storage tank that boils and stores the heated water.

The demand for water heater is met entirely through import. The present (2012) demand for water heater is estimated at 54,454 units. The demand for water heater is projected to reach 114,373 units and 240,221 units by the year 2017 and 2022, respectively.

The principal raw materials required are steel, copper and brass sheets of various thicknesses, electrical components, screws & pipe fittings which have to be imported.

The total investment cost of the project including working capital is estimated at Birr 12.13 million. From the total investment cost the highest share (Birr 6.90 million or 56.92%) is accounted by fixed investment cost followed by initial working capital (Birr 3.74 million or 30.88%) and pre operation cost (Birr 1.48million or 12.20%). From the total investment cost Birr 4.32 million or 35.62% is required in foreign currency.

The project is financially viable with an internal rate of return (IRR) of 19.95% and a net present value (NPV) of Birr 6.84 million discounted at 10%.

The project can create employment for 23 persons. The establishment of such factory will have a foreign exchange saving effect to the country by substituting the current imports. The project will also create forward linkage with the construction and manufacturing sub sectors and also generates income for the Government in terms of tax revenue and payroll tax.

## **II. PRODUCT DESCRIPTIONS AND APPLICATIONS**

Water heater is a storage tank that boils and stores the heated water. Water heater tank has two chambers called inner and outer chamber. The inner chamber heats and stores the heated water. The external part of the tank contains the insulator jacket of the tank that prevents the water from losing its heat which otherwise would cool the heated water. Water heater is very essential in residential buildings, factories, offices and other buildings occupied by people full time or

partially. The capacity of the tank varies to serve various purposes. The common sizes of the tank have a range of 25,35,50,80 and 100 liters capacity.

### **III. MARKET STUDY AND PLANT CAPACITY**

#### **A. MARKET STUDY**

##### **1. Past Supply and Present Demand**

According to the data collected from the Ethiopian Revenue and Customs Authority the country has been importing various types of water heaters including;

- Instantaneous gas water heaters,
- Instantaneous water heater, non electric,
- Electric instantaneous water heaters and immersion water heater, and
- Other instantaneous water heaters.

Import of the various types of water heaters mentioned above is given in Table 3.1

**Table 3.1**

#### **IMPORTED QUANTITY OF WATER HEATERS (UNIT)**

<b>Year</b>	<b>Quantity</b>
2002	39,292
2003	42,607
2004	21,499
2005	33,779
2006	22,847
2007	33,166
2008	54,632
2009	43,899
2010	67,594
2011	51,692

**Source -** *Ethiopian Revenue and Customs Authority*

The import data on Table 3.1 is characterized with significant fluctuation. Import varies from low level of 21,499 pieces in the year 2004 to 67,594 in the year 2010. Despite the high

fluctuations from year to year, there is some what a general increasing trend in the past ten years. The yearly average level of import which was 32,005 units during the period 2002--2006 has increased to a yearly average 50,196 units during the period 2007--2011. In view of the above factor, the average of the recent four years import (2008-2011) which is 54,454 pieces is considered to reflect the current (2012) demand for water heaters.

## 2. Projected Demand

The demand for water heater is expected to increase with the growth of house holds and the service sector such as hotels, hospital, schools and the like. The contribution of the service sector to the national economy has been growing by about 16% during the period 2005-2010 and this is applied to forecast the future demand for water heaters (see Table 3.3).

**Table 3.3**  
**FORECASTED DEMAND FOR WATER HEATERS (UNITS)**

<b>Year</b>	<b>Projected Demand</b>
2013	63,167
2014	73,274
2015	84,997
2016	98,597
2017	114,373
2018	132,672
2019	153,900
2020	178,524
2021	207,087
2022	240,221
2023	278,657
2024	323,242
2025	374,961

### 3. Pricing and Distribution

The price of water heaters differ greatly by size or the capacity. By looking to the average CIF price and considering other charges, Birr 1,500 per piece is adopted for sales revenue projection. The product can find its market outlet through the existing household and office furniture enterprise.

#### B. PLANT CAPACITY AND PRODUCTION PROGRAMME

##### 1. Plant Capacity

Considering the market study and available technology, the selected manufacturing capacity of the plant is 15,000 units (225 tons) of assorted sizes of boiler per year. Assuming 15 kg for average weight of one boiler.

##### 2. Production Program

The production program is worked out by considering the time required for skill development and market penetration. Accordingly, the plant is assumed to start its operation at 75% of its rated full capacity and progressively increase to 85% in the second year and to 100% in the third year and there after. The production programme is provided in Table 3.3.

**Table 3.3**

#### **ANNUAL PRODUCTION PROGRAM**

	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3-10</b>
<b>Annual production (Tons)</b>	169	191	225
<b>Capacity %</b>	75	85	100

#### IV. RAW MATERIAL AND INPUTS

##### A. RAW AND AUXILIARY MATERIALS

The raw materials required for the manufacture of water heaters are steel, copper and brass sheets of various thicknesses, electrical components, screws & pipe fittings and other auxiliary materials. Most of the raw materials have to be imported. The required raw materials along with their cost at full capacity operation is shown in Table 4.1

**Table 4.1**  
**RAW MATERIALS REQUIREMENT AND ANNUAL COST**

No	Raw Materials	Annual Requirement (ton)	Cost ( 000 Birr )		
			F.C	L.C	Total
1	Mild steel sheets	90	1,620.0	405.0	2,025.0
2	Copper sheets	105	6,300.0	1,575.0	7,875.0
3	Copper Pipes	5	450.0	112.5	562.5
4	Glass Wool	75	1,875.0	468.8	2,343.8
5	Brass scraps	8	187.5	46.9	234.4
6	Resistors elements (pcs)	15,000	450.0	112.5	562.5
7	Quartz powder	10	150.0	37.5	187.5
8	Paint / enamel	15	375.0	93.8	468.8
11	Cables, thermo mt. lamps	25	875.0	218.8	1,093.8
12	Screws and pipe fittings	8	224.0	56.0	280.0
	<b>Total</b>		<b>12,506.5</b>	<b>3,126.6</b>	<b>15,633.1</b>

##### B UTILITIES

The major utilities required by the plant are electricity and water. The annual cost of utilities at full capacity operation is Birr 36,253 (see Table 4.2).

**Table 4.2****ANNUAL UTILITY REQUIREMENTS AND COST**

<b>No</b>	<b>Utility</b>	<b>Unit</b>	<b>Quantity</b>	<b>Cost (Birr)</b>
1	Electricity	Kwh.	49,000	28,253
2	Water	Meter cube	800	8,000
	<b>Total</b>			<b>36,253</b>

**V. TECHNOLOGY AND ENGINEERING****A. TECHNOLOGY****1. Process Description**

The main component of the water heater is the heater coil. To manufacture this, the resistor element is placed in the center of the copper tube where the quartz powder is poured in the tube to fill the gap between the tube and the element, while vibrating the tube. The tube will be sealed at its ends with the oxygen welder to make it water tight. The tube base is made by casting of brass scrap and threading the ends.

The outer wall is made by rolling the steel sheet already cut in size. The bottom and the top covers of the outer cover are made by pressing the sheet metal already cut by circle cutting machine.

The inner wall is made by rolling the copper sheet already cut in size. The bottom and the top covers of the outer cover is made by pressing the sheet copper already cut by circle cutting machine.

The top and bottom of the inner container is manufactured by pressing the copper sheet metal which is already cut by circle cutting machine.

The parts are assembled together after inserting the glass wool between the outer and inner walls.



## 2. Environmental Impact

Since the operations involved in the manufacture of water heaters are cutting, pressing and fitting of electrical components, the plant does not have any negative impact on the environment.

### B. ENGINEERING

#### 1. Machinery and Equipment

Total cost of machinery and equipment is Birr 4,731,000 of which Birr 3,942,800 is required in foreign currency. The list of the required machinery and equipment is shown in Table 5.1.

**TABLE 5.1**  
**LIST OF MACHINERY & EQUIPMENT AND COST**

Sr. No.	Machine	Description	Qty.
1	Guillotine shearing M/c	Cap 2X1500mm	1
2	Threadle shearing machine	Cap 2X1000mm	1
3	Oil fired furnace		1
4	Powered Sheet metal Roller	Cap 2mm	1
5	Sheet metal Circle cutter	Cap2,5mm	1
6	Mechanical press	Cap 30Ton	1`
7	Fl y Wheel press	Cap.10 Ton	2
8	Pedestal Grinding Machine		1
9	Pillar Drilling Machine	Cap20mm	1
10	Stoving Furnace.	15kva	1
11	Turning lathe machine	1mt cenert to center	1
12	Testing lab. equipment		1Set
13	Material Handling .Eqpt.	1set	1set
14	Dies and moulds	Complete	1set
15	Paint/print/packing		1set

<b>Sr. No.</b>	<b>Machine</b>	<b>Description</b>	<b>Qty.</b>
16	Gas Welding set	2sets	2 sets
17	Spot welding machine	30Kva	1set
18	Threading cutting Machine	¾-2inch cap.	2 sets

## **2. Land Building and Civil Work**

The entire space requirement of the plant is 800 meter square. Total built-up area of the land is suggested to be 200 square meters. Total cost of building at the rate of Birr 5000/sq. meter amounts to Birr 1,000,000.

According to the Federal Legislation on the Lease Holding of Urban Land (Proclamation No 721/2004) in principle, urban land permit by lease is on auction or negotiation basis, however, the time and condition of applying the proclamation shall be determined by the concerned regional or city government depending on the level of development.

The legislation has also set the maximum on lease period and the payment of lease prices. The lease period ranges from 99 years for education, cultural research health, sport, NGO , religious and residential area to 80 years for industry and 70 years for trade while the lease payment period ranges from 10 years to 60 years based on the towns grade and type of investment.

Moreover, advance payment of lease based on the type of investment ranges from 5% to 10%.The lease price is payable after the grace period annually. For those that pay the entire amount of the lease will receive 0.5% discount from the total lease value and those that pay in installments will be charged interest based on the prevailing interest rate of banks. Moreover, based on the type of investment, two to seven years grace period shall also be provided.

However, the Federal Legislation on the Lease Holding of Urban Land apart from setting the maximum has conferred on regional and city governments the power to issue regulations on the exact terms based on the development level of each region.

In Addis Ababa, the City's Land Administration and Development Authority is directly responsible in dealing with matters concerning land. However, regarding the manufacturing sector, industrial zone preparation is one of the strategic intervention measures adopted by the City Administration for the promotion of the sector and all manufacturing projects are assumed to be located in the developed industrial zones.

Regarding land allocation of industrial zones if the land requirement of the project is below 5,000 m<sup>2</sup>, the land lease request is evaluated and decided upon by the Industrial Zone Development and Coordination Committee of the City's Investment Authority. However, if the land request is above 5,000 m<sup>2</sup>, the request is evaluated by the City's Investment Authority and passed with recommendation to the Land Development and Administration Authority for decision, while the lease price is the same for both cases.

Moreover, the Addis Ababa City Administration has recently adopted a new land lease floor price for plots in the city. The new prices will be used as a benchmark for plots that are going to be auctioned by the city government or transferred under the new "Urban Lands Lease Holding Proclamation."

The new regulation classified the city into three zones. The first Zone is Central Market District Zone, which is classified in five levels and the floor land lease price ranges from Birr 1,686 to Birr 894 per m<sup>2</sup>. The rate for Central Market District Zone will be applicable in most areas of the city that are considered to be main business areas that entertain high level of business activities.

The second zone, Transitional Zone, will also have five levels and the floor land lease price ranges from Birr 1,035 to Birr 555 per m<sup>2</sup>. This zone includes places that are surrounding the city and are occupied by mainly residential units and industries.

The last and the third zone, Expansion Zone, is classified into four levels and covers areas that are considered to be in the outskirts of the city, where the city is expected to expand in the future. The floor land lease price in the Expansion Zone ranges from Birr 355 to Birr 191 per m<sup>2</sup> (see Table 5.2).

**Table 5.2****NEW LAND LEASE FLOOR PRICE FOR PLOTS IN ADDIS ABABA**

<b>Zone</b>	<b>Level</b>	<b>Floor price/m<sup>2</sup></b>
Central Market District	1 <sup>st</sup>	1686
	2 <sup>nd</sup>	1535
	3 <sup>rd</sup>	1323
	4 <sup>th</sup>	1085
	5 <sup>th</sup>	894
Transitional zone	1 <sup>st</sup>	1035
	2 <sup>nd</sup>	935
	3 <sup>rd</sup>	809
	4 <sup>th</sup>	685
	5 <sup>th</sup>	555
Expansion zone	1 <sup>st</sup>	355
	2 <sup>nd</sup>	299
	3 <sup>rd</sup>	217
	4 <sup>th</sup>	191

Accordingly, in order to estimate the land lease cost of the project profiles it is assumed that all new manufacturing projects will be located in industrial zones located in expansion zones. Therefore, for the profile a land lease rate of Birr 266 per m<sup>2</sup>, which is equivalent to the average floor price of plots located in expansion zone, is adopted.

On the other hand, some of the investment incentives arranged by the Addis Ababa City Administration on lease payment for industrial projects are granting longer grace period and extending the lease payment period. The criteria are creation of job opportunity, foreign exchange saving, investment capital and land utilization tendency etc. Accordingly, Table 5.3 shows incentives for lease payment.

**Table 5.3****INCENTIVES FOR LEASE PAYMENT OF INDUSTRIAL PROJECTS**

<b>Scored point</b>	<b>Grace period</b>	<b>Payment Completion Period</b>	<b>Down Payment</b>
Above 75%	5 Years	30 Years	10%
From 50 - 75%	5 Years	28 Years	10%
From 25 - 49%	4 Years	25 Years	10%

For the purpose of this project profile the average i.e. five years grace period, 28 years payment completion period and 10% down payment is used. The land lease period for industry is 60 years.

Accordingly, the total land lease cost at a rate of Birr 266 per m<sup>2</sup> is estimated at Birr 212,800 of which 10% or Birr 21,280 will be paid in advance. The remaining Birr 191,520 will be paid in equal installments with in 28 years i.e. Birr 6,840 annually.

**VI. HUMAN RESOURCE AND TRAINING REQUIREMENT****A. HUMAN RESOURCE REQUIREMENT**

The envisaged plant requires 23 workers for one shift. Of these 14 are technical workers. The total annual salary, including employees benefit, amounts to Birr 624,900. The details are shown in Table 6.1 below.

**B. TRAINING REQUIREMENT**

On the job training of the operators would be enough for workers with technical back ground. For the simple training to be conducted Birr 10,000 is required.

**Table 6.1**  
**LIST OF HUMAN RESOURCE AND SALARY**

Sr. No.	Description	No.	Salary (Birr)	
			Monthly	Annual
<b>A. ADMINISTRATION</b>				
1	Plant Manager	1	5,000	60,000
2	Secretary	1	2,500	30,000
3	Accountant	1	2,500	30,000
4	Salesman/purchaser	1	2,500	30,000
5	Clerk	1	1,500	18,000
6	Cashier	1	2,000	24,000
7	General Service	3	800	28,800
<b>SUB TOTAL</b>		<b>9</b>		<b>220,800</b>
<b>B. PRODUCTION</b>				
8	Foreman/	1	2,500	30,000
9	Machinery Operators	6	2,000	144,000
10	Assistant Operators	2	1,500	36,000
11	Mechanics	2	2,000	48,000
12	Quality controller	1	1,500	18,000
13	Laborers	2	800	19,200
<b>SUB TOTAL</b>		<b>14</b>	<b>-</b>	<b>295,200</b>
<b>TOTAL</b>				<b>516,000</b>
EMPLOYEE'S BENEFIT (25% OF BASIC SALARY)		-	-	108,900
<b>TOTAL</b>		<b>23</b>	<b>-</b>	<b>624,900</b>

## VII. FINANCIAL ANALYSIS

The financial analysis of the water heater 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	10%
Discount cash flow	10%
Accounts receivable	30 days
Raw material local	30 days
Raw material imported	120 days
Work in progress	1 day
Finished products	30 days
Cash in hand	5 days
Accounts payable	30 days
Repair and maintenance	5% of machinery cost

### A. TOTAL INITIAL INVESTMENT COST

The total investment cost of the project including working capital is estimated at Birr 12.13 million (See Table 7.1). From the total investment cost the highest share (Birr 6.90 million or 56.92%) is accounted by fixed investment cost followed by initial working capital (Birr 3.74 million or 30.88%) and pre operation cost (Birr 1.48million or 12.20%). From the total investment cost Birr 4.32 million or 35.62% is required in foreign currency.

**Table 7.1****INITIAL INVESTMENT COST ( '000 Birr)**

Sr. No	Cost Items	Local Cost	Foreign Cost	Total Cost	% Share
<b>1</b>	<b>Fixed investment</b>				
1.1	Land Lease	21.28		21.28	0.18
1.2	Building and civil work	1,000.00		1,000.00	8.25
1.3	Machinery and equipment	411.00	4,320.00	4,731.00	39.01
1.4	Vehicles	900.00		900.00	7.42
1.5	Office furniture and equipment	250.00		250.00	2.06
	<b>Sub total</b>	<b>2,582.28</b>	<b>4,320.00</b>	<b>6,902.28</b>	<b>56.92</b>
<b>2</b>	<b>Pre operating cost *</b>				
2.1	Pre operating cost	686.55		686.55	5.66
2.2	Interest during construction	793.30		793.30	6.54
	<b>Sub total</b>	<b>1,479.85</b>		<b>1,479.85</b>	<b>12.20</b>
<b>3</b>	<b>Working capital **</b>	<b>3,744.05</b>		<b>3,744.05</b>	<b>30.88</b>
	<b>Grand Total</b>	<b>7,806.18</b>	<b>4,320.00</b>	<b>12,126.18</b>	<b>100</b>

\* *N.B Pre operating cost include project implementation cost such as installation, startup, commissioning, project engineering, project management etc and capitalized interest during construction.*

\*\* *The total working capital required at full capacity operation is Birr 5.34 million. However, only the initial working capital of Birr 3.74 million during the first year of production is assumed to be funded through external sources. During the remaining years the working capital requirement will be financed by funds to be generated internally (for detail working capital requirement see Appendix 7.A.1).*

**B. PRODUCTION COST**

The annual production cost at full operation capacity is estimated at Birr 19.62 million (see Table 7.2). The cost of raw material account for 79.67% of the production cost. The other major components of the production cost are depreciation, financial cost, direct labour, and cost of marketing and distribution which account for 6.77%, 3.89%, 2.63%, and 3.82% respectively. The remaining 3.22% is the share of utility, repair and maintenance, labour overhead and administration cost. For detail production cost see Appendix 7.A.2.



**Table 7.2****ANNUAL PRODUCTION COST AT FULL CAPACITY (year three)**

<b>Items</b>	<b>Cost (000 Birr)</b>	<b>%</b>
Raw Material and Inputs	15,633	79.67
Utilities	36	0.18
Maintenance and repair	237	1.21
Labour direct	516	2.63
Labour overheads	109	0.56
Administration Costs	250	1.27
Land lease cost	0	0.00
Cost of marketing and distribution	750	3.82
<b>Total Operating Costs</b>	<b>17,531</b>	<b>89.34</b>
Depreciation	1,329	6.77
Cost of Finance	764	3.89
<b>Total Production Cost</b>	<b>19,623</b>	<b>100.00</b>

**C. FINANCIAL EVALUATION****1. Profitability**

Based on the projected profit and loss statement, the project will generate a profit throughout its operation life. Annual net profit after tax will grow from Birr 1.04 million to Birr 2.38 million during the life of the project. Moreover, at the end of the project life the accumulated net cash flow amounts to Birr 19.78 million. For profit and loss statement and cash flow projection see Appendix 7.A.3 and 7.A.4, respectively.

## 2. Ratios

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. Using the year-end balance sheet figures and other relevant data, the most important ratios such as return on sales which is computed by dividing net income by revenue, return on assets (operating income divided by assets), return on equity (net profit divided by equity) and return on total investment (net profit plus interest divided by total investment) has been carried out over the period of the project life and all the results are found to be satisfactory.

## 3. Break-even Analysis

The break-even analysis establishes a relationship between operation costs and revenues. It indicates the level at which costs and revenue are in equilibrium. To this end, the break-even point for capacity utilization and sales value estimated by using income statement projection are computed as followed.

$$\text{Break Even Sales Value} = \frac{\text{Fixed Cost} + \text{Financial Cost}}{\text{Variable Margin ratio (\%)}} = \text{Birr } 8,820,000$$

$$\text{Break Even Capacity utilization} = \frac{\text{Break even Sales Value}}{\text{Sales revenue}} \times 100 = 49.27 \%$$

## 4. Pay-back 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 it is estimated that the project's initial investment will be fully recovered within 6 years.

## **5. Internal Rate of Return**

The internal rate of return (IRR) is the annualized effective compounded return rate that can be earned on the invested capital, i.e., the yield on the investment. Put another way, the internal rate of return for an investment is the discount rate that makes the net present value of the investment's income stream total to zero. It is an indicator of the efficiency or quality of an investment. A project is a good investment proposition if its IRR is greater than the rate of return that could be earned by alternate investments or putting the money in a bank account. Accordingly, the IRR of this project is computed to be 19.95% indicating the viability of the project.

## **6. Net Present Value**

Net present value (NPV) is defined as the total present (discounted) value of a time series of cash flows. NPV aggregates cash flows that occur during different periods of time during the life of a project in to a common measuring unit i.e. present value. It is a standard method for using the time value of money to appraise long-term projects. NPV is an indicator of how much value an investment or project adds to the capital invested. In principal a project is accepted if the NPV is non-negative.

Accordingly, the net present value of the project at 10% discount rate is found to be Birr 6.84 million which is acceptable. For detail discounted cash flow see Appendix 7.A.5.

## **D. ECONOMIC AND SOCIAL BENEFITS**

The project can create employment for 23 persons. The project will generate Birr 5.69 million 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. The project will also create forward linkage with the construction and manufacturing sub sectors and also generates other income for the government.

**Appendix 7.A**

**FINANCIAL ANALYSES SUPPORTING TABLES**



**Appendix 7.A.2**  
**PRODUCTION COST ( in 000 Birr)**

<b>Item</b>	<b>Year 2</b>	<b>Year 3</b>	<b>Year 4</b>	<b>Year 5</b>	<b>Year 6</b>	<b>Year 7</b>	<b>Year 8</b>	<b>Year 9</b>	<b>Year 10</b>	<b>Year 11</b>
Raw Material and Inputs	10,943	14,070	15,633	15,633	15,633	15,633	15,633	15,633	15,633	15,633
Utilities	25	32	36	36	36	36	36	36	36	36
Maintenance and repair	166	213	237	237	237	237	237	237	237	237
Labour direct	361	464	516	516	516	516	516	516	516	516
Labour overheads	76	98	109	109	109	109	109	109	109	109
Administration Costs	175	225	250	250	250	250	250	250	250	250
Land lease cost	0	0	0	0	7	7	7	7	7	7
Cost of marketing and distribution	750	750	750	750	750	750	750	750	750	750
<b>Total Operating Costs</b>	<b>12,497</b>	<b>15,853</b>	<b>17,531</b>	<b>17,531</b>	<b>17,538</b>	<b>17,538</b>	<b>17,538</b>	<b>17,538</b>	<b>17,538</b>	<b>17,538</b>
Depreciation	1,329	1,329	1,329	1,329	1,329	65	65	65	65	65
Cost of Finance	0	873	764	654	545	436	327	218	109	0
<b>Total Production Cost</b>	<b>13,825</b>	<b>18,054</b>	<b>19,623</b>	<b>19,514</b>	<b>19,412</b>	<b>18,039</b>	<b>17,930</b>	<b>17,821</b>	<b>17,712</b>	<b>17,603</b>

**Appendix 7.A.3**  
**INCOME STATEMENT ( in 000 Birr)**

Item	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11
Sales revenue	14,700	18,900	21,000	21,000	21,000	21,000	21,000	21,000	21,000	21,000
Less variable costs	11,747	15,103	16,781	16,781	16,781	16,781	16,781	16,781	16,781	16,781
<b>VARIABLE MARGIN</b>	<b>2,953</b>	<b>3,797</b>	<b>4,219</b>	<b>4,219</b>	<b>4,219</b>	<b>4,219</b>	<b>4,219</b>	<b>4,219</b>	<b>4,219</b>	<b>4,219</b>
in % of sales revenue	20.09	20.09	20.09	20.09	20.09	20.09	20.09	20.09	20.09	20.09
Less fixed costs	2,079	2,079	2,079	2,079	2,085	822	822	822	822	822
<b>OPERATIONAL MARGIN</b>	<b>875</b>	<b>1,719</b>	<b>2,140</b>	<b>2,140</b>	<b>2,134</b>	<b>3,397</b>	<b>3,397</b>	<b>3,397</b>	<b>3,397</b>	<b>3,397</b>
in % of sales revenue	5.95	9.09	10.19	10.19	10.16	16.18	16.18	16.18	16.18	16.18
Financial costs		873	764	654	545	436	327	218	109	0
<b>GROSS PROFIT</b>	<b>875</b>	<b>846</b>	<b>1,377</b>	<b>1,486</b>	<b>1,588</b>	<b>2,961</b>	<b>3,070</b>	<b>3,179</b>	<b>3,288</b>	<b>3,397</b>
in % of sales revenue	5.95	4.48	6.56	7.08	7.56	14.10	14.62	15.14	15.66	16.18
Income (corporate) tax	0	0	0	446	476	888	921	954	986	1,019
<b>NET PROFIT</b>	<b>875</b>	<b>846</b>	<b>1,377</b>	<b>1,040</b>	<b>1,112</b>	<b>2,073</b>	<b>2,149</b>	<b>2,225</b>	<b>2,302</b>	<b>2,378</b>
in % of sales revenue	5.95	4.48	6.56	4.95	5.29	9.87	10.23	10.60	10.96	11.32

**Appendix 7.A.4****CASH FLOW FOR FINANCIAL MANAGEMENT ( in 000 Birr)**

<b>Item</b>	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>	<b>Year 4</b>	<b>Year 5</b>	<b>Year 6</b>	<b>Year 7</b>	<b>Year 8</b>	<b>Year 9</b>	<b>Year 10</b>	<b>Year 11</b>	<b>Scrap</b>
<b>TOTAL CASH INFLOW</b>	<b>7,589</b>	<b>19,281</b>	<b>18,913</b>	<b>21,006</b>	<b>21,000</b>	<b>21,000</b>	<b>21,000</b>	<b>21,000</b>	<b>21,000</b>	<b>21,000</b>	<b>21,000</b>	<b>6,737</b>
Inflow funds	7,589	4,581	13	6	0	0	0	0	0	0	0	0
Inflow operation	0	14,700	18,900	21,000	21,000	21,000	21,000	21,000	21,000	21,000	21,000	0
Other income	0	0	0	0	0	0	0	0	0	0	0	6,737
<b>TOTAL CASH OUTFLOW</b>	<b>7,589</b>	<b>17,078</b>	<b>18,881</b>	<b>19,918</b>	<b>19,722</b>	<b>19,651</b>	<b>19,953</b>	<b>19,877</b>	<b>19,800</b>	<b>19,724</b>	<b>18,557</b>	<b>0</b>
Increase in fixed assets	7,589	0	0	0	0	0	0	0	0	0	0	0
Increase in current assets	0	3,788	1,064	532	0	1	0	0	0	0	0	0
Operating costs	0	11,747	15,103	16,781	16,781	16,788	16,788	16,788	16,788	16,788	16,788	0
Marketing and Distribution cost	0	750	750	750	750	750	750	750	750	750	750	0
Income tax	0	0	0	0	446	476	888	921	954	986	1,019	0
Financial costs	0	793	873	764	654	545	436	327	218	109	0	0
Loan repayment	0	0	1,091	1,091	1,091	1,091	1,091	1,091	1,091	1,091	0	0
<b>SURPLUS (DEFICIT)</b>	<b>0</b>	<b>2,203</b>	<b>32</b>	<b>1,089</b>	<b>1,278</b>	<b>1,349</b>	<b>1,047</b>	<b>1,123</b>	<b>1,200</b>	<b>1,276</b>	<b>2,443</b>	<b>6,737</b>
<b>CUMULATIVE CASH BALANCE</b>	<b>0</b>	<b>2,203</b>	<b>2,235</b>	<b>3,324</b>	<b>4,602</b>	<b>5,951</b>	<b>6,997</b>	<b>8,121</b>	<b>9,320</b>	<b>10,596</b>	<b>13,039</b>	<b>19,776</b>



**Appendix 7.A.5**  
**DISCOUNTED CASH FLOW ( in 000 Birr)**

Item	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Scrap
<b>TOTAL CASH INFLOW</b>	<b>0</b>	<b>14,700</b>	<b>18,900</b>	<b>21,000</b>	<b>21,000</b>	<b>21,000</b>	<b>21,000</b>	<b>21,000</b>	<b>21,000</b>	<b>21,000</b>	<b>21,000</b>	<b>6,737</b>
Inflow operation	0	14,700	18,900	21,000	21,000	21,000	21,000	21,000	21,000	21,000	21,000	0
Other income	0	0	0	0	0	0	0	0	0	0	0	6,737
<b>TOTAL CASH OUTFLOW</b>	<b>11,333</b>	<b>13,549</b>	<b>16,379</b>	<b>17,531</b>	<b>17,977</b>	<b>18,014</b>	<b>18,426</b>	<b>18,459</b>	<b>18,492</b>	<b>18,524</b>	<b>18,557</b>	<b>0</b>
Increase in fixed assets	7,589	0	0	0	0	0	0	0	0	0	0	0
Increase in net working capital	3,744	1,052	526	0	1	0	0	0	0	0	0	0
Operating costs	0	11,747	15,103	16,781	16,781	16,788	16,788	16,788	16,788	16,788	16,788	0
Marketing and Distribution cost	0	750	750	750	750	750	750	750	750	750	750	0
Income (corporate) tax		0	0	0	446	476	888	921	954	986	1,019	0
<b>NET CASH FLOW</b>	<b>-11,333</b>	<b>1,151</b>	<b>2,521</b>	<b>3,469</b>	<b>3,023</b>	<b>2,986</b>	<b>2,574</b>	<b>2,541</b>	<b>2,508</b>	<b>2,476</b>	<b>2,443</b>	<b>6,737</b>
<b>CUMULATIVE NET CASH FLOW</b>	<b>-11,333</b>	<b>10,181</b>	<b>-7,660</b>	<b>-4,191</b>	<b>-1,169</b>	<b>1,817</b>	<b>4,391</b>	<b>6,932</b>	<b>9,440</b>	<b>11,916</b>	<b>14,359</b>	<b>21,096</b>
Net present value	-11,333	1,047	2,084	2,606	2,064	1,854	1,453	1,304	1,170	1,050	942	2,597
Cumulative net present value	-11,333	10,286	-8,203	-5,596	-3,532	-1,678	-225	1,079	2,249	3,299	4,241	6,839

NET PRESENT VALUE                   6,839  
INTERNAL RATE OF RETURN       19.95%  
NORMAL PAYBACK                     6 years