

**104. PROFILE ON THE PRODUCTION OF GYPSUM  
BOARD**

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## **I. SUMMARY**

This profile envisages the establishment of a plant for the production of gypsum board with a capacity of 300,000 m<sup>2</sup> of a 1,820mm x 910mm x 9 mm plain board types per annum. Gypsum board is widely used as construction materials mainly for interior finishing like partition, walls, ceiling and acoustic boards

The demand for gypsum board is met through import and domestic production. The present (2012) unsatisfied demand for gypsum board is estimated at 429,765 m<sup>2</sup>. The unsatisfied demand for synthetic marble is projected to reach 692,140 m<sup>2</sup> and 1,114,699 m<sup>2</sup> by the year 2017 and 2022, respectively.

The principal raw materials required is raw gypsum, the by-product of phosphoric acid gypsum, which is available locally.

The total investment cost of the project including working capital is estimated at Birr 18.56 million. From the total investment cost, the highest share (Birr 11.33 million or 61.03%) is accounted by fixed investment cost initial followed by working capital ( Birr 5.36 million or 28.88%) and pre operation cost (Birr 1.87 million or 10.09%). From the total investment cost, Birr 3.21 million or 17.31% is required in foreign currency.

The project is financially viable with an internal rate of return (IRR) of 32.98% and a net present value (NPV) of Birr 26.30 million, discounted at 10%.

The project can create employment for 23 persons. The project will generate Birr 14.32 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. It has forward linkage effect with construction sector and backward linkage effect with gypsum & paper producing industries. It also generates other income for the Government.

## **II. PRODUCT DESCRIPTION AND APPLICATION**

Gypsum board is a board made of gypsum, which consists of the core of the board and covering of the core of the board and covering paper. It is widely used as construction materials mainly for interior finishing like partition, walls, ceiling and acoustic boards. Major raw materials are gypsum and hard board papers. The plant can be categorized as small-scale industry.

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

### **A. MARKET STUDY**

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

Gypsum board is widely used as construction materials mainly for interior finishing like partition, walls, ceiling and acoustic boards. Therefore, the demand for the product is influenced by the dynamism in the real estate sub sector mainly of residential and commercial building. Nowadays, the use of gypsum board partition for commercial building has become customary. Furthermore, high end houses, restaurants, pastries and the like use gypsum board for ceiling and decorations.

The local demand for gypsum board was met only through import in the past. However, recently a gypsum board manufacturing plant named GH Industrial Plc has become operational. However, there is no available data which indicates the production level of the new plant. Therefore, for estimating the demand for the product the unsatisfied demand i.e. the demand which is met through import is considered. Accordingly, the quantity of gypsum board imported during the period 2002-2011 is given in Table 3.1

**Table 3.1**  
**IMPORT OF GYPSUM BOARD (IN M<sup>2</sup>)**

<b>Year</b>	<b>Import</b>
2002	28,247
2003	11,901
2004	25,275
2005	54,998
2006	101,379
2007	236,634
2008	105,045
2009	281,953
2010	217,294
2011	380,323

*Source: - Ethiopian Revenues & Customs Authority.*

As could be observed from Table 3.1, import of gypsum board exhibits a substantial growth especially during the recent six years i.e. 2006--2011. The average annual import, which was 30,105 m<sup>2</sup> during the period 2002-2005, has increased by more than seven fold to an average of 220,438 m<sup>2</sup> during the period 2006-2011.

For estimating the present unsatisfied demand for gypsum board, a growth rate 13% which is equivalent to growth rate of the contribution of the construction sector to GDP during the period 2001--2010 is considered.

Accordingly, taking the 2011 level of import as a base and applying a growth rate 13%, the present (2012) unsatisfied demand for gypsum board is estimated at 429,765 m<sup>2</sup>.

## **2. Demand Projection**

The demand for gypsum board is directly related with the growth in the construction sector in general and the housing construction sub sector in particular which in turn depends on the overall economic development of the country.

The contribution of the construction sector to the GDP during the period 2001 – 2010 have been

growing at annual average growth rate of 13 percent which is above the average annual growth rate of real GDP during the period under consideration (11.4 %), indicating a rise in the share of the construction sector within the overall economy.

According to the GTP, during the period 2010/11 – 2014/15 the real GDP of the country (at a base case scenario) is expected to grow at an average annual growth rate of 11.2%. Moreover, during the same period the annual average planned targets of growth for the construction sector is 20%.

Accordingly, by considering the above factors the demand for gypsum board is conservatively assumed to grow at a rate of 10%. Accordingly, projected unsatisfied demand is presented in Table 3.2.

**Table 3.2**  
**PROJECTED UNSATISFIED DEMAND (M<sup>2</sup>)**

<b>Year</b>	<b>Projected Demand</b>
2013	472,741
2014	520,015
2015	572,017
2016	629,219
2017	692,140
2018	761,354
2019	837,490
2020	921,239
2021	1,013,363
2022	1,114,699

### **3. Pricing and Distribution**

The current factory price of gypsum board ranges between Birr 125 per m<sup>2</sup> to 160 per m<sup>2</sup>. For the envisaged plant a factory-gate price of Birr 140 per m<sup>2</sup> is recommended. The plant will directly sell its product to the end-users at the premises of the factory.

## B. PLANT CAPACITY AND PRODUCTION PROGRAM

### 1. Plant Capacity

Based on the market study and the economic scale of Gypsum board, the rated capacity of the plant is proposed to be 300,000 m<sup>2</sup> of a 1,820mm x 910mm x 9 mm plain board types per annum.

### 2. Production Program

The production program is set away that the plant will attain 75% of its capacity in the first year, 85% in the second year and full capacity beginning from the third year.

## IV. MATERIALS AND INPUTS

### A. RAW MATERIALS

Raw gypsum, the by-product of phosphoric acid gypsum, is the main raw material for production of gypsum board which is available locally. The annual raw material required with the corresponding cost is given in Table 4.1.

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

Raw Material Type	Quantity (Tone)	Cost ('000 Birr)		
		FC	LC	Total
Gypsum	2,240		16,800.00	16,800.00
Paper	210	1543.50	661.50	2,205.00
Pulp	14	51.45	22.05	73.50
Additives	35	183.75	78.75	262.50
<b>Total</b>		<b>1778.7</b>	<b>17,562.3</b>	<b>19,341.00</b>

## B. UTILITIES

The utilities required are steam, fuel (heavy oil), water and electrical power, annual cost of utilities is Birr 13.34 million. Table 4.2 below shows utility requirement and the corresponding cost at full capacity utilization of the envisaged plant.

**Table 4.2**  
**UTILITIES REQUIREMENT AND COST**

<b>Sr. No.</b>	<b>Utilities</b>	<b>Unit of Measure</b>	<b>Quantity</b>	<b>Cost (Birr)</b>
1	Steam	kg	2,400,000	468,304
2	Fuel (heavy oil)	liters	490,000	7,105,000
3	Water	m <sup>3</sup>	550,000	5,500,000
5	Electrical power	kWh	465,000	269,700
	<b>Total</b>			<b>13,343,004</b>

## V. TECHNOLOGY AND ENGINEERING

### A. TECHNOLOGY

#### 1. Production Process

The wet gypsum is dried in a dryer, then calcined to form plaster, hemihydrates of calcium sulphate (partly water soluble anhydrite) in a calcination unit, and stocked in silos after milling of the calcined product. Heavy oil is usually used for drying and calcination, and the exhaust gas is released in to air passing through a scrubber.

The pulp used as filler is mixed with required amount of water in pulper. In a board forming process, plaster, filter and water and adhesives under fixed ratios into a mixer, and the slurry leaving the mixer is sent to forming unit. While the paper for the top and bottom of the gypsum board is supplied is fed in between the top and the bottom papers moving sandwiched and



enveloped by the papers. Setting of the plaster in the slurry raked place on the belt conveyer of the forming unit along the moving of the formed gypsum board, and after certain time allowed for setting the board is cut into uniform size. The setting progresses further on the gypsum board pieces are placed in a drying unit.

## 2. Environmental Impact Assessment

Gypsum is an abundant naturally occurring non-toxic mineral and the production process of gypsum board which consist drying, calcinations and cutting does no have any adverse effect on the environment.

## B. ENGINEERING

### 1. Machinery and Equipment

Total cost of machinery and equipment is estimated at Birr 6,951,450, out of which Birr 3,212,850 is required in foreign currency. The list of machinery and equipment required for the manufacture of gypsum board is given in Table 5.1.

**Table 5.1**

### **LIST OF REQUIRED MACHINERY AND EQUIPMENT**

<b>Sr. No.</b>	<b>Description</b>	<b>Qty.</b>
1	<b>Gypsum Drying Section</b>	
	Oil storage tank	1
	Furnace	1
	Gypsum feeder & Conveyer	1set
	Gypsum dryer	1
	Cyclone	1
	Exhaust gas blower	1
	Scrubber	1
	Dry gypsum hopper	1

Sr. No.	Description	Qty.
2	<p style="text-align: center;"><b>Gypsum Calcining Section</b></p> Kettle Furnace Hot pit Pulverizer Silo Plaster hopper electrical dust collector Bag filter Scrubber Exhaust gas blower Feeder and conveyer	2 1 2 2 3 1 1 1 1 1
3	Automatic regulating equipment	1
4	2HP motors, fans, hand cars	4 set
5	Accessories	1set

## 2. Land, Building and Civil Works

The plant requires a total of 1,000 m<sup>2</sup> area of land out of which 600 m<sup>2</sup> is built-up area, which includes manufacturing area, raw material stock area, offices etc. Assuming construction rate of Birr 5,000 per m<sup>2</sup>, the total cost of construction is estimated to be Birr 3 million.

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 266,000 of which 10% or Birr 26,600 will be paid in advance. The remaining Birr 239,400 will be paid in equal installments with in 28 years i.e. Birr 8,550 annually.

## **VI. HUMAN RESORCE AND TRAINING REQUIREMENTS**

### **A. HUMAN RESORCE REQUIREMENT**

Total human resource requirement, including skilled and unskilled labor is 23 persons. Correspondingly total annual labor cost is estimated at Birr 302,400. Table 6.1 below shows the list of human resource required and the estimated annual labor costs.

**Table 6.1****HUMAN RESORCE REQUIREMENT & LABOR COST(BIRR)**

<b>Sr. No.</b>	<b>Job Position</b>	<b>Req. No.</b>	<b>Salary Per Month</b>	<b>Salary Per Year</b>
1	Manager	1	3,000	36,000
2	Admin. and finance head	1	2,400	28,800
3	Prod. & technique head	1	2,400	28,800
4	Marketing head	1	2,400	28,800
5	Supervisor	2	2,000	24,000
6	General service head	1	1,500	18,000
7	Secretary	1	1,050	12,600
8	Personnel clerk	1	1,050	12,600
9	Sales man	2	2,000	24,000
10	Production operators	3	1800	21,600
11	Drying section operators	2	1,200	14,400
12	Finishing section operators	3	1,800	21,600
13	Security guards	3	1,800	21,600
14	Driver	1	800	9,600
	<b>Total</b>	<b>23</b>	<b>25,200</b>	<b>302,400</b>

**B. TRAINING REQUIREMENT**

All operators need basic training so that they can be acquainted to the operation. This can be done during the commissioning period of the plant. Such training is estimated to cost about Birr 125,000.

**VII. FINANCIAL ANALYSIS**

The financial analysis of the gypsum board 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
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 18.56 million (see Table 7.1). From the total investment cost, the highest share (Birr 11.33 million or 61.03%) is accounted by fixed investment cost initial followed by working capital ( Birr 5.36 million or 28.88%) and pre operation cost (Birr 1.87 million or 10.09%). From the total investment cost, Birr 3.21 million or 17.31% 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	26.60		26.60	0.14
1.2	Building and civil work	3,000.00		3,000.00	16.16
1.3	Machinery and equipment	3,738.45	3,213.00	6,951.45	37.45
1.4	Vehicles	900.00		900.00	4.85
1.5	Office furniture and equipment	450.00		450.00	2.42
	<b>Sub total</b>	<b>8,115.05</b>	<b>3,213.00</b>	<b>11,328.05</b>	<b>61.03</b>
<b>2</b>	<b>Pre operating cost *</b>				
2.1	Pre operating cost	658.54		658.54	3.55
2.2	Interest during construction	1,214.27		1,214.27	6.54
	<b>Sub total</b>	<b>1,872.81</b>		<b>1,872.81</b>	<b>10.09</b>
<b>3</b>	<b>Working capital **</b>	<b>5,360.06</b>		<b>5,360.06</b>	<b>28.88</b>
	<b>Grand Total</b>	<b>15,347.92</b>	<b>3,213.00</b>	<b>18,560.92</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 7.68 million. However, only the initial working capital of Birr 5.36 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 37.06 million (see Table 7.2). The cost of raw material account for 52.19% of the production cost. The other major components of the production cost are utility, depreciation, financial cost, and labor, which account for 36.01%, 5.04%, 3.15, and 0.81%, respectively. The remaining 2.80% is the share of repair and maintenance, labor 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</b>	<b>%</b>
Raw Material and Inputs	19,341	52.19
Utilities	13,343	36.01
Maintenance and repair	209	0.56
Labor direct	302	0.81
Labor overheads	76	0.21
Administration Costs	250	0.67
Land lease cost	0	0.00
Cost of marketing and distribution	500	1.35
<b>Total Operating Costs</b>	<b>34,021</b>	<b>91.81</b>
Depreciation	1,867	5.04
Cost of Finance	1,169	3.15
<b>Total Production Cost</b>	<b>37,057</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 3.58 million to Birr 5.46 million during the life of the project. Moreover, at the end of the project life the accumulated net cash flow amounts to Birr 54.41 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.

$$\text{Break- Even Sales Value} = \frac{\text{Fixed Cost} + \text{Financial Cost}}{\text{Variable Margin ratio (\%)}} = 17,640,000 \text{ Birr}$$

$$\text{Break -Even Capacity utilization} = \frac{\text{Break- even Sales Value}}{\text{Sales revenue}} \times 100 = 27.92 \%$$

## 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 2 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 32.98% 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 principle, 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 26.30 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 14.32 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. It has forward linkage effect with construction sector and backward linkage effect with gypsum & paper producing industries. It 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	13,539	15,473	19,341	19,341	19,341	19,341	19,341	19,341	19,341	19,341
Utilities	9,340	10,674	13,343	13,343	13,343	13,343	13,343	13,343	13,343	13,343
Maintenance and repair	146	167	209	209	209	209	209	209	209	209
Labour direct	211	242	302	302	302	302	302	302	302	302
Labour overheads	53	61	76	76	76	76	76	76	76	76
Administration Costs	175	200	250	250	250	250	250	250	250	250
Land lease cost	0	0	0	0	9	9	9	9	9	9
Cost of marketing and distribution	500	500	500	500	500	500	500	500	500	500
<b>Total Operating Costs</b>	<b>23,965</b>	<b>27,317</b>	<b>34,021</b>	<b>34,021</b>	<b>34,030</b>	<b>34,030</b>	<b>34,030</b>	<b>34,030</b>	<b>34,030</b>	<b>34,030</b>
Depreciation	1,867	1,867	1,867	1,867	1,867	165	165	165	165	165
Cost of Finance	0	1,336	1,169	1,002	835	668	501	334	167	0
<b>Total Production Cost</b>	<b>25,832</b>	<b>30,519</b>	<b>37,057</b>	<b>36,890</b>	<b>36,731</b>	<b>34,862</b>	<b>34,695</b>	<b>34,528</b>	<b>34,362</b>	<b>34,195</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	29,400	37,800	42,000	42,000	42,000	42,000	42,000	42,000	42,000	42,000
Less variable costs	23,465	26,817	33,521	33,521	33,521	33,521	33,521	33,521	33,521	33,521
<b>VARIABLE MARGIN</b>	<b>5,935</b>	<b>10,983</b>	<b>8,479</b>	<b>8,479</b>	<b>8,479</b>	<b>8,479</b>	<b>8,479</b>	<b>8,479</b>	<b>8,479</b>	<b>8,479</b>
in % of sales revenue	20.19	29.06	20.19	20.19	20.19	20.19	20.19	20.19	20.19	20.19
Less fixed costs	2,367	2,367	2,367	2,367	2,376	674	674	674	674	674
<b>OPERATIONAL MARGIN</b>	<b>3,568</b>	<b>8,616</b>	<b>6,112</b>	<b>6,112</b>	<b>6,103</b>	<b>7,805</b>	<b>7,805</b>	<b>7,805</b>	<b>7,805</b>	<b>7,805</b>
in % of sales revenue	12.14	22.79	14.55	14.55	14.53	18.58	18.58	18.58	18.58	18.58
Financial costs		1,336	1,169	1,002	835	668	501	334	167	0
<b>GROSS PROFIT</b>	<b>3,568</b>	<b>7,281</b>	<b>4,943</b>	<b>5,110</b>	<b>5,269</b>	<b>7,138</b>	<b>7,305</b>	<b>7,472</b>	<b>7,638</b>	<b>7,805</b>
in % of sales revenue	12.14	19.26	11.77	12.17	12.54	16.99	17.39	17.79	18.19	18.58
Income (corporate) tax	0	0	0	1,533	1,581	2,141	2,191	2,241	2,292	2,342
<b>NET PROFIT</b>	<b>3,568</b>	<b>7,281</b>	<b>4,943</b>	<b>3,577</b>	<b>3,688</b>	<b>4,996</b>	<b>5,113</b>	<b>5,230</b>	<b>5,347</b>	<b>5,464</b>
in % of sales revenue	12.14	19.26	11.77	8.52	8.78	11.90	12.17	12.45	12.73	13.01

**Appendix 7.A.4**  
**CASH FLOW FOR FINANCIAL MANAGEMENT ( 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>11,987</b>	<b>36,004</b>	<b>37,804</b>	<b>42,009</b>	<b>42,000</b>	<b>42,000</b>	<b>42,000</b>	<b>42,000</b>	<b>42,000</b>	<b>42,000</b>	<b>42,000</b>	<b>10,681</b>
Inflow funds	11,987	6,604	4	9	0	0	0	0	0	0	0	0
Inflow operation	0	29,400	37,800	42,000	42,000	42,000	42,000	42,000	42,000	42,000	42,000	0
Other income	0	0	0	0	0	0	0	0	0	0	0	10,681
<b>TOTAL CASH OUTFLOW</b>	<b>11,987</b>	<b>30,569</b>	<b>31,086</b>	<b>38,387</b>	<b>38,225</b>	<b>38,115</b>	<b>38,508</b>	<b>38,391</b>	<b>38,275</b>	<b>38,158</b>	<b>36,371</b>	<b>0</b>
Increase in fixed assets	11,987	0	0	0	0	0	0	0	0	0	0	0
Increase in current assets	0	5,390	764	1,528	0	1	0	0	0	0	0	0
Operating costs	0	23,465	26,817	33,521	33,521	33,530	33,530	33,530	33,530	33,530	33,530	0
Marketing and Distribution cost	0	500	500	500	500	500	500	500	500	500	500	0
Income tax	0	0	0	0	1,533	1,581	2,141	2,191	2,241	2,292	2,342	0
Financial costs	0	1,214	1,336	1,169	1,002	835	668	501	334	167	0	0
Loan repayment	0	0	1,670	1,670	1,670	1,670	1,670	1,670	1,670	1,670	0	0
<b>SURPLUS (DEFICIT)</b>	<b>0</b>	<b>5,435</b>	<b>6,718</b>	<b>3,621</b>	<b>3,775</b>	<b>3,885</b>	<b>3,492</b>	<b>3,609</b>	<b>3,725</b>	<b>3,842</b>	<b>5,629</b>	<b>10,681</b>
<b>CUMULATIVE CASH BALANCE</b>	<b>0</b>	<b>5,435</b>	<b>12,153</b>	<b>15,775</b>	<b>19,549</b>	<b>23,434</b>	<b>26,925</b>	<b>30,534</b>	<b>34,259</b>	<b>38,102</b>	<b>43,731</b>	<b>54,412</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>29,400</b>	<b>37,800</b>	<b>42,000</b>	<b>42,000</b>	<b>42,000</b>	<b>42,000</b>	<b>42,000</b>	<b>42,000</b>	<b>42,000</b>	<b>42,000</b>	<b>10,681</b>
Inflow operation	0	29,400	37,800	42,000	42,000	42,000	42,000	42,000	42,000	42,000	42,000	0
Other income	0	0	0	0	0	0	0	0	0	0	0	10,681
<b>TOTAL CASH OUTFLOW</b>	<b>17,347</b>	<b>24,724</b>	<b>28,836</b>	<b>34,021</b>	<b>35,555</b>	<b>35,610</b>	<b>36,171</b>	<b>36,221</b>	<b>36,271</b>	<b>36,321</b>	<b>36,371</b>	<b>0</b>
Increase in fixed assets	11,987	0	0	0	0	0	0	0	0	0	0	0
Increase in net working capital	5,360	760	1,520	0	1	0	0	0	0	0	0	0
Operating costs	0	23,465	26,817	33,521	33,521	33,530	33,530	33,530	33,530	33,530	33,530	0
Marketing and Distribution cost	0	500	500	500	500	500	500	500	500	500	500	0
Income (corporate) tax		0	0	0	1,533	1,581	2,141	2,191	2,241	2,292	2,342	0
<b>NET CASH FLOW</b>	<b>-17,347</b>	<b>4,676</b>	<b>8,964</b>	<b>7,979</b>	<b>6,445</b>	<b>6,390</b>	<b>5,829</b>	<b>5,779</b>	<b>5,729</b>	<b>5,679</b>	<b>5,629</b>	<b>10,681</b>
<b>CUMULATIVE NET CASH FLOW</b>	<b>-17,347</b>	<b>12,671</b>	<b>-3,707</b>	<b>4,272</b>	<b>10,717</b>	<b>17,106</b>	<b>22,936</b>	<b>28,715</b>	<b>34,444</b>	<b>40,123</b>	<b>45,751</b>	<b>56,433</b>
Net present value	-17,347	4,250	7,408	5,995	4,402	3,968	3,290	2,966	2,673	2,408	2,170	4,118
Cumulative net present value	-17,347	13,096	-5,688	307	4,709	8,676	11,967	14,932	17,605	20,013	22,183	26,301

NET PRESENT VALUE                   26,301  
INTERNAL RATE OF RETURN       32.98%  
NORMAL PAYBACK                       2 years