

**70. PROFILE ON THE PRODUCTION OF SODIUM  
SULPHATE**

**TABLE OF CONTENTS**

	<b><u>PAGE</u></b>
I. SUMMARY	70-3
II. PRODUCT DESCRIPTION & APPLICATION	70-3
III. MARKET STUDY AND PLANT CAPACITY	70-3
A. MARKET STUDY	70-3
B. PLANT CAPACITY & PRODUCTION PROGRAM	70-6
IV. MATERIALS AND INPUTS	70-7
A. RAW & AUXILIARY MATERIALS	70-7
B. UTILITIES	70-8
V. TECHNOLOGY & ENGINEERING	70-8
A. TECHNOLOGY	70-8
B. ENGINEERING	70-9
VI. HUMAN RESOURCE & TRAINING REQUIREMENT	70-13
A. HUMAN RESOURCE REQUIREMENT	70-13
B. TRAINING REQUIREMENT	70-13
VII. FINANCIAL ANALYSIS	70-14
A. TOTAL INITIAL INVESTMENT COST	70-15
B. PRODUCTION COST	70-16
C. FINANCIAL EVALUATION	70-17
D. ECONOMIC & SOCIAL BENEFITS	70-19

## **I. SUMMARY**

This profile envisages the establishment of a plant for the production of sodium sulphate with a capacity of 3,000 tons per annum. Sodium sulphate is used as an aid in digesting pulpwood and dissolves the lignin, also used in soap and detergent industry and to manufacture sodium salts, ceramic glazes, processing textile fibers dyes, pharmaceuticals, etc.

The demand for Sodium sulphate is entirely met through import. The present (2012) demand for Sodium sulphate is estimated at 1,980 tons. The demand for Sodium sulphate is projected to reach 3,489 tons and 16,150 tons by the year 2017 and 2022, respectively.

The principal raw materials required by the envisaged plant are sulphuric acid and common salt. Both raw materials are locally available.

The total investment cost of the project including working capital is estimated at Birr 40.66 million. From the total investment cost, the highest share (Birr 32.27 million or 79.35%) is accounted by fixed investment cost followed by pre operation cost (4.32 million or 10.63%) and initial working capital (Birr 4.08 million or 10.02%). From the total investment cost, Birr 21.87 million or 53.79% is required in foreign currency.

The project is financially viable with an internal rate of return (IRR) of 21.36% and a net present value (NPV) of Birr 22.50 million, discounted at 10%.

The project can create employment for 36 persons. The project will generate Birr 15.38 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 backward linkage with sulphuric acid plants and salt producers and forward linkage with the soap and detergent, textile, and pharmaceuticals sub sectors and also generate income for the Government in terms of payroll tax.

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

Sodium sulphate is white crystal or powder which is soluble in water and glycerol. It is used as an aid in digesting pulpwood and dissolves the lignin. The next major user is the soap and detergent industry. It is also used to manufacture sodium salts, ceramic glazes, processing textile fibers dyes, pharmaceuticals, etc.

Sodium sulfate has been used in powdered detergents as filler, dyeing textiles, ceramic glazes, pharmaceuticals, etc. Sodium sulfate prevents scum formation by the molten glass during refining, and also fluxes the glass. The compound also acts as a fining agent in molten glass, removing small air bubbles and imperfections during the blowing and casting processes.

In the laboratory, sodium sulfate is often used as an inert drying compound for organic materials. It removes water from compounds reliably at temperatures below 30° C (86° F). Another main use of sodium sulfate is in thermal storage. It has been utilized as a solar heat storage component since the 1950s, because it has a high heat storage capacity and does not change from a solid to a liquid until 90 ° F (32 ° C). Sodium sulfate is used to store heat in thermal tiles, and put into cells surrounded by solar-heated water, as well as in some computer-cooling and insulating applications.

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

### **A. MARKET STUDY**

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

Sodium sulphate, is an important ingredient in the manufacture of detergent powder, glass, textiles, paper and starch. The demand for sodium sulphate is entirely met through import. Import of sodium sulphate for the last twelve years is presented in Table 3.1.

**Table 3.1**  
**IMPORT OF SODIUM SULPHATE**

<b>Year</b>	<b>Quantity (Tons)</b>	<b>Value ( '000 Birr)</b>
2000	22.3	117.5
2001	163.5	548.5
2002	126.0	541.5
2003	332.8	665.6
2004	260.0	817.4
2005	291.2	450.5
2006	871.8	1,379.3
2007	575.1	1,183.7
2008	2,044.3	5,276.4
2009	1,945.0	6,122.6
2010	2,162.0	8,290.7
2011	1,057.7	4,553.6

*Source: Ethiopian Revenues and Customs Authority.*

Import of Sodium sulphate in the past twelve years has shown a substantial increase in volume and value. In the initial three years (2000--2002), the annual average volume of import was only 104 tons. In the following three years (2003-2005) ,the annual average imported quantity increased to 295 tons, which is 2.8 times higher than the preceding years. The growth of import after year 2005 was exceptionally very high. During 2006-2008 the yearly average volume of import has reached to a level of 1,164 tons, which is almost four fold of the previous three years (2003--2005) average. Similarly, a modest growth is observed in the recent three years i.e. 2009 – 2011. During this period the yearly average volume of import was 1,722 tons. Compared to the preceding three years average the total growth is 48% or a yearly growth rate of 15%.

Present effective demand for the product is estimated by taking the recent three years average and applying the 15% growth rate observed recently. Accordingly, the present demand is estimated at 1,980 tons.

## 2. Demand Projection

The demand for sodium sulphate is directly related with the development and expansion of the user industries such as detergent, textiles, paper, glass and others. The Ethiopian Investment Agency data reveals that there are a number of projects in the pipeline for implementation in all the subsectors of the manufacturing sector. Hence, when the projects are operational the demand for the product will definitely increase. Moreover, the GTP envisages a 20% yearly average growth of the manufacturing sector for the coming years to transform the economy from agrarian to industrial. Considering these factors a conservative growth rate of 12% is applied to forecast the future demand. Projected demand for sodium sulphate is presented in Table 3.2.

**Table 3.2**  
**PROJECTED DEMAND FOR SODIUM SULPHATE (TONS)**

<b>Year</b>	<b>Projected Demand</b>
2013	2,217
2014	2,484
2015	2,782
2016	3,115
2017	3,489
2018	3,908
2019	4,377
2020	4,902
2021	5,490
2022	6,150
2023	6,888

The demand for sodium sulphate will increase from 2,217 tons in the year 2013 to 3,115 tons and 4,902 tons by the year 2016 and 2020, respectively. The demand will reach at about 7 thousand tons by the year 2023.

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

The CIF price of imported sodium sulphate in the year 2011 is Birr 5,305 per ton. By adding duty and other costs Birr 6,897 is recommended as a factory gate price for this project. Moreover, based on the CIF value of year 2011 import the recommended a factory gate price of the by product i.e. hydrochloric acid is Birr 7,010 per ton.

The product can be supplied in a variety of package sizes and in bulk via tank truck. Hence, for bulk purchasers direct distribution by the factory is recommended for convenience of handling. For these who require in relatively small quantity agents who have the requisite experience can be utilized.

## **B. PLANT CAPACITY AND PRODUCTION PROGRAM**

### **1. Plant Capacity**

The market study indicates that, the demand for sodium sulfate increases from 2,217 tons in the year 2013 to 6,888 tons in the year 2023. The annual production capacity of the envisaged project is proposed to be 3,000 tons of sodium sulfate based on the market study, minimum economies of scale and period required for the implementation of the project and technical skill development and market penetration. The plant will also produce 1,400 tons of hydrochloric acid as by product at full capacity utilization. The capacity is determined assuming that there will be 300 working days per annum and three shifts of 8 hours each per day.

### **2. Production Program**

At the initial stage of the production period, the plant requires some years to penetrate the market and develop technical skill. Therefore, in the first and second year of production, the capacity utilization rate will be 70% and 90%, respectively. In the third year and then-after, full capacity production shall be attained. The production program is indicated in Table 3.3.

**Table 3.3**  
**PRODUCTION PROGRAM**

Sr. No.	Product	Production Year		
		1	2	3-10
1	Sodium sulphate (ton)	2,100	2,700	3,000
2	Hydrochloric acid (ton) (31%)	980	1260	1,400
3	Capacity utilization rate (%)	70	90	100

#### IV. RAW MATERIAL AND INPUTS

##### A. RAW AND AUXILIARY MATERIAL

The principal raw materials required by the envisaged plant are sulphuric acid and common salt. Both raw materials are locally available. The total annual cost of raw and auxiliary materials is estimated at Birr 16,798,000. Table 4.1 shows the annual raw material requirement and cost of the project at full capacity production.

**Table 4.1**  
**ANNUAL RAW MATERIAL REQUIREMENT & COST**

Sr. No.	Raw Material	UOM	Qty.	Total Cost (`000 Birr)
1	Sulphuric Acid (98%)	Tons	2,000	13,000
2	Salt (NaCl-96%)	Tons	2,500	3,750
3	Packing materials for HCl (50kg plastic drum)	pcs	280	42
4	Packing materials sodium sulphate (50kg PP bag)	Pcs	600	6
	<b>Total</b>			<b>16,798</b>



## B. UTILITIES

The major utilities of the proposed plant are electricity furnace oil and water. The total annual cost of utility is estimated at Birr 2,540.56. The annual utility requirement and cost are indicated in Table 4.2.

**Table 4.2**  
**ANNUAL UTILITIES REQUIREMENT & COST**

<b>Sr. No.</b>	<b>Description</b>	<b>UOM</b>	<b>Qty.</b>	<b>Cost ('000 Birr)</b>
1	Electricity	kWh	612,000	354.96
2	Furnaces oil	Lt.	50,000	744.00
3	Water	m <sup>3</sup>	40,000	400.00
	<b>Total</b>			<b>1,498.96</b>

## V. TECHNOLOGY AND ENGINEERING

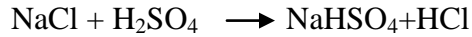
### A. TECHNOLOGY

#### 1. Production Processes

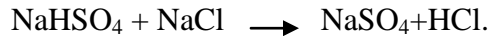
Sodium sulphate is produced from different sources such as natural sources, and as by-product of other chemicals such as hydrochloric acid, lithium, ragon, chrome chemicals etc.

It can also be produced using Mannheim and Hargreaves process. The former utilizes sulphuric acid and salt as raw material while the second uses salt, sulphure dioxide, water and oxygen as inputs. In this profile, the Mannhiem process has been selected because of the availability of the two raw materials.

In Mannheim process common salt is first mixed with calculated amount of concentrated sulfuric acid and then heated in a cast iron furnace. Two products, i.e., Sodium hydrogen sulphate and hydrogen chloride gas, will be formed.



The resulting paste of sodium hydrogen sulphate ( $\text{NaHSO}_4$ ) is then taken out and heated to a high temperature ( $550^\circ\text{C}$  to  $600^\circ\text{C}$ ) on the hearth of a furnace along with some more common salt. The sodium hydrogen sulphate is thus converted into sodium sulphate, known as salt cake.



The salt cake is then broken and pulverized. On the other side, the hydrogen chloride gas ( $\text{HCl}$ ) is given off from the furnace and allowed to pass into a packed tower (absorption tower). A spray of water also come down the tower and dissolves the vapour of hydrogen chloride to form hydrochloric acid. In this process adiabatic absorption is used to produce high strength acid (about 31% concentrate).

## **2. Environmental Impact Assessment**

The selected technology is seamless and does not have any gas emission, liquid as well as solid wastes. Hence, there is no adverse impact on environment.

### **B. ENGINEERING**

#### **1. Machinery & Equipment**

The total cost of machinery is estimated at Birr 26,250,000, of which Birr 21,875,000 is in foreign currency. The list of machinery and equipment is indicated in Table 5.1.

**Table 5.1**  
**LIST OF MACHINERY & EQUIPMENT**

Sr. No.	Machinery	No.
1	Storage tank (sulfuric acid)	1
2	Furnace (double compartment)	1
3	Cooler (sodium sulphate)	1
4	Crusher with screen and recycle	1
5	Pulverizer	1
6	Cooler (HCl)	1
7	Absorption unit	1 unit
8	Storage tank (HCl)	1

## **2. Land, Building and Civil Works**

The total area of the project is 2,500 m<sup>2</sup> out of which 1,200 m<sup>2</sup> is a built-up area. Therefore, the cost of building and civil work is estimated at Birr 4.8 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 665,000 of which 10% or Birr 66,500 will be paid in advance. The remaining Birr 598,500 will be paid in equal installments with in 28 years i.e. Birr 21,375 annually.

## **VI. HUMAN RESOURCE & TRAINING REQUIREMENT**

### **A. HUMAN RESOURCE REQUIREMENT**

The plant will employ a total of 36 persons. The total annual cost of labor is estimated at Birr 720,000. The list of human resource and labor cost are indicated in Table 6.1.

### **B. TRAINING REQUIREMENT**

Training of labor force shall be carried out during plant erection by the experts of plant machinery supplier. The cost of training is estimated at Birr 60,000

**Table 6.1****HUMAN RESOURCE REQUIREMENT & LABOR COST**

<b>Sr. No.</b>	<b>Manpower</b>	<b>No. of Persons</b>	<b>Monthly Salary (Birr)</b>	<b>Annual Salary (Birr)</b>
1	General manager	1	8000	96,000
2	Secretary	1	2,000	24,000
3	Sales and purchasing officer	2	5,000	60,000
4	Accountant	2	5000	60,000
5	Production head	1	5,000	60,000
6	Mechanic	2	3,000	36,000
7	Electrician	2	3,000	36,000
8	Chemist	3	4500	54,000
9	Operators	6	4500	54,000
10	Laborers	8	4,800	57,600
11	General service	8	3,200	38,400
	<b>Sub -total</b>	<b>36</b>	<b>48,000</b>	<b>576,000</b>
	Benefit (25% BS)		12,000	144,000
	<b>Total</b>		<b>60,000</b>	<b>720,000</b>

**VII. FINANCIAL ANALYSIS**

The financial analysis of the sodium sulphate 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	5 days
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 40.66 million (see Table 7.1). From the total investment cost, the highest share (Birr 32.27 million or 79.35%) is accounted by fixed investment cost followed by pre operation cost (4.32 million or 10.63%) and initial working capital (Birr 4.08 million or 10.02%). From the total investment cost, Birr 21.87 million or 53.79% 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	66.50		66.50	0.16
1.2	Building and civil work	4,800.00		4,800.00	11.80
1.3	Machinery and equipment	4,375.00	21,875.00	26,250.00	64.55
1.4	Vehicles	900.00		900.00	2.21
1.5	Office furniture and equipment	250.00		250.00	0.61
	<b>Sub total</b>	<b>10,391.50</b>	<b>21,875.00</b>	<b>32,266.50</b>	<b>79.35</b>
<b>2</b>	<b>Pre operating cost *</b>				
2.1	Pre operating cost	1,662.50		1,662.50	4.09
2.2	Interest during construction	2,660.37		2,660.37	6.54
	<b>Sub total</b>	<b>4,322.87</b>		<b>4,322.87</b>	<b>10.63</b>
<b>3</b>	<b>Working capital **</b>	<b>4,076.22</b>		<b>4,076.22</b>	<b>10.02</b>
	<b>Grand Total</b>	<b>18,790.58</b>	<b>21,875.00</b>	<b>40,665.58</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 5.93 million. However, only the initial working capital of Birr 4.07 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 28.94 million (see Table 7.2). The cost of raw material account for 58.03% of the production cost. The other major components of the production cost are depreciation, utility, financial cost which account for 20.66%, 5.18%, and 8.85%, respectively. The remaining 7.28% is the share of marketing and distribution, repair and maintenance, labor overhead and administration cost and labor. 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 (in 000 Birr)</b>	<b>%</b>
Raw Material and Inputs	16,798.00	58.03
Utilities	1,499.00	5.18
Maintenance and repair	788.00	2.72
Labour direct	576.00	1.99
Labour overheads	144.00	0.50
Administration Costs	250.00	0.86
Land lease cost	-	-
Cost of marketing and distribution	350.00	1.21
<b>Total Operating Costs</b>	<b>20,405.00</b>	<b>70.50</b>
Depreciation	5,979.50	20.66
Cost of Finance	2,560.60	8.85
<b>Total Production Cost</b>	<b>28,945.10</b>	<b>100</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 2.33 million to Birr 7.88 million during the life of the project. Moreover, at the end of the project life the accumulated net cash flow amounts to Birr 59.49 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.

$$\text{Break -Even Sales Value} = \frac{\text{Fixed Cost} + \text{Financial Cost}}{\text{Variable Margin ratio (\%)}} = \text{Birr } 13,400,100$$

$$\text{Break -Even Capacity utilization} = \frac{\text{Break- even Sales Value}}{\text{Sales revenue}} \times 100 = 53.41 \%$$

#### **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 5 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 21.36% 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 22.50 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 36 persons. The project will generate Birr 17.89 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 soap and detergent, textile, and pharmaceuticals sub sectors and also generate income for the Government in terms of payroll tax.

**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	11,759	15,118	16,798	16,798	16,798	16,798	16,798	16,798	16,798	16,798
Utilities	1,049	1,349	1,499	1,499	1,499	1,499	1,499	1,499	1,499	1,499
Maintenance and repair	552	709	788	788	788	788	788	788	788	788
Labour direct	403	518	576	576	576	576	576	576	576	576
Labour overheads	101	130	144	144	144	144	144	144	144	144
Administration Costs	175	225	250	250	250	250	250	250	250	250
Land lease cost	0	0	0	0	21	21	21	21	21	21
Cost of marketing and distribution	350	350	350	350	350	350	350	350	350	350
<b>Total Operating Costs</b>	<b>14,389</b>	<b>18,400</b>	<b>20,405</b>	<b>20,405</b>	<b>20,426</b>	<b>20,426</b>	<b>20,426</b>	<b>20,426</b>	<b>20,426</b>	<b>20,426</b>
Depreciation	5,980	5,980	5,980	5,980	5,980	217	217	217	217	217
Cost of Finance	0	2,926	2,561	2,195	1,829	1,463	1,097	732	366	0
<b>Total Production Cost</b>	<b>20,368</b>	<b>27,305</b>	<b>28,945</b>	<b>28,579</b>	<b>28,235</b>	<b>22,107</b>	<b>21,741</b>	<b>21,375</b>	<b>21,009</b>	<b>20,643</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	22,334	28,715	31,905	31,905	31,905	31,905	31,905	31,905	31,905	31,905
Less variable costs	14,039	18,050	20,055	20,055	20,055	20,055	20,055	20,055	20,055	20,055
<b>VARIABLE MARGIN</b>	<b>8,296</b>	<b>10,666</b>	<b>11,850</b>	<b>11,850</b>	<b>11,850</b>	<b>11,850</b>	<b>11,850</b>	<b>11,850</b>	<b>11,850</b>	<b>11,850</b>
in % of sales revenue	37.14	37.14	37.14	37.14	37.14	37.14	37.14	37.14	37.14	37.14
Less fixed costs	6,330	6,330	6,330	6,330	6,351	588	588	588	588	588
<b>OPERATIONAL MARGIN</b>	<b>1,966</b>	<b>4,336</b>	<b>5,521</b>	<b>5,521</b>	<b>5,499</b>	<b>11,262</b>	<b>11,262</b>	<b>11,262</b>	<b>11,262</b>	<b>11,262</b>
in % of sales revenue	8.80	15.10	17.30	17.30	17.24	35.30	35.30	35.30	35.30	35.30
Financial costs		2,926	2,561	2,195	1,829	1,463	1,097	732	366	0
<b>GROSS PROFIT</b>	<b>1,966</b>	<b>1,410</b>	<b>2,960</b>	<b>3,326</b>	<b>3,670</b>	<b>9,798</b>	<b>10,164</b>	<b>10,530</b>	<b>10,896</b>	<b>11,262</b>
in % of sales revenue	8.80	4.91	9.28	10.42	11.50	30.71	31.86	33.00	34.15	35.30
Income (corporate) tax	0	0	0	998	1,101	2,940	3,049	3,159	3,269	3,378
<b>NET PROFIT</b>	<b>1,966</b>	<b>1,410</b>	<b>2,960</b>	<b>2,328</b>	<b>2,569</b>	<b>6,859</b>	<b>7,115</b>	<b>7,371</b>	<b>7,627</b>	<b>7,883</b>
in % of sales revenue	8.80	4.91	9.28	7.30	8.05	21.50	22.30	23.10	23.91	24.71

**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>33,929</b>	<b>29,150</b>	<b>28,738</b>	<b>31,916</b>	<b>31,905</b>	<b>31,905</b>	<b>31,905</b>	<b>31,905</b>	<b>31,905</b>	<b>31,905</b>	<b>31,905</b>	<b>11,420</b>
Inflow funds	33,929	6,816	23	11	0	0	0	0	0	0	0	0
Inflow operation	0	22,334	28,715	31,905	31,905	31,905	31,905	31,905	31,905	31,905	31,905	0
Other income	0	0	0	0	0	0	0	0	0	0	0	11,420
<b>TOTAL CASH OUTFLOW</b>	<b>33,929</b>	<b>21,205</b>	<b>26,163</b>	<b>27,213</b>	<b>27,256</b>	<b>27,016</b>	<b>28,487</b>	<b>28,231</b>	<b>27,975</b>	<b>27,719</b>	<b>23,805</b>	<b>0</b>
Increase in fixed assets	33,929	0	0	0	0	0	0	0	0	0	0	0
Increase in current assets	0	4,156	1,179	590	0	2	0	0	0	0	0	0
Operating costs	0	14,039	18,050	20,055	20,055	20,076	20,076	20,076	20,076	20,076	20,076	0
Marketing and Distribution cost	0	350	350	350	350	350	350	350	350	350	350	0
Income tax	0	0	0	0	998	1,101	2,940	3,049	3,159	3,269	3,378	0
Financial costs	0	2,660	2,926	2,561	2,195	1,829	1,463	1,097	732	366	0	0
Loan repayment	0	0	3,658	3,658	3,658	3,658	3,658	3,658	3,658	3,658	0	0
<b>SURPLUS (DEFICIT)</b>	<b>0</b>	<b>7,946</b>	<b>2,575</b>	<b>4,703</b>	<b>4,649</b>	<b>4,889</b>	<b>3,418</b>	<b>3,674</b>	<b>3,930</b>	<b>4,186</b>	<b>8,100</b>	<b>11,420</b>
<b>CUMULATIVE CASH BALANCE</b>	<b>0</b>	<b>7,946</b>	<b>10,520</b>	<b>15,224</b>	<b>19,873</b>	<b>24,762</b>	<b>28,179</b>	<b>31,853</b>	<b>35,783</b>	<b>39,969</b>	<b>48,070</b>	<b>59,489</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>22,334</b>	<b>28,715</b>	<b>31,905</b>	<b>31,905</b>	<b>31,905</b>	<b>31,905</b>	<b>31,905</b>	<b>31,905</b>	<b>31,905</b>	<b>31,905</b>	<b>11,420</b>
Inflow operation	0	22,334	28,715	31,905	31,905	31,905	31,905	31,905	31,905	31,905	31,905	0
Other income	0	0	0	0	0	0	0	0	0	0	0	11,420
<b>TOTAL CASH OUTFLOW</b>	<b>38,005</b>	<b>15,545</b>	<b>18,978</b>	<b>20,405</b>	<b>21,405</b>	<b>21,527</b>	<b>23,366</b>	<b>23,476</b>	<b>23,585</b>	<b>23,695</b>	<b>23,805</b>	<b>0</b>
Increase in fixed assets	33,929	0	0	0	0	0	0	0	0	0	0	0
Increase in net working capital	4,076	1,156	578	0	2	0	0	0	0	0	0	0
Operating costs	0	14,039	18,050	20,055	20,055	20,076	20,076	20,076	20,076	20,076	20,076	0
Marketing and Distribution cost	0	350	350	350	350	350	350	350	350	350	350	0
Income (corporate) tax		0	0	0	998	1,101	2,940	3,049	3,159	3,269	3,378	0
<b>NET CASH FLOW</b>	<b>-38,005</b>	<b>6,789</b>	<b>9,737</b>	<b>11,500</b>	<b>10,500</b>	<b>10,378</b>	<b>8,539</b>	<b>8,429</b>	<b>8,320</b>	<b>8,210</b>	<b>8,100</b>	<b>11,420</b>
<b>CUMULATIVE NET CASH FLOW</b>	<b>-38,005</b>	<b>31,216</b>	<b>-21,479</b>	<b>-9,979</b>	<b>522</b>	<b>10,899</b>	<b>19,438</b>	<b>27,868</b>	<b>36,187</b>	<b>44,397</b>	<b>52,497</b>	<b>63,917</b>
Net present value	-38,005	6,172	8,047	8,640	7,172	6,444	4,820	4,326	3,881	3,482	3,123	4,403
Cumulative net present value	-38,005	31,833	-23,786	15,146	-7,974	-1,530	3,290	7,615	11,497	14,978	18,101	22,504

NET PRESENT VALUE                    22,504  
INTERNAL RATE OF RETURN            21.36%  
NORMAL PAYBACK                        5 years