

**81. PROFILE ON THE PRODUCTION OF PLASTIC  
SANITARY WARE**

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## **I. SUMMARY**

This profile envisages the establishment of a plant for the production of plastic sanitary ware with a capacity of 500 tons per annum. Plastic sanitary ware uses includes baths, showers, washbasins, bidets, lavatory pans, seats and covers, flushing cisterns of plastics.

The demand for plastic sanitary ware is met through import. The present (2012) demand for plastic sanitary ware is estimated at 1,938 tons. The demand for plastic sanitary ware is projected to reach 3,120 tons and 5,025 tons by the year 2017 and 2022, respectively.

The principal raw materials required are PVC resin, stearic acid, stabilizers, calcium stearate, filler, and colorings pigments, all of which has to be imported.

The total investment cost of the project including working capital is estimated at Birr 47.45 million. From the total investment cost, the highest share (Birr 36.69 million or 77.33%) is accounted by fixed investment cost followed by initial working capital (Birr 5.80 million or 12.23%) and pre operation cost (Birr 4.95 million or 10.44%). From the total investment cost, Birr 24.32 million or 51.24% is required in foreign currency.

The project is financially viable with an internal rate of return (IRR) of 21.83% and a net present value (NPV) of Birr 27.70 million, discounted at 10%.

The project can create employment for 51 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 forward linkage with the construction sub sector and also generates income for the Government in terms of tax revenue and payroll tax.

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

Sanitary ware encompasses all plumbed-in bathroom fixtures and fittings including showers, bathroom basins, WC's (toilet), baths, and bidets. Sanitary Ware products are classified under three broad categories on the basis of material type. Sanitary ware made of Plastics, Sanitary

ware made of Ceramics and Sanitary ware made of Iron. This project profile however discusses the sanitary ware made of plastic.

Plastic sanitary ware includes baths, showers, washbasins, bidets, lavatory pans, seats and covers, flushing cisterns of plastics.

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

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

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

Currently, the local demand for plastic sanitary wares is been met through imports. Accordingly, import or apparent consumption for plastic sanitary ware for the period 2002 – 2011 is shown in Table 3.1.

**Table 3.1**  
**IMPORT OF PLASTIC SANITARY WARES (TONS)**

<b>Year</b>	<b>Import</b>	
	<b>Quantity (tons)</b>	<b>Value (Birr)</b>
2002	212	1,849,730
2003	331	3,917,955
2004	404	4,527,818
2005	932	5,892,407
2006	959	8,028,158
2007	1,028	9,546,087
2008	1,260	14,253,192
2009	1,452	14,290,020
2010	1,686	25,624,677
2011	1,622	36,041,598

*Sources: - Ethiopian Revenue and Customs Authority.*

As can be seen from Table 3.1, import or apparent consumption of plastic sanitary wares during the period 2002 – 2011 shows a substantial growth from year to year. Import or apparent consumption of the product which was 212 tons in year 2002 has exhibited a consistent year to year growth reaching 1,686 tons in 2010. In 2011 import has exhibited a slight (4%) decrease as compared to 2010. Similarly, import of plastic sanitary wares in terms of value has increased from 1.84 million in 2002 to 36.04 million in 2011.

During the period under consideration (2002 -2011), import of plastic sanitary ware has registered an average annual growth rate of 30% in terms of volume and 42% in terms of value.

In order to estimate the current (2012) effective demand, since past import shows a consistent growth trend, the time trend extrapolation method is applied. Accordingly, the principle of least squares is employed to fit a linear trend to the historical data of export (y) and time (t) and the relation is expressed by the following equation:

$$Y = \alpha + bt,$$

Where

‘a ‘ is the intercept and ‘b’ is the slope. Accordingly, the estimated linear equations becomes,

$$y = 989 + 86.26667t.$$

Using the above equation, the estimated present (2012) demand for plastic sanitary ware is shown in Table 3.2.

**Table 3.2****ESTIMATED PRESENT DEMAND (TONS)**

<b>Year</b>	<b>Import</b>	<b>Forecasted Demand</b>
2002	212	212
2003	331	385
2004	404	557
2005	932	730
2006	959	902
2007	1,028	1,075
2008	1,260	1,247
2009	1,452	1,420
2010	1,686	1,592
2011	1,622	1,765
<b>2012</b>	<b>-</b>	<b>1,938</b>

**2. Demand Projection**

The demand for plastic sanitary ware 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 2011 – 2015 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 plastic sanitary ware is conservatively assumed to grow at a rate of 10%. Projected demand is presented in Table 3.3.

**Table 3.3**  
**PROJECTED DEMAND (TONS)**

<b>Year</b>	<b>Projected Demand</b>
2013	2,131
2014	2,344
2015	2,579
2016	2,837
2017	3,120
2018	3,432
2019	3,776
2020	4,153
2021	4,569
2022	5,025
2023	5,528
2024	6,081
2025	6,689

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

Based on the average CIF price of imported plastic sanitary wares and adding duty and other import related costs, the recommended factory- gate price is Birr 83,574 per ton. The products of the envisaged plant can be marketed through the existing wholesale and retail network. The envisaged plant can also appoint agents at different locations.

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

### **1. Plant Capacity**

Considering the economic scale and production management relative to the market demand projection, the annual total production capacity of the plant is set to be 500 tons of plastic sanitary wares per annum. The envisaged plant will operate in two shifts sixteen hours per day for three hundred days within a year considering 13 holidays and 52 Sunday per year and assuming that maintenance activities will be performed during off hours and Sunday

### **2. Production Program**

The manufacturing process of plastic sanitary wares involves precise tooling , testing , and skilled manpower in production tools arrangement and services, so the manpower will take a considerable time until they develop a skill in operation and troubleshooting of the production process and also in providing a manufacturing and maintenance services of production tools, and moulds. The production program arrangement of the envisaged plant is shown in Table 3.4.

**Table 3.4**  
**PRODUCTION PROGRAM**

<b>Description</b>	<b>Production Year</b>			
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
Capacity utilization rate (%)	<b>75</b>	<b>85</b>	<b>90</b>	<b>100</b>
Plastic sanitary wares ( ton)	375.00	425.00	450.00	500.00



#### IV. MATERIALS AND INPUTS

##### A. RAW MATERIALS

The direct and auxiliary raw materials required for annual plant production capacity with their quantity and related cost is shown in Table 4.1 below.

**Table 4.1**  
**RAW & AUXILIARY MATERIALS REQUIREMENT & COST**

Sr. No.	Description	Annual Consumption	UOM	Unit Cost (Birr) /Ton	Cost ( '000 ) Birr		
					LC	FC	Total ( Birr)
1	PVC Resin	390	ton	38,400.00		14,976.0	14,976.0
2	Stearic Acid	5	ton	16,800.00		84.0	84.0
3	Stabilizers	11	ton	24,000.00		264.0	264.0
4	Calcium Sterate	11	ton	38,400.00		422.4	422.4
5	Filler	115	ton	11,520.00		1,324.8	1,324.8
6	Coloring Pigments	26	ton	87,600.00		2,277.6	2,277.6
<b>Total FOB</b>						<b>19,348.80</b>	<b>19,348.80</b>
7	CIF (15%)				2,902.32	0	2,902.32
<b>Grand Total Cost</b>					<b>2,902.32</b>	<b>19,348.80</b>	<b>22,251.12</b>

##### B. UTILITES

The annual utilities requirements such as electricity as a source of energy and water as a cooling and cleaning agent are estimated with their associated cost is shown Table 4.2 below .

**Table 4.2**  
**UTILITIES CONSUMPTION & COST**

Sr. No.	Description	Annual Consumption	UOM	Unit Cost	Cost
				( Birr)	( '000 Birr)
1	Electricity	1,325,000	kWh	0.58	768.50
2	Water	95,000	m <sup>3</sup>	10.00	950.00
<b>Total Cost</b>					<b>1,718.50</b>

## V. TECHNOLOGY AND ENGINEERING

### A. TECHNOLOGY

#### 1. Production Process

The manufacturing of plastic sanitary wares comprises of four stages, each of which must be closely controlled and regulated to get good quality mould products.

##### **Plasticizing:**

The resin is fed from the hopper of molding and heated, softened to make its plastics in a heated cylinder and during the operation the resin compound is conveyed from one end to the other end of the cylinder is heated ,melted and plasticized .

##### **Injection:**

In this process, the plasticized plastic is injected from the plasticizing cylinder into relatively cold mould while closed under controlled pressure.

##### **After filling:**

The solidification of the plasticized melt begins in the cold mould soon after its injection in the mould from walls of the mould ten ,injected materials is kept under pressure for some time to ensure adequate filling of the mold and prevent the backflow of the polymer and to compensate for the decrease volume due to solidification.

##### **Cooling and mould release:**

The mold temperature control system allow the mold temperature to raised to to its optimum value before start up that the manufacturing of highly strained parts from a cold mod and wastage of materials will be avoided .The mold is then opened to eject the molding and is closed again to receive plasticized melt for the next cycle operation.

## 2. Environmental Impact

The envisaged plant is a manufacturing plant with no chemical or any hazardous waste to the surrounding environment and process scrapes and wastes will be recycled or sold to surrounding market for different application so that there will not be additional investment for environmental protection .

### B. ENGINNERING

#### 1. Machinery and Equipment

Total cost of machinery and equipment is estimated at Birr 3.648 million. The list of direct and auxiliary machinery, tools and equipments required for the plant and their estimated cost is shown in Table 5.1.

**Table 5.1**

**LIST OF MACHINERY, TOOLS AND EQUIPMENT& COST**

Sr. No.	Description	Qty.	UOM	Unit Cost ( Birr)	Cost ( `000 Birr)		
					LC	FC	Total ( Birr)
1	Injection moulding machine	4.00	pcs	3,600,000.00		14,400.00	14,400.00
2	High Speed Mixer	1.00	pcs	900,000.00		900.00	900.00
3	Pvc Crusher Machine	2.00	pcs	360,000.00		720.00	720.00
4	Molds and dies	1.00	set	2,700,000.00		2,700.00	2,700.00
5	Lathe	1.00	Pcs	720,000.00		720.00	720.00
6	Surface Grinder	1.00	Pcs	990,000.00		990.00	990.00
7	Milling Machine	1.00	Pcs	720,000.00		720.00	720.00
8	Drilling Machine	1.00	Pcs	450,000.00		450.00	450.00
9	Hydraulic Press Machine	1.00	Pcs	360,000.00		360.00	360.00
10	Welding	1.00	Pcs	27,000.00		27.00	27.00
11	Bench Grinder	1.00	Pcs	5,400.00		5.40	5.40

Sr. No.	Description	Qty.	UOM	Unit Cost ( Birr)	Cost ( `000 Birr)		
					LC	FC	Total ( Birr)
12	Compressor	1.00	Pcs	630,000.00		630.00	630.00
13	Tools Of Different Type	1.00	Pcs	180,000.00		180.00	180.00
14	Over Head Crane (5 Ton )	1.00	Pcs	360,000.00		360.00	360.00
15	Spare parts (5%)					<b>1,158.12</b>	<b>1,158.12</b>
Total Fob Price						24,320.52	24,320.52
16	CIF( 15%)				3,648.08	<b>0.00</b>	<b>3,648.08</b>
<b>Grand Total Cost</b>					<b>3,648.08</b>	<b>24,320.52</b>	<b>27,968.60</b>

## 2. Land, Building and Civil Works

The envisaged plant requires total land area of 3,000 meter square out of which built- up area is 1,500 meter square. At the rate of Birr 5,000 per m<sup>2</sup>, the total cost of building and civil work is estimated at Birr 7.5 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 798,000 of which 10% or Birr 79,800 will be paid in advance. The remaining Birr 718,200 will be paid in equal installments within 28 years i.e. Birr 25,650 annually

## **VI. HUMANRESOURCE AND TRAINING REQUIREMENTS**

### **A. HUMANRESOURCE REQUIREMENT**

The total human resource required for the plant is 51 persons. Annual cost of labor is Birr 1,267,200. The list of direct and indirect labor requirement and their monthly and annual cost is shown in Table 6.1.

**Table 6.1**  
**HUMANRESOURCE REQUIREMENT &LABOR COST**

<b>Sr. No.</b>	<b>Position</b>	<b>No. of Persons</b>	<b>Monthly Salary</b>	<b>Annual Salary</b>
1	Plant manager	1	10,000	120,000
2	Secretary	1	2,800	33,600
3	Administration and finance	1	3,000	36,000
4	Accountant	1	2,200	26,400
5	Mechanic	2	2,200	52,800
6	Electrician	2	2,500	60,000
7	Sales man	2	1,400	33,600
8	Operators	18	2,500	540,000
9	Production foreman	2	2,500	60,000
10	Senior machinist	2	1,800	43,200
11	Junior machinist	3	800	28,800
12	Clerk	1	1,000	12,000
13	Cashier	1	700	8,400
14	Assistant operator	7	1,600	134,400
15	Quality inspector	2	1,400	33,600
16	Store keeper	1	1,200	14,400
17	Time keeper	1	700	8,400
18	Guards	3	500	18,000
<b>Sub-total</b>		<b>51</b>		<b>1,263,600</b>
Employment benefits and allowances 20%				315,900
				<b>1,579,500</b>

## **B. TRAINING REQUIREMENT**

Since it is a manufacturing process, individual operators will be trained during machinery commissioning so that the operators and mechanics will be hired two months before the project implementation .In addition special training about the good practice of injection moulds maintenance should be given to the senior and junior machinists from the technology supplier during commissioning with an estimated training cost of Birr 250,000.



## VII. FINANCIAL ANALYSIS

The financial analysis of the plastic sanitary ware 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 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 47.45 million (see Table 7.1). From the total investment cost, the highest share (Birr 36.69 million or 77.33%) is accounted by fixed investment cost followed by initial working capital (Birr 5.80 million or 12.23%) and pre operation cost (Birr 4.95 million or 10.44%). From the total investment cost, Birr 24.32 million or 51.24% is required in foreign currency.

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

<b>Sr. No.</b>	<b>Cost Items</b>	<b>Local Cost</b>	<b>Foreign Cost</b>	<b>Total Cost</b>	<b>% Share</b>
<b>1</b>	<b>Fixed investment</b>				
1.1	Land Lease	79.80		79.80	0.17
1.2	Building and civil work	7,500.00		7,500.00	15.80
1.3	Machinery and equipment	3,648.08	24,320.52	27,968.60	58.94
1.4	Vehicles	900.00		900.00	1.90
1.5	Office furniture and equipment	250.00		250.00	0.53
	<b>Sub- total</b>	<b>12,377.88</b>	<b>24,320.52</b>	<b>36,698.40</b>	<b>77.33</b>
<b>2</b>	<b>Pre operating cost *</b>				
2.1	Pre operating cost	1,848.43		1,848.43	3.90
2.2	Interest during construction	3,104.61		3,104.61	6.54
	<b>Sub- total</b>	<b>4,953.04</b>		<b>4,953.04</b>	<b>10.44</b>
<b>3</b>	<b>Working capital**</b>	<b>5,804.80</b>		<b>5,804.80</b>	<b>12.23</b>
	<b>Grand Total</b>	<b>23,135.73</b>	<b>24,320.52</b>	<b>47,456.25</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 7.72 million. However, only the initial working capital of Birr 5.80 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 37.02 million (see Table 7.2). The cost of raw material account for 60.09% of the production cost. The other major components of the production cost are depreciation, financial cost and utility which account for 17.47%, 6.92% and 4.64%, respectively. The remaining 10.88% is the share of labor, repair and maintenance, marketing and distribution, labor overhead and administration cost. For detail production cost see Appendix 7.A.2.

**Table 7.2****ANNUAL PRODUCTION COST AT FULL CAPACITY (YEAR FOUR)**

<b>Items</b>	<b>Cost</b>	<b>%</b>
Raw Material and Inputs	22,251.00	60.09
Utilities	1,719.00	4.64
Maintenance and repair	1,398.00	3.78
Labor direct	1,263.60	3.41
Labor overheads	315.90	0.85
Administration Costs	350.00	0.95
Land lease cost	-	-
Cost of marketing and distribution	700.00	1.89
<b>Total Operating Costs</b>	<b>27,997.50</b>	<b>75.61</b>
Depreciation	6,468.41	17.47
Cost of Finance	2,561.31	6.92
<b>Total Production Cost</b>	<b>37,027.21</b>	<b>100</b>

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

Based on the projected profit and loss statement, the project will generate a profit through out its operation life. Annual net profit after tax will grow from Birr 3.69 million to Birr 9.40 million during the life of the project. Moreover, at the end of the project life the accumulated net cash flow amounts to Birr 72.59 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.

$$\text{Break -Even Sales Value} = \frac{\text{Fixed Cost} + \text{Financial Cost}}{\text{Variable Margin ratio (\%)}} = \text{Birr } 20,673,328$$

$$\text{Break -Even Capacity utilization} = \frac{\text{Break -even Sales Value}}{\text{Sales revenue}} \times 100 = 49\%$$

### 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 21.83% 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 27.70 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 51 persons. The project will generate Birr 21.85 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 forward linkage with the construction sub sector and also generates other income for the Government.

**Appendix 7.A**

**FINANCIAL ANALYSES SUPPORTING TABLES**



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

Item	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11
Raw Material and Inputs	16,688	18,913	20,026	22,251	22,251	22,251	22,251	22,251	22,251	22,251
Utilities	1,289	1,461	1,547	1,719	1,719	1,719	1,719	1,719	1,719	1,719
Maintenance and repair	1,049	1,188	1,258	1,398	1,398	1,398	1,398	1,398	1,398	1,398
Labour direct	948	1,074	1,137	1,264	1,264	1,264	1,264	1,264	1,264	1,264
Labour overheads	237	269	284	316	316	316	316	316	316	316
Administration Costs	263	298	315	350	350	350	350	350	350	350
Land lease cost	0	0	0	0	26	26	26	26	26	26
Cost of marketing and distribution	700	700	700	700	700	700	700	700	700	700
<b>Total Operating Costs</b>	<b>21,173</b>	<b>23,903</b>	<b>25,268</b>	<b>27,998</b>	<b>28,023</b>	<b>28,023</b>	<b>28,023</b>	<b>28,023</b>	<b>28,023</b>	<b>28,023</b>
Depreciation	6,468	6,468	6,468	6,468	6,468	325	325	325	325	325
Cost of Finance	0	3,415	2,988	2,561	2,134	1,708	1,281	854	427	0
<b>Total Production Cost</b>	<b>27,642</b>	<b>33,786</b>	<b>34,724</b>	<b>37,027</b>	<b>36,626</b>	<b>30,056</b>	<b>29,629</b>	<b>29,202</b>	<b>28,775</b>	<b>28,348</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	31,340	35,519	37,608	41,787	41,787	41,787	41,787	41,787	41,787	41,787
Less variable costs	20,473	23,203	24,568	27,298	27,298	27,298	27,298	27,298	27,298	27,298
<b>VARIABLE MARGIN</b>	<b>10,867</b>	<b>12,316</b>	<b>13,040</b>	<b>14,490</b>	<b>14,490</b>	<b>14,490</b>	<b>14,490</b>	<b>14,490</b>	<b>14,490</b>	<b>14,490</b>
in % of sales revenue	34.67	34.67	34.67	34.67	34.67	34.67	34.67	34.67	34.67	34.67
Less fixed costs	7,168	7,168	7,168	7,168	7,194	1,051	1,051	1,051	1,051	1,051
<b>OPERATIONAL MARGIN</b>	<b>3,698</b>	<b>5,148</b>	<b>5,872</b>	<b>7,321</b>	<b>7,295</b>	<b>13,439</b>	<b>13,439</b>	<b>13,439</b>	<b>13,439</b>	<b>13,439</b>
in % of sales revenue	11.80	14.49	15.61	17.52	17.46	32.16	32.16	32.16	32.16	32.16
Financial costs		3,415	2,988	2,561	2,134	1,708	1,281	854	427	0
<b>GROSS PROFIT</b>	<b>3,698</b>	<b>1,733</b>	<b>2,884</b>	<b>4,760</b>	<b>5,161</b>	<b>11,731</b>	<b>12,158</b>	<b>12,585</b>	<b>13,012</b>	<b>13,439</b>
in % of sales revenue	11.80	4.88	7.67	11.39	12.35	28.07	29.10	30.12	31.14	32.16
Income (corporate) tax	0	0	0	1,428	1,548	3,519	3,647	3,776	3,904	4,032
<b>NET PROFIT</b>	<b>3,698</b>	<b>1,733</b>	<b>2,884</b>	<b>3,332</b>	<b>3,613</b>	<b>8,212</b>	<b>8,511</b>	<b>8,810</b>	<b>9,108</b>	<b>9,407</b>
in % of sales revenue	11.80	4.88	7.67	7.97	8.65	19.65	20.37	21.08	21.80	22.51

**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>38,547</b>	<b>40,416</b>	<b>35,541</b>	<b>37,619</b>	<b>41,787</b>	<b>41,787</b>	<b>41,787</b>	<b>41,787</b>	<b>41,787</b>	<b>41,787</b>	<b>41,787</b>	<b>15,407</b>
Inflow funds	38,547	9,076	22	11	0	0	0	0	0	0	0	0
Inflow operation	0	31,340	35,519	37,608	41,787	41,787	41,787	41,787	41,787	41,787	41,787	0
Other income	0	0	0	0	0	0	0	0	0	0	0	15,407
<b>TOTAL CASH OUTFLOW</b>	<b>38,547</b>	<b>30,249</b>	<b>32,375</b>	<b>32,919</b>	<b>37,044</b>	<b>35,977</b>	<b>37,519</b>	<b>37,220</b>	<b>36,921</b>	<b>36,622</b>	<b>32,055</b>	<b>0</b>
Increase in fixed assets	38,547	0	0	0	0	0	0	0	0	0	0	0
Increase in current assets	0	5,971	788	394	788	2	0	0	0	0	0	0
Operating costs	0	20,473	23,203	24,568	27,298	27,323	27,323	27,323	27,323	27,323	27,323	0
Marketing and Distribution cost	0	700	700	700	700	700	700	700	700	700	700	0
Income tax	0	0	0	0	1,428	1,548	3,519	3,647	3,776	3,904	4,032	0
Financial costs	0	3,105	3,415	2,988	2,561	2,134	1,708	1,281	854	427	0	0
Loan repayment	0	0	4,269	4,269	4,269	4,269	4,269	4,269	4,269	4,269	0	0
<b>SURPLUS (DEFICIT)</b>	<b>0</b>	<b>10,167</b>	<b>3,166</b>	<b>4,700</b>	<b>4,743</b>	<b>5,810</b>	<b>4,268</b>	<b>4,567</b>	<b>4,866</b>	<b>5,165</b>	<b>9,732</b>	<b>15,407</b>
<b>CUMULATIVE CASH BALANCE</b>	<b>0</b>	<b>10,167</b>	<b>13,333</b>	<b>18,033</b>	<b>22,776</b>	<b>28,586</b>	<b>32,854</b>	<b>37,421</b>	<b>42,287</b>	<b>47,451</b>	<b>57,183</b>	<b>72,590</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>31,340</b>	<b>35,519</b>	<b>37,608</b>	<b>41,787</b>	<b>41,787</b>	<b>41,787</b>	<b>41,787</b>	<b>41,787</b>	<b>41,787</b>	<b>41,787</b>	<b>15,407</b>
Inflow operation	0	31,340	35,519	37,608	41,787	41,787	41,787	41,787	41,787	41,787	41,787	0
Other income	0	0	0	0	0	0	0	0	0	0	0	15,407
<b>TOTAL CASH OUTFLOW</b>	<b>44,352</b>	<b>21,939</b>	<b>24,286</b>	<b>26,034</b>	<b>29,428</b>	<b>29,571</b>	<b>31,543</b>	<b>31,671</b>	<b>31,799</b>	<b>31,927</b>	<b>32,055</b>	<b>0</b>
Increase in fixed assets	38,547	0	0	0	0	0	0	0	0	0	0	0
Increase in net working capital	5,805	766	383	766	2	0	0	0	0	0	0	0
Operating costs	0	20,473	23,203	24,568	27,298	27,323	27,323	27,323	27,323	27,323	27,323	0
Marketing and Distribution cost	0	700	700	700	700	700	700	700	700	700	700	0
Income (corporate) tax		0	0	0	1,428	1,548	3,519	3,647	3,776	3,904	4,032	0
<b>NET CASH FLOW</b>	<b>-44,352</b>	<b>9,401</b>	<b>11,233</b>	<b>11,574</b>	<b>12,359</b>	<b>12,216</b>	<b>10,244</b>	<b>10,116</b>	<b>9,988</b>	<b>9,860</b>	<b>9,732</b>	<b>15,407</b>
<b>CUMULATIVE NET CASH FLOW</b>	<b>-44,352</b>	<b>34,951</b>	<b>-23,718</b>	<b>12,144</b>	<b>215</b>	<b>12,431</b>	<b>22,675</b>	<b>32,792</b>	<b>42,780</b>	<b>52,640</b>	<b>62,372</b>	<b>77,780</b>
Net present value	-44,352	8,546	9,283	8,696	8,441	7,585	5,783	5,191	4,660	4,182	3,752	5,940
Cumulative net present value	-44,352	35,806	-26,522	17,826	-9,385	-1,800	3,983	9,174	13,834	18,015	21,768	27,708

NET PRESENT VALUE                    27,708  
INTERNAL RATE OF RETURN            21.83%  
NORMAL PAYBACK                        5 years