

**PROFILE ON THE PRODUCTION OF STEEL  
PROFILES**

## **Table of Contents**

I. SUMMARY.....	2
II. PRODUCT DESCRIPTIONS AND APPLICATIONS.....	3
III. MARKET AND PLANT CAPACITY .....	3
IV. MATERIAL INPUTS AND UTILITIES .....	7
V. TECHNOLOGY AND ENGINEERING.....	8
VI. HUMAN RESOURCE AND TRAINING REQUIREMENT.....	14
VII. FINANCIAL ANALYSIS .....	15
FINANCIAL ANALYSES SUPPORTING TABLES .....	20

## **I. SUMMARY**

This profile envisages the establishment of a plant for the production of steel profiles with a capacity of 30,000 tons per annum. Steel profiles are used in various forms for the construction of machine parts, structural supports or any place in the industry.

The demand for steel profiles is met through both local production and import. The present (2012) unsatisfied demand for steel profiles is estimated at 60,871 tons. The unsatisfied demand for steel profiles is projected to reach 98,033 tons and 157,883 tons by the year 2017 and 2022, respectively.

The principal raw materials required are hot and cold rolled steel strips which have to be imported.

The total investment cost of the project including working capital is estimated at Birr 185.58 million. From the total investment cost the highest share (Birr 102.92 million or 55.46%) is accounted by initial working capital followed by fixed investment cost (Birr 68.61 million or 36.97%) and pre operation cost (Birr 14.04 million or 7.57%). From the total investment cost Birr 43.02 million or 23.18% is required in foreign currency.

The project is financially viable with an internal rate of return (IRR) of 25.37% and a net present value (NPV) of Birr 182.65 million discounted at 10%.

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

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

Steel is used in various forms for the construction of machine parts, structural supports or any place in the industry. Mostly steel is prepared in shapes like L-angles U-channels, round hex sections. These profiles are manufactured in a length of six meters the end user cuts this sections to the desired length and purposes.

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

### **A. MARKET STUDY**

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

The country's requirement of steel profiles is met through both local production and imports. The Ethiopian Basic Iron and Steel Industry, in general, is one of the major industrial sub sectors in Ethiopia. The industry composes of fifteen public owned and several private factories (Source: CSA, Statistical Bulletin of 2010). Out of these public and private factories only Kaliti Metal Products factory, Akaki Metal Products Factory, Gelan Metal Industry, Mame steel Industry, Kaliti Spring Leaf Factory, Waliya steel Industry, Sunny Steel Pipe Factory and HH Steel Sections Industry are engaged in the manufacture of fabricated metals mainly round tubes and RHS products, open profiles, structural steel and water pipe products.

Therefore, there are two public owned and six private steel tubes and pipes manufacturing factories in Ethiopia that have an aggregate attainable production capacity of 42,000 tons per year in three shifts. However, the aggregate actual production of these factories was only 22,806 tons per year on average indicating that they were operating at about 54.3 percent of their attainable capacity. However, there is no available data that shows time series local production of steel profiles. Hence, for the purpose of this study the unsatisfied demand for the product i.e. the demand which is meet through import is considered.

The country imports steel profiles from different countries. The quantity of the products annually imported during the period 2002– 2011 is shown in Table 3.1.

**Table 3.1**  
**IMPORT OF STEEL PROFILES (TONS)**

<b>Year</b>	<b>Import</b>
2002	12,621
2003	20,008
2004	12,873
2005	27,809
2006	36,950
2007	31,714
2008	25,559
2009	38,648
2010	78,432
2011	65,533

*Source: Ethiopian Revenue & Customs Authority.*

As can be seen from Table 3.1, import of steel profile shows a substantial fluctuation from year to year ranging from 12,621 tons in year 2002 to 78,432 tons in 2010. However, a general growth can be observed. The growth in import of steel profile can be clearly seen when the import data is analyzed in three years interval. The average import of steel profile which was 20,230 tons during the period 2003-2005 has increased to 31,408 tons during the subsequent three years average (2006-2008). Moreover, import has increased to 60,871 tons during the recent three years average (2009-2010).

Accordingly, considering the trend of the product's import, it is assumed that the recent three years (2009-2011) average approximates the present (2012) unsatisfied demand for steel profiles. Accordingly, the unsatisfied demand for steel profile is estimated at 60,871 tons.

## **2. Projected Demand**

The demand for steel profiles depends mainly on the performance of its end-users (i.e. the construction sector or more specifically the building construction sector and the furniture manufacturing sector). Therefore, the demand for the products under consideration is a derived demand, which depends directly on the performance of its major end – users.

The construction sector of the country has undergone tremendous changes and development in recent years. 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. Moreover, during the GTP period (2010 – 2015), the construction sector is expected to grow at annual average growth rate of 20%.

On the other hand among the factors that influence the demand for steel profiles one of the critical factor is identified to be economic growth leading to growth of the construction sector. According to the government’s “Growth and Transformation Plan” during the period 2010 – 2015 the GDP of the country is expected to grow at a minimum average annual growth rate of 11.2%.

Accordingly, based on the above discussion a growth rate of 10% which is slightly lower than the expected growth rate of the country’s GDP during the GTP period (2011 – 2015) is used. Based on the above assumption and using the estimated present unsatisfied demand as a base the projected unsatisfied demand for steel profiles is shown in Table 3.2.

**Table 3.2**

**PROJECTED UNSATISFIED DEMAND FOR STEEL PROFILES (TONS)**

<b>Year</b>	<b>Projected Demand</b>
2013	66,958
2014	73,654
2015	81,019
2016	89,121
2017	98,033
2018	107,836
2019	118,620
2020	130,482
2021	143,530
2022	157,883
2023	173,671
2024	191,039
2025	210,142

**3. Pricing and Distribution**

The current retail price of steel profiles is Birr 27.50/kg. Considering wholesalers and retailers margin of 30% the recommended factory gate price for the envisaged factory is Birr 20.60/kg.

Considering the nature of the products and the characteristics of the end users a combination both direct distribution to end users (for bulk purchasers) and indirect distribution (using agents) is selected as the most appropriate distribution channel.

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

### **1. Plant Capacity**

From the market study and taking into consideration the complexity of the manufacturing process, the manufacturing capacity of the plant is taken as 30,000 tons of steel profiles per annum.

### **2. Production Program**

Considering the production process involved and time to take to master the operation, the plant will start to produce at 75% of its installed capacity. In the second year it will increase to 85% and in the third year and then after it will attain at full capacity operation. The production program is shown in Table 3.3.

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

<b>Type of product</b>	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>
<b>Steel Profiles(Tons )</b>	22,500	25,500	30,000
<b>Capacity %</b>	75	85	100

## **IV. MATERIAL INPUTS AND UTILITIES**

### **A. RAW MATERIALS**

The raw materials required are hot and cold rolled steel strips. Cold rolled black steel strips are used to produce furniture products with a thickness from 0.6 to 1.5mm. The material is imported in thickness of 0.6, 0.8, 1.0, 1.2 and 1.5mm, in coils of 1.0, 1.2 or 1.5 m width. Hot rolled carbon steel strips are used to produce RHS sections used for structural purposes. The



thicknesses of these sheets are 2.0, 2.5, 3.0, 3.5, 4.0, 4.5mm delivered in coils of 1.0 to 1.5m of width.

Assuming wastage of 3% , the total annual requirement of hot and cold rolled steel strips is 30,900 tons. Considering the current international FOB price of hot and cold rolled steel strips (USD 650 per ton) the total FOB cost of the required raw materials is estimated at Birr 336,130,200. Adding 20% to account for sea freight, insurance, port handling, bank charge etc the total cost of raw material is estimated at Birr 440,102,520.

## **B. UTILITIES**

The major utilities requirements of the plant are electricity and water. Annual cost is estimated at Birr 2.84 million as indicated in Table 4.2.

**Table 4.2**

### **ANNUAL UTILITY REQUIREMENTS**

<b>No</b>	<b>Utility</b>	<b>Unit</b>	<b>Quantity</b>	<b>Cost (Birr)</b>
1	Electricity	kWh.	5,184,000	2,592,000
2	Water	Meter cube	25,500	255,000
	<b>Total</b>			<b>2,847,000</b>

## **V. TECHNOLOGY AND ENGINEERING**

### **A. TECHNOLOGY**

#### **1. Process Description**

The first process line in the manufacture of steel profiles is the slitting of steel coils in to various strips which have different width as required for the production of round pipes and R.H.S. section.

The slitting unit consists of a hydraulic mandrel type un-coiler, a hydraulic leveler, a multi-head slitting device and a multi section hydraulic re-coiler. Coil that is made ready for processing at the coil storage is mounted on the hydraulic mandrel type un-coiler and then feed into the

hydraulic leveler, which levels and straightens all bends and warps on the sheet as it passes continuously through it. The straightened sheet is then led into the multi-head slitting device where it is slit into narrow strips.

The process of tube forming starts with the mounting of slit-coils on the spiral strip accumulator. The spiral accumulator table with intake pinch roll has the function to feed the mill without stopping it. The strip with the required development size is then shaped into a circular section through a series of forming rollers. The two mating edges of the circular section are then fused together by a high frequency electric resistance welding (400 KHz) right after forming rollers. The welded circular pipes pass under a cutting tool, which removes the outside flash resulting from the pressure during welding. To reduce the high temperature developed during welding, the pipe is cooled to ambient temperature by applying a continuous flow of soluble oil (coolant) on the pipe.

After cooling, the sizing and straightening of the pipe is carried out by several driven horizontal and vertical rolls. For a production of square or rectangular sections, the sized circular pipe is reshaped by the use of additional forming rollers.

The pipe after forming and straightening is cut to any required length by the flying automatic cut-to-length device, which is capable to cut pipes up to 300mm outside diameter. Finished products are unloaded on discharge table of the line and are stacked and strapped into suitable bundles by two automatic stacking and strapping machines. Finished pipes are inspected by the quality control section on a random basis at the inspection laboratory.

## **2. Environmental Impact**

The production of steel tubes does not have any negative impact on the environment since the process does not use any chemicals and the wastage, which is mainly steel scrap, can be recycled.

## **B. ENGINEERING**

### **1. Machinery and Equipment**

Total cost of machinery and equipment is estimated at Birr 1.245 million of which Birr 830 thousand is required in foreign currency. The necessary machinery and equipment with their corresponding cost are given in Table 5.1.

**Table 5.1**

**LIST OF MACHINERY AND EQUIPMENT AND COST**

<b>Sr. No.</b>	<b>Description</b>	<b>Unit of Measure</b>	<b>Qty</b>	<b>Costs (000 Birr)</b>
1	Slitting line	No.	1	7,943
2	ERW (Electric resistance welding) pipe and profile making machine, complete line to manufacture round, square, and rectangular steel tubes			
2.1	Smaller Tube Mill Line	No.	1	7,487
2.2	Larger Tube Mill Line	No.	1	15,078
3	Over – head crane 30 tons , 16.50 m double girder over-head traveling crane	No.	1	3,819
4	Fork Lift, diesel operated, 8 tones lifting capacity, max. lifting height-4mt.	No.	1	1,461
5	‘Pick and Carry’ diesel operated Mobile Crane, 25 ton lifting max. capacity	No.	1	5,867
6	Transformer (2500 KVA); hooks, insulators, and poles; bus bars, cubicles, etc; different high and low voltage (3 phase) cables	Set	1	1,370
<b>Total FOB</b>				<b>43,024</b>
	Sea freight, port handling insurance, inland transport etc (20% of FOB)			8,605
<b>Grand Total</b>				<b>51,629</b>

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

The total land area required is 5,000 m<sup>2</sup> of which the built up area is 3,000 m<sup>2</sup>. The total cost of building and civil work, at the rate of Birr 5,000 per m<sup>2</sup> is estimated at Birr 15 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 1,330,000 of which 10% or Birr 133,000 will be paid in advance. The remaining Birr 1,197,000 will be paid in equal installments within 28 years i.e. Birr 42,750 annually.

**NB:** The land issue in the above statement narrates or shows only Addis Ababa's city administration land lease price, policy and regulations.

Accordingly the project profile prepared based on the land lease price of Addis Ababa region.

To know land lease price, police and regulation of other regional state of the country updated information is available at Ethiopian Investment Agency's website [www.eia.gov.et](http://www.eia.gov.et) on the factor cost.

## VI. HUMAN RESOURCE AND TRAINING REQUIREMENT

### A. HUMAN RESOURCE REQUIREMENT

A total of 23 persons are required out of which 14 are technical workers. Annual cost of labor is estimated at Birr 565,800. The human resource required by type of job and monthly and annual salary is indicated in Table 6.1.

**Table 6.1**

#### **LIST OF HUMAN RESOURCE REQUIREMENT AND LABOR COST**

Sr. No.	Description	No.	Salary (Birr)	
			Monthly	Annual
<b>A. Administration</b>				
1	Plant Manager	1	5,000	60,000
2	Secretary	1	2,500	30,000
3	Accountant	1	2,500	30,000
4	Salesman/purchaser	1	2,500	30,000
5	Clerk	1	1,500	18,000
6	Cashier	1	2,000	24,000
7	General Service	3	800	28,800
<b>Sub- total</b>		<b>9</b>		<b>220,800</b>
<b>B. Production</b>				
8	Foreman/	1	2,500	30,000
9	Machinery Operators	6	2,000	144,000
10	Assistant Operators	1	1,500	6,000
11	Quality controller &lab. technicians	3	1,500	54,000
12	Laborers	2	800	19,200

<b>Sub- total</b>	<b>14</b>	<b>-</b>	<b>253,200</b>
<b>Total</b>			<b>474,000</b>
Employee's benefit (25% of basic salary)	-	-	91,800
<b>Total</b>	<b>23</b>	<b>-</b>	<b>565,800</b>

## **B. TRAINING REQUIREMENT**

On the job training of the operators would be enough for workers with technical back ground. For this purpose an amount of Birr 20,000 would be required to train 11 operators and other workers.

## **VII. FINANCIAL ANALYSIS**

The financial analysis of the steel profiles 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	5 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 185.58 million (see Table 7.1). From the total investment cost the highest share (Birr 102.92 million or



55.46%) is accounted by initial working capital followed by fixed investment cost (Birr 68.61 million or 36.97%) and pre operation cost (Birr 14.04 million or 7.57%). From the total investment cost Birr 43.02 million or 23.18% 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	133.00		133.00	0.07
1.2	Building and civil work	15,000.00		15,000.00	8.08
1.3	Machinery and equipment	8,605.00	43,024.00	51,629.00	27.82
1.4	Vehicles	1,500.00		1,500.00	0.81
1.5	Office furniture and equipment	350.00		350.00	0.19
	<b>Sub total</b>	<b>25,588.00</b>	<b>43,024.00</b>	<b>68,612.00</b>	<b>36.97</b>
<b>2</b>	<b>Pre operating cost *</b>				
2.1	Pre operating cost	1,898.87		1,898.87	1.02
2.2	Interest during construction	12,140.54		12,140.54	6.54
	<b>Sub total</b>	<b>14,039.41</b>		<b>14,039.41</b>	<b>7.57</b>
<b>3</b>	<b>Working capital **</b>	<b>102,925.48</b>		<b>102,925.48</b>	<b>55.46</b>
	<b>Grand Total</b>	<b>142,552.90</b>	<b>43,024.00</b>	<b>185,576.90</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 147.06 million. However, only the initial working capital of Birr 102.92 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 468.94 million (see Table 7.2). The cost of raw material account for 93.85% of the production cost. The other major components of the production cost are financial cost, depreciation, repair and maintenance, and utility which account for 2.49%, 2.48%, 0.33% and 0.61%, respectively. The remaining 0.24% is

the share of cost of marketing and distribution, direct labor, 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 ( 000 Birr)</b>	<b>%</b>
Raw Material and Inputs	440,103	93.85
Utilities	2,847	0.61
Maintenance and repair	1,549	0.33
Labor direct	474	0.10
Labor overheads	92	0.02
Administration Costs	200	0.04
Land lease cost	0	0.00
Cost of marketing and distribution	350	0.07
<b>Total Operating Costs</b>	<b>445,615</b>	<b>95.03</b>
Depreciation	11,641	2.48
Cost of Finance	11,685	2.49
<b>Total Production Cost</b>	<b>468,941</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 39.92 million to Birr 44.59 million during the life of the project. Moreover, at the end of the project life the accumulated net cash flow amounts to Birr 457.70 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.

$$\text{Break Even Sales Value} = \frac{\text{Fixed Cost} + \text{Financial Cost}}{\text{Variable Margin ratio (\%)}} = \text{Birr } 214,200,000$$

$$\text{Break Even Capacity utilization} = \frac{\text{Break even Sales Value}}{\text{Sales revenue}} \times 100 = 18.52\%$$

## 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 4 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 25.37% 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 182.65 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 90.55 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 manufacturing, construction and engineering sub sectors and also generates other income for the Government.

## **Appendix 7.A**

### **FINANCIAL ANALYSES SUPPORTING TABLES**

**Appendix 7.A.1**  
**NET WORKING CAPITAL ( in 000 Birr)**

<b>Items</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>
Total inventory	77,018.03	99,023.18	110,025.75	110,025.75	110,025.75	110,025.75	110,025.75	110,025.75	110,025.75	110,025.75
Accounts receivable	26,002.96	33,424.04	37,134.58	37,134.58	37,138.15	37,138.15	37,138.15	37,138.15	37,138.15	37,138.15
Cash-in-hand	22.51	28.94	32.15	32.15	32.75	32.75	32.75	32.75	32.75	32.75
<b>CURRENT ASSETS</b>	<b>103,043.49</b>	<b>132,476.15</b>	<b>147,192.49</b>	<b>147,192.49</b>	<b>147,196.64</b>	<b>147,196.64</b>	<b>147,196.64</b>	<b>147,196.64</b>	<b>147,196.64</b>	<b>147,196.64</b>
Accounts payable	118.01	151.73	168.58	168.58	168.58	168.58	168.58	168.58	168.58	168.58
<b>CURRENT LIABILITIES</b>	<b>118.01</b>	<b>151.73</b>	<b>168.58</b>	<b>168.58</b>	<b>168.58</b>	<b>168.58</b>	<b>168.58</b>	<b>168.58</b>	<b>168.58</b>	<b>168.58</b>
<b>TOTAL WORKING CAPITAL</b>	<b>102,925.48</b>	<b>132,324.43</b>	<b>147,023.90</b>	<b>147,023.90</b>	<b>147,028.06</b>	<b>147,028.06</b>	<b>147,028.06</b>	<b>147,028.06</b>	<b>147,028.06</b>	<b>147,028.06</b>

**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	308,072	396,093	440,103	440,103	440,103	440,103	440,103	440,103	440,103	440,103
Utilities	1,993	2,562	2,847	2,847	2,847	2,847	2,847	2,847	2,847	2,847
Maintenance and repair	1,084	1,394	1,549	1,549	1,549	1,549	1,549	1,549	1,549	1,549
Labour direct	332	427	474	474	474	474	474	474	474	474
Labour overheads	64	83	92	92	92	92	92	92	92	92
Administration Costs	140	180	200	200	200	200	200	200	200	200
Land lease cost	0	0	0	0	43	43	43	43	43	43
Cost of marketing and distribution	350	350	350	350	350	350	350	350	350	350
<b>Total Operating Costs</b>	<b>312,036</b>	<b>401,089</b>	<b>445,615</b>	<b>445,615</b>	<b>445,658</b>	<b>445,658</b>	<b>445,658</b>	<b>445,658</b>	<b>445,658</b>	<b>445,658</b>
Depreciation	11,641	11,641	11,641	11,641	11,641	635	635	635	635	635
Cost of Finance	0	13,355	11,685	10,016	8,347	6,677	5,008	3,339	1,669	0
<b>Total Production Cost</b>	<b>323,676</b>	<b>426,084</b>	<b>468,941</b>	<b>467,272</b>	<b>465,645</b>	<b>452,970</b>	<b>451,301</b>	<b>449,631</b>	<b>447,962</b>	<b>446,293</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	357,000	459,000	510,000	510,000	510,000	510,000	510,000	510,000	510,000	510,000
Less variable costs	311,686	400,739	445,265	445,265	445,265	445,265	445,265	445,265	445,265	445,265
<b>VARIABLE MARGIN</b>	<b>45,315</b>	<b>58,262</b>	<b>64,735</b>	<b>64,735</b>	<b>64,735</b>	<b>64,735</b>	<b>64,735</b>	<b>64,735</b>	<b>64,735</b>	<b>64,735</b>
in % of sales revenue	12.69	12.69	12.69	12.69	12.69	12.69	12.69	12.69	12.69	12.69
Less fixed costs	11,991	11,991	11,991	11,991	12,033	1,028	1,028	1,028	1,028	1,028
<b>OPERATIONAL MARGIN</b>	<b>33,324</b>	<b>46,271</b>	<b>52,744</b>	<b>52,744</b>	<b>52,702</b>	<b>63,707</b>	<b>63,707</b>	<b>63,707</b>	<b>63,707</b>	<b>63,707</b>
in % of sales revenue	9.33	10.08	10.34	10.34	10.33	12.49	12.49	12.49	12.49	12.49
Financial costs		13,355	11,685	10,016	8,347	6,677	5,008	3,339	1,669	0
<b>GROSS PROFIT</b>	<b>33,324</b>	<b>32,916</b>	<b>41,059</b>	<b>42,728</b>	<b>44,355</b>	<b>57,030</b>	<b>58,699</b>	<b>60,369</b>	<b>62,038</b>	<b>63,707</b>
in % of sales revenue	9.33	7.17	8.05	8.38	8.70	11.18	11.51	11.84	12.16	12.49
Income (corporate) tax	0	0	0	0	0	17,109	17,610	18,111	18,611	19,112
<b>NET PROFIT</b>	<b>33,324</b>	<b>32,916</b>	<b>41,059</b>	<b>42,728</b>	<b>44,355</b>	<b>39,921</b>	<b>41,089</b>	<b>42,258</b>	<b>43,427</b>	<b>44,595</b>
in % of sales revenue	9.33	7.17	8.05	8.38	8.70	7.83	8.06	8.29	8.52	8.74



**Appendix 7.A.4**

**CASH FLOW FOR FINANCIAL MANAGEMENT ( in 000 Birr)**

<b>Item</b>	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>	<b>Year 4</b>	<b>Year 5</b>	<b>Year 6</b>	<b>Year 7</b>	<b>Year 8</b>	<b>Year 9</b>	<b>Year 10</b>	<b>Year 11</b>	<b>Scrap</b>
<b>TOTAL CASH INFLOW</b>	<b>70,511</b>	<b>472,184</b>	<b>459,034</b>	<b>510,017</b>	<b>510,000</b>	<b>510,000</b>	<b>510,000</b>	<b>510,000</b>	<b>510,000</b>	<b>510,000</b>	<b>510,000</b>	<b>168,302</b>
Inflow funds	70,511	115,184	34	17	0	0	0	0	0	0	0	0
Inflow operation	0	357,000	459,000	510,000	510,000	510,000	510,000	510,000	510,000	510,000	510,000	0
Other income	0	0	0	0	0	0	0	0	0	0	0	168,302
<b>TOTAL CASH OUTFLOW</b>	<b>70,511</b>	<b>427,220</b>	<b>460,569</b>	<b>488,710</b>	<b>472,324</b>	<b>470,702</b>	<b>486,137</b>	<b>484,969</b>	<b>483,800</b>	<b>482,632</b>	<b>464,770</b>	<b>0</b>
Increase in fixed assets	70,511	0	0	0	0	0	0	0	0	0	0	0
Increase in current assets	0	103,043	29,433	14,716	0	4	0	0	0	0	0	0
Operating costs	0	311,686	400,739	445,265	445,265	445,308	445,308	445,308	445,308	445,308	445,308	0
Marketing and Distribution cost	0	350	350	350	350	350	350	350	350	350	350	0
Income tax	0	0	0	0	0	0	17,109	17,610	18,111	18,611	19,112	0
Financial costs	0	12,141	13,355	11,685	10,016	8,347	6,677	5,008	3,339	1,669	0	0
Loan repayment	0	0	16,693	16,693	16,693	16,693	16,693	16,693	16,693	16,693	0	0
<b>SURPLUS (DEFICIT)</b>	<b>0</b>	<b>44,965</b>	<b>-1,535</b>	<b>21,307</b>	<b>37,676</b>	<b>39,298</b>	<b>23,863</b>	<b>25,031</b>	<b>26,200</b>	<b>27,368</b>	<b>45,230</b>	<b>168,302</b>
<b>CUMULATIVE CASH BALANCE</b>	<b>0</b>	<b>44,965</b>	<b>43,429</b>	<b>64,736</b>	<b>102,412</b>	<b>141,710</b>	<b>165,573</b>	<b>190,604</b>	<b>216,804</b>	<b>244,172</b>	<b>289,402</b>	<b>457,704</b>

**Appendix 7.A.5**

**DISCOUNTED CASH FLOW ( in 000 Birr)**

<b>Item</b>	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>	<b>Year 4</b>	<b>Year 5</b>	<b>Year 6</b>	<b>Year 7</b>	<b>Year 8</b>	<b>Year 9</b>	<b>Year 10</b>	<b>Year 11</b>	<b>Scrap</b>
<b>TOTAL CASH INFLOW</b>	<b>0</b>	<b>357,000</b>	<b>459,000</b>	<b>510,000</b>	<b>510,000</b>	<b>510,000</b>	<b>510,000</b>	<b>510,000</b>	<b>510,000</b>	<b>510,000</b>	<b>510,000</b>	<b>168,302</b>
Inflow operation	0	357,000	459,000	510,000	510,000	510,000	510,000	510,000	510,000	510,000	510,000	0
Other income	0	0	0	0	0	0	0	0	0	0	0	168,302
<b>TOTAL CASH OUTFLOW</b>	<b>173,436</b>	<b>341,434</b>	<b>415,788</b>	<b>445,615</b>	<b>445,619</b>	<b>445,658</b>	<b>462,767</b>	<b>463,268</b>	<b>463,768</b>	<b>464,269</b>	<b>464,770</b>	<b>0</b>
Increase in fixed assets	70,511	0	0	0	0	0	0	0	0	0	0	0
Increase in net working capital	102,925	29,399	14,699	0	4	0	0	0	0	0	0	0
Operating costs	0	311,686	400,739	445,265	445,265	445,308	445,308	445,308	445,308	445,308	445,308	0
Marketing and Distribution cost	0	350	350	350	350	350	350	350	350	350	350	0
Income (corporate) tax		0	0	0	0	0	17,109	17,610	18,111	18,611	19,112	0
<b>NET CASH FLOW</b>	<b>-173,436</b>	<b>15,566</b>	<b>43,212</b>	<b>64,385</b>	<b>64,381</b>	<b>64,342</b>	<b>47,233</b>	<b>46,732</b>	<b>46,232</b>	<b>45,731</b>	<b>45,230</b>	<b>168,302</b>
<b>CUMULATIVE NET CASH FLOW</b>	<b>-173,436</b>	<b>-157,871</b>	<b>114,659</b>	<b>-50,274</b>	<b>14,107</b>	<b>78,449</b>	<b>125,683</b>	<b>172,415</b>	<b>218,647</b>	<b>264,378</b>	<b>309,608</b>	<b>477,909</b>
Net present value	-173,436	14,151	35,712	48,373	43,973	39,951	26,662	23,981	21,567	19,394	17,438	64,888
Cumulative net present value	-173,436	-159,286	123,573	-75,200	-31,227	8,724	35,386	59,367	80,935	100,329	117,767	182,655

NET PRESENT VALUE                   182,655  
INTERNAL RATE OF RETURN       25.37%  
NORMAL PAYBACK                     4 years