

**197. PROFILE ON THE PRODUCTION OF  
WELDING ELECTRODE**

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## **I. SUMMARY**

This profile envisages the establishment of a plant for the production of welding electrode with an annual capacity of 2,200 tons. Welding electrodes are used on steel work structures to join together at one point two or more members of the Structure. The electrodes join together the metal members by melting & fusing together with high temperature arc formed by an electric supply.

The country's requirement of welding electrode is met through import. The present (2012) demand for welding electrode is estimated to be about 4,456 tons. The demand for welding electrode is projected to reach 8,795 tons and 15,500 tons by the year 2018 and year 2023, respectively.

The principal raw materials required are steel wire and chemicals for coating as flux on the steel material which have to be imported.

The total investment cost of the project including working capital is estimated at Birr 32.03 million. From the total investment cost the highest share (Birr 22.06 million or 68.89%) is accounted by initial working capital followed by fixed investment cost (Birr 7.44 million or 23.25%) and pre operation cost (Birr 2.51 million or 7.86%). From the total investment cost Birr 2.06 million or 6.42% is required in foreign currency.

The project is financially viable with an internal rate of return (IRR) of 28.47% and a net present value (NPV) of Birr 36.37 million discounted at 10%.

The project can create employment for 19 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 metal products manufacturing sub sector and the construction sector and also generates income for the Government in terms of tax revenue and payroll tax.

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

Welding electrodes are used on steel work structures to join together at one point two or more members of the Structure .The electrodes join together the metal members by melting & fusing together with high temperature arc formed by an electric supply. The electrodes to be manufactured by the envisaged plant vary in diameter. These diameters include electrode of diameter 2.5, 3.15, 4, & 5.5 mm. Depending on the thickness of the steel part to be welded, the electrode diameters are selected proportionally. Welding electrodes are coated by fluxes for controlling the arc and for preventing the electrodes from oxygen attack during welding.

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

### **A. MARKET STUDY**

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

The demand for welding electrode in Ethiopia is met through import. Ethiopia imports a huge amount of welding electrode from a number of Asian and European countries. Among the major exporters of welding electrode to the Ethiopian market are China, India, and turkey. The major type of electrode imported to the country is coated electrode of base metal for electric arc welding. Others include cored wire of base metal for electric arc welding and carbon electrodes for furnaces and the like. The historical import data of welding electrode for the years 2000 to 2011 is shown in Table 3.1.

**Table 3.1****IMPORT OF WELDING ELECTRODE**

<b>Year</b>	<b>Quantity (Tons)</b>	<b>Value (`000 Birr)</b>
2000	2,293	12,875
2001	1,841	14,306
2002	2,202	14,115
2003	2,225	17,042
2004	2,974	20,820
2005	1,833	14,683
2006	3,902	29,911
2007	3,686	34,409
2008	3,003	38,583
2009	6,389	81,831
2010	4,317	90,642
2011	2,662	69,144

*Source: - Ethiopian Revenues & Customs Authority.*

As shown in Table 3.1, import of welding electrode has been generally growing from year to year with minor fluctuations. The general increasing trend could be easily seen when the data set is analyzed in to three years interval. Accordingly, the yearly average level of import which was 2,112 tons during the period 2000--2002 has increased to a yearly average of 2,344 tons during the period 2003--2005. Similarly, the yearly average imported quantity has increased to 3,530 tons during the period 2006--2008, which is higher by 50% compared with the preceding three years average. In the recent three years (2009--2011) the yearly average level of import has reached to a level of 4,456 tons. Compared to the preceding years (2006--2008) the total increase is about 26% or annual average growth rate of 8.7%.

In terms of value, the country was on the average spending only Birr 13.7 million during the period 2000--2002. The expenditure for importing the product has increased to annual average of Birr 17.5 million and Birr 34.3 million during the period 2003--2005 and 2006--2008, respectively. During the recent three years (2009--2011), the annual average expenditure for importing the product has reached to a level of Birr 80.5 million.

With regard to the share of the different types of electrodes imported in the past 12 years the lions share is accounted by coated electrodes of base metal for electric arc welding. The average share of this type is 91.6%. The remaining 8.4% is the share of carbon electrode for furnaces and others. Hence, the project should concentrate on the type of the product which has the highest demand.

The huge increase for the demand of the product is believed to be due to the fast growing construction sector and establishment of construction sector associated enterprises, mainly in the metal, vehicle and trailer assembly and manufacture and furniture sub-sectors. In estimating the current effective demand, it is considered as reasonable to assume that the present demand for the product would be the average of the imported quantity of the recent three years i.e. year 2009--2011. Accordingly, the present (year 2012) effective demand for welding electrodes is estimated at 4,456 tons.

## **2. Projected Demand**

The future demand for welding electrode depends mainly on the growth of the metal and allied industries, which are using it to weld various types of metal products. The construction sector was one of the sectors with high growth rate and is to continue for the future due to the various development projects to be implemented by the government and the private sector. The metal industry, which has a strong relationship with construction is also planned to grow at a faster rate. Generally, the industrial sector is planned to grow at 20% per annum during the GTP period.

By considering the past trend, the future development of the construction and the metal manufacturing sub sectors a conservative growth rate of 12% per annum is applied in forecasting the future demand. The demand projection based on this assumption is presented in Table 3.2.

**Table 3.2****PROJECTED DEMAND FOR ELECTRODE (TONS)**

<b>Year</b>	<b>Projected Demand</b>
2013	4,991
2014	5,590
2015	6,260
2016	7,012
2017	7,853
2018	8,795
2019	9,850
2020	11,033
2021	12,356
2022	13,840
2023	15,500

The projection executed in Table 3.2 reveals that the demand for welding electrode will grow from 4,991 tons in the year 2013 to 8,795 tons and 15,500 tons by the year 2018 and year 2023, respectively.

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

As per the calculations made on the data obtained from the Ethiopian Revenue and Customs Authority the recent average CIF value (excluding duty) of imported welding electrode is Birr 35,974 per tone. Allowing 20% for customs duty and other import related expenses a factory gate price of Birr 43,169 per tone is recommended for the purpose of sales revenue projection and financial analysis.

The major end users of the product are mainly industrial establishment in the area of fabricated metal products, furniture producers, vehicle assembly plants and garages, construction sites and the like. Most of the activities mentioned above are widely distributed through out the country

and their number is very large. By considering the number and geographical distribution of the end users the use of regional distributors is recommended as an appropriate distribution channel for the envisaged project.

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

### **1. Plant Capacity**

The production capacity of the plant is selected to be 2,200 tons of assorted sizes of electrodes when working at 100% full capacity in 1 shift of 8hrs a day for 300 annual working days.

### **2. Production Program**

By considering the time required for skill development in the operation of the plant and market penetration, the plant is assumed to attain full capacity operation in the third year. In the first year it will start at 75% of its installed capacity and will increase to 85% in the second year. The production program is shown in Table 3.3.

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

Description	Year 1	Year 2	Year 3 And Then After
Annual Production (Ton )	1,650	1,870	2,200
Capacity %	75	85	100

## **IV. MATERIAL AND INPUTS**

### **A. RAW MATERIALS**

The production of welding electrodes requires an input of steel wire and chemicals for coating as flux on the steel material, which have to be imported. Annual cost of raw materials is estimated at Birr 82.4 million. The quantity and cost of raw materials at full capacity operation are given in Table 4.1.



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

Sr. No	Raw Materials	Description	Annual req. (Ton)	Unit Cost (in '000 Birr)		Total Cost (in '000 Birr)
				F.C	L.C	Total
1	Steel wire	Dia.2.5,3.15,4.0,	2,080	30		62,400
2	Minerals & chemicals, for flux		125	50		6,250
	<b>Total FOB</b>					<b>68,650</b>
	Freight, port handling, inland transport etc (20%)				13,730	13,730
	<b>Total</b>					<b>82,380</b>

**B. UTILITIES**

The major utility requirement of the plant is electricity and water. The total cost is Birr 46,467.

The detail is indicated in Table 4.2

**Table 4.2****ANNUAL UTILITY REQUIREMENT & COST**

No	Utility	Unit	Quantity	Cost (Birr)
1	Electricity	kWh	59,500	34,467
2	Water	Meter cube	1,200	12,000
	<b>Total</b>			<b>46,467</b>

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

The Production of Welding Elect rods are made mainly using integrated specialized machines.

The wire raw material of the selected size is first straightened and then fed into the extruder

coating machine where the coated product is finally cut, end grinded, printed and fed to caking furnace for final drying The final finished product is packed and made ready for market dispatch. The Material to be pasted as coating material on the electrode is prepared with water for final paste.

## 2. Environmental Impact

The Process of Production involves cutting of wire, coating the wire with the flux .This process does not bring any adverse impact on the surrounding areas. Thus the plant does not have any negative impact on the environment.

## B. ENGINEERING

### 1. Machinery and Equipment

For the production of electrodes the selected machinery is continuous and integrated. The selected machinery costs Birr 1million and the detail is indicated on Table 5.1.

**Table 5.1**

**LIST OF MACHINERY AND EQUIPMENT AND COST**

Sr. No.	Machinery	Qty	Cost ( in 000 Birr)		
			FC	LC	Total
1	Wire straightening machine	1set	400.0		400.0
2	Extrusion press	1set	500.0		500.0
3	End brushing/grinding machine	1set	460.0		460.0
4	Backing oven	1unit	440.0		440.0
5	Printing and Quality testing center	1unit	160.0		160.0
6	Hand tool Sets, cutter bits.	4 sets	60.0		60.0
7	Packing center.	1set	40.0		40.0
	<b>Total FOB</b>				<b>2,060.0</b>
	Freight, port handling, inland transport etc (20%)			412.0	412.0
	<b>Total</b>		<b>2,060.0</b>	<b>412.0</b>	<b>2,472.0</b>

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

The total area of the plant, including provision for open space, is 1,000 m<sup>2</sup> out of which 750 m<sup>2</sup> is a built-up area. Therefore, the cost of building at a rate of Birr 5,000 per m<sup>2</sup> is estimated at Birr 3.75 million.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Accordingly, the total land lease cost at a rate of Birr 266 per m<sup>2</sup> is estimated at Birr 266,000 of which 10% or Birr 26,600 will be paid in advance. The remaining Birr 239,400 will be paid in equal installments with in 28 years i.e. Birr 8,550 annually.

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

The total human resource requirement of the project is 19 persons. Annual cost of labor, including employees benefit, the salary and benefit of workers is Birr 510,950. The detail is indicated on Table 6.1.

**Table 6.1**  
**HUMAN RESOURCE REQUIREMENT AND 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	Forman	1	2,500	30,000
9	Machinery Operators	3	2,000	72,000
10	Assistant Operators/mechanics	2	1,500	36,000
11	Quality controller and chemists	2	2,000	48,000
12	Laborers	2	800	19,200
<b>Sub- Total</b>		<b>10</b>	-	<b>205,000</b>
<b>Total Annual Salary</b>				<b>425,800</b>
Employee's Benefit (25% Of Basic Salary)				85,150
<b>Grand Total</b>		<b>19</b>		<b>510,950</b>

## **B. TRAINING REQUIREMENTS**

The production of welding electrodes takes place on automatic machines. On the job demonstration of the operation of the machine during commissioning period would be enough for workers with moderate technical skill and background. The cost of training for 10 workers would be Birr 20,000.

## VII. FINANCIAL ANALYSIS

The financial analysis of the welding electrode 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 32.03 million (see Table 7.1). From the total investment cost the highest share (Birr 22.06 million or 68.89%) is accounted by initial working capital followed by fixed investment cost (Birr 7.44 million or 23.25%) and pre operation cost (Birr 2.51 million or 7.86%). From the total investment cost Birr 2.06 million or 6.42% 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	26.60		26.60	0.08
1.2	Building and civil work	3,750.00		3,750.00	11.70
1.3	Machinery and equipment	412.00	2,060.00	2,472.00	7.72
1.4	Vehicles	900.00		900.00	2.81
1.5	Office furniture and equipment	300.00		300.00	0.94
	<b>Sub total</b>	<b>5,388.60</b>	<b>2,060.00</b>	<b>7,448.60</b>	<b>23.25</b>
<b>2</b>	<b>Pre operating cost *</b>				
2.1	Pre operating cost	423.60		423.60	1.32
2.2	Interest during construction	2,095.93		2,095.93	6.54
	<b>Sub total</b>	<b>2,519.53</b>		<b>2,519.53</b>	<b>7.86</b>
<b>3</b>	<b>Working capital</b>	<b>22,069.66</b>		<b>22,069.66</b>	<b>68.89</b>
	<b>Grand Total</b>	<b>29,977.79</b>	<b>2,060.00</b>	<b>32,037.79</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 27.57 million. However, only the initial working capital of Birr 22.06 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 87.06 million (see Table 7.2). The cost of raw material account for 94.62% of the production cost. The other major components of the production cost are financial cost, depreciation and labor, which account for 2.442.32%, 1.08% and 0.49% respectively. The remaining 1.50% is the share of utility, repair and maintenance, labor overhead and administration cost. For detail production cost see Appendix 7.A.2.

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

<b>Items</b>	<b>Cost (000 Birr)</b>	<b>%</b>
Raw Material and Inputs	82,380.00	94.62
Utilities	46.46	0.05
Maintenance and repair	123.60	0.14
Labor direct	425.80	0.49
Labor overheads	85.15	0.10
Administration Costs	300.00	0.34
Land lease cost	-	-
Cost of marketing and distribution	750.00	0.86
<b>Total Operating Costs</b>	<b>84,111.01</b>	<b>96.60</b>
Depreciation	939.12	1.08
Cost of Finance	2,017.33	2.32
<b>Total Production Cost</b>	<b>87,067.46</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 ranges from Birr 6.53 million to Birr 8.27 million during the life of the project. Moreover, at the end of the project life the accumulated net cash flow amounts to Birr 86.65 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.

$$\text{Break Even Sales Value} = \frac{\text{Fixed Cost} + \text{Financial Cost}}{\text{Variable Margin ratio (\%)}} = \text{Birr } 23,137,960$$

$$\text{Break Even Capacity utilization} = \frac{\text{Break even Sales Value}}{\text{Sales revenue}} \times 100 = 23\%$$

## 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 26.72 % 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 28.47 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 19 persons. The project will generate Birr 22.55 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 metal products manufacturing sub sector and the construction sector and also generates 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)**

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	65,904	74,142	82,380	82,380	82,380	82,380	82,380	82,380	82,380	82,380
Utilities	37	42	46	46	46	46	46	46	46	46
Maintenance and repair	99	111	124	124	124	124	124	124	124	124
Labour direct	341	383	426	426	426	426	426	426	426	426
Labour overheads	68	77	85	85	85	85	85	85	85	85
Administration Costs	240	270	300	300	300	300	300	300	300	300
Land lease cost	0	0	0	0	9	9	9	9	9	9
Cost of marketing and distribution	750	750	750	750	750	750	750	750	750	750
<b>Total Operating Costs</b>	<b>67,439</b>	<b>75,775</b>	<b>84,111</b>	<b>84,111</b>	<b>84,120</b>	<b>84,120</b>	<b>84,120</b>	<b>84,120</b>	<b>84,120</b>	<b>84,120</b>
Depreciation	939	939	939	939	939	180	180	180	180	180
Cost of Finance	0	2,306	2,017	1,729	1,441	1,153	865	576	288	0
<b>Total Production Cost</b>	<b>68,378</b>	<b>79,020</b>	<b>87,067</b>	<b>86,779</b>	<b>86,500</b>	<b>85,452</b>	<b>85,164</b>	<b>84,876</b>	<b>84,588</b>	<b>84,300</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	76,894	86,506	96,118	96,118	96,118	96,118	96,118	96,118	96,118	96,118
Less variable costs	66,689	75,025	83,361	83,361	83,361	83,361	83,361	83,361	83,361	83,361
<b>VARIABLE MARGIN</b>	<b>10,205</b>	<b>11,481</b>	<b>12,757</b>	<b>12,757</b>	<b>12,757</b>	<b>12,757</b>	<b>12,757</b>	<b>12,757</b>	<b>12,757</b>	<b>12,757</b>
in % of sales revenue	13.27	13.27	13.27	13.27	13.27	13.27	13.27	13.27	13.27	13.27
Less fixed costs	1,689	1,689	1,689	1,689	1,698	939	939	939	939	939
<b>OPERATIONAL MARGIN</b>	<b>8,516</b>	<b>9,792</b>	<b>11,068</b>	<b>11,068</b>	<b>11,059</b>	<b>11,818</b>	<b>11,818</b>	<b>11,818</b>	<b>11,818</b>	<b>11,818</b>
in % of sales revenue	11.08	11.32	11.51	11.51	11.51	12.30	12.30	12.30	12.30	12.30
Financial costs		2,306	2,017	1,729	1,441	1,153	865	576	288	0
<b>GROSS PROFIT</b>	<b>8,516</b>	<b>7,486</b>	<b>9,051</b>	<b>9,339</b>	<b>9,618</b>	<b>10,666</b>	<b>10,954</b>	<b>11,242</b>	<b>11,530</b>	<b>11,818</b>
in % of sales revenue	11.08	8.65	9.42	9.72	10.01	11.10	11.40	11.70	12.00	12.30
Income (corporate) tax	0	0	0	2,802	2,886	3,200	3,286	3,373	3,459	3,546
<b>NET PROFIT</b>	<b>8,516</b>	<b>7,486</b>	<b>9,051</b>	<b>6,537</b>	<b>6,733</b>	<b>7,466</b>	<b>7,668</b>	<b>7,869</b>	<b>8,071</b>	<b>8,273</b>
in % of sales revenue	11.08	8.65	9.42	6.80	7.00	7.77	7.98	8.19	8.40	8.61



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

<b>Item</b>	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>	<b>Year 4</b>	<b>Year 5</b>	<b>Year 6</b>	<b>Year 7</b>	<b>Year 8</b>	<b>Year 9</b>	<b>Year 10</b>	<b>Year 11</b>	<b>Scrap</b>
<b>TOTAL CASH INFLOW</b>	<b>7,872</b>	<b>101,096</b>	<b>86,511</b>	<b>96,123</b>	<b>96,118</b>	<b>96,118</b>	<b>96,118</b>	<b>96,118</b>	<b>96,118</b>	<b>96,118</b>	<b>96,118</b>	<b>31,945</b>
Inflow funds	7,872	24,202	5	5	0	0	0	0	0	0	0	0
Inflow operation	0	76,894	86,506	96,118	96,118	96,118	96,118	96,118	96,118	96,118	96,118	0
Other income	0	0	0	0	0	0	0	0	0	0	0	31,945
<b>TOTAL CASH OUTFLOW</b>	<b>7,872</b>	<b>91,641</b>	<b>83,718</b>	<b>91,766</b>	<b>91,524</b>	<b>91,329</b>	<b>91,354</b>	<b>91,152</b>	<b>90,950</b>	<b>90,749</b>	<b>87,665</b>	<b>0</b>
Increase in fixed assets	7,872	0	0	0	0	0	0	0	0	0	0	0
Increase in current assets	0	22,106	2,755	2,755	0	1	0	0	0	0	0	0
Operating costs	0	66,689	75,025	83,361	83,361	83,370	83,370	83,370	83,370	83,370	83,370	0
Marketing and Distribution cost	0	750	750	750	750	750	750	750	750	750	750	0
Income tax	0	0	0	0	2,802	2,886	3,200	3,286	3,373	3,459	3,546	0
Financial costs	0	2,096	2,306	2,017	1,729	1,441	1,153	865	576	288	0	0
Loan repayment	0	0	2,882	2,882	2,882	2,882	2,882	2,882	2,882	2,882	0	0
<b>SURPLUS (DEFICIT)</b>	<b>0</b>	<b>9,455</b>	<b>2,793</b>	<b>4,357</b>	<b>4,594</b>	<b>4,789</b>	<b>4,764</b>	<b>4,966</b>	<b>5,168</b>	<b>5,369</b>	<b>8,453</b>	<b>31,945</b>
<b>CUMULATIVE CASH BALANCE</b>	<b>0</b>	<b>9,455</b>	<b>12,248</b>	<b>16,605</b>	<b>21,199</b>	<b>25,988</b>	<b>30,752</b>	<b>35,718</b>	<b>40,886</b>	<b>46,255</b>	<b>54,708</b>	<b>86,653</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>76,894</b>	<b>86,506</b>	<b>96,118</b>	<b>96,118</b>	<b>96,118</b>	<b>96,118</b>	<b>96,118</b>	<b>96,118</b>	<b>96,118</b>	<b>96,118</b>	<b>31,945</b>
Inflow operation	0	76,894	86,506	96,118	96,118	96,118	96,118	96,118	96,118	96,118	96,118	0
Other income	0	0	0	0	0	0	0	0	0	0	0	31,945
<b>TOTAL CASH OUTFLOW</b>	<b>29,942</b>	<b>70,190</b>	<b>78,526</b>	<b>84,111</b>	<b>86,913</b>	<b>87,005</b>	<b>87,319</b>	<b>87,406</b>	<b>87,492</b>	<b>87,579</b>	<b>87,665</b>	<b>0</b>
Increase in fixed assets	7,872	0	0	0	0	0	0	0	0	0	0	0
Increase in net working capital	22,070	2,751	2,751	0	1	0	0	0	0	0	0	0
Operating costs	0	66,689	75,025	83,361	83,361	83,370	83,370	83,370	83,370	83,370	83,370	0
Marketing and Distribution cost	0	750	750	750	750	750	750	750	750	750	750	0
Income (corporate) tax		0	0	0	2,802	2,886	3,200	3,286	3,373	3,459	3,546	0
<b>NET CASH FLOW</b>	<b>-29,942</b>	<b>6,704</b>	<b>7,980</b>	<b>12,007</b>	<b>9,205</b>	<b>9,113</b>	<b>8,799</b>	<b>8,712</b>	<b>8,626</b>	<b>8,539</b>	<b>8,453</b>	<b>31,945</b>
<b>CUMULATIVE NET CASH FLOW</b>	<b>-29,942</b>	<b>23,238</b>	<b>15,257</b>	<b>-3,250</b>	<b>5,954</b>	<b>15,067</b>	<b>23,866</b>	<b>32,578</b>	<b>41,204</b>	<b>49,743</b>	<b>58,196</b>	<b>90,141</b>
Net present value	-29,942	6,095	6,595	9,021	6,287	5,658	4,967	4,471	4,024	3,622	3,259	12,316
Cumulative net present value	-29,942	23,847	17,252	-8,231	-1,944	3,714	8,681	13,152	17,176	20,797	24,056	36,372

NET PRESENT VALUE           36,372  
INTERNAL RATE OF RETURN   28.47%  
NORMAL PAYBACK               4 years