

**150. PROFILE ON THE PRODUCTION OF  
AC MOTORS**

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## **I. SUMMARY**

This profile envisages the establishment of a plant for the production of 10,000 units of AC motors with capacity of 1 to 7.5 horse power range per annum. AC motors are used worldwide in many residential, commercial, industrial, and utility applications- from those that require a single motor to applications requiring several motors. An AC motor may be part of a pump or fan, or connected to some other form of mechanical equipment such as a winder, conveyor, or mixer.

The demand for AC motors is entirely met through import. The present (2012) demand for AC motors is estimated at 27,845 pieces. The demand for AC motors is projected to reach 44,849 pieces and 72,231 pieces by the year 2017 and 2022, respectively.

The principal raw material required are aluminum for cases, covers and fan, copper for rotor bars, rings and stator windings, high quality iron sheet for stator and rotor laminations and steel bar for shafts. All the raw materials have to be imported initially.

The total investment cost of the project including working capital is estimated at Birr 37.65 million. From the total investment cost the highest share (Birr 23.09 million or 61.33%) is accounted by fixed investment cost followed by initial working capital (Birr 10.97 million or 29.14%) and pre operation cost (Birr 3.58 million or 9.53%). From the total investment cost Birr 11.75 million or 31.20% is required in foreign currency.

The project is financially viable with an internal rate of return (IRR) of 21.22% and a net present value (NPV) of Birr 23.47 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 create backward linkage with the metallic manufacturing sub sector and forward linkage with the construction and automotive sub sectors and also generates income for the Government in terms of tax revenue and payroll tax.

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

The simplest form of electric motor is the squirrel cage motor which has no commutator or brushes because there are no windings on the rotor. Copper bars are placed in the rotor slots and connected to slip rings. The motor's main windings are located in the stator. These motor run at constant speed and starting torque is low.

The main components of the motor are rotor shaft on to which the rotor laminations and bars are assembled, the stator casing into which the stator laminations and windings are assembled and the covers which contain bearings in which the rotor is located. A junction box for the electrical connections is usually attached to the motor case. A fan cover may also be fastened in the case with the fan mounted on the rotor. AC motors are used worldwide in many residential, commercial, industrial, and utility applications- from those that require a single motor to applications requiring several motors. An AC motor may be part of a pump or fan, or connected to some other form of mechanical equipment such as a winder, conveyor, or mixer.

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

### **A. MARKET STUDY**

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

The demand for AC motors is met through import. The quantity of AC motors annually imported during the period 2002 - 2011 is presented in Table 3.1.

**Table 3.1**  
**IMPORT OF AC MOTOR (PIECES)**

<b>Year</b>	<b>Import</b>
2002	3,428
2003	5,591
2004	6,642
2005	11,560
2006	20,199
2007	101,087
2008	51,608
2009	19,928
2010	26,291
2011	13,565

*Source: - Ethiopian Revenues & Customs Authority*

As could be observed from Table 3.1 import of AC motors fluctuates in the past 10 years. During the period 2002 – 2004 import was below 10,000 (on average 5,220 pieces). Starting year 2005 up to 2007 the imported quantity has shown increasing trend and reached 101,087 pieces. The imported quantity has sharply decreased during the following four recent years (2008 – 2011) in to an average of 27,845 pieces.

Accordingly, due to the non-existence of a trend in the data the recent four years (2008-2011) average level of import is assumed to reflect the current demand. Accordingly, current demand is estimated at 27,845 pieces.

## **2. Projected Demand**

The demand for AC motors is directly related with the development of the various sub sectors of the manufacturing sector. According to the Growth and Transformation Plan (GTP), the

industrial sector is expected to grow at an average annual growth rate of 20% during the period 2011 – 2015. Taking this in to account and to be conservative an annual average growth rate of 10% is assumed for projecting the demand for industrial AC motors (see Table 3.2.).

**Table 3.2**  
**PROJECTED DEMAND FOR AC MOTORS (PIECES)**

<b>Year</b>	<b>Projected Demand</b>
2013	30,633
2014	33,696
2015	37,066
2016	40,772
2017	44,849
2018	49,334
2019	54,268
2020	59,695
2021	65,664
2022	72,231
2023	79,454
2024	87,399
2025	96,139

Demand for AC motors will increase from 30,633 pieces in the year 2013 to 37,066 pieces and 59,695 pieces by the year 2015 and year 2020, respectively. The demand will reach above 96,000 by the year 2025.

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

The price of AC motors varies greatly according to use, design and other factors. For the purpose of this project the average import value of the recent two years plus 30% for various costs is taken. Accordingly, Birr 6,000 per pieces is recommended. The product will be sold directly to the end user.

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

### **1. Plant Capacity**

Based on demand projection shown in Table 3.2, and capital requirement, the envisaged AC motor manufacturing plant will have a capacity of producing 10,000 units of AC motors with 1 to 7.5 horse power range per annum operating in one shift/day (8 hours/shift) and 300 days/annum. The capacity can be doubled or further increased, without increasing any significant fixed investment cost, by increasing the number of shifts.

### **2. Production programme**

In order to provide adequate time for developing the skill of producing AC motors and penetrate the market, it would be advisable to start production at a lower level and gradually build up the scale of production. Accordingly, the envisaged plant will start operation at 65% of its production capacity during the first year of operation, and then raise up production to 80%, 90% and lastly to 100% during the next succeeding years. Table 3.3 below shows the production programme.

**Table 3.3**  
**PRODUCTION PROGRAMME**

<b>Description</b>	<b>Unit</b>	<b>Production Year</b>			
		<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>	<b>Year 4 --10</b>
AC motors	pcs	6,500	8,000	9,000	10,000
Capacity Utilization	%	65	80	90	100

#### IV. MATERIALS AND INPUTS

##### A. RAW MATERIALS

The principal raw materials are aluminum for cases, covers and fan, copper for rotor bars, rings and stator windings, high quality iron sheet for stator and rotor laminations and steel bar for shafts.

Miscellaneous items required include ball or roller bearings for shafts, fasteners for covers, and various materials for fixing and securing electrical leads to stator windings and junction box terminals. Finally, impregnation and paint materials and labels are required for finishing the completed product.

Initially the principal raw materials would have to be imported to ensure that they were of sufficient quality to meet the requirements that need to be met to achieve adequate motor performance. If aluminum and copper metal processing were established in Ethiopia, then these raw materials could be sourced locally. Since electric cables manufacturing factories with the capacity to manufacture enameled windings wire are well developed in the country, this could be sourced locally. Details of annual raw and auxiliary raw material requirement at full capacity operation are shown in Table 4.1

**Table 4.1**  
**SUMMARY OF ANNUAL CONSUMPTION FOR RAW AND AUXILIARY**  
**MATERIALS AND COST**

Sr. No.	Description	Unit of Measure	Annual Con's	Cost in '000 Birr		
				FC	LC	TC
1.	Aluminum for cases, covers and fans	Tonnes	300	9,000	1,350	10,350
2.	Copper for rotor bars,	Tonnes	120	3,600	540	4,140
3.	High quality iron sheet for stator and rotor	Tonnes	60	1,200	180	1,380

Sr. No.	Description	Unit of Measure	Annual Con's	Cost in '000 Birr		
				FC	LC	TC
	laminations					
4.	Steel bar for shafts	Tonnes	120	7,200	1,080	8,280
5.	Enameled Copper wire	coil	15,000	-	4,500	4,500
6.	Ball bearings	pcs	60,000	15,000	2,250	17,250
7.	impregnating material	lump sum	-	-	600	600
	<b>Total</b>			<b>36,000</b>	<b>10,500</b>	<b>46,500</b>

## B. UTILITIES

Industrial water of 200 m<sup>3</sup> and electric power of 15,000 kWh are consumed in this plant per annum. The total cost of utilities is estimated to be Birr 10,667. Details of which are shown in Table 4.2.

**Table 4.2**

### **ANNUAL REQUIREMENT OF UTILITIES AND COST**

Sr. No.	Description	Qty.	Unit Price (Birr)	Cost ('000 Birr)
1	Electricity (kWh)	15,000	0.5778	8.667
2	Water (m <sup>3</sup> )	200	10.00	2.00
	<b>Grand total</b>			<b>10.667</b>

## **V. TECHNOLOGY AND ENGINEERING**

### **A. TECHNOLOGY**

#### **1. Production Process**

The main processes in the manufacture of electric motors are:

- Pressure dies casting cases, covers and fan
- Component machining
- Coil winding and impregnation
- Subassembly of stators and rotors, balancing and testing
- Final assembly and test
- Finishing, painting and labeling

#### **2. Environmental Impact Assessment**

The envisaged AC motor manufacturing plant does not create any negative impact on the environment.

### **B. ENGINEERING**

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

The list of machinery and equipment required for the manufacture of AC motors is given in Table 5.1. Total cost of machinery and equipment is estimated at Birr 13.5 million, out of which Birr 11.75 million is required in foreign currency.

The plant needs one pick-up vehicle for transportation of finished product and for office activities. The total cost of vehicle is estimated at Birr 450,000.

**Table 5.1****MACHINERY AND EQUIPMENT REQUIREMENTS AND COST**

Sr. No.	Description	Qty.	Cost in '000 Birr		
			FC	LC	TC
1.	Foundry equipment	1	3,000	450.0	3,450.0
2.	Machine shop machineries and equipment	4	4,000	600.0	4,600.0
3	Coil winding and impregnation equipment	-	1,500	225.0	1,725.0
4.	Assembling and testing equipment	-	2,500	375.0	2,875.0
6	Compressor	1	750	112.5	862.5
8	Weighing scale	1	-	5.0	5.0
9	Hard pallet truck	1	-	7.0	7.0
	<b>Total</b>		<b>11,750</b>	<b>1,775.5</b>	<b>13,525.5</b>

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

The total land area required is 2,500 m<sup>2</sup>. The plant requires a total of 1,700 m<sup>2</sup> built-up area which includes manufacturing area, raw material stock area, offices etc. Assuming construction rate of Birr 4,500 per m<sup>2</sup>, the total cost of construction is estimated to be Birr 7,650,000.

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

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

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

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

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

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

Moreover, the Addis Ababa City Administration has recently adopted a new land lease floor price for plots in the city. The new prices will be used as a benchmark for plots that are going to

be auctioned by the city government or transferred under the new “Urban Lands Lease Holding Proclamation.”

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

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

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

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

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

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

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

**Table 5.3**

**INCENTIVES FOR LEASE PAYMENT OF INDUSTRIAL PROJECTS**

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

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

Accordingly, the total land lease cost at a rate of Birr 266 per m<sup>2</sup> is estimated at Birr 665,000 of which 10% or Birr 66,500 will be paid in advance. The remaining Birr 598,500 will be paid in equal installments with in 28 years i.e. Birr 21,375 annually.

## VI. HUMAN RESOURCE AND TRAINING REQUIREMENTS

### A. HUMAN RESOURCE REQUIREMENT

The plant will require about 31 workers of which 21 workers will be engaged in the production activities, and 10 workers in administration unit. The plant manager will have to be a mechanical engineer having sufficient experience in the field. The detail of human resource requirement is given in Table 6.1.

**Table 6.1**  
**HUMAN RESOURCE REQUIREMENT AND COST**

Sr. No	Description	Req. No.	Salary Monthly (Birr)	Salary Annual (Birr)
1	Plant Manager	1	8,000	96,000
2	Secretary	1	1,000	12,000
3	Store Man	1	2000	24,000
4	Sales Man	1	3,000	36,000
5	Accountant	1	3,000	36,000
6	Clerk	1	1000	12,000
7	General Services	4	1750	84,000
1	Supervisor	1	5,000	60,000
2	Skilled workers	25	2,500	750,000
3	Semi-skilled workers	10	1,500	180,000
4	Helpers	5	1,000	60,000
Sub-total		<b>51</b>	<b>29,750</b>	<b>1,350,000</b>
8	Workers Benefit 25% of basic Salary		7,438	337,500
Grand Total		<b>51</b>	<b>37,188</b>	<b>1,687,500</b>

### B. TRAINING REQUIREMENT

All operators need basic training so that they can be acquainted to the operation. This can be done during the commissioning period of the plant. The cost of such training is estimated at Birr 100,000.

## VII. FINANCIAL ANALYSIS

The financial analysis of the AC motors project is based on the data presented in the previous chapters and the following assumptions:-

Construction period	1 year
Source of finance	30 % equity & 70 loan
Tax holidays	3 years
Bank interest	10%
Discount cash flow	10%
Accounts receivable	30 days
Raw material local	30 days
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 37.65 million (See Table 7.1). From the total investment cost the highest share (Birr 23.09 million or 61.33%) is accounted by fixed investment cost followed by initial working capital (Birr 10.97 million or 29.14%) and pre operation cost (Birr 3.58 million or 9.53%). From the total investment cost Birr 11.75 million or 31.20% is required in foreign currency.

**Table 7.1**

#### **INITIAL INVESTMENT COST ( '000 Birr)**

Sr. No	Cost Items	Local Cost	Foreign Cost	Total Cost	% Share
<b>1</b>	<b>Fixed investment</b>				
1.1	Land Lease	66.50		66.50	0.18
1.2	Building and civil work	7,650.00		7,650.00	20.32
1.3	Machinery and equipment	1,775.00	11,750.00	13,525.00	35.92
1.4	Vehicles	1,500.00		1,500.00	3.98
1.5	Office furniture and equipment	350.00		350.00	0.93
	<b>Sub total</b>	<b>11,341.50</b>	<b>11,750.00</b>	<b>23,091.50</b>	<b>61.33</b>

Sr. No	Cost Items	Local Cost	Foreign Cost	Total Cost	% Share
<b>2</b>	<b>Pre operating cost *</b>				
2.1	Pre operating cost	1,126.25		1,126.25	2.99
2.2	Interest during construction	2,463.34		2,463.34	6.54
	<b>Sub total</b>	<b>3,589.59</b>		<b>3,589.59</b>	<b>9.53</b>
<b>3</b>	<b>Working capital **</b>	<b>10,972.86</b>		<b>10,972.86</b>	<b>29.14</b>
	<b>Grand Total</b>	<b>25,903.95</b>	<b>11,750.00</b>	<b>37,653.95</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 15.65 million. However, only the initial working capital of Birr 10.97 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 55.81 million (see Table 7.2). The cost of raw material account for 83.31% of the production cost. The other major components of the production cost are depreciation, financial cost and labor, which account for 6.40%, 4.25% and 2.42% respectively. The remaining 3.63% is the share of utility, repair and maintenance, cost of marketing and distribution, labour overhead and administration cost. For detail production cost see Appendix 7.A.2.

**Table 7.2**

### **ANNUAL PRODUCTION COST AT FULL CAPACITY (year four)**

Items	Cost ( 000 Birr)	%
Raw Material and Inputs	46,500.00	83.31
Utilities	11.00	0.02
Maintenance and repair	676.00	1.21

<b>Items</b>	<b>Cost ( 000 Birr)</b>	<b>%</b>
Labour direct	1,350.00	2.42
Labour overheads	338.00	0.61
Administration Costs	250.00	0.45
Land lease cost	-	-
Cost of marketing and distribution	750.00	1.34
<b>Total Operating Costs</b>	<b>49,875.00</b>	<b>89.35</b>
Depreciation	3,571.25	6.40
Cost of Finance	2,370.97	4.25
<b>Total Production Cost</b>	<b>55,817.22</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 2.29 million to Birr 6.83 million during the life of the project. Moreover, at the end of the project life the accumulated net cash flow amounts to Birr 64.40 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.

$$\text{Break Even Sales Value} = \frac{\text{Fixed Cost} + \text{Financial Cost}}{\text{Variable Margin ratio (\%)}} = \text{Birr } 23,841,379$$

$$\text{Break Even Capacity utilization} = \frac{\text{Break even Sales Value}}{\text{Sales revenue}} \times 100 = 40\%$$

### 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 21.22% 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 principal 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 23.47 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 51 persons. The project will generate Birr 13.62 million in terms of tax revenue. The establishment of such factory will have a foreign exchange saving effect to the country by substituting the current imports. The project will also create backward linkage with the metallic manufacturing sub sector and forward linkage with the construction and automotive sub sectors and also generates other income for the Government.

**Appendix 7.A**

**FINANCIAL ANALYSES SUPPORTING TABLES**



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

<b>Item</b>	<b>Year 2</b>	<b>Year 3</b>	<b>Year 4</b>	<b>Year 5</b>	<b>Year 6</b>	<b>Year 7</b>	<b>Year 8</b>	<b>Year 9</b>	<b>Year 10</b>	<b>Year 11</b>
Raw Material and Inputs	32,550	39,525	46,500	46,500	46,500	46,500	46,500	46,500	46,500	46,500
Utilities	8	9	11	11	11	11	11	11	11	11
Maintenance and repair	473	575	676	676	676	676	676	676	676	676
Labour direct	945	1,148	1,350	1,350	1,350	1,350	1,350	1,350	1,350	1,350
Labour overheads	237	287	338	338	338	338	338	338	338	338
Administration Costs	175	213	250	250	250	250	250	250	250	250
Land lease cost	0	0	0	0	21	21	21	21	21	21
Cost of marketing and distribution	750	750	750	750	750	750	750	750	750	750
<b>Total Operating Costs</b>	<b>35,138</b>	<b>42,506</b>	<b>49,875</b>	<b>49,875</b>	<b>49,896</b>	<b>49,896</b>	<b>49,896</b>	<b>49,896</b>	<b>49,896</b>	<b>49,896</b>
Depreciation	3,571	3,571	3,571	3,571	3,571	341	341	341	341	341
Cost of Finance	0	2,710	2,371	2,032	1,694	1,355	1,016	677	339	0
<b>Total Production Cost</b>	<b>38,709</b>	<b>48,787</b>	<b>55,817</b>	<b>55,479</b>	<b>55,161</b>	<b>51,592</b>	<b>51,254</b>	<b>50,915</b>	<b>50,576</b>	<b>50,237</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	42,000	54,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000
Less variable costs	34,388	41,756	49,125	49,125	49,125	49,125	49,125	49,125	49,125	49,125
<b>VARIABLE MARGIN</b>	<b>7,613</b>	<b>12,244</b>	<b>10,875</b>	<b>10,875</b>	<b>10,875</b>	<b>10,875</b>	<b>10,875</b>	<b>10,875</b>	<b>10,875</b>	<b>10,875</b>
in % of sales revenue	18.13	22.67	18.13	18.13	18.13	18.13	18.13	18.13	18.13	18.13
Less fixed costs	4,321	4,321	4,321	4,321	4,343	1,112	1,112	1,112	1,112	1,112
<b>OPERATIONAL MARGIN</b>	<b>3,291</b>	<b>7,923</b>	<b>6,554</b>	<b>6,554</b>	<b>6,532</b>	<b>9,763</b>	<b>9,763</b>	<b>9,763</b>	<b>9,763</b>	<b>9,763</b>
in % of sales revenue	7.84	14.67	10.92	10.92	10.89	16.27	16.27	16.27	16.27	16.27
Financial costs		2,710	2,371	2,032	1,694	1,355	1,016	677	339	0
<b>GROSS PROFIT</b>	<b>3,291</b>	<b>5,213</b>	<b>4,183</b>	<b>4,521</b>	<b>4,839</b>	<b>8,408</b>	<b>8,746</b>	<b>9,085</b>	<b>9,424</b>	<b>9,763</b>
in % of sales revenue	7.84	9.65	6.97	7.54	8.06	14.01	14.58	15.14	15.71	16.27
Income (corporate) tax	0	0	0	0	0	2,522	2,624	2,726	2,827	2,929
<b>NET PROFIT</b>	<b>3,291</b>	<b>5,213</b>	<b>4,183</b>	<b>4,521</b>	<b>4,839</b>	<b>5,885</b>	<b>6,123</b>	<b>6,360</b>	<b>6,597</b>	<b>6,834</b>
in % of sales revenue	7.84	9.65	6.97	7.54	8.06	9.81	10.20	10.60	10.99	11.39

**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>24,218</b>	<b>55,554</b>	<b>54,025</b>	<b>60,025</b>	<b>60,000</b>	<b>60,000</b>	<b>60,000</b>	<b>60,000</b>	<b>60,000</b>	<b>60,000</b>	<b>60,000</b>	<b>22,771</b>
Inflow funds	24,218	13,554	25	25	0	0	0	0	0	0	0	0
Inflow operation	0	42,000	54,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	0
Other income	0	0	0	0	0	0	0	0	0	0	0	22,771
<b>TOTAL CASH OUTFLOW</b>	<b>24,218</b>	<b>48,692</b>	<b>50,966</b>	<b>57,996</b>	<b>55,294</b>	<b>54,979</b>	<b>57,161</b>	<b>56,924</b>	<b>56,686</b>	<b>56,449</b>	<b>52,825</b>	<b>0</b>
Increase in fixed assets	24,218	0	0	0	0	0	0	0	0	0	0	0
Increase in current assets	0	11,091	2,363	2,363	0	2	0	0	0	0	0	0
Operating costs	0	34,388	41,756	49,125	49,125	49,146	49,146	49,146	49,146	49,146	49,146	0
Marketing and Distribution cost	0	750	750	750	750	750	750	750	750	750	750	0
Income tax	0	0	0	0	0	0	2,522	2,624	2,726	2,827	2,929	0
Financial costs	0	2,463	2,710	2,371	2,032	1,694	1,355	1,016	677	339	0	0
Loan repayment	0	0	3,387	3,387	3,387	3,387	3,387	3,387	3,387	3,387	0	0
<b>SURPLUS (DEFICIT)</b>	<b>0</b>	<b>6,863</b>	<b>3,059</b>	<b>2,029</b>	<b>4,706</b>	<b>5,021</b>	<b>2,839</b>	<b>3,076</b>	<b>3,314</b>	<b>3,551</b>	<b>7,175</b>	<b>22,771</b>
<b>CUMULATIVE CASH BALANCE</b>	<b>0</b>	<b>6,863</b>	<b>9,922</b>	<b>11,951</b>	<b>16,656</b>	<b>21,677</b>	<b>24,516</b>	<b>27,593</b>	<b>30,906</b>	<b>34,457</b>	<b>41,632</b>	<b>64,403</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>42,000</b>	<b>54,000</b>	<b>60,000</b>	<b>60,000</b>	<b>60,000</b>	<b>60,000</b>	<b>60,000</b>	<b>60,000</b>	<b>60,000</b>	<b>60,000</b>	<b>22,771</b>
Inflow operation	0	42,000	54,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	0
Other income	0	0	0	0	0	0	0	0	0	0	0	22,771
<b>TOTAL CASH OUTFLOW</b>	<b>35,191</b>	<b>37,475</b>	<b>44,844</b>	<b>49,875</b>	<b>49,877</b>	<b>49,896</b>	<b>52,419</b>	<b>52,520</b>	<b>52,622</b>	<b>52,724</b>	<b>52,825</b>	<b>0</b>
Increase in fixed assets	24,218	0	0	0	0	0	0	0	0	0	0	0
Increase in net working capital	10,973	2,338	2,338	0	2	0	0	0	0	0	0	0
Operating costs	0	34,388	41,756	49,125	49,125	49,146	49,146	49,146	49,146	49,146	49,146	0
Marketing and Distribution cost	0	750	750	750	750	750	750	750	750	750	750	0
Income (corporate) tax		0	0	0	0	0	2,522	2,624	2,726	2,827	2,929	0
<b>NET CASH FLOW</b>	<b>-35,191</b>	<b>4,525</b>	<b>9,156</b>	<b>10,125</b>	<b>10,123</b>	<b>10,104</b>	<b>7,581</b>	<b>7,480</b>	<b>7,378</b>	<b>7,276</b>	<b>7,175</b>	<b>22,771</b>
<b>CUMULATIVE NET CASH FLOW</b>	<b>-35,191</b>	<b>30,666</b>	<b>-21,510</b>	<b>11,385</b>	<b>-1,262</b>	<b>8,841</b>	<b>16,423</b>	<b>23,902</b>	<b>31,280</b>	<b>38,557</b>	<b>45,732</b>	<b>68,502</b>
Net present value	-35,191	4,113	7,567	7,607	6,914	6,274	4,279	3,838	3,442	3,086	2,766	8,779
Cumulative net present value	-35,191	31,077	-23,511	15,904	-8,989	-2,716	1,564	5,402	8,844	11,930	14,696	23,475

NET PRESENT VALUE           23,475  
INTERNAL RATE OF RETURN   21.22%  
NORMAL PAYBACK               5 years

