

**186. PROFILE ON THE PRODUCTION OF SHOCK  
ABSORBER (HYDRAULIC)**

**TABLE OF CONTENTS**

		<b><u>PAGE</u></b>
I.	SUMMARY	186-2
II.	PRODUCT DESCRIPTION & APPLICATION	186-3
III.	MARKET STUDY AND PLANT CAPACITY	186-4
	A. MARKET STUDY	186-4
	B. PLANT CAPACITY & PRODUCTION PROGRAMME	186-6
IV.	MATERIALS AND INPUTS	186-7
	A. RAW & AUXILIARY MATERIALS	186-7
	B. UTILITIES	186-8
V.	TECHNOLOGY & ENGINEERING	186-9
	A. TECHNOLOGY	186-9
	B. ENGINEERING	186-9
VI.	HUMAN RESOURCE & TRAINING REQUIREMENT	186-13
	A. HUMAN RESOURCE REQUIREMENT	186-13
	B. TRAINING REQUIREMENT	186-14
VII.	FINANCIAL ANALYSIS	186-14
	A. TOTAL INITIAL INVESTMENT COST	186-15
	B. PRODUCTION COST	186-16
	C. FINANCIAL EVALUATION	186-17
	D. ECONOMIC AND SOCIAL BENEFITS	186-19

## **I. SUMMARY**

This profile envisages the establishment of a plant for the production of shock absorber (hydraulic) with a capacity of 60,000 pieces per annum. Pneumatic and hydraulic shock absorbers include cushions and springs and are an important part of automobile and motorcycle suspensions, aircraft landing gear, and supports for many industrial machines. Large shock absorbers have also been used in structural engineering to reduce the susceptibility of structures to earthquake damage and resonance.

The demand for shock absorber (hydraulic) is met entirely through import. The present (2012) demand for hydraulic shock absorber is estimated at 94 tons. The demand for hydraulic shock absorber is projected to reach 138 tons and 203 tons by the year 2017 2022, respectively.

The principal raw materials required are aluminum metal, pipe, rubber, and plate which have to be imported.

The total investment cost of the project including working capital is estimated at Birr 35.32 million. From the total investment cost the highest share (Birr 24.39 million or 69.06%) is accounted by fixed investment cost followed by initial working capital (Birr 7.70 million or 21.82%) and pre operation cost (Birr 3.22 million or 9.12%) From the total investment cost Birr 16.44 million or 46.54% is required in foreign currency.

The project is financially viable with an internal rate of return (IRR) of 29% and a net present value (NPV) of Birr 35.72 million discounted at 10%.

The project can create employment for 30 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 automotive, aviation, and manufacturing sub sectors and also generates income for the Government in terms of tax revenue and payroll tax.

## II. PRODUCT DESCRIPTION AND APPLICATION

A shock absorber is a mechanical device designed to smooth out or damp shock impulse, and dissipate kinetic energy. Pneumatic and hydraulic shock absorbers include cushions and springs. An automobile shock absorber contains spring-loaded check valves and orifices to control the flow of oil through an internal piston.

The shock absorber absorbs and dissipates energy. One design consideration, when designing or choosing a shock absorber, is where that energy will go. In most dashpots, energy is converted to heat inside the viscous fluid. In hydraulic cylinders, the hydraulic fluid heats up, while in air cylinders, the hot air is usually exhausted to the atmosphere. In other types of dashpots, such as electromagnetic types, the dissipated energy can be stored and used later. In general terms, shock absorbers help cushion vehicles on uneven roads.

Shock absorbers are an important part of automobile and motorcycle suspensions, aircraft landing gear, and supports for many industrial machines. Large shock absorbers have also been used in structural engineering to reduce the susceptibility of structures to earthquake damage and resonance. A transverse mounted shock absorber, called a yaw damper, helps keep railcars from swaying excessively from side to side and are important in passenger railroads, commuter rail and rapid transit systems because they prevent railcars from damaging station platforms.

In a vehicle, shock absorbers reduce the effect of traveling over rough ground, leading to improved ride quality and increase in comfort. While shock absorbers serve the purpose of limiting excessive suspension movement, their intended sole purpose is to dampen spring oscillations. Shock absorbers use valving of oil and gasses to absorb excess energy from the springs. Spring rates are chosen by the manufacturer based on the weight of the vehicle, loaded and unloaded.

### III. MARKET STUDY AND PLANT CAPACITY

#### A. MARKET STUDY

##### 1. Past supply and present Demand

The demand for shock absorbers is met through imports. However, there is an increasing demand of the items due to continuous increase in road vehicles population. To estimate present supply and effective demand for shock absorbers, data on import of the product from 2002 - 2011 is collected and analyzed (see Table 3.1).

**Table 3.1**  
**IMPORT OF SHOCK ABSORBERS (TON)**

Year	Quantity
2002	117
2003	157
2004	151
2005	169
2006	208
2007	219
2008	177
2009	186
2010	337
2011	178

*Source: Ethiopian Revenue and Customs Authority*

As can be seen from Table 3.1 during the period 2002-2011 the maximum import or total supply of shock absorbers was 337 tons while the minimum was 117 tons in 2002. However during the period under consideration the average total supply or apparent consumption was 190 tons. During the same period apparent consumption of shock absorbers has registered an average annual growth rate of 10%.

For estimating the present demand it is assumed that the average import during the recent three years is a fair approximate. Accordingly, the present (2012) effective demand for shock absorbers is estimated at 234 tons. Moreover, based on opinion of knowledgeable persons and observation of the available vehicle types in the country the share of hydraulic type shock absorbers from the total estimated demand for shock absorbers is estimated at 40% of the total. Hence, the present demand for hydraulic type shock absorbers is estimated at 94 tons.

## 2. Demand Projection

The total number of inspected and registered vehicles in the country in 2000 was only 96,504. This number has grown to 199,414 in 2010. During the period 2000 – 2010 the number of operational vehicles has registered an average annual growth rate of 8.04%, accordingly, the future demand for shock absorber is assumed to annually increase at the rate of 8%. (See Table 3.2)

**Table 3.2**

**FORECASTED DEMAND FOR HYDRAULIC TYPE SHOCK ABSORBERS (TON)**

<b>Year</b>	<b>Projected Demand</b>
2013	102
2014	110
2015	118
2016	128
2017	138
2018	149
2019	161
2020	174
2021	188
2022	203
2023	219
2024	237
2025	256

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

The price of shock spring absorbers varies according to the type of vehicles. For the purpose of financial analyses the current average retail price of Birr 1,000 per pieces is considered. Accordingly, allowing 25% margin for wholesalers and retailers the recommended factory gate price for the envisaged factory is Birr 800 per pieces.

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 PROGRAMME**

### **1. Plant Capacity**

The sizes of shock absorbers vary according to the type of vehicles. But for the purpose of this study, they are categorized into small, medium and big size shock absorbers.

Depending on the demand forecast the envisaged plant will have an annual production capacity of 60,000 pieces of shock absorbers. Each size is produced in equal quantity.

### **2. Production Programme**

Considering the time required to develop experience and to be acquainted with equipment, production in the first year is estimated to be maintained at 60% capacity utilization. This will grow by 15% during year second of the project period and will reach full capacity at the 4<sup>th</sup> year of operation. Table 3.3 shows details of the production programme.

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

Product	Unit	Year 1 (60%)	Year 2 (80%)	Year 3 (90%)	Year 4 - 10 (100%)
Shock absorbers					
Small Size	Pcs.	12,000	16,000	18,000	20,000
Medium Size	"	12,000	16,000	18,000	20,000
Big size	"	12,000	16,000	18,000	20,000
<b>Total</b>		<b>36,000</b>	<b>48,000</b>	<b>54,000</b>	<b>60,000</b>

**IV. MATERIALS AND INPUTS****A. MATERIALS**

The major raw materials for the manufacture of shock absorbers are aluminum metal, pipe, rubber, plate, etc. The only auxiliary materials needed are oil & grease. Annual requirement of these materials at 100% capacity utilization is given in Table 4.1.

**Table 4.1****ANNUAL MATERIALS AND INPUTS REQUIREMENTS AND COST**

<b>Materials and inputs</b>	<b>Unit of Measure</b>	<b>Qty.</b>	<b>Unit cost in Birr</b>	<b>Total cost in Birr</b>
<u>Raw Materials</u>				
Aluminum	tons	1,440	38,040	54,777,600
Pipe	"	2,640	14,880	39,283,200
Rubber	"	192	26,000	4,992,000
Plate	"	192	7,668	1,472,256
Wire	"	384	5,992	2,300,928
<u>Aux. Materials</u>				
Oil	"	384	39,000	4,992,000
Grease	"	24		



<b>Materials and inputs</b>	<b>Unit of Measure</b>	<b>Qty.</b>	<b>Unit cost in Birr</b>	<b>Total cost in Birr</b>
Fuel	kg	43,200	90,000 3.0	720,000 43,200
<u>Utilities</u>				
Electric power	Mwh	720	759	546,480
Air	m <sup>3</sup>	336,000	-	-
Water	m <sup>3</sup>	57,600	8.0	460,800
Total Materials and input cost			222,350	110,000,000

## B. UTILITIES

Utilities required are electric power, water and air. Annual cost of utilities is Birr 209,204. The annual requirement along with its cost at full capacity operation is given in Table 4.2.

**Table 4.2**

### **MATERIALS AND INPUTS REQUIREMENTS AND COST**

<b>No.</b>	<b>Description</b>	<b>Unit</b>	<b>Qty</b>	<b>Unit cost ( Birr)</b>	<b>Total Cost (Birr)</b>
1	Electric Power	MWh	180,000	0.5778	104,004
2	Air	M <sup>3</sup>	84,000	-	-
3	Water	M <sup>3</sup>	11,520	10.00	115,200
	<b>Total</b>				<b>209,204</b>

## **V. TECHNOLOGY AND ENGINEERING**

### **A. TECHNOLOGY**

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

The machining operation breaks down into the cylindrical bottom care of cast aluminum and fork pipe as basic materials. The casting is a gravity casting method while the deep-hole boring method is used in machining.

The machining of fork pipes includes the hard chrome coating and polishing work designed to prolong its service life.

The assembly section consists of the cleaning, painting and assembly conveyer lines, while the inspection line consists of damping force test, endurance test and other tests, making a steady manufacturing work flow possible.

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

The production of hydraulic type shock absorbers 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**

List of machinery and equipment is given in Table 5.1. The total estimated cost of these machinery and equipment is about Birr 18.69 million, out of which Birr 16.44 million will be required in foreign currency.

**Table 5.1**  
**DETAILS OF MACHINERY AND EQUIPMENT**

S/N	Machinery and Equipment	Quantity
1	Shell core forming machine	1
2	Gravity casting machine	1
3	Welding machine	3
4	Automatic lair Machine	1
5	Polishing machine	1
6	Chrome plating equipment	1 set
7	Ultrasonic cleaning machine	1 set
8	Painting shop equipment	1 set
9	Baling shop equipment	1 set
10	Assembly line equipment	1 set
11	Sampling force tester	1 set
12	Endurance tester	1 set
13	Function tester	1 set
14	Special tools	1 set

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

A total site area of about 2,000 square meters will be required for the plant. The total built-up area is estimated to be about 1,000 square meters. Of this area, about 120 square meters is for office complex. The average unit cost for factory shed, office complex and store is Birr 4,500 per m<sup>2</sup>. Accordingly, the total cost of building and civil work is estimated at Birr 4.5 million.

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

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

Moreover, advance payment of lease based on the type of investment ranges from 5% to 10%.The lease price is payable after the grace period annually. For those that pay the entire amount of the lease will receive 0.5% discount from the total lease value and those that pay in installments will be charged interest based on the prevailing interest rate of banks. Moreover, based on the type of investment, two to seven years grace period shall also be provided. However, the Federal Legislation on the Lease Holding of Urban Land apart from setting the maximum has conferred on regional and city governments the power to issue regulations on the exact terms based on the development level of each region.

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

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

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

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

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

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

**Table 5.2**

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

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

Accordingly, in order to estimate the land lease cost of the project profiles it is assumed that all new manufacturing projects will be located in industrial zones located in expansion zones.

Therefore, for the profile a land lease rate of Birr 266 per m<sup>2</sup> which is equivalent to the average floor price of plots located in expansion zone is adopted.

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

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

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

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

Accordingly, the total land lease cost at a rate of Birr 266 per m<sup>2</sup> is estimated at Birr 532,000 of which 10% or Birr 53,200 will be paid in advance. The remaining Birr 478,800 will be paid in equal installments with in 28 years i.e. Birr 17,100 annually.

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

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

The total human resource required for the plant is estimated to be about 30 persons. The human resource requirement along with monthly and annual salaries is provided in Table 6.1

**Table 6.1****DETAILS OF HUMAN RESOURCE REQUIREMENT**

S/N	Manpower	Qty	Monthly Salary (in Birr)	Annual Salary (in Birr)
1	General manager	1	4000	48,000
2	Secretary	1	1,200	14,400
3	Engineer	1	3,500	42,000
4	Foremen	2	1,500	36,000
5	Operators	7	1,000	84,000
6	Asst. Operators	5	750	45,000
7	Technicians	2	1,000	24,000
8	Asst. technicians	2	750	18,000
9	Clerical people	3	750	27,000
10	Others	6	550	39,600
	<b>Sub-total</b>	<b>30</b>		<b>378,000</b>
	Workers benefit (25%)			94,500
	<b>Total</b>			<b>472,500</b>

**B. TRAINING REQUIREMENT**

The engineer is proposed to have a general exposure in the supplier's training centre. The rest will be trained on the job by the supplier's expert. The cost of training is estimated to be Birr 200,000, out of which 25% is in foreign currency.

**VII. FINANCIAL ANALYSIS**

The financial analysis of the shock absorber hydraulic 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 35.32 million (See Table 7.1). From the total investment cost the highest share (Birr 24.39 million or 69.06%) is accounted by fixed investment cost followed by initial working capital (Birr 7.70 million or 21.82%) and pre operation cost (Birr 3.22 million or 9.12%) From the total investment cost Birr 16.44 million or 46.54% 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	53.20		53.20	0.15
1.2	Building and civil work	4,500.00		4,500.00	12.74
1.3	Machinery and equipment	2,250.00	16,440.00	18,690.00	52.92
1.4	Vehicles	900.00		900.00	2.55
1.5	Office furniture and equipment	250.00		250.00	0.71
	<b>Sub total</b>	<b>7,953.20</b>	<b>16,440.00</b>	<b>24,393.20</b>	<b>69.06</b>
<b>2</b>	<b>Pre operating cost *</b>				
2.1	Pre operating cost	910.70		910.70	2.58
2.2	Interest during construction	2,310.69		2,310.69	6.54
	<b>Sub total</b>	<b>3,221.39</b>		<b>3,221.39</b>	<b>9.12</b>
<b>3</b>	<b>Working capital **</b>	<b>7,705.97</b>		<b>7,705.97</b>	<b>21.82</b>
	<b>Grand Total</b>	<b>18,880.56</b>	<b>16,440.00</b>	<b>35,320.56</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 10.99 million. However, only the initial working capital of Birr 7.70 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 41.17 million (see Table 7.2). The cost of raw material account for 79.30% of the production cost. The other major components of the production cost are depreciation, financial cost and repair and maintenance which account for 10.46%, 5.40%, and 1.36% respectively. The remaining 3.48% is the share of utility, 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)**

<b>Items</b>	<b>Cost (000 Birr)</b>	<b>%</b>
Raw Material and Inputs	32,655.00	79.30
Utilities	209.00	0.51
Maintenance and repair	561.00	1.36
Labour direct	378.00	0.92
Labour overheads	95.00	0.23
Administration Costs	250.00	0.61
Land lease cost	-	-
Cost of marketing and distribution	500.00	1.21
<b>Total Operating Costs</b>	<b>34,648.00</b>	<b>84.14</b>
Depreciation	4,305.14	10.46
Cost of Finance	2,224.04	5.40
<b>Total Production Cost</b>	<b>41,177.18</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 4.89 million to Birr 9.19 million during the life of the project. Moreover, at the end of the project life the accumulated net cash flow amounts to Birr 80.67 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.

$$\text{Break Even Sales Value} = \frac{\text{Fixed Cost} + \text{Financial Cost}}{\text{Variable Margin ratio (\%)}} = \text{Birr } 16,650,788$$

$$\text{Break Even Capacity utilization} = \frac{\text{Break even Sales Value}}{\text{Sales revenue}} \times 100 = 35\%$$

### **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 3 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 29% 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 35.72 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 30 persons. The project will generate Birr 23.11 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 automotive, aviation, and manufacturing sub sectors and generate 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	22,859	29,390	32,655	32,655	32,655	32,655	32,655	32,655	32,655	32,655
Utilities	146	188	209	209	209	209	209	209	209	209
Maintenance and repair	393	505	561	561	561	561	561	561	561	561
Labour direct	265	340	378	378	378	378	378	378	378	378
Labour overheads	67	86	95	95	95	95	95	95	95	95
Administration Costs	175	225	250	250	250	250	250	250	250	250
Land lease cost	0	0	0	0	17	17	17	17	17	17
Cost of marketing and distribution	500	500	500	500	500	500	500	500	500	500
<b>Total Operating Costs</b>	<b>24,404</b>	<b>31,233</b>	<b>34,648</b>	<b>34,648</b>	<b>34,665</b>	<b>34,665</b>	<b>34,665</b>	<b>34,665</b>	<b>34,665</b>	<b>34,665</b>
Depreciation	4,305	4,305	4,305	4,305	4,305	205	205	205	205	205
Cost of Finance	0	2,542	2,224	1,906	1,589	1,271	953	635	318	0
<b>Total Production Cost</b>	<b>28,709</b>	<b>38,080</b>	<b>41,177</b>	<b>40,859</b>	<b>40,559</b>	<b>36,141</b>	<b>35,823</b>	<b>35,506</b>	<b>35,188</b>	<b>34,870</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	33,600	43,200	48,000	48,000	48,000	48,000	48,000	48,000	48,000	48,000
Less variable costs	23,904	30,733	34,148	34,148	34,148	34,148	34,148	34,148	34,148	34,148
<b>VARIABLE MARGIN</b>	<b>9,696</b>	<b>12,467</b>	<b>13,852</b>	<b>13,852</b>	<b>13,852</b>	<b>13,852</b>	<b>13,852</b>	<b>13,852</b>	<b>13,852</b>	<b>13,852</b>
in % of sales revenue	28.86	28.86	28.86	28.86	28.86	28.86	28.86	28.86	28.86	28.86
Less fixed costs	4,805	4,805	4,805	4,805	4,822	722	722	722	722	722
<b>OPERATIONAL MARGIN</b>	<b>4,891</b>	<b>7,662</b>	<b>9,047</b>	<b>9,047</b>	<b>9,030</b>	<b>13,130</b>	<b>13,130</b>	<b>13,130</b>	<b>13,130</b>	<b>13,130</b>
in % of sales revenue	14.56	17.74	18.85	18.85	18.81	27.35	27.35	27.35	27.35	27.35
Financial costs		2,542	2,224	1,906	1,589	1,271	953	635	318	0
<b>GROSS PROFIT</b>	<b>4,891</b>	<b>5,120</b>	<b>6,823</b>	<b>7,141</b>	<b>7,441</b>	<b>11,859</b>	<b>12,177</b>	<b>12,494</b>	<b>12,812</b>	<b>13,130</b>
in % of sales revenue	14.56	11.85	14.21	14.88	15.50	24.71	25.37	26.03	26.69	27.35
Income (corporate) tax	0	0	0	2,142	2,232	3,558	3,653	3,748	3,844	3,939
<b>NET PROFIT</b>	<b>4,891</b>	<b>5,120</b>	<b>6,823</b>	<b>4,998</b>	<b>5,209</b>	<b>8,301</b>	<b>8,524</b>	<b>8,746</b>	<b>8,969</b>	<b>9,191</b>
in % of sales revenue	14.56	11.85	14.21	10.41	10.85	17.29	17.76	18.22	18.68	19.15



**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>25,304</b>	<b>43,671</b>	<b>43,216</b>	<b>48,008</b>	<b>48,000</b>	<b>48,000</b>	<b>48,000</b>	<b>48,000</b>	<b>48,000</b>	<b>48,000</b>	<b>48,000</b>	<b>16,056</b>
Inflow funds	25,304	10,071	16	8	0	0	0	0	0	0	0	0
Inflow operation	0	33,600	43,200	48,000	48,000	48,000	48,000	48,000	48,000	48,000	48,000	0
Other income	0	0	0	0	0	0	0	0	0	0	0	16,056
<b>TOTAL CASH OUTFLOW</b>	<b>25,304</b>	<b>34,475</b>	<b>39,158</b>	<b>41,152</b>	<b>41,874</b>	<b>41,665</b>	<b>42,671</b>	<b>42,448</b>	<b>42,226</b>	<b>42,004</b>	<b>38,604</b>	<b>0</b>
Increase in fixed assets	25,304	0	0	0	0	0	0	0	0	0	0	0
Increase in current assets	0	7,761	2,205	1,103	0	2	0	0	0	0	0	0
Operating costs	0	23,904	30,733	34,148	34,148	34,165	34,165	34,165	34,165	34,165	34,165	0
Marketing and Distribution cost	0	500	500	500	500	500	500	500	500	500	500	0
Income tax	0	0	0	0	2,142	2,232	3,558	3,653	3,748	3,844	3,939	0
Financial costs	0	2,311	2,542	2,224	1,906	1,589	1,271	953	635	318	0	0
Loan repayment	0	0	3,177	3,177	3,177	3,177	3,177	3,177	3,177	3,177	0	0
<b>SURPLUS (DEFICIT)</b>	<b>0</b>	<b>9,196</b>	<b>4,058</b>	<b>6,856</b>	<b>6,126</b>	<b>6,335</b>	<b>5,329</b>	<b>5,552</b>	<b>5,774</b>	<b>5,996</b>	<b>9,396</b>	<b>16,056</b>
<b>CUMULATIVE CASH BALANCE</b>	<b>0</b>	<b>9,196</b>	<b>13,254</b>	<b>20,110</b>	<b>26,237</b>	<b>32,572</b>	<b>37,901</b>	<b>43,452</b>	<b>49,226</b>	<b>55,223</b>	<b>64,619</b>	<b>80,675</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>33,600</b>	<b>43,200</b>	<b>48,000</b>	<b>48,000</b>	<b>48,000</b>	<b>48,000</b>	<b>48,000</b>	<b>48,000</b>	<b>48,000</b>	<b>48,000</b>	<b>16,056</b>
Inflow operation	0	33,600	43,200	48,000	48,000	48,000	48,000	48,000	48,000	48,000	48,000	0
Other income	0	0	0	0	0	0	0	0	0	0	0	16,056
<b>TOTAL CASH OUTFLOW</b>	<b>33,010</b>	<b>26,593</b>	<b>32,328</b>	<b>34,648</b>	<b>36,792</b>	<b>36,897</b>	<b>38,223</b>	<b>38,318</b>	<b>38,413</b>	<b>38,509</b>	<b>38,604</b>	<b>0</b>
Increase in fixed assets	25,304	0	0	0	0	0	0	0	0	0	0	0
Increase in net working capital	7,706	2,190	1,095	0	2	0	0	0	0	0	0	0
Operating costs	0	23,904	30,733	34,148	34,148	34,165	34,165	34,165	34,165	34,165	34,165	0
Marketing and Distribution cost	0	500	500	500	500	500	500	500	500	500	500	0
Income (corporate) tax		0	0	0	2,142	2,232	3,558	3,653	3,748	3,844	3,939	0
<b>NET CASH FLOW</b>	<b>-33,010</b>	<b>7,007</b>	<b>10,872</b>	<b>13,352</b>	<b>11,208</b>	<b>11,103</b>	<b>9,777</b>	<b>9,682</b>	<b>9,587</b>	<b>9,491</b>	<b>9,396</b>	<b>16,056</b>
<b>CUMULATIVE NET CASH FLOW</b>	<b>-33,010</b>	<b>26,003</b>	<b>-15,131</b>	<b>-1,779</b>	<b>9,429</b>	<b>20,531</b>	<b>30,309</b>	<b>39,990</b>	<b>49,577</b>	<b>59,068</b>	<b>68,464</b>	<b>84,520</b>
Net present value	-33,010	6,370	8,985	10,032	7,655	6,894	5,519	4,968	4,472	4,025	3,623	6,190
Cumulative net present value	-33,010	26,640	-17,655	-7,624	32	6,926	12,444	17,413	21,885	25,910	29,533	35,723

NET PRESENT VALUE                   35,723  
INTERNAL RATE OF RETURN       29.00%  
NORMAL PAYBACK                    3 years