

**187. PROFILE ON THE PRODUCTION OF SHOCK
ABSORBER (SPRING)**

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I. SUMMARY

This profile envisages the establishment of a plant for the production of shock absorber spring with a capacity of 300, 000 pieces per annum. A spring shock absorber is a mechanical device designed to smooth out or damp shock impulse, and dissipate kinetic energy and is used in automobile and motorcycle suspensions, aircraft landing gear, and supports for many industrial machines.

The demand for shock absorber spring is met entirely through import. The present (2012) demand for shock absorber spring is estimated at 140 tons. The demand for shock absorber spring is projected to reach 206 tons and 303 tons by the year 2017 and year 2022, respectively.

The principal raw materials required are steel wire and steel plate which have to be imported.

The total investment cost of the project including working capital is estimated at Birr 181.77 million. From the total investment cost the highest share (Birr 150.38 million or 82.73%) is accounted by fixed investment cost followed by pre operation cost (Birr 16.39 million or 9.02%) and initial working capital (Birr 14.99 million or 8.25%). From the total investment cost Birr 110.75 million or 60.93% is required in foreign currency.

The project is financially viable with an internal rate of return (IRR) of 19.09% and a net present value (NPV) of Birr 72.86 million discounted at 10%.

The project can create employment for 62 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 spring shock absorber is a mechanical device designed to smooth out or damp shock impulse, and dissipate kinetic energy. The shock absorber absorbs and dissipates energy. One design consideration, when designing or choosing a spring 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.

Spring-based shock absorbers commonly use coil springs or leaf springs, though torsion bars are used in torsional shocks as well.

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 faire 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 spring type shock absorbers from the total estimated demand for shock absorbers is estimated at 60% of the total. Hence, the present demand for spring type shock absorbers is estimated at 140 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 SPRING TYPE SHOCK ABSORBERS (TON)

Year	Projected Demand
2013	151
2014	163
2015	177
2016	191
2017	206
2018	222
2019	240
2020	259
2021	280
2022	303
2023	327
2024	353
2025	381

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 400 per pieces is considered. Accordingly, allowing 20% margin for wholesalers and retailers the recommended factory gate price for the envisaged factory is Birr 333 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 size of shock spring absorbers varies according to the type of vehicles. But for the purpose of this study, they are categorized in to small, medium and big size shock absorbers. Depending on the demand forecast the plant capacity is proposed to be 300,000 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 year 1 of the project life is estimated to be maintained at 90% capacity utilization and 100 % capacity utilization will be maintained during year 2 and thereafter of the project period. Table 3.1 shows details of the production programme.

Table 3.1

PRODUCTION PROGRAMME

Product	Unit	Year 1	Year 2-10
<u>Shock absorber</u>			
Small Size	Pcs.	90,000	100,000
Medium size	”	90,000	100,000
Big size	”	90,000	100,000
Total		270,000	300,000

IV. MATERIALS AND INPUTS

A. RAW MATERIALS

The major raw materials for the manufacture of spring shock absorbers are steel wire, steel plate etc. Annual requirement of these materials at 100 % capacity utilization is given in Table 4.1.

Table 4.1

ANNUAL RAW MATERIAL REQUIREMENT AND COST

Materials and inputs	Unit of Measure	Qty.	Cost (in 000 Birr)		Total
			FC	LC	
Steel plate	tons	900	18,900	4,725	23,625
Steel wire	”	600	15,600	3,900	19,500
Grease	”	50	4,500	1,125	5,625
Total			39,000	9,750	48,750

B. UTILITIES

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

Table 4.2

ANNUAL UTILITY REQUIREMENTS

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

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 overall processes of spring shock absorber includes heat treatment of the wire such as annealing and tempering, coiling and polishing work that is designed to prolong its service life.

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

2. Environmental Impact

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

B. ENGINEERING

1. Machinery and Equipment

List of the required machinery and equipment is provided in Table 5.1. The total cost of machinery and equipment is estimated at Birr 138,447,450 of which Birr 110,757,960 is required in foreign currency.

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

Sr. No.	Description	Qty.
1.	Welding machine	3
2.	Automatic lair machine	1
3.	Heat treatment furnaces	1 set
4.	Polishing machine	1
5.	Ultrasonic cleaning machine	1set
6.	Painting shop equipment	1set
7.	Baling shop equipment	1set
8.	Assembly line equipment	1set
9.	Sampling force tester	1set
10.	Endurance tester	1set
11.	Function tester	1set
12.	Special tools	1set

2. Land, Building and Civil Works

A total site area of about 5,000 square meters will be required for the plant. The total built-up area is estimated to be about 3,000 square meters. Of this area about 300 square meters is for office complex. The unit cost for factory shed and store is Birr 3,500 and Birr 4,000 for office complex. Therefore, the total cost of building will be Birr 10,650,000.

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 m², 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 m², 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 m². 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 m². 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 m² (see Table 5.2).

Table 5.2

NEW LAND LEASE FLOOR PRICE FOR PLOTS IN ADDIS ABABA

Zone	Level	Floor price/m²
Central Market District	1 st	1686
	2 nd	1535
	3 rd	1323
	4 th	1085
	5 th	894
Transitional zone	1 st	1035
	2 nd	935
	3 rd	809
	4 th	685
	5 th	555
Expansion zone	1 st	355
	2 nd	299
	3 rd	217
	4 th	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 m², 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

Scored point	Grace period	Payment Completion Period	Down Payment
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 m² is estimated at Birr 1,330,000 of which 10% or Birr 133,000 will be paid in advance. The remaining Birr 1,197,000 will be paid in equal installments with in 28 years i.e. Birr 42,750 annually.

VI. HUMAN RESOURCE AND TRAINING REQUIREMENTS

A. HUMAN RESOURCE REQUIREMENT

The total human resource for the plant is estimated to be about 62 persons the human resource requirement along with monthly and annual salaries is provided in table 6.1.

Table 6.1
HUMAN RESOURCE REQUIREMENT & LABOUR COST

Sr. No.	Job Position	Req. No.	Salary per Month	Salary per Year
<u>A. Production</u>				
1.	Manger	1	6,000	72,000
2.	Production and maintenance supervisor	3	13,500	162,000
3.	Production clerk	1	1,250	15,000
4.	Operator	36	48,600	583,200
5.	Mechanic	6	15,000	180,000
6.	Labour	6	5,100	61,200
<u>B. Others</u>				
1.	Stores, Finance ,administration and sales head	1	5,500	66,000
2.	Salesman	1	2,500	30,000
3.	Secretary	1	2,500	30,000
4.	Cashier/ clerk	1	2,500	30,000
5.	Store clerk	1	1,350	16,200
6.	Security guard	2	1,700	20,400
7.	Messenger/ cleaner	1	750	9,000
8.	Driver	1	1,250	15,000
	Total	62	107,500	1,290,000

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 150,000.

VII. FINANCIAL ANALYSIS

The financial analysis of the shock absorber spring project is based on the data presented in the previous chapters and the following assumptions:-

Construction period	1 year
Source of finance	30 % equity and 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 181.77 million (See Table 7.1). From the total investment cost the highest share (Birr 150.38 million or 82.73%) is accounted by fixed investment cost followed by pre operation cost (Birr 16.39 million or 9.02%) and initial working capital (Birr 14.99 million or 8.25%). From the total investment cost Birr 110.75 million or 60.93% is required in foreign currency.

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

Sr. No	Cost Items	Local Cost	Foreign Cost	Total Cost	% Share
1	Fixed investment				
1.1	Land Lease	133.00		133.00	0.07
1.2	Building and civil work	10,650.00		10,650.00	5.86
1.3	Machinery and equipment	27,689.49	110,757.96	138,447.45	76.16
1.4	Vehicles	900.00		900.00	0.50
1.5	Office furniture and equipment	250.00		250.00	0.14
	Sub total	39,622.49	110,757.96	150,380.45	82.73
2	Pre operating cost *				
2.1	Pre operating cost	4,503.42		4,503.42	2.48
2.2	Interest during construction	11,891.76		11,891.76	6.54
	Sub total	16,395.18		16,395.18	9.02
3	Working capital **	14,998.37		14,998.37	8.25
	Grand Total	71,016.03	110,757.96	181,773.99	100

* *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 16.66 million. However, only the initial working capital of Birr 14.99 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 100.41 million (see Table 7.2). The cost of raw material account for 48.55% of the production cost. The other major components of the production cost are depreciation, financial cost and repair and maintenance which account for 29.10%, 13.03% and 4.14% respectively. The remaining 5.19% is the share of direct labour, 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 two)**

Items	Cost (000 Birr)	%
Raw Material and Inputs	48,750.00	48.55
Utilities	2,847.00	2.84
Maintenance and repair	4,153.00	4.14
Labour direct	1,290.00	1.28
Labour overheads	323.00	0.32
Administration Costs	250.00	0.25
Land lease cost	-	-
Cost of marketing and distribution	500.00	0.50
Total Operating Costs	58,113.00	57.87
Depreciation	29,221.17	29.10
Cost of Finance	13,080.93	13.03
Total Production Cost	100,415.11	100

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 685 thousand to Birr 29.74 million during the life of the project. Moreover, at the end of the project life the accumulated net cash flow amounts to Birr 207.31 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.

$$\text{Break Even Sales Value} = \frac{\text{Fixed Cost} + \text{Financial Cost}}{\text{Variable Margin ratio (\%)}} = \text{Birr } 69,096,757$$

$$\text{Break Even Capacity utilization} = \frac{\text{Break even Sales Value}}{\text{Sales revenue}} \times 100 = 68\%$$

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 19.09% 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 72.86 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 62 persons. The project will generate Birr 61.68 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 and aviation sub sectors generate other income for the government.

Appendix 7.A

FINANCIAL ANALYSES SUPPORTING TABLES

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

Item	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11
Raw Material and Inputs	43,875	48,750	48,750	48,750	48,750	48,750	48,750	48,750	48,750	48,750
Utilities	2,562	2,847	2,847	2,847	2,847	2,847	2,847	2,847	2,847	2,847
Maintenance and repair	3,738	4,153	4,153	4,153	4,153	4,153	4,153	4,153	4,153	4,153
Labour direct	1,161	1,290	1,290	1,290	1,290	1,290	1,290	1,290	1,290	1,290
Labour overheads	291	323	323	323	323	323	323	323	323	323
Administration Costs	225	250	250	250	250	250	250	250	250	250
Land lease cost	0	0	0	0	43	43	43	43	43	43
Cost of marketing and distribution	500	500	500	500	500	500	500	500	500	500
Total Operating Costs	52,352	58,113	58,113	58,113	58,156	58,156	58,156	58,156	58,156	58,156
Depreciation	29,221	29,221	29,221	29,221	29,221	451	451	451	451	451
Cost of Finance	0	13,081	11,446	9,811	8,176	6,540	4,905	3,270	1,635	0
Total Production Cost	81,573	100,415	98,780	97,145	95,553	65,147	63,512	61,877	60,242	58,607

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	90,990	101,100	101,100	101,100	101,100	101,100	101,100	101,100	101,100	101,100
Less variable costs	51,852	57,613	57,613	57,613	57,613	57,613	57,613	57,613	57,613	57,613
VARIABLE MARGIN	39,138	43,487	43,487	43,487	43,487	43,487	43,487	43,487	43,487	43,487
in % of sales revenue	43.01	43.01	43.01	43.01	43.01	43.01	43.01	43.01	43.01	43.01
Less fixed costs	29,721	29,721	29,721	29,721	29,764	994	994	994	994	994
OPERATIONAL MARGIN	9,417	13,766	13,766	13,766	13,723	42,493	42,493	42,493	42,493	42,493
in % of sales revenue	10.35	13.62	13.62	13.62	13.57	42.03	42.03	42.03	42.03	42.03
Financial costs		13,081	11,446	9,811	8,176	6,540	4,905	3,270	1,635	0
GROSS PROFIT	9,417	685	2,320	3,955	5,547	35,953	37,588	39,223	40,858	42,493
in % of sales revenue	10.35	0.68	2.29	3.91	5.49	35.56	37.18	38.80	40.41	42.03
Income (corporate) tax	0	0	0	1,187	1,664	10,786	11,276	11,767	12,257	12,748
NET PROFIT	9,417	685	2,320	2,769	3,883	25,167	26,312	27,456	28,601	29,745
in % of sales revenue	10.35	0.68	2.29	2.74	3.84	24.89	26.03	27.16	28.29	29.42

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
TOTAL CASH INFLOW	154,884	118,288	101,145	101,100	101,100	101,100	101,100	101,100	101,100	101,100	101,100	35,079
Inflow funds	154,884	27,298	45	0	0	0	0	0	0	0	0	0
Inflow operation	0	90,990	101,100	101,100	101,100	101,100	101,100	101,100	101,100	101,100	101,100	0
Other income	0	0	0	0	0	0	0	0	0	0	0	35,079
TOTAL CASH OUTFLOW	154,884	79,650	89,252	85,910	85,461	84,351	91,833	90,689	89,544	88,399	70,904	0
Increase in fixed assets	154,884	0	0	0	0	0	0	0	0	0	0	0
Increase in current assets	0	15,407	1,707	0	0	4	0	0	0	0	0	0
Operating costs	0	51,852	57,613	57,613	57,613	57,656	57,656	57,656	57,656	57,656	57,656	0
Marketing and Distribution cost	0	500	500	500	500	500	500	500	500	500	500	0
Income tax	0	0	0	0	1,187	1,664	10,786	11,276	11,767	12,257	12,748	0
Financial costs	0	11,892	13,081	11,446	9,811	8,176	6,540	4,905	3,270	1,635	0	0
Loan repayment	0	0	16,351	16,351	16,351	16,351	16,351	16,351	16,351	16,351	0	0
SURPLUS (DEFICIT)	0	38,638	11,893	15,190	15,639	16,749	9,267	10,411	11,556	12,701	30,196	35,079
CUMULATIVE CASH BALANCE	0	38,638	50,531	65,721	81,360	98,109	107,376	117,787	129,343	142,044	172,240	207,319

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
TOTAL CASH INFLOW	0	90,990	101,100	101,100	101,100	101,100	101,100	101,100	101,100	101,100	101,100	35,079
Inflow operation	0	90,990	101,100	101,100	101,100	101,100	101,100	101,100	101,100	101,100	101,100	0
Other income	0	0	0	0	0	0	0	0	0	0	0	35,079
TOTAL CASH OUTFLOW	169,882	54,014	58,113	58,113	59,304	59,820	68,942	69,432	69,923	70,413	70,904	0
Increase in fixed assets	154,884	0	0	0	0	0	0	0	0	0	0	0
Increase in net working capital	14,998	1,662	0	0	4	0	0	0	0	0	0	0
Operating costs	0	51,852	57,613	57,613	57,613	57,656	57,656	57,656	57,656	57,656	57,656	0
Marketing and Distribution cost	0	500	500	500	500	500	500	500	500	500	500	0
Income (corporate) tax		0	0	0	1,187	1,664	10,786	11,276	11,767	12,257	12,748	0
NET CASH FLOW	-169,882	36,976	42,987	42,987	41,796	41,280	32,158	31,668	31,177	30,687	30,196	35,079
CUMULATIVE NET CASH FLOW	-169,882	-132,906	-89,919	-46,932	-5,135	36,145	68,303	99,971	131,148	161,835	192,031	227,110
Net present value	-169,882	33,615	35,526	32,297	28,547	25,632	18,153	16,251	14,544	13,014	11,642	13,525
Cumulative net present value	-169,882	-136,267	-100,741	-68,444	-39,897	-14,265	3,888	20,138	34,683	47,697	59,339	72,863

NET PRESENT VALUE 72,863
INTERNAL RATE OF
RETURN 19.09%
NORMAL PAYBACK 5 years

