

**192. PROFILE ON THE PRODUCTION OF
SPRINGS AND COILS**

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I. SUMMARY

This profile envisages the establishment of a plant for the production of springs and coils with a capacity of 150 tons per annum. Springs and coils are devices that are made in various shapes and sizes by winding high carbon steel wires in different forms of different diameters.

The demand for springs and coils is met entirely through import. The present (2012) demand for springs and coils is estimated at 2,005 tons. The demand for springs and coils is projected to reach 3,229 tons and 5,200 tons by the year 2017 and 2022, respectively.

The principal raw materials required are wires of high carbon steel with diameters of 0.15mm up to 4 mm, which have to be imported.

The total investment cost of the project including working capital is estimated at Birr 23.47 million (See Table 7.1). From the total investment cost the highest share (Birr 11.28 million or 48.07%) is accounted by initial working capital followed by fixed investment cost (Birr 10.13 million or 43.16%) and pre operation cost (Birr 2.06 million or 8.77%). From the total investment cost Birr 4.32 million or 18.41% is required in foreign currency.

The project is financially viable with an internal rate of return (IRR) of 28.63% and a net present value (NPV) of Birr 26.86 million discounted at 10%.

The project can create employment for 19 persons. The establishment of such factory will have a foreign exchange saving effect to the country by substituting the current imports. The project will also create backward linkage with the paper manufacturing sub sector and forward linkage with the automotive and furniture manufacturing sub sectors and also generates income for the Government in terms of tax revenue and payroll tax.

II. PRODUCT DESCRIPTIONS AND APPLICATIONS

Springs and coils are devices that are made in various shapes and sizes by winding high carbon steel wires in different forms of different diameters. They are produced in cylindrical, conical or in Flat, Zigzag shapes to serve various purposes in machine parts or chair cushions and other places.

III. MARKET STUDY AND PLANT CAPACITY

A. MARKET STUDY

1. Past Supply and Present Demand

The local demand for springs and coils is met through import. The country imports a significant quantity of the product from various countries. Table 3.1 shows the annual import of springs and coils for the period 2002 – 2011.

Table 3.1
IMPORT OF SPRINGS AND COILS (TONS)

Year	Quantity
2002	1,189
2003	1,306
2004	1,199
2005	2,156
2006	2,599
2007	2,341
2008	2,132
2009	2,702
2010	1,875
2011	1,150

Source:-Ethiopian Revenue and Customs Authority.

As can be seen from Table 3.1, import of bolts and nuts for the period 2002-2011 ranges from the lowest 1,189 tons (year 2002) to the highest 2,702 tons (year 2009) with annual average of about 1,865 tons. Though import of springs and coils fluctuates from year to year, a general growth trend can be observed. For example average import during the first five years of the data set (2002 – 2006) was 1,690 tons which has increased to 2,040 during the next five years (2007-2011) average.

During the period under consideration (2002 – 2011) import of springs and coils has registered an average annual growth rate of 5%. For estimating the present demand for springs and coils it is assumed that the growth rate registered in import or total supply of the product will continue at least in the near future.

Accordingly, by taking the average level of import during the recent three years (2009 -2011) as a base and applying a growth rate 5%, the present (2012) demand for springs and coils is estimated at 2,005 tons.

2. Demand Projection

Springs and coils are items which are used extensively in all industries either during manufacturing or repair and maintenance of engineering products and their demand is expected to increase with the development of the manufacturing sector.

According to the government's "Growth and Transformation Plan (2011 – 2015)" during the plan period, the industrial sector, which includes the manufacturing and construction sectors, is expected to grow at an average annual growth rate of 20%.

However, in order to be conservative a growth rate of 10%, which is slightly lower than the anticipated growth rate of GDP during the Growth and Transformation period (11.4%), is used to project the demand for springs and coils. Accordingly, using the estimated present demand as a base and applying a growth rate of 10% the projected demand for springs and coils is shown in Table 3.2.

3. Pricing and distribution

The price of springs and coils varies greatly according to use, design and other factors. For the purpose of this project the average CIF value of the recent two years plus 30% for various costs is taken. Accordingly, Birr 48/kg is recommended. The product will be sold directly to the end user.

Table 3.2**PROJECTED DEMAND FOR SPRINGS AND COILS (TON)**

Year	Projected Demand
2013	2,206
2014	2,426
2015	2,669
2016	2,936
2017	3,229
2018	3,552
2019	3,907
2020	4,298
2021	4,728
2022	5,200
2023	5,720
2024	6,293
2025	6,922

B. PLANT CAPACITY AND PRODUCTION PROGRAM**1. Plant Capacity**

The selected manufacturing capacity of the plant is 150 tons of springs and coils per year, based on 300 working days on a single shift basis.

2. Production Program

The production program is worked out by y considering the time required for market penetration and development of the worker's skill level. Accordingly, the plant will start at 75% of its installed capacity during the first year of production and then increases to 85% in the second year. Full capacity utilization will be attained during the third year and then after. The production program is shown in Table 3.3.

Table 3.3
PRODUCTION PROGRAM

	Year 1	Year 2	Year 3-10
Production (Ton)	113	128	150
Capacity %	75	85	100

IV. RAW MATERIAL AND INPUTS

A. RAW AND AUXILIARY MATERIALS

The selected product requires wires of high carbon steel with diameters of 0.15mm up to 4 mm, which have to be imported. The quantity required and the corresponding cost is shown in Table 4.1.

Table 4.1
RAW MATERIALS AND ANNUAL COST

Sr. No	Raw Materials	Annual Requirement (ton)	Cost (000 Birr)		
			F.C	L.C	Total
1	Carbon steel wires (0.15mm)	82.5	1,320.0	198.0	1,518.0
2	Carbon steel wires (2.5 mm)	82.5	1,485.0	222.8	1,707.8
3	Packing Cartons and labels	7.5		90.0	90.0
	Total		2,805.0	510.8	3,315.8

B. UTILITIES

The major utility requirements of the plant are water and electricity. Annual cost of utilities is estimated at Birr 54,240. The details of utility requirement at full capacity operation are shown in Table 4.2.

Table 4.2
ANNUAL UTILITYIES REQUIREMENT COST

No	Utility	Unit	Quantity	Cost(Birr)
1	Electricity	KWh	72,000	42,240
2	Water	Meter cube	1,200	12,000
	Total			54,240

V. TECHNOLOGY AND ENGINEERING

A. TECHNOLOGY

1. Process Description

Flat Spring: - This spring is mostly made from a wire of 2.5mm diameter. The wire is first fed to a wire straightening machine. The straightened wire is fed to the spring coiling machine which is produced in cylindrical form. This formed coil is fed to a flattening machine. The final flattened spring is cut into the proper length. Hooks are formed at each end of the springs for further use

Zig Zag Springs: - This spring is made from a wire of 2.5mm diameter .The wire is first fed to a wire straightening machine. The straightened machine is fed to the Zig Zag forming machine. The produced spring is fed to a knotting machine the spring is finally inspected and packed.

Compression spring:-This spring is made from a wire of 2.5mm diameter. After the wire is straightened it is fed to the forming machine. The product is finally knotted at the tips.

All **cylindrical springs** can be formed by the spindle of the spring making machines by interchanging the spindles.

2. Environmental Impact

The production process involves cutting drilling; machining, bending operations. This does not have any negative impact on the surrounding environment.

B. ENGINEERING

1. Machinery and Equipment

Total cost of machinery and equipment is estimated at Birr 2.5 million out of which Birr 2 million is required in foreign currency. The list of the necessary machinery and equipment is shown are listed in Table 5.1.

Table 5.1

MACHINERY AND EQUIPMENT FOR SPRING AND COIL FORMING PLANT

Sr. No.	Machine	Qty.
1	Automatic spring coiling machine	1
2	Automatic Universal spring coiling machine	1
3	Semiautomatic spring knotting machine.	1
4	Spring flattening Machine	1
5	Mechanical press	1`
6	Fixtures for making knots	1
7	Hand operated small spring making machine	1
8	Portable Electric drill	2
9	Tool Sets	3
10	Material Handling Equipment	1set
12	Paint/print/packing	1set

2. Land, Building and Civil Works

The envisaged plant requires a total land area of 1,000 m², of which 600 m² would be built-up area. Building construction cost at a rate of Birr 5,000/m² is estimated to be Birr 3 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 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

Zone	Level	Floor price/m²
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 period of lease for industry is 60 years. Accordingly, the total lease cost, for a period of 60 years at a land lease rate of Birr 266 per m² is estimated at Birr 15.96 million of which 10% or Birr 1,596,000 will be paid in advance. The remaining Birr 14.36 million will be paid in equal installments with in 28 years i.e. Birr 513,000 annually.

VI. HUMAN RESOURCE AND TRAINING REQUIREMENT

A. HUMAN RESOURCE REQUIREMENT

A total of 19 workers are required in the plant; of these 10 are technical workers. Annual cost of labor is estimated at Birr 576,900. The detail of human resource required by type of job and corresponding monthly and annual salary is given is included in Table 6.1.

Table 6.1
HUMAN RESOURCE REQUIREMENTS AND COST

Sr. No.	Description	No.	Salary (Birr)	
			Monthly	Annual
A. ADMINISTRATION				
1	Plant Manager	1	5,000	60,000
2	Secretary	1	2,500	30,000
3	Accountant	1	2,500	30,000
4	Salesman/purchaser	1	2,500	30,000
5	Clerk	1	1,500	18,000
6	Cashier	1	2,000	24,000
7	General Service	3	800	28,800
SUB TOTAL		9		220,800
B. PRODUCTION				
8	Foreman/	1	2,500	30,000
9	Machinery Operators	2	2,000	48,000
10	Assistant Operators	2	1,500	36,000
11	Mechanics	2	2,000	48,000
12	Quality controller	1	1,500	18,000
13	Laborers	2	800	19,200
SUB TOTAL		10	-	247,200
TOTAL				468,000
Employee's benefit (25% of basic salary)		-	-	108,900
TOTAL		19	-	576,900

B. TRAINING REQUIREMENT

On the job training of the operators would be enough for workers with technical back ground. For this a sum of Birr 10,000 is required .The production Technology is dependent to a great extent on the automatic machines.

VII. FINANCIAL ANALYSIS

The financial analysis of the springs and coils 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 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 23.47 million (See Table 7.1). From the total investment cost the highest share (Birr 11.28 million or 48.07%) is accounted by initial working capital followed by fixed investment cost (Birr 10.13 million or 43.16%) and pre operation cost (Birr 2.06 million or 8.77%). From the total investment cost Birr 4.32 million or 18.41% 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	39.90		39.90	0.17
1.2	Building and civil work	3,150.00		3,150.00	13.42
1.3	Machinery and equipment	1,470.00	4,320.00	5,790.00	24.67
1.4	Vehicles	900.00		900.00	3.83
1.5	Office furniture and equipment	250.00		250.00	1.07
	Sub total	5,809.90	4,320.00	10,129.90	43.16
2	Pre operating cost *				
2.1	Pre operating cost	523.70		523.70	2.23
2.2	Interest during construction	1,535.42		1,535.42	6.54
	Sub total	2,059.12		2,059.12	8.77
3	Working capital **	11,280.92		11,280.92	48.07
	Grand Total	19,149.93	4,320.00	23,469.93	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 1.23 million. However, only the initial working capital of Birr 845.30 thousand 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 52.46 million (see Table 7.2). The cost of raw material account for 91.68% of the production cost. The other major components of the production cost are depreciation, financial cost, direct labour, and cost of marketing and distribution which account for 3.04%, 2.82%, 0.81%, and 0.67% respectively. The remaining 0.98% is the share of utility, repair and maintenance, labour overhead and administration cost. For detail production cost see Appendix 7.A.2.

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

Items	Cost (000 Birr)	%
Raw Material and Inputs	48,099.00	91.68
Utilities	61.00	0.12
Maintenance and repair	174.00	0.33
Labour direct	426.00	0.81
Labour overheads	83.00	0.16
Administration Costs	200.00	0.38
Land lease cost	-	-
Cost of marketing and distribution	350.00	0.67
Total Operating Costs	49,393.00	94.15
Depreciation	1,593.74	3.04
Cost of Finance	1,477.84	2.82
Total Production Cost	52,464.58	100

C. FINANCIAL EVALUATION**1. Profitability**

Based on the projected profit and loss statement, the project will generate a profit throughout its operation life. Annual net profit after tax will grow from Birr 4.58 million to Birr 6.47 million during the life of the project. Moreover, at the end of the project life the accumulated net cash flow amounts to Birr 63.13 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.

$$\text{Break Even Sales Value} = \frac{\text{Fixed Cost} + \text{Financial Cost}}{\text{Variable Margin ratio (\%)}} = \text{Birr } 24,696,000$$

$$\text{Break Even Capacity utilization} = \frac{\text{Break even Sales Value}}{\text{Sales revenue}} \times 100 = 19.92 \%$$

4. Pay-back Period

The pay-back period, also called pay – off period is defined as the period required for recovering the original investment outlay through the accumulated net cash flows earned by the project. Accordingly, based on the projected cash flow it is estimated that the project's initial investment will be fully recovered within 4 years.

5. Internal Rate of Return

The internal rate of return (IRR) is the annualized effective compounded return rate that can be earned on the invested capital, i.e., the yield on the investment. Put another way, the internal rate of return for an investment is the discount rate that makes the net present value of the investment's income stream total to zero. It is an indicator of the efficiency or quality of an investment. A project is a good investment proposition if its IRR is greater than the rate of return that could be earned by alternate investments or putting the money in a bank account. Accordingly, the IRR of this project is computed to be 28.63% 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 26.86 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 19 persons. The project will generate Birr 17.22 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 paper manufacturing sub sector and forward linkage with the automotive and furniture manufacturing 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)

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	33,669	43,289	48,099	48,099	48,099	48,099	48,099	48,099	48,099	48,099
Utilities	43	55	61	61	61	61	61	61	61	61
Maintenance and repair	122	157	174	174	174	174	174	174	174	174
Labour direct	298	383	426	426	426	426	426	426	426	426
Labour overheads	58	75	83	83	83	83	83	83	83	83
Administration Costs	140	180	200	200	200	200	200	200	200	200
Land lease cost	0	0	0	0	13	13	13	13	13	13
Cost of marketing and distribution	350	350	350	350	350	350	350	350	350	350
Total Operating Costs	34,680	44,489	49,393	49,393	49,406	49,406	49,406	49,406	49,406	49,406
Depreciation	1,594	1,594	1,594	1,594	1,594	151	151	151	151	151
Cost of Finance	0	1,689	1,478	1,267	1,056	844	633	422	211	0
Total Production Cost	36,274	47,771	52,465	52,253	52,055	50,401	50,190	49,979	49,768	49,557

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	41,160	52,920	58,800	58,800	58,800	58,800	58,800	58,800	58,800	58,800
Less variable costs	34,330	44,139	49,043	49,043	49,043	49,043	49,043	49,043	49,043	49,043
VARIABLE MARGIN	6,830	8,781	9,757	9,757	9,757	9,757	9,757	9,757	9,757	9,757
in % of sales revenue	16.59	16.59	16.59	16.59	16.59	16.59	16.59	16.59	16.59	16.59
Less fixed costs	1,944	1,944	1,944	1,944	1,957	514	514	514	514	514
OPERATIONAL MARGIN	4,886	6,838	7,813	7,813	7,800	9,243	9,243	9,243	9,243	9,243
in % of sales revenue	11.87	12.92	13.29	13.29	13.27	15.72	15.72	15.72	15.72	15.72
Financial costs		1,689	1,478	1,267	1,056	844	633	422	211	0
GROSS PROFIT	4,886	5,149	6,335	6,547	6,745	8,399	8,610	8,821	9,032	9,243
in % of sales revenue	11.87	9.73	10.77	11.13	11.47	14.28	14.64	15.00	15.36	15.72
Income (corporate) tax	0	0	0	1,964	2,023	2,520	2,583	2,646	2,710	2,773
NET PROFIT	4,886	5,149	6,335	4,583	4,721	5,879	6,027	6,175	6,322	6,470
in % of sales revenue	11.87	9.73	10.77	7.79	8.03	10.00	10.25	10.50	10.75	11.00

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	10,654	54,011	52,930	58,805	58,800	58,800	58,800	58,800	58,800	58,800	58,800	19,570
Inflow funds	10,654	12,851	10	5	0	0	0	0	0	0	0	0
Inflow operation	0	41,160	52,920	58,800	58,800	58,800	58,800	58,800	58,800	58,800	58,800	0
Other income	0	0	0	0	0	0	0	0	0	0	0	19,570
TOTAL CASH OUTFLOW	10,654	47,531	51,514	54,594	54,735	54,597	54,881	54,733	54,586	54,438	52,179	17,219
Increase in fixed assets	10,654	0	0	0	0	0	0	0	0	0	0	0
Increase in current assets	0	11,316	3,225	1,612	0	1	0	0	0	0	0	0
Operating costs	0	34,330	44,139	49,043	49,043	49,056	49,056	49,056	49,056	49,056	49,056	0
Marketing and Distribution cost	0	350	350	350	350	350	350	350	350	350	350	0
Income tax	0	0	0	0	1,964	2,023	2,520	2,583	2,646	2,710	2,773	17,219
Financial costs	0	1,535	1,689	1,478	1,267	1,056	844	633	422	211	0	0
Loan repayment	0	0	2,111	2,111	2,111	2,111	2,111	2,111	2,111	2,111	0	0
SURPLUS (DEFICIT)	0	6,480	1,416	4,211	4,065	4,203	3,919	4,067	4,214	4,362	6,621	2,351
CUMULATIVE CASH BALANCE	0	6,480	7,896	12,107	16,172	20,375	24,294	28,360	32,575	36,937	43,558	45,909

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	41,160	52,920	58,800	58,800	58,800	58,800	58,800	58,800	58,800	58,800	19,570
Inflow operation	0	41,160	52,920	58,800	58,800	58,800	58,800	58,800	58,800	58,800	58,800	0
Other income	0	0	0	0	0	0	0	0	0	0	0	19,570
TOTAL CASH OUTFLOW	21,935	37,895	46,096	49,393	51,358	51,429	51,925	51,989	52,052	52,115	52,179	0
Increase in fixed assets	10,654	0	0	0	0	0	0	0	0	0	0	0
Increase in net working capital	11,281	3,215	1,607	0	1	0	0	0	0	0	0	0
Operating costs	0	34,330	44,139	49,043	49,043	49,056	49,056	49,056	49,056	49,056	49,056	0
Marketing and Distribution cost	0	350	350	350	350	350	350	350	350	350	350	0
Income (corporate) tax		0	0	0	1,964	2,023	2,520	2,583	2,646	2,710	2,773	17,219
NET CASH FLOW	-21,935	3,265	6,824	9,407	7,442	7,371	6,875	6,811	6,748	6,685	6,621	19,570
CUMULATIVE NET CASH FLOW	-21,935	-18,669	-11,845	-2,438	5,003	12,374	19,249	26,060	32,808	39,492	46,113	65,683
Net present value	-21,935	2,968	5,640	7,068	5,083	4,577	3,881	3,495	3,148	2,835	2,553	7,545
Cumulative net present value	-21,935	-18,966	-13,327	-6,259	-1,176	3,400	7,281	10,776	13,924	16,759	19,312	26,857

NET PRESENT VALUE 26,857
INTERNAL RATE OF RETURN 28.63%
NORMAL PAYBACK 4 years