

**169. PROFILE ON THE PRODUCTION OF FILTER
ELEMENTS FOR VEHICLES**

TABLE OF CONTENTS

	<u>PAGE</u>
I. SUMMARY	169-2
II. PRODUCT DESCRIPTION & APPLICATION	169-2
III. MARKET STUDY AND PLANT CAPACITY	169-3
A. MARKET STUDY	169-3
B. PLANT CAPACITY & PRODUCTION PROGRAM	169-5
IV. MATERIALS AND INPUTS	169-6
A. RAW & AUXILIARY MATERIALS	169-6
B. UTILITIES	169-6
V. TECHNOLOGY & ENGINEERING	169-7
A. TECHNOLOGY	169-7
B. ENGINEERING	169-7
VI. HUMAN RESOURCE & TRAINING REQUIREMENT	169-12
A. HUMAN RESOURCE REQUIREMENT	169-12
B. TRAINING REQUIREMENT	169-12
VII. FINANCIAL ANALYSIS	169-13
A. TOTAL INITIAL INVESTMENT COST	169-14
B. PRODUCTION COST	169-15
C. FINANCIAL EVALUATION	169-16
D. ECONOMIC AND SOCIAL BENEFITS	169-18

I. SUMMARY

This profile envisages the establishment of a plant for the production of filter elements for vehicles with a capacity of 180 tons per annum. Filter elements is a name that includes parts and devices in the vehicle that filter intake air, input fuel and engine oils.

The demand for filter elements for vehicles is met entirely through import. The present (2012) demand for filter elements for vehicles is estimated at 1,282 tons. The demand for filter elements for vehicles is projected to reach 1,639 tones and 2,092 tones by the year 2017 and 2022, respectively.

The principal raw materials required are sheet metal sections and filter paper as well as electroplating chemicals and paints that have to be imported.

The total investment cost of the project including working capital is estimated at Birr 15.28 million. From the total investment cost the highest share (Birr 11.55 million or 75.62%) is accounted by fixed investment cost followed by pre operation cost (Birr 1.88 million or 12.32%) and initial working capital (Birr 1.84 million or 12.07%). From the total investment cost Birr 3.97 million or 26.02% is required in foreign currency.

The project is financially viable with an internal rate of return (IRR) of 32.31% and a net present value (NPV) of Birr 17.90 million discounted at 10%.

The project can create employment for 25 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 sub sector and also generates income for the Government in terms of tax revenue and payroll tax.

II. PRODUCT DESCRIPTIONS AND APPLICATIONS

Filter elements in vehicles is a name that includes parts and devices in the vehicle that filter intake air, input fuel and engine oils. These filters serving in different parts of the vehicle are specifically called as a) Air filter b) Fuel Filter c) Oil Filter

Air filters are used in vehicles to clean out the dust and foreign material from the in coming air before the air reaches the burning chamber (piston) of the engine.

Fuel filters are used to clean out dust and foreign materials from incoming fuel before the fuel reaches the burning chamber (piston) of the engine.

Oil Filter are used to clean out incoming dust and foreign materials from the newly entering or circulating oil from reaching the engine chamber or the lubricating gear box or any desired part.

III. MARKET STUDY AND PLANT CAPACITY

A. MARKET STUDY

1. Past Supply and Present Demand

Currently there is no plant in the country that manufactures filter elements for vehicles. Thus, the demand for the product is met through import. Import of the product during the period 2002 – 2011 is shown in Table 3.1.

Table 3.1
IMPORT OF FILTER ELEMENTS FOR VEHICLES (TONS)

Year	Quantity
2002	220
2003	398
2004	291
2005	388
2006	643
2007	731
2008	834
2009	1,164
2010	1,118
2011	880

Source: - *Ethiopian Revenue and Customs Authority.*

As could be seen from Table 3.1, import data of the product show a general increasing trend registering an average annual growth rate of 21.69% during the period under consideration (2002 – 2011).

For estimating the present effective demand for filter elements for vehicles, it is assumed that the average growth rate exhibited by the product's import or apparent consumption will continue at least in the near future. Accordingly, by considering the average of the recent three years (2009-2011) as the level of supply during 2011 and applying a growth rate of 21.69%, the present (2012) effective demand for filter elements for vehicles is estimated at 1,282 tons.

2. Projected Demand

The road transport dependence for both passenger and freight traffic is increasing. The road construction being undertaken as pre-requisite for investment and development, guarantees a healthy and continuously growing auto component industry. Although the number of vehicles in the country has shown a higher growth rate in order to be conservative an annual average growth rate of 5% is used in projecting the future demand for filter elements for vehicles (see Table 3.2).

Table 3.2

PROJECTED DEMAND FOR FILTER ELEMENTS FOR VEHICLES (TONS)

Year	Projected Demand
2013	1,348
2014	1,416
2015	1,486
2016	1,561
2017	1,639
2018	1,721
2019	1,807
2020	1,897
2021	1,992
2022	2,092
2023	2,196
2024	2,306
2025	2,421

3. Pricing and Distribution

The average CIF price per ton of filter elements for vehicles is found to be Birr 71 per kg. Allowing 25% for taxes, inland transport and other charges Birr 89 per kg is taken for sales revenue projection. The product will be distributed through spare part shops.

B. PLANT CAPACITY AND PRODUCTION PROGRAM

1. Plant Capacity

Based on the market study and taking into consideration the diversity of the products and the selected manufacturing capacity of the plant is 180 tons of filter elements per annum on a single shift per day.

2. Production Program

Considering the production process involved and the time required for skill development ,the plant is assumed to attain its full capacity during the third year of operation. In the first and second year capacity utilization will be 75% and 85%, respectively (see Table 3.3).

Table 3.3
ANNUAL PRODUCTION PROGRAM

Type of product	Year 1	Year 2	Year 3
Filter elements (Tons)	135	153	180
Capacity %	75	85	100

IV. RAW MATERIAL AND INPUTS

A. RAW AND AUXILIARY MATERIALS

Manufacturing of filters require various sizes of sheet metal sections and filter paper filters as well as electroplating chemicals and paints that have to imported. Annual cost of raw and auxiliary materials is Birr 7.41 million. The required quantity of raw materials and their cost at full capacity production are shown in Table 4.1.

Table 4.1
RAW MATERIALS REQUIREMENT AND COST

No.	Raw Materials	Annual input		Total Cost		
				(000 Birr)		
		Units	Quantity	F.C	L.C	Total
1	Sheet Metal (0.6 mm)	Ton	105	1,680	420	2,100
2	Sheet metal (0.8 mm)	“	84	1,512	378	1,890
3	Electro plating chemicals	“	1.5	188	47	234
4	Filter paper	“	10	2,380	595	2,975
5	Paint	“	6	174	44	218
	Total			5,934	1,483	7,417

B UTILITIES

Electricity and water are the major utilities required by the plan. Annual cost of utilities is Birr 128,760. The quantity required and corresponding cost at full capacity utilization is shown in Table 4.2.

Table 4.2
ANNUAL UTILITIES REQUIREMENT& COST

No.	Utility	Unit	Quantity	Cost (Birr)
1	Electricity	kWh.	200,000	116,010
2	Water	Meter cube	1,275	12,750
	Total			128,760

V. TECHNOLOGY AND ENGINEERING

A. TECHNOLOGY

1. Process Description

There are various models of vehicle filter elements. In spite of the difference in models, vehicle filter elements are basically made with an outer metal cover body and perforated sheet metal surrounding the inner paper filter. The basic processes are as indicated below.

- The filter body is made by cutting the sheet metal in circular form and forming into a bowl or a can by deep drawing press.
- The perforated sheet is made first by cutting the sheet metal to the required size and then by perforating the sheet in the machine using dies.
- The filter paper is unrolled and is pleated into a zigzag form by paper pleating machine.
- The pleated paper is formed into shape by joining with glue and keeping in a drying oven.
- Each part of the filter is painted before assembling the parts.
- After assembling a test on the parts is carried out in a laboratory to assure the product performance.
- The assembled parts are packed ready for delivery.

2. Environmental Impact

The production activity of the plant does not have any negative impact on the environment, as it involves only cutting, drilling, punching and bending operations.

B. ENGINEERING

1. Machinery and Equipment

Total cost of machinery and equipment is Birr 4,650,000 of which Birr 3,975,500 is required in foreign currency. The necessary machinery and equipment are shown in Table 5.1.

Table 5.1**LIST OF REQUIRED MACHINERY AND EQUIPMENT**

Sr. No.	Machine	Description	Qty.
1	Deep drawing Press	Cap.150 T	1
2	Mechanical press	Cap100 T	1
3	Mechanical press	Cap50T	2
4	Mechanical press	Cap20t	2
5	Lathe machine	1mt.center d	1
6	Treadle shearing machine	Cap.2mm	1
7	Sheet metal rolling machine	Cap 4mm	1
8	Circle cutting machine	Cap 2mm	2
9	Spinning machine	Cap 2mm	2
10	Filter paper pleating machines		1
11	Filter paper drying oven		1
12	Surface grinding machine	1mt length	1
13	Press die and jig		1set
14	Perforating machine		1
15	Arc welding Machine	1.5kva	1
16	Pedestal Grinding Machine		2
17	Portable grinding Machine		2
18	Portable Electric drill	Cap. 12mm	2
19	Pillar drilling machine	Cap. 20mm	3
20	Hand Tool Sets		3
21	Material Handling Equipment		3
22	Painting and compressor set		1set

2. Land, Building and Civil Work

The plant requires a total of 2,000 m² area of land out of which 1,000 m² is built-up area which includes Processing area, raw material stock area, offices etc. Assuming construction rate of Birr 5000 per m². The total investment cost for building and civil works 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 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 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 requirement of the plant is 25 persons. Annual labor cost is Birr 768,000. The list of human resource required by type of job with the monthly and annual salary is shown in Table 6.1.

B. TRAINING REQUIREMENT

On the job training of the operators would be enough for workers with technical back ground. Most of the production work is being done manually. Thus an amount of Birr 20,000 would be enough.

Table 6.1
HUMAN RESOURCE REQUIREMENT 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	15	2,000	360,000
10	Assistant Operators	2	1,500	36,000
11	Machinist technicians	2	2,000	48,000
12	Quality controller &lab. technicians	3	1,500	54,000
13	Laborers	2	800	19,200
Sub- Total		25	-	547,200
Total				768,000
EMPLOYEE'S BENEFIT (25% OF BASIC SALARY)		-	-	135,000
TOTAL		34	-	903,000

VII. FINANCIAL ANALYSIS

The financial analysis of the filter elements for vehicles 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 15.28 million (see Table 7.1). From the total investment cost the highest share (Birr 11.55 million or 75.62%) is accounted by fixed investment cost followed by pre operation cost (Birr 1.88 million or 12.32%) and initial working capital (Birr 1.84 million or 12.07%). From the total investment cost Birr 3.97 million or 26.02% 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	53.20		53.20	0.35
1.2	Building and civil work	5,000.00		5,000.00	32.73
1.3	Machinery and equipment	674.50	3,975.50	4,650.00	30.43
1.4	Vehicles	1,500.00		1,500.00	9.82
1.5	Office furniture and equipment	350.00		350.00	2.29
	Sub total	7,577.70	3,975.50	11,553.20	75.62
2	Pre operating cost *				
2.1	Pre operating cost	882.50		882.50	5.78
2.2	Interest during construction	999.54		999.54	6.54
	Sub total	1,882.04		1,882.04	12.32
3	Working capital **	1,843.40		1,843.40	12.07
	Grand Total	11,303.13	3,975.50	15,278.63	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 2.69 million. However, only the initial working capital of Birr 1.84 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 12.39 million (see Table 7.2). The cost of raw material account for 59.88% of the production cost. The other major components of the production cost are depreciation, financial cost, direct labor, and cost of marketing and distribution which account for 13.25%, 7.77%, 6.20%, and 6.06% respectively. The remaining 6.84% is the share of utility, repair and maintenance, labor overhead and administration cost. For detail production cost see Appendix 7.A.2.

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

Items	Cost (000 Birr)	%
Raw Material and Inputs	7,417	59.88
Utilities	129	1.04
Maintenance and repair	233	1.88
Labor direct	768	6.20
Labor overheads	135	1.09
Administration Costs	350	2.83
Land lease cost	0	0.00
Cost of marketing and distribution	750	6.06
Total Operating Costs	9,782	78.98
Depreciation	1,642	13.25
Cost of Finance	962	7.77
Total Production Cost	12,386	100.00

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 2.64 million to Birr 4.19 million during the life of the project. Moreover, at the end of the project life the accumulated net cash flow amounts to Birr 38.57 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.

$$\text{Break Even Sales Value} = \frac{\text{Fixed Cost} + \text{Financial Cost}}{\text{Variable Margin ratio (\%)}} = \text{Birr } 6,728,400$$

$$\text{Break Even Capacity utilization} = \frac{\text{Break even Sales Value}}{\text{Sales revenue}} \times 100 = 34.22\%$$

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 32.31% indicating the viability of the project.

6. Net Present Value

Net present value (NPV) is defined as the total present (discounted) value of a time series of cash flows. NPV aggregates cash flows that occur during different periods of time during the life of a project in to a common measuring unit i.e. present value. It is a standard method for using the time value of money to appraise long-term projects. NPV is an indicator of how much value an investment or project adds to the capital invested. In principle, a project is accepted if the NPV is non-negative.

Accordingly, the net present value of the project at 10% discount rate is found to be Birr 17.90 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 25 persons. The project will generate Birr 10.87 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 sub sector 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	5,192	6,675	7,417	7,417	7,417	7,417	7,417	7,417	7,417	7,417
Utilities	90	116	129	129	129	129	129	129	129	129
Maintenance and repair	163	210	233	233	233	233	233	233	233	233
Labour direct	538	691	768	768	768	768	768	768	768	768
Labour overheads	95	122	135	135	135	135	135	135	135	135
Administration Costs	245	315	350	350	350	350	350	350	350	350
Land lease cost	0	0	0	0	17	17	17	17	17	17
Cost of marketing and distribution	750	750	750	750	750	750	750	750	750	750
Total Operating Costs	7,072	8,879	9,782	9,782	9,799	9,799	9,799	9,799	9,799	9,799
Depreciation	1,642	1,642	1,642	1,642	1,642	235	235	235	235	235
Cost of Finance	0	1,099	962	825	687	550	412	275	137	0
Total Production Cost	8,714	11,620	12,386	12,248	12,128	10,584	10,446	10,309	10,172	10,034

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	11,214	14,418	16,020	16,020	16,020	16,020	16,020	16,020	16,020	16,020
Less variable costs	6,322	8,129	9,032	9,032	9,032	9,032	9,032	9,032	9,032	9,032
VARIABLE MARGIN	4,892	6,289	6,988	6,988	6,988	6,988	6,988	6,988	6,988	6,988
in % of sales revenue	43.62	43.62	43.62	43.62	43.62	43.62	43.62	43.62	43.62	43.62
Less fixed costs	2,392	2,392	2,392	2,392	2,409	1,002	1,002	1,002	1,002	1,002
OPERATIONAL MARGIN	2,500	3,898	4,597	4,597	4,579	5,986	5,986	5,986	5,986	5,986
in % of sales revenue	22.29	27.03	28.69	28.69	28.59	37.37	37.37	37.37	37.37	37.37
Financial costs		1,099	962	825	687	550	412	275	137	0
GROSS PROFIT	2,500	2,798	3,634	3,772	3,892	5,436	5,574	5,711	5,848	5,986
in % of sales revenue	22.29	19.41	22.69	23.54	24.30	33.93	34.79	35.65	36.51	37.37
Income (corporate) tax	0	0	0	1,132	1,168	1,631	1,672	1,713	1,755	1,796
NET PROFIT	2,500	2,798	3,634	2,640	2,725	3,805	3,902	3,998	4,094	4,190
in % of sales revenue	22.29	19.41	22.69	16.48	17.01	23.75	24.35	24.95	25.56	26.16

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	12,436	14,115	14,435	16,028	16,020	16,020	16,020	16,020	16,020	16,020	16,020	6,661
Inflow funds	12,436	2,901	17	8	0	0	0	0	0	0	0	0
Inflow operation	0	11,214	14,418	16,020	16,020	16,020	16,020	16,020	16,020	16,020	16,020	0
Other income	0	0	0	0	0	0	0	0	0	0	0	6,661
TOTAL CASH OUTFLOW	12,436	9,974	11,878	12,381	13,113	13,030	13,354	13,258	13,162	13,065	11,595	0
Increase in fixed assets	12,436	0	0	0	0	0	0	0	0	0	0	0
Increase in current assets	0	1,902	526	263	0	2	0	0	0	0	0	0
Operating costs	0	6,322	8,129	9,032	9,032	9,049	9,049	9,049	9,049	9,049	9,049	0
Marketing and Distribution cost	0	750	750	750	750	750	750	750	750	750	750	0
Income tax	0	0	0	0	1,132	1,168	1,631	1,672	1,713	1,755	1,796	0
Financial costs	0	1,000	1,099	962	825	687	550	412	275	137	0	0
Loan repayment	0	0	1,374	1,374	1,374	1,374	1,374	1,374	1,374	1,374	0	0
SURPLUS (DEFICIT)	0	4,142	2,557	3,647	2,907	2,990	2,666	2,762	2,858	2,955	4,425	6,661
CUMULATIVE CASH BALANCE	0	4,142	6,698	10,345	13,253	16,243	18,909	21,671	24,529	27,484	31,909	38,570

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	11,214	14,418	16,020	16,020	16,020	16,020	16,020	16,020	16,020	16,020	6,661
Inflow operation	0	11,214	14,418	16,020	16,020	16,020	16,020	16,020	16,020	16,020	16,020	0
Other income	0	0	0	0	0	0	0	0	0	0	0	6,661
TOTAL CASH OUTFLOW	14,279	7,581	9,133	9,782	10,915	10,967	11,430	11,471	11,512	11,554	11,595	0
Increase in fixed assets	12,436	0	0	0	0	0	0	0	0	0	0	0
Increase in net working capital	1,843	509	254	0	2	0	0	0	0	0	0	0
Operating costs	0	6,322	8,129	9,032	9,032	9,049	9,049	9,049	9,049	9,049	9,049	0
Marketing and Distribution cost	0	750	750	750	750	750	750	750	750	750	750	0
Income (corporate) tax		0	0	0	1,132	1,168	1,631	1,672	1,713	1,755	1,796	0
NET CASH FLOW	-14,279	3,633	5,285	6,238	5,105	5,053	4,590	4,549	4,508	4,466	4,425	6,661
CUMULATIVE NET CASH FLOW	-14,279	10,646	-5,362	876	5,981	11,034	15,625	20,173	24,681	29,147	33,572	40,233
Net present value	-14,279	3,303	4,368	4,687	3,487	3,138	2,591	2,334	2,103	1,894	1,706	2,568
Cumulative net present value	-14,279	10,977	-6,609	-1,922	1,564	4,702	7,293	9,627	11,730	13,624	15,330	17,898

NET PRESENT VALUE 17,898
INTERNAL RATE OF RETURN 32.31%
NORMAL PAYBACK 3 years