172. PROFILE ON THE PRODUCTION OF GASKETS AND SEALS

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I. SUMMARY

This profile envisages the establishment of a plant for the production of gaskets and seals with a capacity of 400 tons per annum. Gaskets are used to be inserted between two joining surfaces of machine parts.

The demand for gaskets and seals is met through import. The present (2012) demand for Gaskets and seals is estimated at 230 tons. The demand for gaskets and seals is projected to reach 395 tons and 677 tons by the year 2017 and 2022, respectively.

The principal raw materials required are asbestos sheet, mild steel sheet, and copper sheet which have to be imported.

The total investment cost of the project including working capital is estimated at Birr 12.69 million. From the total investment cost the highest share (Birr 8.46 million or 66.71%) is accounted by fixed investment cost followed by initial working capital (Birr 2.66 million or 20.97%) and pre operation cost (Birr 1.56 million or 12.32%). From the total investment cost Birr 3.15 million or 24.80% is required in foreign currency.

The project is financially viable with an internal rate of return (IRR) of 29.58% and a net present value (NPV) of Birr 13.23 million discounted at 10%.

The project can create employment for 27 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 subsector and also generates income for the Government in terms of tax revenue and payroll tax.

II. PRODUCT DESCRIPTIONS AND APPLICATIONS

Gaskets are items that are made of different materials with desired shapes, thickness and materials that are used to be inserted between two joining surfaces of machine parts. They serve the purpose of either sealing out liquids or gases or forming tightly mating parts. Gaskets can be

made from different materials to meet many purposes. The most common materials that can be used to make gaskets in machine parts are rubber, mineral fiber, copper sheets, steel sheets, etc.

III. MARKET STUDY AND PLANT CAPCITY

A. MARKET STUDY

1. Past Supply and Present Demand

The supply of metallic gasket and seal is mainly met through import. The annual import of the products during the period 2002-2011 is presented in Table 3.1.

Table 3.1

IMPORT OF METALLIC GASKET AND SEALS (TONS)

year	Quantity
2002	107
2003	217
2004	252
2005	142
2006	176
2007	143
2008	118
2009	231
2010	188
2011	198

***Source**: Ethiopian Revenue and Customs Authority*

As can be seen from Table 3.1 the maximum supply of metallic gasket and seal to the local market during the period 2002 -2011 was 252 tons in year 2004 while the minimum was 107 tons in 2002. The average annual import during the period under consideration was 177 tons.

During the period 2002 – 2011 total supply or apparent consumption of metallic gasket and seals has registered an average annual growth rate of 16%. Hence, assuming that the growth rate

registered in the past will continue in the near future, the present (2012) effective demand for metallic gasket and seals are estimated at 230 tons by using the 2011 level of import as a base and applying a growth rate of 16%.

2. Projected Demand

The manufacturing sector is the end user of metallic gasket and seals. Therefore, the demand for the products depends on the performance of the manufacturing sector. According to the government's "Growth and Transformation Plan (2011--2015)" during the plan period, the industrial sector 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 metallic gasket and seals. Accordingly, using the estimated present demand as a base and applying a growth rate of 10% the projected demand for metallic gasket and seals is shown in Table 3.2.

Table 3.2

PROJECTED DEMAND FOR METALLIC GASKET AND SEALS (TON)

Year	Projected Demand
2013	256
2014	285
2015	318
2016	354
2017	395
2018	440
2019	490
2020	546
2021	608
2022	677
2023	754
2024	840
2025	936

3. Pricing and distribution

The price of metallic gasket and seals 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 42/kg is recommended. The product can be sold directly to the end user.

B. PLANT CAPACITY AND PRODUCTION PROGRAMME

1. Plant Capacity

Using the demand projection as guide, the production capacity of the plant is selected to be 400 tons of assorted Gasket and Seals per annum in a single shift per day.

2. Production Program

The production program is worked out by considering the time required for skill development. Accordingly, the plant is assumed to start its operation at 75% of its rated full capacity and progressively increase to 85%, and 100% in the second and third year respectively. The production programme is provided in Table 3.3.

Table 3.3

ANNUAL PRODUCTION PROGRAMME

	Year 1	**Year 2**	**Year 3-10**
Annual Production (Ton)	300	340	400
Capacity %	75	85	100

IV. RAW MATERIAL AND INPUTS

A. RAW AND AUXILIARY MATERIALS

The production of gaskets and seals require sheet materials to be cut into desired sizes and desired final shape of the parts. All the raw materials have to be imported. The annual requirement and cost of raw materials at full capacity utilization is shown in Table 4.1.

Table 4.1

RAW MATERIALS REQUIREMENT AND ANNUAL COST

No	Raw Materials	Annual Requirement (ton)	Cost (000 Birr)		
			F.C	L.C	Total
1	Asbestos Sheet	285	4,275	855	5,130
2	Mild Steel Sheet	100	2,100	420	2,520
3	Copper Sheet	40	2,240	448	2,688
	Total		**8,615**	**1,723**	**10,338**

B. UTILITIES

Electricity and water are the major utilities required by the plan. Annual cost of utilities is Birr 34,304. The quantity required and corresponding cost at full capacity utilization is shown in Table 4.2.

Table 4.2

ANNUAL UTILITY REQUIREMENTS

No	Utility	Unit	Quantity	Cost (Birr)
1	Electricity	Kwh	43,500	25,304
2	Water	Meter cube	900	9,000
	Total			**34,304**

V. TECHNOLOGY AND ENGINEERING

A. TECHNOLOGY

1. Process Description

The Production of Asbestos, Steel Sheet or Copper Gaskets is made mainly using pressing technology.

The Sheet raw material is first blanked into the final or semi final shape of the product using mechanical presses of nearly 50 Tons capacity. For shapes that are not simple, shearing tools may be used in conjunction with the presses.

2. Environmental Impact

The Process of production does not bring any adverse impact on the surrounding areas. Hence the plant is environmental friendly.

B. ENGINEERING

1. Machinery and Equipment

Plant machinery and equipment required for gasket and seal making plant is presented in table 5.1. The total cost of plant machinery and equipment is estimated at Birr 3.68 million. Out of which Birr 3.15 million will be required in foreign currency.

Table 5.1

LIST OF MACHINERY AND EQUIPMENT

Sr. No.	Description	Qty.
1	Automatic double stroke solid die cold heading machine capacity ǿ8-12mm	1
2	Automatic double stroke solid die cold heading machine capacity ǿ6-8mm	1
3	Automatic bolt head trimming & shank reducing machine capacity ǿ6-8mm.	3
4	Automatic bolt head trimming & shank reducing machine capacity ǿ8-12mm.	4
5	Automatic thread rolling machine capacity ǿ6-8mm.	1`
6	Automatic thread rolling machine capacity ǿ8-12mm.	1
7	Automatic nut cutting machine capacity ǿ6-8mm.	1
8	Automatic nut cutting machine capacity ǿ8-12mm.	1
9	Automatic nut tapping machine capacity ǿ6-8mm	1
10	Automatic nut tapping machine capacity ǿ8-12mm	1
11	Polishing Barrel	3
12	Inspection Gauges	1 Set
13	Standard working tools& handling equipment	1 Set
14	Center lathe between center distance 1000mm	1
15	Pillar type drilling machine capacity ǿ20mm	1
16	Surface grinder	1
17	Mechanical scraper	1
18	Pickling tanks	1 Set

2. Land Building and Civil Works

The envisaged plant requires a total land area of 1.500 $m^{2,}$ of which 800 m^2 would be built-up area. Building construction cost at a rate of Birr 4,500/m^2 is estimated to be Birr 3.6 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 5000 m^2, 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^2, 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^2. 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^2 .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^2 (see Table 5.2).

Table 5.2

NEW LAND LEASE FLOOR PRICE FOR PLOTS IN ADDIS ABABA

Zone	Level	Floor price/m^2
Central Market District	1st	1686
	2nd	1535
	3rd	1323
	4th	1085
	5th	894
Transitional zone	1st	1035
	2nd	935
	3rd	809
	4th	685
	5th	555
Expansion zone	1st	355
	2nd	299
	3rd	217
	4th	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^2 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 criterions 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 399,000 of which 10% or Birr 39,900 will be paid in advance. The remaining Birr 359,100 will be paid in equal installments with in 28 years i.e. Birr 12,825 annually.

VI. HUMAN RESOURCE AND TRAINING REQUIREMENT

A. HUMAN RESOURCE REQUIREMENT

The total human resource requirement of the project is 27 persons. Annual cost of labor, including employees benefit, is Birr 697,780. The list of human resource required by type of job and the monthly and annual salary is indicated in Table 6.1.

Table 6.1

LIST OF HUMAN RESOURCE AND SALARY

Sr. No.	Description	No.	Salary (Birr)	
			Monthly	Annual
A. ADMINISTRATION				
1	Plant Manager	1	5,000	60,000
4	Secretary	1	2,500	30,000
5	Accountant	1	2,500	30,000
6	Salesman/purchaser	1	2,500	30,000
7	Clerk	1	1,500	18,000
8	Cashier	1	2,000	24,000
9	General Service	3	800	28,800
SUB TOTAL		**9**		**220,800**
B. PRODUCTION				
10	Forman	1	2,500	30,000
11	Machinery Operators	8	2,000	192,000
12	Assistant Operators	2	1,500	36,000
13	Mechanics	2	2,000	48,000
14	Quality controller	1	1,500	18,000
15	Laborers	4	800	38,400
Sub Total		**18**	**-**	**362,400**
Total				583,200
Employee's Benefit (25% Of Basic Salary)				**114,580**
Grand Total		**27**		**697,780**

B. TRAINING REQUIREMENT

On the job demonstration of the operation of the machine would be enough for workers with moderate technical background. This should be done for new model products. For such training Birr 20,000 is required.

VII. FINANCIAL ANALYSIS

The financial analysis of the gaskets and seals 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	5 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 12.69 million (See Table 7.1). From the total investment cost the highest share (Birr 8.46 million or 66.71%) is accounted by fixed investment cost followed by initial working capital (Birr 2.66 million or 20.97%) and pre operation cost (Birr 1.56 million or 12.32%). From the total investment cost Birr 3.15 million or 24.80% 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	0.31
1.2	Building and civil work	3,600.00		3,600.00	28.35
1.3	Machinery and equipment	530.00	3,150.00	3,680.00	28.98
1.4	Vehicles	900.00		900.00	7.09
1.5	Office furniture and equipment	250.00		250.00	1.97
	Sub total	**5,319.90**	**3,150.00**	**8,469.90**	**66.71**
2	**Pre operating cost ***				
2.1	Pre operating cost	734.00		734.00	5.78
2.2	Interest during construction	830.68		830.68	6.54
	Sub total	**1,564.68**		**1,564.68**	**12.32**
3	**Working capital ****	**2,662.90**		**2,662.90**	**20.97**
	Grand Total	**9,547.47**	**3,150.00**	**12,697.47**	**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 3.53 million. However, only the initial working capital of Birr 2.66 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 14.03 million (see Table 7.2). The cost of raw material account for 73.66% of the production cost. The other major components of the production cost are depreciation, financial cost and direct labour, which account for 8.78%, 5.70% and 4.15% respectively. The remaining 7.72% is the share of utility, repair and maintenance, labour overhead, cost of marketing and distribution 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	10,338.00	73.66
Utilities	34.00	0.24
Maintenance and repair	184.00	1.31
Labour direct	583.00	4.15
Labour overheads	115.00	0.82
Administration Costs	250.00	1.78
Land lease cost	-	-
Cost of marketing and distribution	500.00	3.56
Total Operating Costs	**12,004.00**	**85.53**
Depreciation	1,231.80	8.78
Cost of Finance	799.53	5.70
Total Production Cost	**14,035.33**	**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 2.24 million to Birr 3.23 million during the life of the project. Moreover, at the end of the project life the accumulated net cash flow amounts to Birr 29.87 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.

$$\text{Break Even Sales Value} = \frac{\text{Fixed Cost + Financial Cost}}{\text{Variable Margin ratio (\%)}} = \text{Birr } 5{,}493{,}623$$

$$\text{Break Even Capacity utilization} = \frac{\text{Break even Sales Value}}{\text{Sales revenue}} \times 100 = 33\%$$

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 29.58% 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 13.25 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 27 persons. The project will generate Birr 8.33 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 subsector and generate other income for the government.

Appendix 7.A

FINANCIAL ANALYSES SUPPORTING TABLES

Appendix 7.A.1
NET WORKING CAPITAL (in 000 Birr)

Items	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11
Total inventory	1,938.38	2,196.83	2,584.50	2,584.50	2,584.50	2,584.50	2,584.50	2,584.50	2,584.50	2,584.50
Accounts receivable	760.67	856.53	1,000.33	1,000.33	1,001.40	1,001.40	1,001.40	1,001.40	1,001.40	1,001.40
Cash-in-hand	11.79	13.36	15.72	15.72	15.90	15.90	15.90	15.90	15.90	15.90
CURRENT ASSETS	**2,710.83**	**3,066.72**	**3,600.56**	**3,600.56**	**3,601.80**	**3,601.80**	**3,601.80**	**3,601.80**	**3,601.80**	**3,601.80**
Accounts payable	47.94	54.33	63.92	63.92	63.92	63.92	63.92	63.92	63.92	63.92
CURRENT LIABILITIES	**47.94**	**54.33**	**63.92**	**63.92**	**63.92**	**63.92**	**63.92**	**63.92**	**63.92**	**63.92**
TOTAL WORKING CAPITAL	**2,662.90**	**3,012.39**	**3,536.64**	**3,536.64**	**3,537.89**	**3,537.89**	**3,537.89**	**3,537.89**	**3,537.89**	**3,537.89**

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	7,754	8,787	10,338	10,338	10,338	10,338	10,338	10,338	10,338	10,338
Utilities	26	29	34	34	34	34	34	34	34	34
Maintenance and repair	138	156	184	184	184	184	184	184	184	184
Labour direct	437	496	583	583	583	583	583	583	583	583
Labour overheads	86	98	115	115	115	115	115	115	115	115
Administration Costs	188	213	250	250	250	250	250	250	250	250
Land lease cost	0	0	0	0	13	13	13	13	13	13
Cost of marketing and distribution	500	500	500	500	500	500	500	500	500	500
Total Operating Costs	**9,128**	**10,278**	**12,004**	**12,004**	**12,017**	**12,017**	**12,017**	**12,017**	**12,017**	**12,017**
Depreciation	1,232	1,232	1,232	1,232	1,232	169	169	169	169	169
Cost of Finance	0	914	800	685	571	457	343	228	114	0
Total Production Cost	**10,360**	**12,424**	**14,035**	**13,921**	**13,820**	**12,643**	**12,528**	**12,414**	**12,300**	**12,186**

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	12,600	14,280	16,800	16,800	16,800	16,800	16,800	16,800	16,800	16,800
Less variable costs	8,628	9,778	11,504	11,504	11,504	11,504	11,504	11,504	11,504	11,504
VARIABLE MARGIN	**3,972**	**4,502**	**5,296**	**5,296**	**5,296**	**5,296**	**5,296**	**5,296**	**5,296**	**5,296**
in % of sales revenue	31.52	31.52	31.52	31.52	31.52	31.52	31.52	31.52	31.52	31.52
Less fixed costs	1,732	1,732	1,732	1,732	1,745	682	682	682	682	682
OPERATIONAL MARGIN	**2,240**	**2,770**	**3,564**	**3,564**	**3,551**	**4,614**	**4,614**	**4,614**	**4,614**	**4,614**
in % of sales revenue	17.78	19.40	21.22	21.22	21.14	27.47	27.47	27.47	27.47	27.47
Financial costs		914	800	685	571	457	343	228	114	0
GROSS PROFIT	**2,240**	**1,856**	**2,765**	**2,879**	**2,980**	**4,157**	**4,272**	**4,386**	**4,500**	**4,614**
in % of sales revenue	17.78	13.00	16.46	17.14	17.74	24.75	25.43	26.11	26.79	27.47
Income (corporate) tax	0	0	0	864	894	1,247	1,281	1,316	1,350	1,384
NET PROFIT	**2,240**	**1,856**	**2,765**	**2,015**	**2,086**	**2,910**	**2,990**	**3,070**	**3,150**	**3,230**
in % of sales revenue	17.78	13.00	16.46	12.00	12.42	17.32	17.80	18.27	18.75	19.23

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	**9,204**	**16,142**	**14,286**	**16,810**	**16,800**	**16,800**	**16,800**	**16,800**	**16,800**	**16,800**	**16,800**	**6,568**
Inflow funds	9,204	3,542	6	10	0	0	0	0	0	0	0	0
Inflow operation	0	12,600	14,280	16,800	16,800	16,800	16,800	16,800	16,800	16,800	16,800	0
Other income	0	0	0	0	0	0	0	0	0	0	0	6,568
TOTAL CASH OUTFLOW	**9,204**	**12,670**	**12,690**	**14,480**	**14,695**	**14,625**	**14,863**	**14,783**	**14,703**	**14,623**	**13,401**	**0**
Increase in fixed assets	9,204	0	0	0	0	0	0	0	0	0	0	0
Increase in current assets	0	2,711	356	534	0	1	0	0	0	0	0	0
Operating costs	0	8,628	9,778	11,504	11,504	11,517	11,517	11,517	11,517	11,517	11,517	0
Marketing and Distribution cost	0	500	500	500	500	500	500	500	500	500	500	0
Income tax	0	0	0	0	864	894	1,247	1,281	1,316	1,350	1,384	0
Financial costs	0	831	914	800	685	571	457	343	228	114	0	0
Loan repayment	0	0	1,142	1,142	1,142	1,142	1,142	1,142	1,142	1,142	0	0
SURPLUS (DEFICIT)	**0**	**3,472**	**1,596**	**2,330**	**2,105**	**2,175**	**1,937**	**2,017**	**2,097**	**2,177**	**3,399**	**6,568**
CUMULATIVE CASH BALANCE	**0**	**3,472**	**5,068**	**7,398**	**9,503**	**11,678**	**13,615**	**15,631**	**17,728**	**19,905**	**23,304**	**29,872**

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**	**12,600**	**14,280**	**16,800**	**16,800**	**16,800**	**16,800**	**16,800**	**16,800**	**16,800**	**16,800**	**6,568**
Inflow operation	0	12,600	14,280	16,800	16,800	16,800	16,800	16,800	16,800	16,800	16,800	0
Other income	0	0	0	0	0	0	0	0	0	0	0	6,568
TOTAL CASH OUTFLOW	**11,867**	**9,477**	**10,803**	**12,004**	**12,869**	**12,911**	**13,264**	**13,298**	**13,333**	**13,367**	**13,401**	**0**
Increase in fixed assets	9,204	0	0	0	0	0	0	0	0	0	0	0
Increase in net working capital	2,663	349	524	0	1	0	0	0	0	0	0	0
Operating costs	0	8,628	9,778	11,504	11,504	11,517	11,517	11,517	11,517	11,517	11,517	0
Marketing and Distribution cost	0	500	500	500	500	500	500	500	500	500	500	0
Income (corporate) tax		0	0	0	864	894	1,247	1,281	1,316	1,350	1,384	0
NET CASH FLOW	**-11,867**	**3,123**	**3,477**	**4,796**	**3,931**	**3,889**	**3,536**	**3,502**	**3,467**	**3,433**	**3,399**	**6,568**
CUMULATIVE NET CASH FLOW	**-11,867**	**-8,744**	**-5,267**	**-471**	**3,460**	**7,349**	**10,885**	**14,387**	**17,854**	**21,288**	**24,687**	**31,255**
Net present value	-11,867	2,839	2,874	3,603	2,685	2,415	1,996	1,797	1,618	1,456	1,310	2,532
Cumulative net present value	-11,867	-9,028	-6,154	-2,551	134	2,549	4,545	6,342	7,959	9,415	10,726	13,258

NET PRESENT VALUE	13,258
INTERNAL RATE OF RETURN	29.58%
NORMAL PAYBACK	3 years