105. PROFILE ON THE PRODUCTION OF INDUSTRIAL FILLERS

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I. SUMMARY

This profile envisages the establishment of a plant for the production of industrial fillers with a capacity of 600 tons per annum. Industrial filler is used in rubberized footwear, paint and dyes, printing ink, and plastic products.

The demand for industrial fillers is largely met through import. The present (2012) unsatisfied demand for industrial fillers is estimated at 2,682 tons. The demand for industrial fillers is projected to reach 4,320 tons and 6,957 tons by the year 2017 and 2022, respectively.

The principal raw materials required are sodium silicate and sulphuric acid. Sulphuric acid is available locally while sodium silicate has to be imported.

The total investment cost of the project including working capital is estimated at Birr 23.84 million. From the total investment cost, the highest share (Birr 19.82 million or 83.15%) is accounted by fixed investment cost followed by pre operation cost (Birr 2.46 million or 10.34%) and initial working capital (Birr 1.55 million or 6.51%). From the total investment cost, Birr 9.64 million or 40.46% is required in foreign currency.

The project is financially viable with an internal rate of return (IRR) of 29.64% and a net present value (NPV) of Birr 23.89 million, discounted at 10%.

The project can create employment for 33 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 and forward linkage with the sulphuric acid, footwear, paint and dyes, printing ink, and plastic sub sectors and also generates income for the Government in terms of tax revenue and payroll tax.

II. PRODUCT DESCRIPTION AND APPLICATION

Precipitated silica (industrial filler) is non-reactive filler which possesses large surface area, high absorption capacity, and high hardness. It imparts good finish and strength and balances the required physic-chemical properties of the product, to which it is applied. Precipitated silica has industrial applications in rubberized footwear, paint and dyes, printing ink, and plastic products.

III. MARKET STUDY AND PLANT CAPACITY

A. MARKET STUDY

1. Past Supply & Present Demand

The local demand for industrial fillers is met through import. Accordingly, the historical import of industrial fillers during the period 2002 -2011 is given in Table 3.1.

Table 3.1

IMPORT OF INDUSTRIAL FILLERS (TONS)

Year	Import
2002	172
2003	352
2004	635
2005	704
2006	1,833
2007	2,813
2008	3,921
2009	2,516
2010	2,073
2011	2,936

Source: – *Ethiopian Revenue and Customs Authority.*

A can be seen from Table 3.1, import of for industrial fillers shows a general increasing trend though there are minor fluctuations from year to year. The growth in imports especially marked in the recent six years (2006-2011) where on average about 2,682 tons of for industrial fillers were imported. During the previous four years (2002-2005) the yearly average import was 466 tons.

Considering the nature of import or total supply, it is assumed that the average import during 2006-2011 is assumed to approximate the present demand for industrial fillers. Accordingly, the present (2012) demand for industrial fillers is estimated at 2,682 tons.

2. Demand Projection

The manufacturing sector is the end user of industrial fillers. Therefore, the demand for the product 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 industrial fillers. Accordingly, using the estimated present demand as a base and applying a growth rate of 10% the projected demand for industrial fillers is shown in Table 3.2.

Table 3.2

PROJECTED DEMAND FOR INDUSTRIAL FILLERS (TONS)

Year	Projected Demand
2013	2,950
2014	3,245
2015	3,570
2016	3,927
2017	4,320
2018	4,752
2019	5,227
2020	5,749
2021	6,324
2022	6,957
2023	7,652

3. Pricing and distribution

The price of industrial fillers varies greatly according to use 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 32/kg is recommended.

Industrial fillers are mainly demanded by the manufacturing sector, particularly by the chemical sub sector. Hence, the product can be sold directly to the end user industries without involving intermediaries.

B. PLANT CAPACITY AND PRODUCTION PROGRAM

1. Plant Capacity

Based on the outcome of the market study, the capacity of the envisaged plant is about 600 ton/annum when operating in one shift/day (8 hours/shift) and 300 days/annum. The capacity can be doubled or further increased, without increasing any significant fixed investment cost, by increasing the number of shifts.

2. Production Program

The capacity utilization rate will be 70%, 80%, and 90% during the first second and third year of operation, respectively. During the fourth year and thereafter full capacity production will be maintained. The production programme is set by considering the time required to master the operation of the plant as well as market penetration.

IV. MATERIALS AND INPUTS

A. RAW MATERIALS

The principal raw materials are sodium silicate and sulphuric acid, and the total annual cost of these materials is estimated at Birr 5,740,560. (See Table 4.1)

Table 4.1

ANNUAL RAW MATERIAL REQUIREMENT (AT FULL CAPACITY)

Sr. No.	Material	UOM	Qty.	Cost, 000 Birr		
				Foreign	Local	Total
1	Sodium silicate	Tons	840	3,376.80	1,350.72	4,727.52
2	Sulphuric acid	Tons	360		1,013.04	1,013.04
3	**Grand Total**			**3,376.80**	**2363.76**	**5,740.56**

B. UTILITIES

The annual consumption (at full capacity) of electricity and water is about 300,000kWh and 4,800 m^3 respectively. Furthermore coal and kerosene will also be consumed and the annual requirements of these materials are estimated to be 600 tons and 360 m^3, respectively. The total cost of the above utilities will be Birr 2,306,160.

V. TECHNOLOGY AND ENGINEERING

A. TECHNOLOGY

1. Production Process

Sodium silicate is dissolved in a pressure vessel using steam which is diluted to obtain desired concentration of sodium silicate. The sodium silicate solution is then hydrolyzed with sulpheric acid to obtain precipitated silica. This slurry of precipitated silica is then filtered through a membrane filter and dried in a spray drier.

2. Environmental Impact

The production process does not have any adverse impact on the environment.

B. ENGINEERING

1. Machinery and Equipment

The total cost of machinery and equipment is estimated to be Birr 11,095,200, out of which Birr 9,648,000 is in foreign currency. The list of machinery and equipment of the proposed plant is indicated in Table 5.1.

Table 5.1

LIST OF MACHINERY AND EQUIPMENT

Sr. No.	Machinery	Qty
1	Boiler	1
2	Pressure vessels	2
3	Tanks (for sodium silicate, with motor gear)	7
4	Filler press	1
5	Spray dryer	1
6	Sulphuric acid storage tank	2
7	Reactors	2

2. Land, Building and Civil Works

The total area required by the proposed plant is 3,000 m^2, out of which 1,500m^2 is a built up area. The cost of building including civil work is about Birr 7,500,000.

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 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 m^2 is estimated at Birr 798,000 of which 10% or Birr 79,800 will be paid in advance. The remaining Birr 718,200 will be paid in equal installments with in 28 years i.e. Birr 25,650 annually.

VI. HUMAN RESOURCE AND TRAINING REQUIREMENTS

A. HUMAN RESOURCE REQUIREMENT

Total human resource requirement, including skilled and unskilled labor is 33 persons. Correspondingly, total annual labor cost is estimated at Birr 529,800. Table 6.1 below shows the list of human resource required and the estimated annual labour costs.

Table 6.1

HUMAN RESOURCE REQUIREMENT & LABOR COST

Sr. No.	Job Position	Req. No.	Salary per Month	Salary per Year
	A. Production			
1.	Manager	1	6,000	72,000
2.	Production and maintenance supervisor	2	7,000	84,000
3.	Production clerk	1	1,050	12,600
4.	Operator	18	15,300	183,600
5.	Mechanic	6	7,800	93,600
	B. Others			
	Stores, Finance ,administration and Salesman	5	7,000	84,000
	Total	**33**	44,150	529,800

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 industrial fillers project is based on the data presented in the previous chapters and the following assumptions:-

Construction period	1 year
Source of finance	30 % equity & 70% loan
Tax holidays	3 years
Bank interest	10%
Discount cash flow	10%
Accounts receivable	30 days
Raw material 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 23.84 million (see Table 7.1). From the total investment cost, the highest share (Birr 19.82 million or 83.15%) is accounted by fixed investment cost followed by pre operation cost (Birr 2.46 million or 10.34%) and initial working capital (Birr 1.55 million or 6.51%). From the total investment cost, Birr 9.64 million or 40.46% 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	79.80		79.80	0.33
1.2	Building and civil work	7,500.00		7,500.00	31.46
1.3	Machinery and equipment	1,447.20	9,648.00	11,095.20	46.54
1.4	Vehicles	900.00		900.00	3.77
1.5	Office furniture and equipment	250.00		250.00	1.05
	Sub- total	**10,177.00**	**9,648.00**	**19,825.00**	**83.15**
2	**Pre operating cost ***				
2.1	Pre operating cost	904.76		904.76	3.79
2.2	Interest during construction	1,559.74		1,559.74	6.54
	Sub -total	**2,464.50**		**2,464.50**	**10.34**
3	**Working capital**	**1,552.23**		**1,552.23**	**6.51**
	Grand Total	**14,193.73**	**9,648.00**	**23,841.73**	**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 2.20 million. However, only the initial working capital of Birr 1.55 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 14.20 million (see Table 7.2). The cost of raw material account for 40.41% of the production cost. The other major components of the production cost are depreciation, utility and financial cost which account for 20.45%, 16.23% and 9.06%, respectively. The remaining 13.83% is the share of labor direct, repair and maintenance, marketing and distribution, labor overhead and administration cost. For detail production cost see Appendix 7.A.2.

Table 7.2

ANNUAL PRODUCTION COST AT FULL CAPACITY (YEAR FOUR)

Items	Cost (000 Birr)	%
Raw Material and Inputs	5,740.56	40.41
Utilities	2,306.16	16.23
Maintenance and repair	554.76	3.91
Labor direct	529.80	3.73
Labor overheads	132.45	0.93
Administration Costs	250.00	1.76
Land lease cost	-	-
Cost of marketing and distribution	500.00	3.52
Total Operating Costs	**10,013.73**	**70.49**
Depreciation	2,904.99	20.45
Cost of Finance	1,286.78	9.06
Total Production Cost	**14,205.51**	**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 3.37 million to Birr 6.18 million during the life of the project. Moreover, at the end of the project life the accumulated net cash flow amounts to Birr 53.03 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.

$$\text{Break -Even Sales Value} = \frac{\text{Fixed Cost + Financial Cost}}{\text{Variable Margin ratio (\%)}} = \text{Birr } 6{,}749{,}331$$

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

4. Pay-back Period

The pay- back period, also called pay – off period is defined as the period required for recovering the original investment outlay through the accumulated net cash flows earned by the project. Accordingly, based on the projected cash flow it is estimated that the project's initial investment will be fully recovered within 3 years.

5. Internal Rate of Return

The internal rate of return (IRR) is the annualized effective compounded return rate that can be earned on the invested capital, i.e., the yield on the investment. Put another way, the internal rate of return for an investment is the discount rate that makes the net present value of the investment's income stream total to zero. It is an indicator of the efficiency or quality of an investment. A project is a good investment proposition if its IRR is greater than the rate of return that could be earned by alternate investments or putting the money in a bank account. Accordingly, the IRR of this project is computed to be 29.64%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 23.89 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 33 persons. The project will generate Birr 15.66 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 and forward linkage with the sulphuric acid, footwear, paint and dyes, printing ink, and plastic sub sectors and also generates 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	1,004.60	1,148.11	1,291.63	1,435.14	1,435.14	1,435.14	1,435.14	1,435.14	1,435.14	1,435.14
Accounts receivable	596.63	675.92	755.20	834.48	836.62	836.62	836.62	836.62	836.62	836.62
Cash-in-hand	14.26	16.30	18.34	20.38	20.73	20.73	20.73	20.73	20.73	20.73
CURRENT ASSETS	**1,615.49**	**1,840.33**	**2,065.16**	**2,289.99**	**2,292.49**	**2,292.49**	**2,292.49**	**2,292.49**	**2,292.49**	**2,292.49**
Accounts payable	63.27	72.30	81.34	90.38	90.38	90.38	90.38	90.38	90.38	90.38
CURRENT LIABILITIES	**63.27**	**72.30**	**81.34**	**90.38**	**90.38**	**90.38**	**90.38**	**90.38**	**90.38**	**90.38**
TOTAL WORKING CAPITAL	**1,552.23**	**1,768.02**	**1,983.82**	**2,199.61**	**2,202.11**	**2,202.11**	**2,202.11**	**2,202.11**	**2,202.11**	**2,202.11**

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	4,018	4,592	5,167	5,741	5,741	5,741	5,741	5,741	5,741	5,741
Utilities	1,614	1,845	2,076	2,306	2,306	2,306	2,306	2,306	2,306	2,306
Maintenance and repair	388	444	499	555	555	555	555	555	555	555
Labour direct	371	424	477	530	530	530	530	530	530	530
Labour overheads	93	106	119	132	132	132	132	132	132	132
Administration Costs	175	200	225	250	250	250	250	250	250	250
Land lease cost	0	0	0	0	26	26	26	26	26	26
Cost of marketing and distribution	500	500	500	500	500	500	500	500	500	500
Total Operating Costs	**7,160**	**8,111**	**9,062**	**10,014**	**10,039**	**10,039**	**10,039**	**10,039**	**10,039**	**10,039**
Depreciation	2,905	2,905	2,905	2,905	2,905	325	325	325	325	325
Cost of Finance	0	1,716	1,501	1,287	1,072	858	643	429	214	0
Total Production Cost	**10,065**	**12,732**	**13,469**	**14,206**	**14,017**	**11,222**	**11,008**	**10,793**	**10,579**	**10,364**

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	13,440	15,360	17,280	19,200	19,200	19,200	19,200	19,200	19,200	19,200
Less variable costs	6,660	7,611	8,562	9,514	9,514	9,514	9,514	9,514	9,514	9,514
VARIABLE MARGIN	**6,780**	**7,749**	**8,718**	**9,686**	**9,686**	**9,686**	**9,686**	**9,686**	**9,686**	**9,686**
in % of sales revenue	50.45	50.45	50.45	50.45	50.45	50.45	50.45	50.45	50.45	50.45
Less fixed costs	3,405	3,405	3,405	3,405	3,431	851	851	851	851	851
OPERATIONAL MARGIN	**3,375**	**4,344**	**5,313**	**6,281**	**6,256**	**8,836**	**8,836**	**8,836**	**8,836**	**8,836**
in % of sales revenue	25.11	28.28	30.74	32.71	32.58	46.02	46.02	46.02	46.02	46.02
Financial costs		1,716	1,501	1,287	1,072	858	643	429	214	0
GROSS PROFIT	**3,375**	**2,628**	**3,811**	**4,994**	**5,183**	**7,978**	**8,192**	**8,407**	**8,621**	**8,836**
in % of sales revenue	25.11	17.11	22.06	26.01	27.00	41.55	42.67	43.78	44.90	46.02
Income (corporate) tax	0	0	0	1,498	1,555	2,393	2,458	2,522	2,586	2,651
NET PROFIT	**3,375**	**2,628**	**3,811**	**3,496**	**3,628**	**5,584**	**5,735**	**5,885**	**6,035**	**6,185**
in % of sales revenue	25.11	17.11	22.06	18.21	18.90	29.09	29.87	30.65	31.43	32.21

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	**20,730**	**16,615**	**15,369**	**17,289**	**19,200**	**19,200**	**19,200**	**19,200**	**19,200**	**19,200**	**19,200**	**8,342**
Inflow funds	20,730	3,175	9	9	0	0	0	0	0	0	0	0
Inflow operation	0	13,440	15,360	17,280	19,200	19,200	19,200	19,200	19,200	19,200	19,200	0
Other income	0	0	0	0	0	0	0	0	0	0	0	8,342
TOTAL CASH OUTFLOW	**20,730**	**10,335**	**12,196**	**12,933**	**15,168**	**14,814**	**15,435**	**15,285**	**15,135**	**14,985**	**12,690**	**0**
Increase in fixed assets	20,730	0	0	0	0	0	0	0	0	0	0	0
Increase in current assets	0	1,615	225	225	225	2	0	0	0	0	0	0
Operating costs	0	6,660	7,611	8,562	9,514	9,539	9,539	9,539	9,539	9,539	9,539	0
Marketing and Distribution cost	0	500	500	500	500	500	500	500	500	500	500	0
Income tax	0	0	0	0	1,498	1,555	2,393	2,458	2,522	2,586	2,651	0
Financial costs	0	1,560	1,716	1,501	1,287	1,072	858	643	429	214	0	0
Loan repayment	0	0	2,145	2,145	2,145	2,145	2,145	2,145	2,145	2,145	0	0
SURPLUS (DEFICIT)	**0**	**6,280**	**3,173**	**4,356**	**4,032**	**4,386**	**3,765**	**3,915**	**4,065**	**4,215**	**6,510**	**8,342**
CUMULATIVE CASH BALANCE	**0**	**6,280**	**9,453**	**13,809**	**17,841**	**22,227**	**25,992**	**29,907**	**33,972**	**38,187**	**44,697**	**53,039**

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**	**13,440**	**15,360**	**17,280**	**19,200**	**19,200**	**19,200**	**19,200**	**19,200**	**19,200**	**19,200**	**8,342**
Inflow operation	0	13,440	15,360	17,280	19,200	19,200	19,200	19,200	19,200	19,200	19,200	0
Other income	0	0	0	0	0	0	0	0	0	0	0	8,342
TOTAL CASH OUTFLOW	**22,282**	**7,375**	**8,327**	**9,278**	**11,515**	**11,594**	**12,433**	**12,497**	**12,561**	**12,626**	**12,690**	**0**
Increase in fixed assets	20,730	0	0	0	0	0	0	0	0	0	0	0
Increase in net working capital	1,552	216	216	216	2	0	0	0	0	0	0	0
Operating costs	0	6,660	7,611	8,562	9,514	9,539	9,539	9,539	9,539	9,539	9,539	0
Marketing and Distribution cost	0	500	500	500	500	500	500	500	500	500	500	0
Income (corporate) tax		0	0	0	1,498	1,555	2,393	2,458	2,522	2,586	2,651	0
NET CASH FLOW	**-22,282**	**6,065**	**7,033**	**8,002**	**7,685**	**7,606**	**6,767**	**6,703**	**6,639**	**6,574**	**6,510**	**8,342**
CUMULATIVE NET CASH FLOW	**-22,282**	**-16,217**	**-9,184**	**-1,182**	**6,503**	**14,109**	**20,876**	**27,579**	**34,218**	**40,792**	**47,302**	**55,643**
Net present value	-22,282	5,513	5,813	6,012	5,249	4,722	3,820	3,440	3,097	2,788	2,510	3,216
Cumulative net present value	-22,282	-16,769	-10,956	-4,944	305	5,028	8,847	12,287	15,384	18,172	20,682	23,898

NET PRESENT VALUE	23,898
INTERNAL RATE OF RETURN	29.64%
NORMAL PAYBACK	3 years