40. PROFILE ON THE PRODUCTION OF DISINFECTANT

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I. SUMMARY

This profile envisages the establishment of a plant for the production of disinfectant with a capacity of 300 tons of per annum. Disinfectants are substances that are applied to non-living objects to destroy microorganisms that are living on the objects. Disinfectants are widely used in the health care, food and pharmaceutical sectors to prevent unwanted microorganisms from causing disease.

The demand for the product is met through import. The present (2012) demand for the products is estimated at 250 tons per annum. The demand is projected to reach 335 tons and 427 tons by the years 2018 and year 2023, respectively.

The principal raw materials required are high boiling tar acid, cresol, casein, borax, sodium benzene, rosin, castor oil, soya bean oil, and caustic soda. Caustic soda and soya bean oil can be obtained locally. The remaining raw materials have to be imported.

The total investment cost of the project including working capital is estimated at Birr 9.66 million. From the total investment cost the highest share (Birr 5.32 million or 55.12%) is accounted by initial working capital followed by fixed investment cost (Birr 3.52 million or 36.51%) and pre operation cost (Birr 809.03 thousand or 8.37%).

The project is financially viable with an internal rate of return (IRR) of 29.76% and a net present value (NPV) of Birr 15.73 million, discounted at 10%.

The project can create employment opportunities for 29 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 local producers of caustic soda and soya bean oil and forward linkage with the service sector such as hotels, restaurants and hospitals and also generates income for the Government in terms of tax revenue and payroll tax.

II. PRODUCT DESCRIPTION AND APPLICATION

Disinfectants are substances that are applied to non-living objects to destroy microorganisms that are living on the objects. Disinfection refers to the reduction in the number of living microorganisms to a level that is considered to be safe for the particular environment. Typically, this entails the destruction of those microbes that are capable of causing disease.

There are a variety of disinfectants that can be used to reduce the microbial load on a surface or in a solution.

A good disinfectant should also be a deodorant possessing good shelf qualities and it should be effective against a host of microorganisms.

Disinfectants are frequently used in hospitals, dental surgeries, kitchens, and bathrooms to kill infectious organisms. Today disinfectants are widely used in the health care, food and pharmaceutical sectors to prevent unwanted microorganisms from causing disease.

III. MARKET AND PLANT CAPACITY

A. MARKET STUDY

1. Past Supply and Present Demand

Due to the absence of domestic production of disinfectants, the requirement of the country is mainly met through import. The amount and value of different types of disinfectants supplied from import during the past 12 years covering the period 2000--2011 is presented in Table 3.1.

Table 3.1

IMPORT OF DISINFECTANT

Year	Quantity (Tons)	Value ('000 Birr)
2000	85.7	2,966
2001	93.4	1,167
2002	130.6	2,178
2003	209.4	2,875
2004	146.6	2,620
2005	175.1	2,164
2006	515.1	11,134
2007	432.7	11,978
2008	200.0	5,733
2009	81.8	2,150
2010	170.3	8,619
2011	96.1	6,823

Source: - *Ethiopian Revenue and Customs Authority.*

As could be observed from Table 3.1, the import volume has been fluctuating from year to year. During the period 2000-2003 the imported quantity has grown consistently from 85.7 tons to 209.4 tons. The average yearly growth during the initial four years of the data set was 36%, which can be considered very high. But, in the following two years i.e. 2004/05 it fell to an average of 161 tons. Surprisingly, the quantity imported increased sharply to an annual average of 474 tons during year 2006/07, which is almost three fold of the previous two years average. The erratic nature of the data again continued in the last four recent years of 2008-2011. During this period the imported quantity ranged from the lowest 81.8 tons to the highest 200 tons with a mean figure of 137 tons. The decline of import in the recent years is believed to be due to the stock carry over from the period where high level of import was registered.

In the absence of a clear trend, the averages of the past six years, which includes the highest and lowest figures, is taken to reflect the present demand. Accordingly, the present demand is estimated at 250 tons.

2. Demand Projection

The demand for disinfectant is directly related with the expansion of urbanization, population growth, income rise and expansion of health care system and awareness of the population. Considering the combined effect of the above factors the future demand is assumed to grow by 5% per annum. The projected demand for disinfectant is presented in Table 3.2.

Table 3.2

PROJECTED DEMAND FOR DISINFECTANT (TONS)

Year	Quantity
2013	263
2014	276
2015	289
2016	304
2017	319
2018	335
2019	352
2020	369
2021	388
2022	407
2023	427

The demand for disinfectant will grow from 263 tons in the year 2013 to 335 tons and 427 tons by the year 2018 and year 2023, respectively.

3. Pricing and Distribution

Based on the average CIF value of imported disinfectants and adding duty and other costs the ex-factory price is proposed to be Birr 85,200 per ton.

Since disinfectants are demanded by relatively huge number of end –users, the project has to make arrangement with the existing distributors of the product. Among the possible distributors are those that are currently engaged in pharmaceutical and health care related product vendors.

B. PLANT CAPACITY AND PRODUCTION PROGRAM

1. Plant Capacity

The market study shows that demand for disinfectant increases from 263 tons in the year 2013 to 427 tons in the year 2023. Based on the market study and period required to implement the project and market penetration and technical skill development, the envisaged plant capacity is 300 tons per annum on a three shifts of 8 hours per day and 312 working days per year.

2. Production Program

In order to develop the operators' skill in production and quality control, it is vital to have a gradual capacity buildup. In addition to this, a period is required to penetrate to the market. Hence, it is assumed that the plant will go into full capacity operation in four years' time starting with 70% capacity in the first year and progressively developing to 80%, 90% and 100% in the second, third and fourth year and then- after, respectively. The production program of the envisaged plant is given in Table 3.3.

Table 3.3

PRODUCTION PROGRAM OF THE ENVISAGED DISENFECTANT PLANT(TONS)

Sr. No.	Item Description	1st year	2nd year	3rd year	4th -10th
1	Production of disinfectant	210	240	270	300
2	Capacity utilization (%)	70	80	90	100

IV. MATERIALS AND INPTUS

A. MATERIALS

The principal raw materials required are high boiling tar acid, cresol, casein, borax, sodium benzene, rosin, castor oil, soya bean oil, and caustic soda. Caustic soda and soya bean oil can be obtained locally. Packing material is the only auxiliary material required by the envisaged plant. The total annual cost of raw material at full capacity operation is estimated at Birr 19,784,000. The annual requirement of raw material and their estimated costs are presented in Table 4.1.

Table 4.1

ANNUAL REQUIREMENT FOR RAW AND AUXILIARY MATEIRALS AND THEIR COST

Sr.No.	Item Description	Quantity	LC (' 000 Birr)	FC ('000 Birr)	TC ('000Birr)
1	Tar acid (tons)	48	-	17,600.00	17,600.00
2	Cresol,	6010	-	601.00	601.00
3	Casein and	2,995	-	449.25	449.25
4	Sodium	2,995	-	624.00	624.00
5	Rosin(lt)	281	-	42.15	42.15
6	Castor oil and	468	93.60	-	93.60
7	Caustic soda(lt)	600	13.80	-	13.80
8	Packing	120,000	-	360.00	360.00
	Total		**107.40**	**19,676.40**	**19,783.80**

B. UTILITIES

Utilities required are electricity and water. The total annual cost of utilities is estimated at Birr 176,448. The annual quantities and cost of utilities is estimated as shown in Table 4.2.

Table 4.2

ANNUAL UTILITY REQUIREMENT AND COST

Sr.No.	Description	Qty	Total
1	Electric Power(kWh)	45,600	26.45
2	Water(m^3)	15,000	150.00
	Total		**176.45**

V. TECHNOLOGY AND ENGINEERING

A. TECHNOLOGY

1. Production Process

The manufacture of black fluid disinfectants involves saponification of fatty oils. Soft soap is prepared by adding a boiling solution of caustic soda (33 %) to a mixture of fatty oils and molten rosin. The soft soap thus obtained is dissolved in hot water and the creosote and cresol are added. The fluid thus obtained is dark brown or black in color. To manufacture white fluid disinfectants, casein is dissolved in water and a homogenous solution is made. Borax is added to this casein solution and stirred properly, which is then filtered and the requisite amounts of HBTA and cresol and creosote are added. Subsequently, homogenization is done in shearing colloid mill.

2. Environmental Impact Assessment

The production of black disinfectant involves mainly a mixing unit operation and filling to a desired packing material and these unit operations can be performed in a controlled manner. Hence, the plant does not have any adverse impact on environment.

B. ENGINEERING

1. Machinery and Equipment

The list of machinery and equipment required for the envisaged plant is given in Table 5.1. The total cost of machinery and equipment is estimated at Birr 900,000.

Table 5.1

LIST OF MACHINERY & EQUIPMENT

Sr. No.	Description	Qty.
1	Cast iron pan	1
2	Soft soap dissolving vessel	1
3	Colloid mill	1
4	Hot water still direct fired	1
5	Casein solution tank	1
6	HBTA creosote mixing tank	1
7	Other tools and equipment	LS

2. Land, Buildings & Civil Works

The total area required by the project is 1,500 m^2, of which 500 m^2 is built-up area. The cost of building at unit cost of Birr 4,000 per m^2 is, thus, estimated at Birr 2,000,000.

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 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 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	1,686
	2nd	1,535
	3rd	1,323
	4th	1,085
	5th	894
Transitional zone	1st	1,035
	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 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

Total human resource required is 29 persons. The total annual cost of human resource is estimated at Birr 673,500. The details of the human resource requirement and the estimated annual labor cost including employees' benefit are given in Table 6.1.

Table 6.1

HUMAN RESOURCE REQUIREMENT AND ESTIMATED LABOR COST (BIRR)

Sr.No.	Item Description	Req.No.	Monthly salary	Annual Salary
1	General Manager	1	6,000	72,000
2	Executive Secretary	1	1,500	18,000
3	Production & Technical Head	1	4,000	48,000
4	Commercial Head	1	4,000	48,000
5	Finance & Administration Head	1	4,000	48,000
6	Accountant	2	3,000	36,000
8	Cashier	1	1,500	18,000
9	Purchaser	1	2,000	24,000
10	Store Keeper	2	2,400	28,800
11	Chemist	1	2,000	24,000
12	Shift Leader	1	2,000	24,000
13	Operator	3	3,600	43,200
14	Assistant Operator	3	2,700	32,400
16	Mechanic	1	1,200	14,400
17	Electrician	1	1,200	14,400
18	Driver	2	1,400	16,800
19	Guard	6	2,400	28,800
	Sub -Total	**29**	**44,900**	**538,800**
	Employees benefit (25% of basic		11,225	134,700
	Total	**29**	**56,125**	**673,500**

B. TRAINING REQUIREMENT

The production and technical head, mechanic, electrician and quality control worker need at least two weeks training on the technology, maintenance and quality control. For the rest, on-the-job training will be sufficient in the time of installation and commissioning by the specialists. Total training cost is estimated at about Birr 45,000.

VII. FINANCIAL ANALYSIS

The financial analysis of the disinfectant 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 imported	120 days
Raw Material local	60 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 9.66 million (see Table 7.1). From the total investment cost the highest share (Birr 5.32 million or 55.12%) is accounted by initial working capital followed by fixed investment cost (Birr 3.52 million or 36.51%) and pre operation cost (Birr 809.03 thousand or 8.37%).

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	26.60	-	26.60	0.28
1.2	Building and civil work	2,000.00	-	2,000.00	20.70
1.3	Machinery and equipment	900.00	-	900.00	9.32
1.4	Vehicles	450.00	-	450.00	4.66
1.5	Office furniture and equipment	150.00	-	150.00	1.55
	Sub -total	**3,526.60**	**-**	**3,526.60**	**36.51**
2	**Pre operating cost ***		**-**		
2.1	Pre operating cost	177.05	-	177.05	1.83
2.2	Interest during construction	631.98	-	631.98	6.54
	Sub -total	**809.03**	**-**	**809.03**	**8.37**
3	**Working capital**	**5,324.68**	**-**	**5,324.68**	**55.12**
	Grand Total	**9,660.32**	**-**	**9,660.32**	**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 6.65 million. However, only the initial working capital of Birr 5.32 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 21.93 million (see Table 7.2). The cost of raw material account for 90.18% of the production cost. The other major components of the production cost are financial cost, direct labor and depreciation which account for 2.77%, 2.46% and 1.83%, respectively. The remaining 2.08% 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 FIVE)

Items	Cost (in 000 Birr)	%
Raw Material and Inputs	19,783.80	90.18
Utilities	176.45	0.80
Maintenance and repair	45.00	0.21
Labor direct	538.80	2.46
Labor overheads	134.70	0.61
Administration Costs	100.00	0.46
Land lease cost	-	-
Cost of marketing and distribution	150.00	0.68
Total Operating Costs	**20,928.75**	**95.40**
Depreciation	400.41	1.83
Cost of Finance	608.28	2.77
Total Production Cost	**21,937.44**	**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 ranges from Birr 2.59 million to Birr 3.62 million

during the life of the project. Moreover, at the end of the project life the accumulated net cash flow amounts to Birr 33.15 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.

$$\text{Brake- Even Sales Value} = \frac{\text{Fixed Cost + Financial Cost}}{\text{Variable Margin ratio (\%)}} = \text{Birr } 7{,}923{,}600$$

$$\text{Brake -Even Capacity utilization} = \frac{\text{Brake -even Sales Value}}{\text{Sales revenue}} \times 100 = 31\%$$

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 29.76% 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 15.73 million which is acceptable. For detail discounted cash flow see Appendix 7.A.5.

D. ECONOMIC AND SOCIAL BENEFITS

The project can create employment opportunities for 29 persons. The project will generate Birr 8.78 million in terms of tax revenue and also generates income for the Government in terms payroll tax. 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 local producers of caustic soda and soya bean oil and forward linkage with the service sector such as hotels, restaurants and hospitals.

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	3,956.76	4,451.36	4,945.95	4,945.95	4,945.95	4,945.95	4,945.95	4,945.95	4,945.95	4,945.95
Accounts receivable	1,397.75	1,570.91	1,744.06	1,744.06	1,744.78	1,744.78	1,744.78	1,744.78	1,744.78	1,744.78
Cash-in-hand	9.09	10.23	11.37	11.37	11.49	11.49	11.49	11.49	11.49	11.49
CURRENT ASSETS	**5,363.60**	**6,032.49**	**6,701.38**	**6,701.38**	**6,702.21**	**6,702.21**	**6,702.21**	**6,702.21**	**6,702.21**	**6,702.21**
Accounts payable	38.92	43.79	48.65	48.65	48.65	48.65	48.65	48.65	48.65	48.65
CURRENT LIABILITIES	**38.92**	**43.79**	**48.65**	**48.65**	**48.65**	**48.65**	**48.65**	**48.65**	**48.65**	**48.65**
TOTAL WORKING CAPITAL	**5,324.68**	**5,988.71**	**6,652.73**	**6,652.73**	**6,653.56**	**6,653.56**	**6,653.56**	**6,653.56**	**6,653.56**	**6,653.56**

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	15,827	17,805	19,784	19,784	19,784	19,784	19,784	19,784	19,784	19,784
Utilities	141	159	176	176	176	176	176	176	176	176
Maintenance and repair	36	41	45	45	45	45	45	45	45	45
Labour direct	431	485	539	539	539	539	539	539	539	539
Labour overheads	108	121	135	135	135	135	135	135	135	135
Administration Costs	80	90	100	100	100	100	100	100	100	100
Land lease cost	0	0	0	0	9	9	9	9	9	9
Cost of marketing and distribution	150	150	150	150	150	150	150	150	150	150
Total Operating Costs	**16,773**	**18,851**	**20,929**	**20,929**	**20,937**	**20,937**	**20,937**	**20,937**	**20,937**	**20,937**
Depreciation	400	400	400	400	400	95	95	95	95	95
Cost of Finance	0	695	608	521	434	348	261	174	87	0
Total Production Cost	**17,173**	**19,946**	**21,937**	**21,851**	**21,772**	**21,380**	**21,293**	**21,206**	**21,119**	**21,032**

Appendix 7.A.3

INCOME STATEMENT (in 000 Birr)

Item	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Sales revenue	20,448	23,004	25,560	25,560	25,560	25,560	25,560	25,560	25,560	25,560
Less variable costs	16,623	18,701	20,779	20,779	20,779	20,779	20,779	20,779	20,779	20,779
VARIABLE MARGIN	**3,825**	**4,303**	**4,781**	**4,781**	**4,781**	**4,781**	**4,781**	**4,781**	**4,781**	**4,781**
in % of sales revenue	18.71	18.71	18.71	18.71	18.71	18.71	18.71	18.71	18.71	18.71
Less fixed costs	550	550	550	550	559	254	254	254	254	254
OPERATIONAL MARGIN	**3,275**	**3,753**	**4,231**	**4,231**	**4,222**	**4,528**	**4,528**	**4,528**	**4,528**	**4,528**
in % of sales revenue	16.01	16.31	16.55	16.55	16.52	17.71	17.71	17.71	17.71	17.71
Financial costs		695	608	521	434	348	261	174	87	0
GROSS PROFIT	**3,275**	**3,058**	**3,623**	**3,709**	**3,788**	**4,180**	**4,267**	**4,354**	**4,441**	**4,528**
in % of sales revenue	16.01	13.29	14.17	14.51	14.82	16.35	16.69	17.03	17.37	17.71
Income tax	0	0	0	1,113	1,136	1,254	1,280	1,306	1,332	1,358
NET PROFIT	**3,275**	**3,058**	**3,623**	**2,597**	**2,651**	**2,926**	**2,987**	**3,048**	**3,109**	**3,169**
in % of sales revenue	16.01	13.29	14.17	10.16	10.37	11.45	11.69	11.92	12.16	12.40

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	**3,704**	**26,444**	**23,009**	**25,565**	**25,560**	**25,560**	**25,560**	**25,560**	**25,560**	**25,560**	**25,560**	**8,512**
Inflow funds	3,704	5,996	5	5	0	0	0	0	0	0	0	0
Inflow operation	0	20,448	23,004	25,560	25,560	25,560	25,560	25,560	25,560	25,560	25,560	0
Other income	0	0	0	0	0	0	0	0	0	0	0	8,512
TOTAL CASH OUTFLOW	**3,704**	**22,769**	**21,084**	**23,075**	**23,432**	**23,378**	**23,408**	**23,347**	**23,286**	**23,225**	**22,296**	**0**
Increase in fixed assets	3,704	0	0	0	0	0	0	0	0	0	0	0
Increase in current assets	0	5,364	669	669	0	1	0	0	0	0	0	0
Operating costs	0	16,623	18,701	20,779	20,779	20,787	20,787	20,787	20,787	20,787	20,787	0
Marketing cost	0	150	150	150	150	150	150	150	150	150	150	0
Income tax	0	0	0	0	1,113	1,136	1,254	1,280	1,306	1,332	1,358	0
Financial costs	0	632	695	608	521	434	348	261	174	87	0	0
Loan repayment	0	0	869	869	869	869	869	869	869	869	0	0
SURPLUS (DEFICIT)	**0**	**3,675**	**1,925**	**2,490**	**2,128**	**2,182**	**2,152**	**2,213**	**2,274**	**2,335**	**3,264**	**8,512**
CUMULATIVE CASH BALANCE	**0**	**3,675**	**5,600**	**8,090**	**10,218**	**12,400**	**14,552**	**16,765**	**19,039**	**21,373**	**24,638**	**33,150**

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**	**20,448**	**23,004**	**25,560**	**25,560**	**25,560**	**25,560**	**25,560**	**25,560**	**25,560**	**25,560**	**8,512**
Inflow operation	0	20,448	23,004	25,560	25,560	25,560	25,560	25,560	25,560	25,560	25,560	0
Other income	0	0	0	0	0	0	0	0	0	0	0	8,512
TOTAL CASH OUTFLOW	**9,028**	**17,437**	**19,515**	**20,929**	**22,042**	**22,074**	**22,191**	**22,217**	**22,243**	**22,270**	**22,296**	**0**
Increase in fixed assets	3,704	0	0	0	0	0	0	0	0	0	0	0
Increase in net working capital	5,325	664	664	0	1	0	0	0	0	0	0	0
Operating costs	0	16,623	18,701	20,779	20,779	20,787	20,787	20,787	20,787	20,787	20,787	0
Marketing cost	0	150	150	150	150	150	150	150	150	150	150	0
Income tax		0	0	0	1,113	1,136	1,254	1,280	1,306	1,332	1,358	0
NET CASH FLOW	**-9,028**	**3,011**	**3,489**	**4,631**	**3,518**	**3,486**	**3,369**	**3,343**	**3,317**	**3,290**	**3,264**	**8,512**
CUMULATIVE NET CASH FLOW	**-9,028**	**-6,017**	**-2,528**	**2,103**	**5,621**	**9,107**	**12,476**	**15,818**	**19,135**	**22,425**	**25,690**	**34,202**
Net present value	-9,028	2,737	2,884	3,480	2,403	2,165	1,902	1,715	1,547	1,395	1,259	3,282
Cumulative net present value	-9,028	-6,291	-3,408	72	2,475	4,639	6,541	8,256	9,803	11,199	12,457	15,739

NET PRESENT VALUE	15,739
INTERNAL RATE OF RETURN	29.76%
PAYBACK	3 years