

**38. PROFILE ON THE PRODUCTION OF
DETERGENT POWDER**

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I. SUMMARY

This profile envisages the establishment of a plant for the production of detergent powder with a capacity of 1,000 tons per annum. The major use of detergent powders is in households for washing clothes and utensils. They are suitable for hand washing and also for machine washing in laundries and dish washers.

The country's requirement of detergent powder is largely met through import. The present (2012) demand for detergent powder is estimated at 784 tons. The demand for the product is projected to reach 1,112 tons and 1,488 tons by the year 2018 and 2023, respectively.

The principal raw materials required are alkyl benzene sulphonic acid, sodium tri polyphosphate, sodium sulphate, sodium silicate, and caustic soda. Caustic soda and sodium silicate can be obtained locally while the other raw materials have to be imported

The total investment cost of the project including working capital is estimated at Birr 45.32 million. From the total investment cost the highest share (Birr 34.52 million or 76.19%) is accounted by fixed investment cost followed by initial working capital (6.20 million or 13.68%) and pre operation cost (Birr 4.60 million or 10.13%). From the total investment cost Birr 19.87 million or 43.85% is required in foreign currency.

The project is financially viable with an internal rate of return (IRR) of 20.46% and a net present value (NPV) of Birr 23.85 million, discounted at 10%.

The project can create employment for 50 persons. The establishment of such factory will have a foreign exchange saving effect to the country by substituting the current imports. The project will also create backward linkage with the chemical manufacturing sub sector and also generates income for the Government in terms of tax revenue and payroll tax.

II. PRODUCT DESCRIPTION AND APPLICATION

A detergent powder is a surfactant or a mixture of surfactants with "cleaning properties in dilute solutions. These substances are usually alkyl benzenesulfonates, a family of compounds that are similar to soap but are more soluble in hard water, because the polar sulfonate (of detergents) is less likely than the polar carboxyl (of soap) to bind to calcium and other ions found in hard water. Powder detergents work because they are amphiphilic - partly hydrophilic (polar) and partly hydrophobic (non-polar). Their dual nature facilitates the mixture of hydrophobic compounds (like oil and grease) with water.

Detergent powder falls into four major groups:

- Heavy duty detergents (high and low foaming),
- Light duty detergents,
- Soap powders, and
- Soda products.

The major use of detergent powders is in households for washing clothes and utensils. They are suitable for hand washing and also for machine washing in laundries and dish washers.

III. MARKET STUDY AND PLANT CAPACITY

A. MARKET STUDY

1. Past Supply and Present Demand

The country's requirement of detergents is largely met through import. Although some brands of detergents in a limited quantity are locally manufactured, the data which is published by the Central Statistical Agency on the survey of Medium and Large Scale and Electricity Industries lumps together with soap. Hence, in order to analyse the unsatisfied demand for detergents the data obtained from the Ethiopian Revenues and Customs Authority on the import of detergents for the past nine years is presented for analysis (see Table 3.1).

Table 3.1
IMPORT OF DETERGENTS

Year	Volume (Tons)	Value ('000 Birr)
2003	483.4	3,401
2004	405.3	2,788
2005	232.6	1,618
2006	2,316.6	12,005
2007	165.7	1,364
2008	1,096.6	8,554
2009	1,270.7	14,953
2010	780.3	13,674
2011	541.3	15,253

Source: - Ethiopian Revenues and Customs Authority.

As could be seen from Table 3.1, the imported quantity during the past nine years was highly erratic, which ranges from the lowest 165.7 tons (year 2007) to 2,313.6 tons (year 2006). In the absence of a clear trend in the data set the recent four years average is believed to indicate the present demand. Accordingly, present demand (year 2012) for detergents is estimated at 922 tons.

Since there is no disaggregated data on the amount of powdered and liquid detergents, the views of knowledgeable people in the area have been collected. Accordingly, it was learnt that about 85% of the total volume of imported detergents constitute powdered and the remaining 15% liquid. Taking this as a base the current demand for detergent powder is estimated at 784 tons.

2. Demand Projection

The factors that influence the future demand for detergent powder are numerous. Among the major ones population growth, income rise, urbanization and increase of awareness of the

population on sanitation can be cited. The population of the country in general is growing at a rate of about 2.9 % per annum. The urban population, which is the major user of detergents, is also growing above 3.5%. Gross domestic product (GDP), which is one of the measures of income, has been growing by more than 11% in the past five consecutive years and is forecasted to continue in the future. The sanitation awareness of the whole population is increasing due to the efforts underway by the Ministry of Health and other stakeholders. Hence, as the result of the above factors the demand for detergents in the urban as well as rural areas will increase substantially. By considering the combined effects of the above factors mentioned the future demand is forecasted to grow by 6% per annum. The demand projection made based on this assumption is presented in Table 3.2.

Table 3.2
DEMAND FORECAST FOR DETERGENTS (TONS)

Year	Projected Demand
2013	831
2014	881
2015	934
2016	990
2017	1,049
2018	1,112
2019	1,179
2020	1,250
2021	1,324
2022	1,404
2023	1,488

Demand for detergent powder will grow from 831 ton in the year 2013 to 1,112 tons and 1,488 tons by the year 2018 and 2023, respectively.

3. Pricing and Distribution

By considering the average imported price of detergent and adding costs of duty and other import related expenses, a factory gate price of Birr 43,814 per ton is recommended.

The product can be classified as a consumer item. The end users of the product are numerous and widely distributed throughout the country. Hence, the factory has to appoint a number of distributors in different locations of the country. The distributors will sell the products to the retailers to reach the final consumers of the product.

B. PLANT CAPACITY AND PRODUCTION PROGRAM

1. Plant Capacity

A plant with annual capacity of 1,000 tons, of detergent powder per year is envisaged on the basis of a production schedule of 300 days per annum and three shifts of eight hours a day. The plant capacity is determined by considering the unsatisfied demand and economy of scale limitations.

2. Production Program

The schedule is worked out considering the time required for gradual build up in labor productivity and fine tuning of machinery and market penetration period. Production will commence at 70%, and then will grow to 85% and 100% in the second year, and the third year and then after, respectively. Detail production program is shown in Table 3.3 below.

Table 3.3

PRODUCTION PROGRAM

Year	1	2	3-10
Capacity utilization (%)	70	85	100
Detergent Production (tons)	700	850	1,000

IV. MATERIALS AND INPUTS

A. RAW AND AUXILIARY MATERIALS

The major raw materials used to produce detergent powder are Alkyl benzene sulphonate, sodium tri polyphosphate, sodium sulphate, sodium silicate, and caustic soda. Caustic soda can be obtained locally while the other raw materials are supposed to be imported. However, there is a possibility to manufacture sodium sulphate and sodium silicate locally as the starting materials for these chemicals are locally available. Auxiliary material i.e. printed polyethylene is necessary as packing materials. The total cost of raw material at full capacity operation is estimated at Birr 25.471 million. Annual consumption of raw and auxiliary materials at full production capacity and their corresponding cost is given in Table 4.1.

Table 4.1
RAW AND AUXILIARY MATERIALS REQUIREMENT AND COST

Sr. No.	Description	Qty.	Cost, ['000 Birr]		
			LC	FC	TC
1	Linear Alkyl benzene sulphonate	250	-	14,000	14,000
2	Sodium tri polyphosphate	310	-	7,409	7,409
3	Sodium sulphate	190	-	982	982
4	Sodium silicate	230	-	1,380	1,380
5	Caustic soda	70	700	-	700
6	Printed polyethylene bags, (250g det. Powder)	4 X 10 ⁶	1,000	-	1,000
	Grand Total		1,700	23,771	25,471

B. UTILITIES

Electricity, water and fuel oil are the utilities required by the envisaged plant. The total cost of utilities is estimated at Birr 3,174,000. . Detailed requirement and costs of utilities are shown in Table 4.2.

Table 4.2
UTILITIES REQUIREMENT AND COST

Sr. No.	Description	Quantity	Unit Price (Birr)	Total Cost(Birr)
1	Electricity (kWh)	300,000	0.58	174,000
2	Water (m ³)	30,000	10.00	300,000
3	Furnace oil (lt.)	150,000	18.00	2,700,000
	Grand Total			3,174,000

V. TECHNOLOGY AND ENGINEERING

A. TECHNOLOGY

1. Production Process

Standard detergent powder manufacturing plant consists of mixing, drying, after drying, packing and antipollution units. These units are briefly described as follows:

Mixing unit: Linear alkyl benzene sulphonate paste is metered into a slurry preparation tank together with metered sodium silicate solution, and solid phosphates, sulphates and additives. The slurry preparation tank acts as a coarse mixer. Here lumps are broken down and air pockets are eliminated. Materials after blending are conveyed to an ageing vessel.

Mixing is carefully controlled to prevent aeration of the slurry. Feed slurry passes through a coarse filter, homogenizer and fine filter. Deaeration of product is carried out if necessary. The slurry of constant solid content and viscosity is ready for spray drying. This detergent slurry is heated and transferred to the top of the spray drying tower by high pressure pump.

Drying unit: - Free flowing, non dusty, non caking detergent products in bead form are produced by Spray Drying mostly in counter current flow using pressure nozzle atomization. The mixed slurry is sprayed through nozzles (under pressure) to create small droplets. Inlet temperatures vary according to product and up to 400°C inlet temperatures are used for some detergents. Hot air from direct fired air heaters is used for Spray Drying. Exhaust high efficiency

cyclones / bag houses are used to control emissions and maximize product recovery are part of the spray drying plant. The dried detergent powder is taken out at the bottom of the tower, and is transferred to the sieve by belt conveyor and air lift equipment.

After drying unit: - The dried detergent powder collected from the bottom of the spray tower is pneumatically conveyed to the product silos after sieving. Here filtered atmospheric air is used as the cooling & conveying media. Dense phase conveying systems are normally preferred.

After the granules have been cooled, heat sensitive ingredients, which are not compatible with the spray drying temperatures (like bleach, enzymes and fragrance), are added.

Packing unit: - The final product is packed here. Detergent powder is fed into the packing machine from baggies.

2. Environmental Impact Assessment

The technology selected is equipped with Anti-pollution unit. Dust contained in the exhaust air, is washed and separated by the spraying system. This water, containing detergent dust is recycled to the mixing unit again.

B. ENGINEERING

1. Machinery and Equipment

The total cost of machinery and equipment with the envisaged capacity is estimated at Birr 26.5 million, out of which birr 19.875 million is required in foreign currency. The list of machinery and equipment required by the envisaged plant is given in Table 5.1.

Table 5.1
MACHINERY AND EQUIPMENT REQUIREMENT

Sr. No.	Description	Qty. (No.)
1	Caustic soda solution tank	1
2	Alkyl benzene sulphonic acid tank	1
3	Neutralizer	1
4	Sodium silicate tank	1
5	Mixing vessel(crutcher)	1
6	High pressure tank	1
7	Pumps	Set
8	Furnace	1
9	Blowers	Set
10	Spray drying tower	1
11	Cyclone	Set
12	Conveyors	Set
13	Sieve	Set
14	Perfumer	1
15	Baggies	Set
16	Packing machine	1
17	Anti pollution unit	1

2. Land, Building and Civil Works

The total land requirement, including provision for open space is 3,000 m², of which 1,500 m² will be covered by building. Based on estimated unit building construction cost of Birr 4,000 per m², the total cost of building will be Birr 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 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 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 REQUIREMENT

A. HUMAN RESOURCE REQUIREMENT

The plant requires 50 workers, and their annual expenditure, including fringe benefits, is estimated at Birr 1,327,500. For details see Table 6.1.

Table 6.1**HUMAN RESOURCE REQUIREMENT AND LABOR COST**

Sr. No.	Description	Req. No.	Salary, (Birr)	
			Monthly	Annual
1	Plant manager	1	8,000	96,000
2	Secretary	2	4,000	48,000
3	Production and technical manager	1	6,000	72,000
4	Finance and administration manager	1	6,000	72,000
4	Commercial manager	1	6,000	72,000
5	Accountant	2	5,000	60,000
6	Sales person	1	2,500	30,000
7	Purchaser	1	2,500	30,000
8	Clerk	2	900	10,800
9	Quality control manager	1	4,500	54,000
10	Chemist	3	6,000	72,000
11	Production foreman	3	6,000	72,000
12	Operator	9	13,500	162,000
13	Mechanic	3	4,500	54,000
14	Electrician	3	4,500	54,000
15	Unskilled labor	9	5,400	64,800
16	Driver	2	1,200	14,400
17	Guard	3	1,200	14,400
18	Cleaner	2	800	9,600
	Sub-total	50	88,500	1,062,000
	Employee benefit (25% BS)		22,125	265,500
	Total		110,625	1,327,500

B. TRAINING REQUIREMENT

On-site training program is believed to be adequate for key production, maintenance and quality control personnel by the experts of machinery and technology supplier during commissioning and performance testing period. The total cost of training is estimated at Birr 75,000.

VII. FINANCIAL ANALYSIS

The financial analysis of the detergent powder 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 45.32 million (see Table 7.1). From the total investment cost the highest share (Birr 34.52 million or 76.19%) is accounted by fixed investment cost followed by initial working capital (6.20 million or 13.68%) and pre operation cost (Birr 4.60 million or 10.13%). From the total investment cost Birr 19.87 million or 43.85% 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	0.18
1.2	Building and civil work	6,000.00		6,000.00	13.24
1.3	Machinery and equipment	6,625.00	19,875.00	26,500.00	58.47
1.4	Vehicles	1,500.00		1,500.00	3.31
1.5	Office furniture and equipment	450.00		450.00	0.99
	Sub total	14,654.80	19,875.00	34,529.80	76.19
2	Pre operating cost *				
2.1	Pre operating cost	1,625.00		1,625.00	3.59
2.2	Interest during construction	2,964.81		2,964.81	6.54
	Sub total	4,589.81		4,589.81	10.13
3	Working capital **	6,199.68		6,199.68	13.68
	Grand Total	25,444.29	19,875.00	45,319.29	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 8.99 million. However, only the initial working capital of Birr 6.19 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 40.28 million (see Table 7.2). The cost of raw material account for 63.23% of the production cost. The other major components of the production cost are depreciation, utility and financial cost which account for 15.42%, 7.88% and 7.08%, respectively. The remaining 6.39% is the share of labor, 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 (in 000 Birr)	%
Raw Material and Inputs	25,471.00	63.23
Utilities	3,174.00	7.88
Maintenance and repair	795.00	1.97
Labour direct	1,062.00	2.64
Labour overheads	265.00	0.66
Administration Costs	150.00	0.37
Land lease cost	-	-
Cost of marketing and distribution	300.00	0.74
Total Operating Costs	31,217.00	77.50
Depreciation	6,210.00	15.42
Cost of Finance	2,853.63	7.08
Total Production Cost	40,280.63	100

C. FINANCIAL EVALUATION**1. Profitability**

Based on the projected profit and loss statement, the project will generate a profit throughout its operation life. Annual net profit after tax ranges from Birr 2.76 million to Birr 8.60 million during the life of the project. Moreover, at the end of the project life the accumulated net cash flow amounts to Birr 65.85 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.

$$\text{Break -Even Sales Value} = \frac{\text{Fixed Cost} + \text{Financial Cost}}{\text{Variable Margin ratio (\%)}} = \text{Birr } 18,400,200$$

$$\text{Break- Even Capacity utilization} = \frac{\text{Break -even Sales Value}}{\text{Sales revenue}} \times 100 = 50.49 \%$$

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 5 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 20.46% 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 23.85 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 50 persons. The project will generate Birr 19.70 million in terms of tax revenue. The establishment of such factory will have a foreign exchange saving effect to the country by substituting the current imports. The project will also create backward linkage with the chemical manufacturing sub sector and also generates income for the Government in terms of payroll tax.

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	17,830	21,650	25,471	25,471	25,471	25,471	25,471	25,471	25,471	25,471
Utilities	2,222	2,698	3,174	3,174	3,174	3,174	3,174	3,174	3,174	3,174
Maintenance and repair	557	676	795	795	795	795	795	795	795	795
Labour direct	743	903	1,062	1,062	1,062	1,062	1,062	1,062	1,062	1,062
Labour overheads	186	225	265	265	265	265	265	265	265	265
Administration Costs	105	128	150	150	150	150	150	150	150	150
Land lease cost	0	0	0	0	26	26	26	26	26	26
Cost of marketing and distribution	300	300	300	300	300	300	300	300	300	300
Total Operating Costs	21,942	26,579	31,217	31,217	31,243	31,243	31,243	31,243	31,243	31,243
Depreciation	6,210	6,210	6,210	6,210	6,210	285	285	285	285	285
Cost of Finance	0	3,261	2,854	2,446	2,038	1,631	1,223	815	408	0
Total Production Cost	28,152	36,051	40,281	39,873	39,491	33,158	32,751	32,343	31,935	31,528

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	30,667	37,239	43,810	43,810	43,810	43,810	43,810	43,810	43,810	43,810
Less variable costs	21,642	26,279	30,917	30,917	30,917	30,917	30,917	30,917	30,917	30,917
VARIABLE MARGIN	9,025	10,960	12,893	12,893	12,893	12,893	12,893	12,893	12,893	12,893
in % of sales revenue	29.43	29.43	29.43	29.43	29.43	29.43	29.43	29.43	29.43	29.43
Less fixed costs	6,510	6,510	6,510	6,510	6,536	611	611	611	611	611
OPERATIONAL MARGIN	2,515	4,450	6,383	6,383	6,357	12,282	12,282	12,282	12,282	12,282
in % of sales revenue	8.20	11.95	14.57	14.57	14.51	28.04	28.04	28.04	28.04	28.04
Financial costs		3,261	2,854	2,446	2,038	1,631	1,223	815	408	0
GROSS PROFIT	2,515	1,188	3,529	3,937	4,319	10,652	11,059	11,467	11,875	12,282
in % of sales revenue	8.20	3.19	8.06	8.99	9.86	24.31	25.24	26.17	27.10	28.04
Income (corporate) tax	0	0	0	1,181	1,296	3,196	3,318	3,440	3,562	3,685
NET PROFIT	2,515	1,188	3,529	2,756	3,023	7,456	7,742	8,027	8,312	8,598
in % of sales revenue	8.20	3.19	8.06	6.29	6.90	17.02	17.67	18.32	18.97	19.62

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	36,155	39,940	37,262	43,833	43,810	43,810	43,810	43,810	43,810	43,810	43,810	15,493
Inflow funds	36,155	9,273	23	23	0	0	0	0	0	0	0	0
Inflow operation	0	30,667	37,239	43,810	43,810	43,810	43,810	43,810	43,810	43,810	43,810	0
Other income	0	0	0	0	0	0	0	0	0	0	0	15,493
TOTAL CASH OUTFLOW	36,155	31,215	35,264	39,494	38,921	38,656	40,145	39,860	39,575	39,289	34,927	0
Increase in fixed assets	36,155	0	0	0	0	0	0	0	0	0	0	0
Increase in current assets	0	6,308	1,346	1,346	0	2	0	0	0	0	0	0
Operating costs	0	21,642	26,279	30,917	30,917	30,943	30,943	30,943	30,943	30,943	30,943	0
Marketing and Distribution cost	0	300	300	300	300	300	300	300	300	300	300	0
Income tax	0	0	0	0	1,181	1,296	3,196	3,318	3,440	3,562	3,685	0
Financial costs	0	2,965	3,261	2,854	2,446	2,038	1,631	1,223	815	408	0	0
Loan repayment	0	0	4,077	4,077	4,077	4,077	4,077	4,077	4,077	4,077	0	0
SURPLUS (DEFICIT)	0	8,725	1,998	4,340	4,889	5,154	3,665	3,950	4,235	4,521	8,883	15,493
CUMULATIVE CASH BALANCE	0	8,725	10,724	15,063	19,952	25,107	28,771	32,721	36,957	41,477	50,360	65,853

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	30,667	37,239	43,810	43,810	43,810	43,810	43,810	43,810	43,810	43,810	15,493
Inflow operation	0	30,667	37,239	43,810	43,810	43,810	43,810	43,810	43,810	43,810	43,810	0
Other income	0	0	0	0	0	0	0	0	0	0	0	15,493
TOTAL CASH OUTFLOW	42,354	23,265	27,903	31,217	32,401	32,538	34,438	34,560	34,683	34,805	34,927	0
Increase in fixed assets	36,155	0	0	0	0	0	0	0	0	0	0	0
Increase in net working capital	6,200	1,323	1,323	0	2	0	0	0	0	0	0	0
Operating costs	0	21,642	26,279	30,917	30,917	30,943	30,943	30,943	30,943	30,943	30,943	0
Marketing and Distribution cost	0	300	300	300	300	300	300	300	300	300	300	0
Income (corporate) tax		0	0	0	1,181	1,296	3,196	3,318	3,440	3,562	3,685	0
NET CASH FLOW	-42,354	7,402	9,336	12,593	11,409	11,272	9,372	9,250	9,127	9,005	8,883	15,493
CUMULATIVE NET CASH FLOW	-42,354	34,953	-25,616	13,023	-1,614	9,658	19,030	28,279	37,407	46,411	55,294	70,787
Net present value	-42,354	6,729	7,716	9,461	7,793	6,999	5,290	4,746	4,258	3,819	3,425	5,973
Cumulative net present value	-42,354	35,625	-27,909	18,448	-10,655	-3,657	1,634	6,380	10,638	14,457	17,882	23,855

NET PRESENT VALUE	23,855
INTERNAL RATE OF RETURN	20.46%
NORMAL PAYBACK	5 years