

**72. PROFILE ON THE PRODUCTION OF SODIUM
TRIPOLYPHOSPHATE**

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I. SUMMARY

This profile envisages the establishment of a plant for the production of sodium tri polyphosphate with a capacity of 1,000 tons per annum. Sodium Tri polyphosphate is used as one of the main auxiliaries for synthetic detergent, synergist for soap, water softener, tanning agent for leather making, auxiliary for dyeing, as an effective dispersion agent for suspension solutions of coatings, kaolin, magnesium oxide, calcium carbonate and drilling mud etc.,

The country's requirement of sodium tri polyphosphate is met through import. The present (2012) demand for sodium tri polyphosphate is estimated at 568 tons. The demand for the product is projected to reach 1,006 tons and 1,620 tons by the year 2018 and year 2023, respectively.

The principal raw materials required are soda ash and phosphoric acid. Soda ash is locally available while phosphoric acid has to be imported.

The total investment cost of the project including working capital is estimated at Birr 41.77 million. From the total investment cost the highest share (Birr 33.01 million or 79.03%) is accounted by fixed investment cost followed by initial working capital (Birr 4.47 million or 10.72%) and pre operation cost (Birr 4.28 million or 10.25%). From the total investment cost Birr 16.25 million or 38.90% is required in foreign currency.

The project is financially viable with an internal rate of return (IRR) of 20.41% and a net present value (NPV) of Birr 21.10 million, discounted at 10%.

The project can create employment for 54 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 and backward linkage with the manufacturing sub sector and also generates income for the Government in terms of tax revenue and payroll tax.

II. PRODUCT DESCRIPTION AND APPLICATION

Sodium triphosphate (STP) is an inorganic compound with formula $\text{Na}_5\text{P}_3\text{O}_{10}$. It is the sodium salt of the polyphosphate penta anion, which is the conjugate base of tri-phosphoric acid.

It has got salient chelating capacity to ions of Ca and Mg etc. and can soften hard water to make suspension solution become into clear solution; it has got weak alkalinity but no corrosiveness. It is a surfactant, and has got outstanding emulsification to lubricants and fat.

Sodium Tri polyphosphate is used as one of the main auxiliaries for synthetic detergent, synergist for soap, water softener, tanning agent for leather making, auxiliary for dyeing, as an effective dispersion agent for suspension solutions of coatings, kaolin, magnesium oxide, calcium carbonate and drilling mud etc., as an oil contamination resistance agent in paper production, in foodstuff industry it is used as quality improver in the process of canned food, fruit juice drinks, foodstuffs from milk or soybeans, it may tender the meat in canned ham and soften the skin of horse bean in canned horse bean, it may also serves as a softener or densifier in foodstuff industry, improves the water holding capacity of meat and seafood products, prevents denaturation of proteins, stabilizes the color of the products, improves the texture of meat and seafood products Food grade STPP is used as quality improver in the process of canned food, fruit juice beverages, foodstuffs from milk or soya bean and is also used as softener or densifier in food stuff industry.

III. MARKET STUDY AND PLANT CAPACITY

A. MARKET STUDY

1. Past Supply and Present Demand

Sodium tri polyphosphate as an industrial raw material has various applications in the manufacturing sector of the country. Among the major users of the product are chemical, food, leather, paper and textile sub sectors of the manufacturing sector. The country's demand for the product is entirely met through import. Import of the product for the last twelve years is presented in Table 3.1.

Table 3.1**IMPORT OF SODIUM TRIPOLYPHOSPHATE**

Year	Qty. (Tons)	Value ('000 Birr)
2000	373.2	1,621.8
2001	317.6	1,689.7
2002	406.0	1,943.0
2003	389.5	1,855.1
2004	384.0	2,368.5
2005	203.2	1,240.3
2006	314.2	1,897.2
2007	389.6	2,497.0
2008	320.7	3,231.1
2009	631.0	7,342.7
2010	335.4	4,709.5
2011	584.2	11,646.5

Source: - Ethiopian Revenues and Customs Authority.

Table 3.1 reveals that import of sodium tri-polyphosphate during 2000-2008 was almost similar in most of the years ranging from the lowest 314.2 tons to the highest 406 tons, except for the year 2005 which is registered at 203.2 tons. The annual average volume of import during this period was 333 tons. Import of the product has shown a significant growth in the past recent three years. The imported quantity in year 2009, year 2010, and year 2011 was 631 tons, 335.4 tons and 584.2 tons, respectively, with a mean figure of 516 tons. Compared to the previous nine years average the annual volume of import in the recent three years (2009 – 2011) has increased by about 55%.

The growth of consumption of the product in recent years is due to the fact that a number of new industries are being established in Addis Ababa and other regional towns which utilize the product as one of their ingredients. In order to estimate the present demand a 10% growth is

applied by taking the recent three years average as a base. Accordingly, the present demand is set at 568 tons.

2. Demand Projection

As the product is an industrial input utilized by most of the sub sectors of the manufacturing sector its future demand depends on the development and expansion of the industrial sector. According to the GTP the industrial sector is forecasted to grow by an average of about 20% per annum. To be conservative, demand for the product is projected by taking only 10% annual average growth rate as shown in Table 3.2.

Table 3.2

PROJECTED DEMAND FOR SODIUM TRIPOLYPHOSPHATE (TONS)

Year	Projected Demand
2013	625
2014	687
2015	756
2016	832
2017	915
2018	1,006
2019	1,107
2020	1,217
2021	1,339
2022	1,473
2023	1,620

Demand for sodium tri-polyphosphate will increase from 625 tons in the year 2013 to 1,006 tons and 1,620 tons by the year 2018 and year 2023, respectively.

3. Pricing and distribution

Based on the CIF price of year 2011 and considering other costs associated with import a factory gate price of Birr 33,923 per ton of the product is proposed.

Currently sodium tri-polyphosphate is imported directly by the consuming industries. For the envisaged project, it is thus recommended either to establish a new trade channel by using the existing industrial input dealers wherever it is possible or distribute directly to the consuming industries by establishing its own store or commercial agent at major strategic towns

B. PLANT CAPACITY AND PRODUCTION PROGRAM

1. Plant Capacity

The demand for STTP grows from 625 tons in year 2013 to 1,620 tons in year 2023, as indicated in the market study. By considering two years of implementation period and three years to achieve full capacity, it is prudent to take year 2018 as a base year for the determination of capacity to avoid expansion at the early stage of the project life. Therefore, the plant is proposed to produce 1,000 tons per annum of STTP. The plant will operate three shifts of 8 hours each per day for 300 days in a year.

2. Production Program

The production program is worked out by deducting Sundays and public holidays and assuming that maintenance works will be carried out during off-production hours. 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**PRODUCTION PROGRAM**

Year	1	2	3-10
Capacity Utilization (%)	75	85	100
Production of STTP(tons)	750	850	1,000

IV. MATERIALS AND INPUTS**A. RAW AND AUXILIARY MATERIALS**

The raw materials required for the production of sodium tri polyphosphate are phosphoric acid and soda ash. The auxiliary raw material required by the envisaged project is poly propylene bag to be used as packing material for finished product. The total annual cost of raw material is estimated at Birr 16,800,000. The annual requirement and cost of this raw material is given in Table 4.1.

Table 4.1**ANNUAL REQUIREMENT OF RAW MATERIAL AND COST**

Sr. No.	Raw Material	Unit of Measurement	Annual Consumption	Cost ('000 Birr)		
				LC	FC	TC
1	Phosphoric acid	Tons	900		10,800	10,800
2	Soda ash	Tons	800		5,600	5,600
3	Polypropylene bag of 25kg	Pcs	40,000	400	-	400
	Total			400	16,400	16,800

B. UTILITIES

The utilities required for the production of sodium tri polyphosphate are electricity, water and fuel oil. The total annual cost of utilities is estimated at Birr 3,249,000. The annual requirement of these utilities and their respective cost is given in Table 4.3.

Table 4.3

ANNUAL UTILITIES REQUIREMENT AND THEIR RESPECTIVE COST(BIRR)

Sr.No.	Description	Unit of Meas.	Quantity	Cost
1	Electricity	kWh	250,000	145,000
2	Water	m ³	50,000	500,000
3	Fuel	Lt	175,000	2,604,000
	Total			3,249,000

V. TECHNOLOGY AND ENGINEERING

A. TECHNOLOGY

1. Production Process

The production process of STTP includes the following steps.

- Reacting a sodium compound such as soda ash (Na₂ CO₃) with either wet process phosphoric acid or furnace process phosphoric acid to form a reaction mixture containing monosodium phosphate (NaH₂ PO₄) and disodium phosphate (Na₄ HPO₄);
- Precipitating and thereafter removing insoluble impurities from the reaction mixture; and
- Heating the reaction mixture at elevated temperatures for sufficient time to thermally decompose or calcinate the two above-named phosphate compounds into STTP (Na₅ P₃ O₁₀) according to the following reaction:



In this step, water is simultaneously removed from the reaction mixture by volatilization. Therefore, in the drying/heating step where by drying, poly condensation and calcinations, the solution is converted into STPP.

The gases generated from the drying/heating stage passes through a scrubber liquor to remove fluoride impurities and entrained sodium tri polyphosphate and the scrubber liquor shall be recycled to the makeup stage to recover sodium tri polyphosphate.

The prepared sodium tri polyphosphate is packed in poly propylene bag and transported.

2. Environmental Impact Assessment

Sodium tri polyphosphate manufacture generates no process wastes since the technology selected have a wet scrubber that washes sodium tri polyphosphate emissions from the kiln and the discharge of the wet scrubber is recycled into preparation stage. Therefore, the process of production of sodium tri polyphosphate does not have any adverse impact on environment.

B. ENGINEERING

1. Machinery and Equipment

The total cost of the required machinery and equipment is estimated at Birr 25 million, out of which Birr 16.25 million is required in foreign currency. The list of machineries required for the production of sodium tri polyphosphate is given in Table 5.1.

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

Sr. No.	Item Description	Quantity
1	Soda ash silo	1
2	Phosphoric acid storage tank	1
3	Precipitation tank	1
4	Reaction tank	1
5	Spray tower	1
6	Rotary kiln	1
7	Wet scrubber	1
8	Pump	3
9	Finished product storage tank	1
10	Packing machine	1 set

2. Land, Building and Civil Works

The total land requirement is about 2,500 m². Of this land area, 1,500 m² is a built up area for the plant, office, canteen and other facilities. The construction cost is estimated at Birr 6,000,000.

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 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 665,000 of which 10% or Birr 66,500 will be paid in advance. The remaining Birr 598,500 will be paid in equal installments with in 28 years i.e. Birr 21,375 annually.

VI. HUMAN RESOURCE AND TRAINING REQUIREMENTS

A. HUMAN RESOURCE REQUIREMENT

The total human resource requirement for this plant will be 54 persons. The total annual cost of labour is estimated at Birr 1,405,500. Details of human resource and salaries are presented in Table 6.1.

Table 6.1**HUMAN RESOURCE REQUIREMENT AND LABOR COST(BIRR)**

Sr. No.	Position	No. of Persons	Monthly Salary	Annual Cost
1	General Manager	1	8,000	96,000
2	Secretary	1	2,000	24,000
3	Production manager	1	5,000	60,000
4	Administration and Finance manager	1	5,000	60,000
5	Technical manager	1	5,000	60,000
6	Accountants	2	6,000	72,000
7	Purchaser	2	6,000	72,000
8	Sales person	1	3,000	36,000
9	Store keeper	2	3,000	36,000
10	Cashier	1	1,000	12,000
11	Operators	9	13,500	162,000
12	Assistant operators	9	9,000	108,000
13	Chemists	3	6,000	72,000
14	Mechanic	6	9,000	108,000
15	Electrician	6	9,000	108,000
16	Messenger and cleaner	2	800	9,600
17	Guards	6	2,400	28,800
	Sub-total	54	93,700	1,124,400
	Employees benefit(25% of basic salary)		23,425	281,100
	Total		117,125	1,405,500

B. TRAINING REQUIREMENT

Training on the production process, quality control and operation and maintenance of machinery should be given by respective experts of machinery and equipment supplier for two months during erection and commissioning of the plant. The cost of training is included in the cost of machinery and equipment. Miscellaneous costs in relation to the training such as stationery; reception etc is estimated at Birr 20,000.

VII. FINANCIAL ANALYSIS

The financial analysis of the sodium tri polyphosphate 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 41.77 million (see Table 7.1). From the total investment cost the highest share (Birr 33.01 million or 79.03%) is accounted by fixed investment cost followed by initial working capital (Birr 4.47 million or 10.72%) and pre operation cost (Birr 4.28 million or 10.25%). From the total investment cost Birr 16.25 million or 38.90% is required in foreign currency.

Table 7.1**INITIAL INVESTMENT COST ('000 Birr)**

Sr.No. No	Cost Items	Local Cost	Foreign Cost	Total Cost	% Share
1	Fixed investment				
1.1	Land Lease	66.50		66.50	0.16
1.2	Building and civil work	6,000.00		6,000.00	14.36
1.3	Machinery and equipment	8,750.00	16,250.00	25,000.00	59.84
1.4	Vehicles	1,500.00		1,500.00	3.59
1.5	Office furniture and equipment	450.00		450.00	1.08
	Sub- total	16,766.50	16,250.00	33,016.50	79.03
2	Pre operating cost *				
2.1	Pre operating cost	1,550.00		1,550.00	3.71
2.2	Interest during construction	2,733.19		2,733.19	6.54
	Sub -total	4,283.19		4,283.19	10.25
3	Working capital	4,479.02		4,479.02	10.72
	Grand Total	25,528.70	16,250.00	41,778.70	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 5.96 million. However, only the initial working capital of Birr 4.47 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 31.17 million (see Table 7.2). The cost of raw material account for 53.88% of the production cost. The other major components of the production cost are depreciation, utility and financial cost which account for 18.91%, 10.42% and 8.44%, respectively. The remaining 8.36 % 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	16,800.00	53.88
Utilities	3,249.00	10.42
Maintenance and repair	750.00	2.41
Labor direct	1,124.00	3.60
Labor overheads	281.10	0.90
Administration Costs	150.00	0.48
Land lease cost	-	-
Cost of marketing and distribution	300.00	0.96
Total Operating Costs	22,654.10	72.66
Depreciation	5,895.00	18.91
Cost of Finance	2,630.69	8.44
Total Production Cost	31,179.79	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 2.47 million to Birr 7.67 million during the life of the project. Moreover, at the end of the project life the accumulated net cash flow amounts to Birr 57.90 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.

$$\text{Break - Even Sales Value} = \frac{\text{Fixed Cost} + \text{Financial Cost}}{\text{Variable Margin ratio (\%)}} = \text{Birr } 18,168,440$$

$$\text{Break -Even Capacity utilization} = \frac{\text{Break -even Sales Value}}{\text{Sales revenue}} \times 100 = 54\%$$

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 20.41% 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 21.10 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 54 persons. The project will generate Birr 17.28 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 and backward linkage with the 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	12,600	14,280	16,800	16,800	16,800	16,800	16,800	16,800	16,800	16,800
Utilities	2,437	2,762	3,249	3,249	3,249	3,249	3,249	3,249	3,249	3,249
Maintenance and repair	563	638	750	750	750	750	750	750	750	750
Labour direct	843	955	1,124	1,124	1,124	1,124	1,124	1,124	1,124	1,124
Labour overheads	211	239	281	281	281	281	281	281	281	281
Administration Costs	113	128	150	150	150	150	150	150	150	150
Land lease cost	0	0	0	0	21	21	21	21	21	21
Cost of marketing and distribution	300	300	300	300	300	300	300	300	300	300
Total Operating Costs	17,066	19,301	22,654	22,654	22,675	22,675	22,675	22,675	22,675	22,675
Depreciation	5,895	5,895	5,895	5,895	5,895	285	285	285	285	285
Cost of Finance	0	3,007	2,631	2,255	1,879	1,503	1,127	752	376	0
Total Production Cost	22,961	28,202	31,180	30,804	30,450	24,464	24,088	23,712	23,336	22,960

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	25,440	28,832	33,920	33,920	33,920	33,920	33,920	33,920	33,920	33,920
Less variable costs	16,766	19,001	22,354	22,354	22,354	22,354	22,354	22,354	22,354	22,354
VARIABLE MARGIN	8,674	9,831	11,566	11,566	11,566	11,566	11,566	11,566	11,566	11,566
in % of sales revenue	34.10	34.10	34.10	34.10	34.10	34.10	34.10	34.10	34.10	34.10
Less fixed costs	6,195	6,195	6,195	6,195	6,216	606	606	606	606	606
OPERATIONAL MARGIN	2,479	3,636	5,371	5,371	5,350	10,960	10,960	10,960	10,960	10,960
in % of sales revenue	9.75	12.61	15.83	15.83	15.77	32.31	32.31	32.31	32.31	32.31
Financial costs		3,007	2,631	2,255	1,879	1,503	1,127	752	376	0
GROSS PROFIT	2,479	630	2,740	3,116	3,470	9,456	9,832	10,208	10,584	10,960
in % of sales revenue	9.75	2.18	8.08	9.19	10.23	27.88	28.99	30.09	31.20	32.31
Income tax	0	0	0	935	1,041	2,837	2,950	3,062	3,175	3,288
NET PROFIT	2,479	630	2,740	2,181	2,429	6,619	6,882	7,146	7,409	7,672
in % of sales revenue	9.75	2.18	8.08	6.43	7.16	19.51	20.29	21.07	21.84	22.62

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	34,567	32,769	28,848	33,943	33,920	33,920	33,920	33,920	33,920	33,920	33,920	12,365
Inflow funds	34,567	7,329	16	23	0	0	0	0	0	0	0	0
Inflow operation	0	25,440	28,832	33,920	33,920	33,920	33,920	33,920	33,920	33,920	33,920	0
Other income	0	0	0	0	0	0	0	0	0	0	0	12,365
TOTAL CASH OUTFLOW	34,567	24,395	26,675	29,957	29,602	29,356	30,774	30,511	30,248	29,985	25,963	0
Increase in fixed assets	34,567	0	0	0	0	0	0	0	0	0	0	0
Increase in current assets	0	4,596	609	914	0	2	0	0	0	0	0	0
Operating costs	0	16,766	19,001	22,354	22,354	22,375	22,375	22,375	22,375	22,375	22,375	0
Marketing cost	0	300	300	300	300	300	300	300	300	300	300	0
Income tax	0	0	0	0	935	1,041	2,837	2,950	3,062	3,175	3,288	0
Financial costs	0	2,733	3,007	2,631	2,255	1,879	1,503	1,127	752	376	0	0
Loan repayment	0	0	3,758	3,758	3,758	3,758	3,758	3,758	3,758	3,758	0	0
SURPLUS (DEFICIT)	0	8,374	2,173	3,986	4,318	4,564	3,146	3,409	3,672	3,935	7,957	12,365
CUMULATIVE CASH BALANCE	0	8,374	10,547	14,533	18,851	23,415	26,562	29,971	33,643	37,579	45,536	57,901

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	25,440	28,832	33,920	33,920	33,920	33,920	33,920	33,920	33,920	33,920	12,365
Inflow operation	0	25,440	28,832	33,920	33,920	33,920	33,920	33,920	33,920	33,920	33,920	0
Other income	0	0	0	0	0	0	0	0	0	0	0	12,365
TOTAL CASH OUTFLOW	39,046	17,659	20,192	22,654	23,591	23,717	25,512	25,625	25,738	25,851	25,963	0
Increase in fixed assets	34,567	0	0	0	0	0	0	0	0	0	0	0
Increase in net working capital	4,479	594	891	0	2	0	0	0	0	0	0	0
Operating costs	0	16,766	19,001	22,354	22,354	22,375	22,375	22,375	22,375	22,375	22,375	0
Marketing cost	0	300	300	300	300	300	300	300	300	300	300	0
Income tax		0	0	0	935	1,041	2,837	2,950	3,062	3,175	3,288	0
NET CASH FLOW	-39,046	7,781	8,640	11,266	10,329	10,203	8,408	8,295	8,182	8,069	7,957	12,365
CUMULATIVE NET CASH FLOW	-39,046	-31,265	-22,625	-11,359	-1,030	9,174	17,581	25,876	34,058	42,128	50,084	62,450
Net present value	-39,046	7,073	7,141	8,464	7,055	6,335	4,746	4,257	3,817	3,422	3,068	4,767
Cumulative net present value	-39,046	-31,972	-24,832	-16,367	-9,313	-2,977	1,769	6,025	9,842	13,265	16,332	21,100

NET PRESENT VALUE 21,100

INTERNAL RATE OF
RETURN 20.41%
PAYBACK 5 years