55. PROFILE ON THE PRODUCTION OF INSECTICIDE

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I. SUMMARY

This profile envisages the establishment of a plant for the production of insecticides with a capacity of 1,500 tons per annum. Insecticides are agents of chemical or biological origin that control insects.

The country`s requirement of insecticides is met through local production and import**.** The present (2012) demand for insecticides is estimated at 4,400 tons. The demand for insecticides is projected to reach 6,132 tons in the year 2013 to 2,854 tons and 3,690 tones by the year 2018 and year 2023, respectively.

The principal raw materials required are Malathion AI, Endosulfan AI and Diazinone AI which have to be imported.

The total investment cost of the project including working capital is estimated at Birr 128.71 million. From the total investment cost the highest share (Birr 79.58 million or 61.83%) is accounted by fixed investment cost followed by initial working capital (Birr 37.10 million or 28.83%) and pre operation cost (Birr 12.02 million or 9.34%). From the total investment cost Birr 49.12 million or 38.17% is required in foreign currency.

The project is financially viable with an internal rate of return (IRR) of 31.95% and a net present value (NPV) of Birr 227.22 million, discounted at 10%.

The project can create employment for 48 persons. The establishment of such factory will have a foreign exchange saving effect to the country by substituting the current imports. The project will also create forward linkage with the agricultural sector and also generates income for the Government in terms of tax revenue and payroll tax.

II. PRODUCT DESCRIPTION AND APPLICATION

Insecticides are agents of chemical or biological origin that control insects. An insecticide consists of an active ingredient coupled with inert ingredients. The active ingredient kills the pests, while the inert ingredients facilitate spraying and coating the target plant; they can also contribute other advantages that are not conferred by the active ingredient alone.

Control may result by different means. Some insecticides work as nerve poisons, muscle poisons, desiccants, sterilants, or pheromones; others exert their effects by physical means such as clogging air passages. The classes of insecticides most commonly used today are chlorinated hydrocarbons, organophosphates, and carbamates, and of these, the organophosphate are the most widely used.

Insecticides are used in agriculture, industry and the household.

III. MARKET STUDY AND PLANT CAPACITY

A. MARKET STUDY

1. Past Supply and Present Demand

The demand for insecticides is met both from import and local production. There is only one plant in the country that produces different types of pesticides. The factory which is known by the name of Adami Tulu Pesticides Processing S.Co is located near the town of Adami Tulu, 160 km far from the capital city of Addis Ababa. Different types and brands of pesticides (in liquid and dust form) are produced by the local factory. The designed annual production capacity of the plant is 1.5 million liters liquid and 1.5 million kilograms dust insecticide.

In addition to the local production, the unsatisfied demand is met through import. Import of insecticides, containing bromomethane and other none bromomethane, covering the period 2000--2011 is presented in Table 3.1.

Table 3.1

IMPORT OF INSECTICIDES

Year	Quantity (Tone)	Value (`000 Birr)
2000	689	44,133
2001	1,230	57,324
2002	908	30,777
2003	1,254	40,232
2004	2,358	61,096
2005	2,500	84,017
2006	2,155	77,545
2007	2,389	123,667
2008	3,066	142,930
2009	1,679	134,044
2010	1,837	216,572
2011	1,760	275,090

Source: *- Ethiopian Revenues and Customs Authority.*

As shown in Table 3.1, the imported quantity of insecticides during the first four years of the data set was highly erratic. During year 2000, the imported volume was 689 tons and increased to 1,230 in the following year of 2001. Again it declined to 908 tons and increased to 1,254 tons by the year 2002 and 2003, respectively. The unexpected decline and rapid increase has somewhat stabilized during the period 2004--2007. During this period the imported volume was in the range of 2,155 tons and 2,500 tons. The erratic nature of the data has again started from year 2008 onwards. After a sharp increase in year 2008 (3,066 tons), it declined to an annual average of 1,758 tons during the last three years of 2009--2011.

According to information gathered with regard to the product, the Ethiopian pesticide market fluctuates with weather conditions. The fluctuation rate also varies from year to year. On the average, depending on the weather condition, insecticides demand varies between 20 to 25%.

To estimate the current demand, the import volume and the existing production level are considered. Accordingly, the demand from import is about 2,000 tons while domestic production contributes about 2,400 tons (assuming 80% capacity utilization). Thus, adding import and local production gives an apparent consumption of 4,400 tons per annum. Finally, this is taken as the present effective demand of the country.

2. Demand Projection

Agricultural pesticides prevent loss of crops that are to be damaged by insects and other worms. They are extensively used in modern commercial farms of cotton, fruits and vegetables, flower farms and the like. However, using pesticides has also social costs which include human, livestock, fish and honey bee poisoning. Hence, its use must be justified by considering the costs and benefits that occur to the society. Considering this, only a 3% annual growth rate is applied in forecasting the future demand. The projection worked out based on this assumption, the domestic production and the unsatisfied demand is presented in Table 3.2.

Table 3.2

PROJECTED DEMAND FOR INSECTICIDES (TONS)

Year	Projected Demand	Existing Local Production	Unsatisfied Demand
2013	4,532	2,400	2,132
2014	4,668	2,400	2,268
2015	4,808	2,400	2,408
2016	4,952	2,400	2,552
2017	5,101	2,400	2,701
2018	5,254	2,400	2,854
2019	5,411	2,400	3,011
2020	5,574	2,400	3,174
2021	5,741	2,400	3,341
2022	5,913	2,400	3,513
2023	6,090	2,400	3,690

The total demand for insecticides will grow from 4,532 tons in the year 2013 to 5,254 tons and 6,090 tons by the year 2018 and year 2023. If additional plants, other than the existing one, are not established the unsatisfied demand will grow from 2,132 tons in the year 2013 to 2,854 tons and 3,690 tones by the year 2018 and year 2023, respectively.

3. Pricing and Distribution

Agricultural pesticides/insecticides product price is highly sensitive to agricultural productivity. Sometimes the prices drop by 30 to 50%. This is due to the limited shelf life of the product as it becomes obsolete if it stays more. As a result, careful planning is necessary in the implementation of production program. For the purpose of sales revenue estimation and financial projections the average import price of the product is considered. Accordingly, by taking year

2011average CIF value of imported products and adding other import related costs a factory gate price of Birr 157,561 per ton of insecticides is recommended.

The factory can use the direct sale method and through intermediaries. For bulk purchasers, such as big commercial farms, it can be directly supplied from the factory. For other small purchasers, such as small private farms and individual peasants, it can be reached through appointing agents and retailers at various convenient locations of the country**.**

B. PLANT CAPACITY AND PRODUCTION PROGRAM

1. Plant Capacity

The demand for insecticide grows from 4,532 tons in year 2013 to 6,090 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 1,500 tons per annum of liquid insecticides in the form of EC and ULV. The plant will operate single shift of 8 hours per day for 300 days in a year.

2. Production Program

The production programme 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 70% of its rated full capacity and progressively increase to 80%, 90% and 100% in the second, third and fourth year, respectively. The production programme is provided in Table 3.3.

Table 3.3

PRODUCTION PROGRAMME

Year	1	2	3	4
Capacity Utilization (%)	70	80	90	100
Production of insecticide (tons)	1,050	1,200	1,350	1,500

IV. MATERIALS AND INPUTS

A. RAW AND AUXILIARY MATERIALS

The raw materials required for the production of insecticide are active ingredient, solvent, and emulsifiers for liquid formulation. The auxiliary raw material required by the envisaged project is packing material for finished product. The total annual cost of raw material is estimated at Birr 158,190,000. 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	Annual Consumption in tons	Cost ('000 Birr)		
			LC	FC	TC
1	Malathion AI	125.0	-	20,250	20,250
2	Endosulfan AI	150.0	-	29,400	29,400
3	Diazinone AI	87.5	-	41,400	41,400
4	Deltametrine	2.5	-	14,250	14,250
5	Fenethrotine	75.0	-	27,000	27,000
6	Solvent	560.0	-	13,440	13,440
7	Emulsifiers	7.5	-	450	450
8	Packing materials	LS	-	12,000	12,000
	Total		**-**	**158,190**	**158,190**

B. UTILITIES

The utilities required for the production of insecticides are electricity and water. The total annual cost of utilities is estimated at Birr 653,700. The annual requirement of these utilities and their respective cost is given in Table 4.2.

Table 4.2

ANNUAL UTILITIES REQUIREMENT AND THEIR RESPECTIVE COST

Sr. No.	Description	Unit of Measure	Quantity	Cost
1	Electricity	kWh	265,000	153,700
2	Water	m^3	50,000	500,000
	Total			**653,700**

V. TECHNOLOGY AND ENGINEERING

A. TECHNOLOGY

1. Production Process

A formulation plant accepts the active ingredient, measures out the proper amount and feed to the mixing tank using a feeding screw conveyor if it is in solid state or siphoned pump if it is in liquid state. Solvents, emulsifiers and stabilizers are similarly pumped to the jacketed kettle and these ingredients are heated to a certain temperature in a controlled manner depending on the type of the active ingredient and mixed until a homogeneous mixture is obtained.

A homogeneous and stable mixture of active and inert ingredients makes the final product simpler, safer, and more efficacious to apply to a target insect.

Once formulated, the products pass to the holding tank by passing through a filter to trap insoluble matters. The formulated and filtered insecticide passes through a packing machine, consisting of several automatic packing-machines functioning in parallel and automated capping and labeling machines.

2. Environmental Impact Assessment

The insecticide formulation is associated with fire, health and environmental hazards unless properly controlled. In order to minimize the adverse impact on environment, the plant shall be

equipped with a seamless technology and the volatiles are sucked with a vacuum system and filtered by passing it through activated carbon packed column before released to the atmosphere. Any liquid waste and floor washings shall be collected to the concrete made and polyethylene lined containment vessel. The waste shall be collected in this vessel and evaporated by solar heat and the remaining solid shall be collected periodically and either incinerated or buried at properly managed land fill. The plant is also equipped with different types of fire extinguishers.

B. ENGINEERING

1. Machinery & Equipment

The total cost of machinery is estimated at Birr 65,500,000, of which Birr 49,125,000 is in foreign currency. The list of machinery and equipment for the production of insecticides in liquid form is indicated in Table 5.1.

Table 5.1

LIST OF MACHINERY & EQUIPMENT

Sr. No.	Machinery	No.
1	Pumping station	1
2	Screw feeder for solid active ingredients	1
3	Mixing kettle with a weigh cell	1
4	Holding tank	1
5	Pump	2
6	Filling and capping machine	1unit
7	Labeling machine	1 unit
8	Air handling system	1unit
9	PLC control unit	1 unit

2. Land, Building and Civil Work

The total area of the project is 5,000 m^2, out of which 3,000 m^2 is a built-up area. The cost of building and civil work is estimated at Birr 12 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 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 1,330,000 of which 10% or Birr 133,000 will be paid in advance. The remaining Birr 1,197,000 will be paid in equal installments with in 28 years i.e. Birr 42,750 annually.

VI. HUMAN RESOURCE & TRAINING REQUIREMENT

A. HUMAN RESOURCE REQUIREMENT

The total human resource required for the envisaged plant is 48. The total annual cost of labor is estimated at Birr 1,455,000. The list of human resource and labor cost are indicated in Table 6.1.

Table 6.1

HUMAN RESOURCE REQUIREMENT & COST

Sr. No.	Job title	No. of Persons	Monthly Salary (Birr)	Annual Salary (Birr)
1	General manager	1	8,000	96,000
2	Secretary	1	2,000	24,000
3	Commercial manager	1	6,000	72,000
4	Sales man	2	6,000	72,000
5	Purchaser	2	6,000	72,000
6	Finance manager	1	6,000	72,000
7	Accountant	2	6,000	72,000
8	Cashier	2	1,800	21,600
9	Clerk	2	1,200	14,400
10	Production and technical	1	6,000	72,000
11	Mechanic	2	4,000	48,000
12	Electrician	2	4,000	48,000
14	Chemist	2	6,000	72,000
15	Junior chemists	2	4,000	48,000
16	Operators	9	18,000	216,000
18	Laborers	4	4,800	57,600
19	General service	12	7,200	86,400
	Sub -total	**48**	**97,000**	**1,164,000**
	Benefit (25% Basic Salary)		24,250	291,000
	Total		**121,250**	**1,455,000**

B. TRAINING REQUIREMENT

The formulation plant is simple mixing operation and does not require a special training to the operators except orientation by the machinery supplier experts during commissioning of the plant. The cost of training is covered in the machinery cost.

VII. FINANCIAL ANALYSIS

The financial analysis of the insecticide 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 128.71 million (See Table 7.1). From the total investment cost the highest share (Birr 79.58 million or 61.83%) is accounted by fixed investment cost followed by initial working capital (Birr 37.10 million or 28.83%) and pre operation cost (Birr 12.02 million or 9.34%). From the total investment cost Birr 49.12 million or 38.17% 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	133.00		133.00	0.10
1.2	Building and civil work	12,000.00		12,000.00	9.32
1.3	Machinery and equipment	16,375.00	49,125.00	65,500.00	50.89
1.4	Vehicles	1,500.00		1,500.00	1.17
1.5	Office furniture and equipment	450.00		450.00	0.35
	Sub -total	**30,458.00**	**49,125.00**	**79,583.00**	**61.83**
2	**Pre operating cost ***				
2.1	Pre operating cost	3,605.00		3,605.00	2.80
2.2	Interest during construction	8,420.76		8,420.76	6.54
	Sub -total	**12,025.76**		**12,025.76**	**9.34**
3	**Working capital****	**37,108.62**		**37,108.62**	**28.83**
	Grand Total	**79,592.38**	**49,125.00**	**128,717.38**	**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 52.98 million. However, only the initial working capital of Birr 37.10 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 186.41 million (see Table 7.2). The cost of raw material account for 84.86% of the production cost. The other major components of the production cost are depreciation, financial cost and repair and maintenance

which account for 7.86%, 3.73% and 1.76%, respectively. The remaining 1.80% is the share of utility, 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	158,190.00	84.86
Utilities	653.70	0.35
Maintenance and repair	3,275.00	1.76
Labor direct	1,164.00	0.62
Labor overheads	291.00	0.16
Administration Costs	500.00	0.27
Land lease cost	-	-
Cost of marketing and distribution	750.00	0.40
Total Operating Costs	**164,823.70**	**88.42**
Depreciation	14,646.00	7.86
Cost of Finance	6,947.13	3.73
Total Production Cost	**186,416.83**	**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 35.19 million to Birr 49.66 million during the life of the project. Moreover, at the end of the project life the accumulated net cash flow amounts to Birr 456.82 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.

$$\text{Break - Even Sales Value} = \frac{\text{Fixed Cost + Financial Cost}}{\text{Variable Margin ratio (\%)}} = \text{Birr } 55{,}945{,}710$$

$$\text{Break - Even Capacity utilization} = \frac{\text{Break -even Sales Value}}{\text{Sales revenue}} \times 100 = 24\%$$

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 2 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 31.95 % 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 227.22 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 48 persons. The project will generate Birr 133.23 million in terms of tax revenue. The establishment of such factory will have a foreign exchange saving effect to the country by substituting the current imports. The project will also create forward linkage with the agricultural sector and also generates income for the Government in terms of payroll tax.

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	27,683.25	31,638.00	35,592.75	39,547.50	39,547.50	39,547.50	39,547.50	39,547.50	39,547.50	39,547.50
Accounts receivable	9,633.47	11,000.75	12,368.03	13,735.31	13,738.87	13,738.87	13,738.87	13,738.87	13,738.87	13,738.87
Cash-in-hand	50.85	58.11	65.38	72.64	73.23	73.23	73.23	73.23	73.23	73.23
CURRENT ASSETS	**37,367.56**	**42,696.86**	**48,026.15**	**53,355.45**	**53,359.60**	**53,359.60**	**53,359.60**	**53,359.60**	**53,359.60**	**53,359.60**
Accounts payable	258.94	295.93	332.93	369.92	369.92	369.92	369.92	369.92	369.92	369.92
CURRENT LIABILITIES	**258.94**	**295.93**	**332.93**	**369.92**	**369.92**	**369.92**	**369.92**	**369.92**	**369.92**	**369.92**
TOTAL WORKING CAPITAL	**37,108.62**	**42,400.92**	**47,693.23**	**52,985.53**	**52,989.69**	**52,989.69**	**52,989.69**	**52,989.69**	**52,989.69**	**52,989.69**

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	110,733	126,552	142,371	158,190	158,190	158,190	158,190	158,190	158,190	158,190
Utilities	458	523	588	654	654	654	654	654	654	654
Maintenance and repair	2,293	2,620	2,948	3,275	3,275	3,275	3,275	3,275	3,275	3,275
Labour direct	815	931	1,048	1,164	1,164	1,164	1,164	1,164	1,164	1,164
Labour overheads	204	233	262	291	291	291	291	291	291	291
Administration Costs	350	400	450	500	500	500	500	500	500	500
Land lease cost	0	0	0	0	43	43	43	43	43	43
Cost of marketing and distribution	750	750	750	750	750	750	750	750	750	750
Total Operating Costs	**115,602**	**132,009**	**148,416**	**164,824**	**164,866**	**164,866**	**164,866**	**164,866**	**164,866**	**164,866**
Depreciation	14,646	14,646	14,646	14,646	14,646	525	525	525	525	525
Cost of Finance	0	9,263	8,105	6,947	5,789	4,631	3,474	2,316	1,158	0
Total Production Cost	**130,248**	**155,918**	**171,167**	**186,417**	**185,302**	**170,023**	**168,865**	**167,707**	**166,549**	**165,391**

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	165,438	189,072	212,706	236,340	236,340	236,340	236,340	236,340	236,340	236,340
Less variable costs	114,852	131,259	147,666	164,074	164,074	164,074	164,074	164,074	164,074	164,074
VARIABLE MARGIN	**50,586**	**57,813**	**65,040**	**72,266**	**72,266**	**72,266**	**72,266**	**72,266**	**72,266**	**72,266**
in % of sales revenue	30.58	30.58	30.58	30.58	30.58	30.58	30.58	30.58	30.58	30.58
Less fixed costs	15,396	15,396	15,396	15,396	15,439	1,318	1,318	1,318	1,318	1,318
OPERATIONAL MARGIN	**35,190**	**42,417**	**49,644**	**56,870**	**56,828**	**70,949**	**70,949**	**70,949**	**70,949**	**70,949**
in % of sales revenue	21.27	22.43	23.34	24.06	24.04	30.02	30.02	30.02	30.02	30.02
Financial costs		9,263	8,105	6,947	5,789	4,631	3,474	2,316	1,158	0
GROSS PROFIT	**35,190**	**33,154**	**41,539**	**49,923**	**51,038**	**66,317**	**67,475**	**68,633**	**69,791**	**70,949**
in % of sales revenue	21.27	17.54	19.53	21.12	21.60	28.06	28.55	29.04	29.53	30.02
Income tax	0	0	0	14,977	15,311	19,895	20,242	20,590	20,937	21,285
NET PROFIT	**35,190**	**33,154**	**41,539**	**34,946**	**35,727**	**46,422**	**47,232**	**48,043**	**48,853**	**49,664**
in % of sales revenue	21.27	17.54	19.53	14.79	15.12	19.64	19.98	20.33	20.67	21.01

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	**83,188**	**211,226**	**189,109**	**212,743**	**236,340**	**236,340**	**236,340**	**236,340**	**236,340**	**236,340**	**236,340**	**68,743**
Inflow funds	83,188	45,788	37	37	0	0	0	0	0	0	0	0
Inflow operation	0	165,438	189,072	212,706	236,340	236,340	236,340	236,340	236,340	236,340	236,340	0
Other income	0	0	0	0	0	0	0	0	0	0	0	68,743
TOTAL CASH OUTFLOW	**83,188**	**161,390**	**158,180**	**173,429**	**203,656**	**197,550**	**200,972**	**200,161**	**199,351**	**198,540**	**186,151**	**0**
Increase in fixed assets	83,188	0	0	0	0	0	0	0	0	0	0	0
Increase in current assets	0	37,368	5,329	5,329	5,329	4	0	0	0	0	0	0
Operating costs	0	114,852	131,259	147,666	164,074	164,116	164,116	164,116	164,116	164,116	164,116	0
Marketing cost	0	750	750	750	750	750	750	750	750	750	750	0
Income tax	0	0	0	0	14,977	15,311	19,895	20,242	20,590	20,937	21,285	0
Financial costs	0	8,421	9,263	8,105	6,947	5,789	4,631	3,474	2,316	1,158	0	0
Loan repayment	0	0	11,579	11,579	11,579	11,579	11,579	11,579	11,579	11,579	0	0
SURPLUS (DEFICIT)	**0**	**49,836**	**30,929**	**39,314**	**32,684**	**38,790**	**35,368**	**36,179**	**36,989**	**37,800**	**50,189**	**68,743**
CUMULATIVE CASH BALANCE	**0**	**49,836**	**80,766**	**120,080**	**152,764**	**191,554**	**226,922**	**263,101**	**300,091**	**337,891**	**388,080**	**456,823**

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**	**165,438**	**189,072**	**212,706**	**236,340**	**236,340**	**236,340**	**236,340**	**236,340**	**236,340**	**236,340**	**68,743**
Inflow operation	0	165,438	189,072	212,706	236,340	236,340	236,340	236,340	236,340	236,340	236,340	0
Other income	0	0	0	0	0	0	0	0	0	0	0	68,743
TOTAL CASH OUTFLOW	**120,297**	**120,894**	**137,301**	**153,709**	**179,805**	**180,178**	**184,762**	**185,109**	**185,456**	**185,804**	**186,151**	**0**
Increase in fixed assets	83,188	0	0	0	0	0	0	0	0	0	0	0
Increase in net working capital	37,109	5,292	5,292	5,292	4	0	0	0	0	0	0	0
Operating costs	0	114,852	131,259	147,666	164,074	164,116	164,116	164,116	164,116	164,116	164,116	0
Marketing cost	0	750	750	750	750	750	750	750	750	750	750	0
Income tax		0	0	0	14,977	15,311	19,895	20,242	20,590	20,937	21,285	0
NET CASH FLOW	**-120,297**	**44,544**	**51,771**	**58,997**	**56,535**	**56,162**	**51,578**	**51,231**	**50,884**	**50,536**	**50,189**	**68,743**
CUMULATIVE NET CASH FLOW	**-120,297**	**-75,753**	**-23,982**	**35,016**	**91,551**	**147,713**	**199,291**	**250,522**	**301,406**	**351,942**	**402,131**	**470,875**
Net present value	-120,297	40,495	42,786	44,326	38,614	34,872	29,115	26,290	23,738	21,432	19,350	26,504
Cumulative net present value	-120,297	-79,802	-37,016	7,309	45,924	80,796	109,911	136,200	159,938	181,370	200,720	227,224

NET PRESENT VALUE	227,224
INTERNAL RATE OF RETURN	31.95%
PAYBACK	2 years