

**191. PROFILE ON THE PRODUCTION OF AGRO-
CHEMICALS SPRAYER**

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I. SUMMARY

This profile envisages the establishment of a plant for the production of agro-chemicals sprayer with a capacity of 45,000 pieces per annum. Agro-chemicals sprayer is equipment made of high-density polyethylene (HDPE) plastic material (tank) used for holding agro-chemicals (pesticide, insecticide) in liquid form.

The demand for agro-chemicals sprayer is met through import. Accordingly, the present (2012) effective demand for the agro-chemicals sprayer is estimated at 1,201,425 units. The demand for agro-chemicals sprayer is projected to reach 1,685,061 units and 2,363,385 units by the year 2017 and 2022, respectively.

The principal raw materials required are HDPE plastic tank, strainer, caps, handle grip, pump, powder coating M.S rod, M.S strip, M.S wire, M.S pipe which have to be imported.

The total investment cost of the project including working capital is estimated at Birr 11.40 million. From the total investment cost the highest share (Birr 7.93 million or 69.53%) is accounted by fixed investment cost followed by initial working capital (Birr 2.29 million or 20.06%) and pre operation cost (Birr 1.19 million or 10.40%). From the total investment cost Birr 2.50 million or 21.93% is required in foreign currency.

The project is financially viable with an internal rate of return (IRR) of 21.75% and a net present value (NPV) of Birr 7.84 million discounted at 10%.

The project can create employment for 18 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

Agro-Chemicals sprayer is equipment made of high-density polyethylene (HDPE) plastic material (tank) used for holding agro-chemicals (pesticide, insecticide) in liquid form.

The sprayer comprises of a high density polyethylene plastic tank for holding the agro-chemical in liquid form, detachable piston type hydraulic pump and pressure chamber made of brass, suction hose with strainer, steel frame/ stand, operating lever, foam cushioned back pad and shoulder straps and delivery hose with cut-off device, goose-neck lance and adjustable triple action nozzle. The following are the special features of the product:

- Sprayer can be operated either with left or right hand as per choice.
- Pump and pressure chamber assembly has been mounted outside the chemical tank for easy maintenance and to minimize direct contact with the chemical.
- High volumetric capacity of pressure chamber to minimize fluctuation in pressure and discharge rate.
- Chemical tank detachable from pump and pressure chamber assembly for easy replacement for spraying different types of agro-chemical.
- Longer length of pump operating lever higher mechanical advantage.
- Foam cushioned back pad and shoulder straps for fatigueless working with the sprayer.
- Light in weight for comfortable carriage of the sprayer on the back of the operator.

Level-operated knapsack sprayer fitted with a hydraulic pump is a high volume sprayer. It is operated at a normal working pressure of 300 KPa. The pressure is employed to atomize the spraying liquid into droplets. The droplet size (VMD) is about 400 micron. About 300 to 500 liters of solution is normally sprayed per hectare while working with this type of sprayer. The equipment is useful for spraying almost all types of agro-chemicals.

III. MARKET STUDY AND PLANT CAPACITY

A. MARKET STUDY

1. Past Supply and Present Demand

The country's requirement for the product has been essentially met through imports. The amount of imports of the product during 2002-2011 is shown in Table 3.1.

Table 3.1
IMPORT OF SPRAYERS FOR AGRO CHEMICAL (UNITS)

Year	Quantity
2002	12,474
2003	70,787
2004	1,124,108
2005	760,952
2006	1,341,091
2007	1,300,709
2008	1,035,963
2009	548,100
2010	741,405
2011	1,109,042

Source: - Ethiopian Revenue and Custom Authority.

As can be seen from Table 3.1, the imported amount of agro chemical spryer considerably fluctuated but with a rising trend. For example during the first five years (2002- 2006) the average annual import which was 661,882 units has increased to an average of 947,044 units during subsequent five years (2007 – 2011).

Excluding year 2002 and 2003 where import or total supply was exceptional low import has registered an average annual growth rate of 8.33%. Accordingly, assuming that the trend exhibited in the total supply of the product will continue at least in the near future, the present (2012) demand for the product is estimated at 1,201,425 units by taking the 2011 import as a base and applying a growth rate of 8.33%.

2. Projected Demand

The demand for agro chemical sprayer depends on the performance of the agriculture sector. According to the GTP, during the period 2010/11 – 2014/15 the agriculture sector of the country (at a base case scenario) is expected to grow at an average annual growth rate of 8.6%.

However, in order to be conservative a growth rate of 7% which is slightly lower than the anticipated growth rate of the agriculture sector during the GTP period is used to project the demand for the product. Accordingly, using the estimated present demand as a base and applying a growth rate of 7% the projected demand for agro chemical sprayer is shown in Table 3.2.

Table 3.2

PROJECTED DEMAND FOR AGRO CHEMICAL SPRAYER (UNITS)

Year	Projected Demand
2013	1,285,525
2014	1,375,512
2015	1,471,798
2016	1,574,823
2017	1,685,061
2018	1,803,015
2019	1,929,226
2020	2,064,272
2021	2,208,771
2022	2,363,385
2023	2,528,822
2024	2,705,840
2025	2,895,249

3. Pricing and Distribution

Based on the CIF price of the product in 2011 (the latest data available), and allowing 30% for import duty and other clearing expenses, the factory gate price for the envisaged plant is estimated at Birr 324.63 per unit. The product can get its market outlet through the existing wholesale and retail network for agricultural inputs. The envisaged plant can also supply its product directly to users or appoint agents at selected locations.

B. PLANT CAPACITY AND PRODUCTION PROGRAM

1. Plant Capacity

The plant is envisaged to produce 45,000 pieces of sprayers per year, in 300 working days and operating 8 hours per day.

2. Production Program

By considering the time for skill development and market penetration the plant is assumed to start at 75% of its installed capacity. During the second and third year it will increase to 80% and 90% of capacity utilization. In the fourth year and then after it will operate at full capacity. The production programme is shown in Table 3.3.

Table 3.3
PRODUCTION PROGRAM

Year	1	2	3	4
Capacity utilisation (%)	70	80	90	100
Production programme (tons)	31,500	36,000	40,500	45,000

IV. MATERIALS AND INPUTS

A. RAW MATERIALS

Tank , strainer, caps, handle grip, pump, powder coating; M.S rod, M.S strip, M.S wire, M.S pipe and various bought out fitting are the required materials. Table 4.1 below provides list and costs of raw materials required for the project at full capacity operation.

Table 4.1
ANNUAL RAW MATERIAL REQUIREMENT& COST

Sr. No.	Raw Material	Unit	Quantity	('000 Birr)		
				FC	LC	Total
1	M.S. Rod	ton	27		277.80	277.80
2	M.S. Strip	ton	78		802.50	802.50
3	M.S. Wire	ton	2.4		24.75	24.75
4	M.S. Pipe	ton	7.8		100.50	100.50
5	M.S. Channel with lever	pcs	45,000		588.45	588.45
6	Tank, Strainer, Caps, handle grip, pump and all other sprayer components ,powder coating, spares and operational manuals and parts catalogue	set	45,000	5,625.00	1,125.00	6,750.00
7	Packaging materials, plastic bags and cartons	set	45,000		941.70	941.70
	Grand Total			5,625.00	3,860.70	9,485.70

B. UTILITIES

Utilities such as water and electricity are required by the plant. Annual cost of utilities is Birr 85,600. The annual consumption at full capacity operation is shown in Table 4.2 below.

Table 4.2**ANNUAL CONSUMPTION OF UTILITIES & COST**

Sr. No	Utility	Unit	Quantity	('000 Birr)		
				F.C	L.C	Total
1	Water	m ³	240	-	2.4	2.4
2	Electricity	kWh	144,000		83.2	83.2
	Total			-	85.6	85.6

V. TECHNOLOGY AND ENGINEERING**A. TECHNOLOGY****1. Production Process**

Lever-operated knapsack sprayer consists of a number of components which includes parts manufactured by different processes such as brass forgings and castings, fabrication work such as sheet metal forming ,welding, brazing ,soldering, plastic molding , machining & grinding, and surface treatment such as chemical polishing, coating, painting etc. In light of the above enlisted processes, tools for production of components shall be developed and sources of supply be identified within the country.

The operations such as welding, brazing, soldering and chemical finishing etc. shall be performed with in-house facilities.

All the components and sub-assemblies shall undergo strict quality control measures before assembly of the spares.

The sprayer shall be thoroughly tested for performance as per relevant specifications in a modern laboratory proposed to be established at the works.

2. Environmental Impact

The manufacturing involves cutting of sheet metal, cutting rods and flat bars, fabrication painting and assembly. Hence, the plant does not have negative impact on the environment.

B. ENGINEERING

1. Machinery and Equipment

The list of machinery and equipment required by the plant is given in Table 5.1. The total cost of machinery and equipment is estimated at Birr 2.5 million, out of which Birr 2.0 million will be required in foreign currency.

Table 5.1
LIST OF MACHINERY AND EQUIPMENT

Sr .No.	Type of Machine	Qty
1	Welding Set	1
2	Gas Welding Equipment	1
3	Drilling Machine	1
4	Pedestal Grinder	1
5	Portable Drilling Machine	1
6	Air Compressor	1
7	Spray Painting Gun	1
8	Roll Marking Machine	1
9	Impact Press	1
10	Test Rigs	1
11	Jigs, Fixtures, and press tools	1 set

2. Land, Building and Civil Works

The envisaged plant requires a total land area of 1,000 m², of which 750 m² would be built-up area. Building construction cost at a rate of Birr 5,000/m² is estimated to be Birr 3.75 million.

According to the Federal Legislation on the Lease Holding of Urban Land (Proclamation No 7212004) 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

Zone	Level	Floor Price/m²
	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 266,000 of which 10% or Birr 26,600 will be paid in advance. The remaining Birr 239,400 will be paid in equal installments with in 28 years i.e. Birr 8,550 annually.

VI. HUMAN RESOURCE AND TRAINING REQUIREMENT

A. HUMAN RESOURCE REQUIREMENT

The plant will employ a total of 18 persons. Annual cost of labour, including employees benefit, is Birr 343,400. The human resource requirement of the plant and the monthly and annual salary expenditure are shown in Table 6.1.

Table 6.1
REQUIRED HUMAN RESOURCE AND COST

Sr.No.	Manpower	No.	Monthly Salary	Annual Cost
1	General Manager	1	6,000	72,000
2	Technical "	1	4,500	50,000
3	Administrative Manager	1	2,500	30,000
4	Production Head	1	3,000	36,000
5	Supervisor	1	2,500	30,000
6	Skilled operators	3	3,600	43,200
7	Semiskilled Operators	2	1,900	22,800
8	Maintenance crew	2	2,400	28,800
9	Unskilled (Labourers)	3	1,350	16,200
10	Guards	3	1,200	14,400
	Total	18	28,950	343,400

B. TRAINING REQUIREMENT

The technical personnel of the plant should be trained by qualified engineers. The cost of training is estimated at about Birr 100,000.

VII. FINANCIAL ANALYSIS

The financial analysis of agro-chemicals sprayer project is based on the data presented in the previous chapters and the following assumptions:-

Construction period	1 year
Source of finance	30 % equity and 70% loan
Tax holidays	5 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 11.40 million (See Table 7.1). From the total investment cost the highest share (Birr 7.93 million or 69.53%) is accounted by fixed investment cost followed by initial working capital (Birr 2.29 million or 20.06%) and pre operation cost (Birr 1.19 million or 10.40%). From the total investment cost Birr 2.50 million or 21.93% 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	26.60		26.60	0.23
1.2	Building and civil work	3,750.00		3,750.00	32.90
1.3	Machinery and equipment	500.00	2,500.00	3,000.00	26.32
1.4	Vehicles	900.00		900.00	7.90
1.5	Office furniture and equipment	250.00		250.00	2.19
	Sub total	5,426.60	2,500.00	7,926.60	69.53
2	Pre operating cost *				
2.1	Pre operating cost	440.00		440.00	3.86
2.2	Interest during construction	745.76		745.76	6.54
	Sub total	1,185.76		1,185.76	10.40
3	Working capital **	2,287.16		2,287.16	20.06
	Grand Total	8,899.52	2,500.00	11,399.52	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 3.29 million. However, only the initial working capital of Birr 2.28 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 12.60 million (see Table 7.2). The cost of raw material account for 75.27% of the production cost. The other major components of the production cost are depreciation, financial cost, direct labor, and cost of marketing and distribution which account for 8.28%, 5.70%, 2.72%, and 3.97% respectively. The remaining 4.06% is the share of utility, repair and maintenance, labor overhead and administration cost. For detail production cost see Appendix 7.A.2.

Table 7.2**ANNUAL PRODUCTION COST AT FULL CAPACITY (year four)**

Items	Cost (000 Birr)	%
Raw Material and Inputs	9,486	75.27
Utilities	86	0.68
Maintenance and repair	90	0.71
Labor direct	343	2.72
Labor overheads	86	0.68
Administration Costs	250	0.20
Land lease cost	0	0.00
Cost of marketing and distribution	500	3.97
Total Operating Costs	10,841	86.03
Depreciation	1,043	8.28
Cost of Finance	718	5.70
Total Production Cost	12,602	100.00

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 will grow from Birr 2.20 million to Birr 2.51 million during the life of the project. Moreover, at the end of the project life the accumulated net cash flow amounts to Birr 21.34 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.

$$\text{Break Even Sales Value} = \frac{\text{Fixed Cost} + \text{Financial Cost}}{\text{Variable Margin ratio (\%)}} = \text{Birr } 5,522,160$$

$$\text{Break Even Capacity utilization} = \frac{\text{Break even Sales Value}}{\text{Sales revenue}} \times 100 = 54.97\%$$

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 6 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 21.75% 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 7.84 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 18 persons. The project will generate Birr 5.07 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 chemical sub sector and agricultural sector and also generates other income for the government.

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	6,640	8,537	9,486	9,486	9,486	9,486	9,486	9,486	9,486	9,486
Utilities	60	77	86	86	86	86	86	86	86	86
Maintenance and repair	63	81	90	90	90	90	90	90	90	90
Labour direct	240	309	343	343	343	343	343	343	343	343
Labour overheads	60	77	86	86	86	86	86	86	86	86
Administration Costs	175	225	250	250	250	250	250	250	250	250
Land lease cost	0	0	0	0	9	9	9	9	9	9
Cost of marketing and distribution	500	500	500	500	500	500	500	500	500	500
Total Operating Costs	7,739	9,807	10,841	10,841	10,850	10,850	10,850	10,850	10,850	10,850
Depreciation	1,043	1,043	1,043	1,043	1,043	175	175	175	175	175
Cost of Finance	0	820	718	615	513	410	308	205	103	0
Total Production Cost	8,782	11,670	12,602	12,499	12,405	11,435	11,332	11,230	11,127	11,025

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	10,226	11,687	13,148	14,608	14,608	14,608	14,608	14,608	14,608	14,608
Less variable costs	7,239	9,307	10,341	10,341	10,341	10,341	10,341	10,341	10,341	10,341
VARIABLE MARGIN	2,987	2,380	2,807	4,267	4,267	4,267	4,267	4,267	4,267	4,267
in % of sales revenue	29.21	20.37	21.35	29.21	29.21	29.21	29.21	29.21	29.21	29.21
Less fixed costs	1,543	1,543	1,543	1,543	1,552	684	684	684	684	684
OPERATIONAL MARGIN	1,444	837	1,264	2,724	2,715	3,583	3,583	3,583	3,583	3,583
in % of sales revenue	14.12	7.16	9.61	18.65	18.59	24.53	24.53	24.53	24.53	24.53
Financial costs		820	718	615	513	410	308	205	103	0
GROSS PROFIT	1,444	17	546	2,109	2,203	3,173	3,276	3,378	3,481	3,583
in % of sales revenue	14.12	0.14	4.15	14.44	15.08	21.72	22.42	23.13	23.83	24.53
Income (corporate) tax	0	0	0	0	0	952	983	1,014	1,044	1,075
NET PROFIT	1,444	17	546	2,109	2,203	2,221	2,293	2,365	2,437	2,508
in % of sales revenue	14.12	0.14	4.15	14.44	15.08	15.21	15.70	16.19	16.68	17.17

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	8,367	13,284	11,694	13,152	14,608	14,608	14,608	14,608	14,608	14,608	14,608	6,273
Inflow funds	8,367	3,058	7	4	0	0	0	0	0	0	0	0
Inflow operation	0	10,226	11,687	13,148	14,608	14,608	14,608	14,608	14,608	14,608	14,608	0
Other income	0	0	0	0	0	0	0	0	0	0	0	6,273
TOTAL CASH OUTFLOW	8,367	10,797	12,301	12,909	12,482	12,389	13,237	13,165	13,094	13,022	11,925	0
Increase in fixed assets	8,367	0	0	0	0	0	0	0	0	0	0	0
Increase in current assets	0	2,312	649	324	0	1	0	0	0	0	0	0
Operating costs	0	7,239	9,307	10,341	10,341	10,350	10,350	10,350	10,350	10,350	10,350	0
Marketing and Distribution cost	0	500	500	500	500	500	500	500	500	500	500	0
Income tax	0	0	0	0	0	0	952	983	1,014	1,044	1,075	0
Financial costs	0	746	820	718	615	513	410	308	205	103	0	0
Loan repayment	0	0	1,025	1,025	1,025	1,025	1,025	1,025	1,025	1,025	0	0
SURPLUS (DEFICIT)	0	2,487	-607	243	2,126	2,219	1,371	1,443	1,514	1,586	2,683	6,273
CUMULATIVE CASH BALANCE	0	2,487	1,880	2,123	4,249	6,469	7,840	9,282	10,797	12,383	15,066	21,339

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	10,226	11,687	13,148	14,608	14,608	14,608	14,608	14,608	14,608	14,608	6,273
Inflow operation	0	10,226	11,687	13,148	14,608	14,608	14,608	14,608	14,608	14,608	14,608	0
Other income	0	0	0	0	0	0	0	0	0	0	0	6,273
TOTAL CASH OUTFLOW	10,654	8,380	10,128	10,841	10,842	10,850	11,802	11,832	11,863	11,894	11,925	0
Increase in fixed assets	8,367	0	0	0	0	0	0	0	0	0	0	0
Increase in net working capital	2,287	642	321	0	1	0	0	0	0	0	0	0
Operating costs	0	7,239	9,307	10,341	10,341	10,350	10,350	10,350	10,350	10,350	10,350	0
Marketing and Distribution cost	0	500	500	500	500	500	500	500	500	500	500	0
Income (corporate) tax		0	0	0	0	0	952	983	1,014	1,044	1,075	0
NET CASH FLOW	-10,654	1,846	1,559	2,307	3,766	3,758	2,806	2,776	2,745	2,714	2,683	6,273
CUMULATIVE NET CASH FLOW	-10,654	-8,808	-7,249	-4,942	-1,176	2,583	5,389	8,165	10,910	13,624	16,308	22,580
Net present value	-10,654	1,678	1,289	1,733	2,572	2,334	1,584	1,424	1,281	1,151	1,035	2,418
Cumulative net present value	-10,654	-8,976	-7,687	-5,954	-3,382	-1,048	536	1,961	3,241	4,392	5,427	7,845

NET PRESENT VALUE	7,845
INTERNAL RATE OF RETURN	21.75%
NORMAL PAYBACK	6 years