

**102. PROFILE ON THE PRODUCTION OF GLASS
PACKING MATERIALS**

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I. SUMMARY

This profile envisages the establishment of a plant for the production of glass packing materials with a capacity of 8,200 tons per annum. Glass packing materials is a desirable packaging material.

The demand for glass packing materials is entirely met through import. The present (2012) demand for glass packing materials is estimated at 10,680 tons. The demand for glass packing materials is projected to reach 17,201 tons and 27,702 tons by the year 2017 and 2022, respectively.

The principal raw materials required are silica, limestone, soda ash and cullet which are available locally.

The total investment cost of the project including working capital is estimated at Birr 51.19 million. From the total investment cost, the highest share (Birr 42.22 million or 82.48%) is accounted by fixed investment cost followed by pre operation cost (5.38 million or 10.51%) and initial working capital (Birr 3.59 million or 7.01%). From the total investment cost, Birr 26.20 million or 51.18% is required in foreign currency.

The project is financially viable with an internal rate of return (IRR) of 33.96% and a net present value (NPV) of Birr 62.51 million, discounted at 10%.

The project can create employment for 76 persons. The project will generate Birr 39.04 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 mining sector and forward linkage with manufacturing sub sector and also generates other income for the Government.

II. PRODUCT DESCRIPTION AND APPLICATION

Glass can be moulded into a variety of shapes. It can also be manufactured in a variety of colors. One of the reasons for using glass is that the product can be seen inside it. Although glass is rigid (it is not flexible) it can be recycled. All these factors make glass packing materials such as carboys, flasks and jar a desirable packaging material.

III. MARKET STUDY AND PLANT CAPCITY

A. MARKET STUDY

1. Past Supply and Present Demand

The local demand for glass packing materials such as carboys, flasks and jars is met through import. Table 3.1 shows the annual import of glass packing materials during the period 2002 - 2011.

Table 3.1
IMPORT OF GLASS PACKING MATERIALS (TONS)

Year	Quantity
2002	360
2003	752
2004	3,314
2005	6,237
2006	4,162
2007	10,180
2008	15,269
2009	9,145
2010	9,785
2011	13,111

Source: - Ethiopian Revenue and Customs Authority.

As can be seen from Table 3.1, import or total supply of glass packing materials fluctuate from year to year. However a general growth trend can still be observed. For example the average

annual import which was 3,435 tons during 2003-2005 has increased to an average of 9,870 tons during the successive three years (2006-2008). Moreover, during the subsequent three years (2009-2011) import has further increased to 10,680 tons.

For estimating the present demand for the products under consideration, due to the nature of the supply data, it is assumed that the average import or apparent consumption during the recent three years (2009-2011) can fairly approximate the present demand. Accordingly, the present (2012) effective demand for glass packing materials is estimated at 10,680 tons.

2. Demand Projection

The demand for glass packing materials depends on the performance of the industrial sector. According to the GTP, during the period 2010/11--2014/15 the real GDP of the country (at a base case scenario) is expected to grow at an average annual growth rate of 11.2%. Moreover, during the same period the annual average planned targets of growth for the industrial sector is 20%. Accordingly, by considering the above factors the demand for glass packing materials is conservatively assumed to grow at a rate of 10%. Projected demand is presented in Table 3.2.

Table 3.2

PROJECTED DEMAND FOR GLASS PACKING MATERIALS (TONS)

Year	Projected Demand
2013	11,748
2014	12,923
2015	14,215
2016	15,637
2017	17,201
2018	18,921
2019	20,813
2020	22,894
2021	25,184
2022	27,702
2023	30,472

3. Pricing and Distribution

After assessing the current C.I.F price of glass packing materials, an ex-factory price of Birr 4,650/ton is proposed for the envisaged project. The product can be distributed directly to end users.

B. PLANT CAPACITY AND PRODUCTION PROGRAM

1. Plant Capacity

Based on demand projection shown in Table 3.2, and capital requirement, the envisaged glass bottles and tumblers plant will have a capacity of producing 8,200 tons of packing materials per annum. The proposed plant is an energy intensive unit where large quantity of fuel oil is required in order to operate the glass melting furnace. Such a plant is required to operate continuously for 24 hours a day and for 350 days a year. Therefore, the proposed plant operates three shifts a day.

2. Production Program

In order to provide adequate time for developing the skill of producing glass materials, and develop market outlets at different locations of the country, it would be advisable to start production at a lower level and gradually build up the scale of production. Accordingly, the envisaged plant will start operation at 65% of its production capacity, during the first year of operation, and then raise up production to 80%, 90% and lastly to 100% during the next succeeding years. Table 3.3 below shows production program.

Table 3.3

PRODUCTION PROGRAM

Description	Unit	Production Year			
		1	2	3	4 and beyond
Glass Bottles	tons	5330	6560	7380	8200
Capacity Utilization	%	70	80	90	100

IV. RAW MATERIALS AND INPUTS

A. RAW & AUXILIARY MATERIALS

The major raw materials required for manufacturing of glass for packing are silica, limestone, soda ash and cullet. These major glass raw materials are readily available in the Ethiopia. Silica (sand stone) is the most important oxide and constitutes the larger portion of all the glass making raw materials.

In addition to raw materials, auxiliary materials like include dolomite, ceramic colors (enamel), and packaging materials are required. Annual consumption of these materials at full production capacity of the plant and their estimated cost is given in Table 4.1.

Table 4.1
RAW AND AUXILIARY MATERIALS

Sr.No.	Description	Qty.	Cost ('000 Birr)		
			FC	LC	TC
	<u>A. Raw Material</u>				
1	Silica sand	5,250	-	904.05	904.05
2	Limestone	1,450	-	289.49	289.49
3	Soda Ash	1,600	-	7,851.57	7,851.57
4	Cullet	1,450		356.70	356.70
	Sub – total	-	-	9,401.81	9,401.81
	<u>B. Auxiliary Material</u>				
1	Dolomite	280	-	179.27	179.27
2	Ceramic Color (Enamel)	5	675.9	-	675.90
3	Packing Materials	As req		425.00	425.00
	Sub-total	-	675.9	604.27	1280.17
	Total Cost		675.9	10,006.08	10,681.98

B. UTILITIES

The major utilities required by the envisaged project are electricity, water and furnace fuel. The total cost of utilities is estimated at Birr 16,280,907. The annual requirement of utilities and associated cost is shown in Table 4.2.

Table 4.2
UTILITIES REQUIREMENT & COST

Sr.No.	Utilities	UOM	Qty.	Total Cost (Birr)
1	Electric power	KWh	2,451,303	1,421,756
2	Water	M ³	177,129	1,771,290
3	Furnace oil	lit	654,394	13,087,861
	Grand Total			16,280,907

VI TECHNOLOGY AND ENGINEERING

A. TECHNOLOGY

1. Production Process

Production process mainly involves cleaning, mixing, molding and packing. These processes are discussed in brief as follows.

Cleaning and mixing: - The foreign matter and pieces of iron contained in the raw material will be removed and weighed in proportion to the mixing ratio with auxiliary material. Then, the mixture is proposed into molten, refined glass in the furnace at the temperature of approximately 1,500⁰c.

Molding: - The molten mixture is molded by bottle forming and tumbler forming machines and cooled slowly in the annealing Lehr.

Packing: - Going through inspection, the annealed product is packed and delivered. After glazing, final inspection will be conducted for delivery.

2. Environmental Impact assessment

Glass containers are wholly recyclable. The main impacts of this processing technology to the environment are noise to the residential areas, water pollution by NO_x and SO_x. Therefore the envisaged plant will be located in non-residential areas; and water treatment unit for neutralizing the acid wastes will be considered. The cost of waste water treatment unit is included in the cost of machinery and equipment.

B. ENGINEERING

1. Machinery and Equipment

The required machinery and equipment for the production of glass and tumblers plant will be acquired from abroad. The total machinery and equipment cost is estimated at Birr 27.638 million, out of which about Birr 26.20 million will be required in foreign currency. The detailed list of machinery and equipment is given in Table 5.1.

Table 5.1

MACHINERY AND EQUIPMENT REQUIREMENT & COST

Description	UOM	Qty.
A. Machinery		
1. Raw material preparation plant	Set	1
2. Melting furnace	Pcs	1
3. Forming Machine	Pcs	1
4. Annealing oven/lehr	Pcs	1
5. Decorating and packing machine	Set	1
6. Compressor	Pcs	2
7. Boiler	Pcs	1
8. Generator	Pcs	2
9. Pumps	Pcs	1
10. Waste water treatment unit	Set	1
B. Installation costs		

Description	UOM	Qty.
1. Oil system	Set	1
2. LPG system	Set	1
3. Electrical System	Set	1
4. Cooling system	Set	1
C. Equipments		
1. Office furniture	Set	6
2. Vehicles	Pcs	2

2. Land, Building and Civil Works

The envisaged plant will require a total land area of 5,000 m², out of which 2,500 m² will be covered by factory and office buildings, stores, etc. At the rate of Birr 5,000 per m² the total cost of building and civil work is estimated at Birr 12.5 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 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 AND TRAINING REQUIREMENT

A. HUMAN RESOURCE REQUIREMENT

The total human resource requirement of the envisaged project is 76 persons. Annual cost of labor, including employees benefit, is estimated at Birr 1,265,460. The proposed human resource and the estimated annual labor cost are indicated in Table 6.1.

Table 6.1
HUMAN RESOURCE REQUIREMENT AND LABOR COST

Sr. No.	Description	Req. No.	Monthly Salary (Birr)	Annual Salary (Birr)
1	General Manager	1	6,500	78,000
2	Executive Secretary	1	1,800	21,600
3	Production and Technical Manager	1	4,000	48,000
4	Commercial and Marketing Manager	1	4,000	48,000
5	Finance Manager	1	3,600	43,200
6	Administration Manager	1	3,600	43,200
7	Personnel	1	2,600	31,200
8	Secretary	3	1400	50,400
9	Glass Technologist	1	2,800	33,600
10	Production Workers	24	1,200	345,600
11	Technicians	6	1,400	100,800
12	Sales man	3	2,000	72,000
13	Store Head	1	1,800	21,600
14	General Accountant	2	1,800	43,200
15	Finance and Budget Accountant	2	1,800	43,200
16	General Service	8	800	76,800
Sub-total		57		1,100,400
Employees Benefit (15% BS)				165,060
Total				1,265,460

B. TRAINING REQUIREMENT

Training is required for technical staff and operators for a period of at least one month. It is recommended that machinery supplier will provide on-job training. A total of Birr 50,000 is allotted to execute the training program.

VII. FINANCIAL ANALYSIS

The financial analysis of the glass packing materials 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
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 51.19 million (see Table 7.1). From the total investment cost, the highest share (Birr 42.22 million or 82.48%) is accounted by fixed investment cost followed by pre operation cost (5.38 million or 10.51%) and initial working capital (Birr 3.59 million or 7.01%). From the total investment cost, Birr 26.20 million or 51.18% 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	0.26
1.2	Building and civil work	12,500.00		12,500.00	24.42
1.3	Machinery and equipment	1,438.00	26,200.00	27,638.00	53.99
1.4	Vehicles	1,500.00		1,500.00	2.93
1.5	Office furniture and equipment	450.00		450.00	0.88
	Sub total	16,021.00	26,200.00	42,221.00	82.48
2	Pre operating cost *				
2.1	Pre operating cost	2,031.90		2,031.90	3.97
2.2	Interest during construction	3,348.97		3,348.97	6.54
	Sub total	5,380.87		5,380.87	10.51
3	Working capital **	3,589.54		3,589.54	7.01
	Grand Total	24,991.41	26,200.00	51,191.41	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 5.34 million. However, only the initial working capital of Birr 3.58 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 40.10 million (see Table 7.2). Utility account for 40.60% of the production cost. The other major components of the production cost are cost of raw material, depreciation, and financial cost which account for 26.64%, 16.91%, and 6.89%, respectively. The remaining 8.96% is the share of direct labor, repair and maintenance, marketing and distribution, 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	10,682	26.64
Utilities	16,281	40.60
Maintenance and repair	829	2.07
Labor direct	1,100	2.74
Labor overheads	165	0.41
Administration Costs	500	1.25
Land lease cost	0	0.00
Cost of marketing and distribution	1,000	2.49
Total Operating Costs	30,557	76.20
Depreciation	6,779	16.91
Cost of Finance	2,763	6.89
Total Production Cost	40,099	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 8.95 million to Birr 15.22 million during the life of the project. Moreover, at the end of the project life the accumulated net cash flow amounts to Birr 131.18 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.

$$\text{Break -Even Sales Value} = \frac{\text{Fixed Cost} + \text{Financial Cost}}{\text{Variable Margin ratio (\%)}} = \text{Birr } 22,213,800$$

$$\text{Break- Even Capacity utilization} = \frac{\text{Break- even Sales Value}}{\text{Sales revenue}} \times 100 = 33.34 \%$$

4. Pay-back Period

The payback period, also called pay – off period is defined as the period required for recovering the original investment outlay through the accumulated net cash flows earned by the project. Accordingly, based on the projected cash flow it is estimated that the project’s initial investment will be fully recovered within 3 years.

5. Internal Rate of Return

The internal rate of return (IRR) is the annualized effective compounded return rate that can be earned on the invested capital, i.e., the yield on the investment. Put another way, the internal rate

of return for an investment is the discount rate that makes the net present value of the investment's income stream total to zero. It is an indicator of the efficiency or quality of an investment. A project is a good investment proposition if its IRR is greater than the rate of return that could be earned by alternate investments or putting the money in a bank account. Accordingly, the IRR of this project is computed to be 33.96% 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 62.51 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 76 persons. The project will generate Birr 39.04 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 mining sector and forward linkage with manufacturing sub 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	7,477	8,546	9,614	10,682	10,682	10,682	10,682	10,682	10,682	10,682
Utilities	11,397	13,025	14,653	16,281	16,281	16,281	16,281	16,281	16,281	16,281
Maintenance and repair	580	663	746	829	829	829	829	829	829	829
Labour direct	770	880	990	1,100	1,100	1,100	1,100	1,100	1,100	1,100
Labour overheads	116	132	149	165	165	165	165	165	165	165
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	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Total Operating Costs	21,690	24,646	27,601	30,557	30,600	30,600	30,600	30,600	30,600	30,600
Depreciation	6,779	6,779	6,779	6,779	6,779	545	545	545	545	545
Cost of Finance	0	3,684	3,223	2,763	2,302	1,842	1,381	921	460	0
Total Production Cost	28,469	35,108	37,604	40,099	39,681	32,987	32,526	32,066	31,605	31,145

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	37,023	42,312	47,601	52,890	52,890	52,890	52,890	52,890	52,890	52,890
Less variable costs	20,690	23,646	26,601	29,557	29,557	29,557	29,557	29,557	29,557	29,557
VARIABLE MARGIN	16,333	18,666	21,000	23,333	23,333	23,333	23,333	23,333	23,333	23,333
in % of sales revenue	44.12	44.12	44.12	44.12	44.12	44.12	44.12	44.12	44.12	44.12
Less fixed costs	7,779	7,779	7,779	7,779	7,822	1,588	1,588	1,588	1,588	1,588
OPERATIONAL MARGIN	8,554	10,887	13,221	15,554	15,511	21,745	21,745	21,745	21,745	21,745
in % of sales revenue	23.10	25.73	27.77	29.41	29.33	41.11	41.11	41.11	41.11	41.11
Financial costs		3,684	3,223	2,763	2,302	1,842	1,381	921	460	0
GROSS PROFIT	8,554	7,204	9,997	12,791	13,209	19,903	20,364	20,824	21,285	21,745
in % of sales revenue	23.10	17.02	21.00	24.18	24.97	37.63	38.50	39.37	40.24	41.11
Income (corporate) tax	0	0	0	3,837	3,963	5,971	6,109	6,247	6,385	6,524
NET PROFIT	8,554	7,204	9,997	8,954	9,246	13,932	14,255	14,577	14,899	15,222
in % of sales revenue	23.10	17.02	21.00	16.93	17.48	26.34	26.95	27.56	28.17	28.78

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	44,253	44,074	42,328	47,617	52,890	52,890	52,890	52,890	52,890	52,890	52,890	16,078
Inflow funds	44,253	7,051	16	16	0	0	0	0	0	0	0	0
Inflow operation	0	37,023	42,312	47,601	52,890	52,890	52,890	52,890	52,890	52,890	52,890	0
Other income	0	0	0	0	0	0	0	0	0	0	0	16,078
TOTAL CASH OUTFLOW	44,253	28,741	33,451	35,946	42,279	41,474	43,018	42,695	42,373	42,050	37,123	0
Increase in fixed assets	44,253	0	0	0	0	0	0	0	0	0	0	0
Increase in current assets	0	3,702	517	517	517	4	0	0	0	0	0	0
Operating costs	0	20,690	23,646	26,601	29,557	29,600	29,600	29,600	29,600	29,600	29,600	0
Marketing and Distribution cost	0	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	0
Income tax	0	0	0	0	3,837	3,963	5,971	6,109	6,247	6,385	6,524	0
Financial costs	0	3,349	3,684	3,223	2,763	2,302	1,842	1,381	921	460	0	0
Loan repayment	0	0	4,605	4,605	4,605	4,605	4,605	4,605	4,605	4,605	0	0
SURPLUS (DEFICIT)	0	15,333	8,877	11,671	10,611	11,416	9,872	10,195	10,517	10,840	15,767	16,078
CUMULATIVE CASH BALANCE	0	15,333	24,210	35,881	46,491	57,908	67,780	77,975	88,492	99,332	115,098	131,177

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	37,023	42,312	47,601	52,890	52,890	52,890	52,890	52,890	52,890	52,890	16,078
Inflow operation	0	37,023	42,312	47,601	52,890	52,890	52,890	52,890	52,890	52,890	52,890	0
Other income	0	0	0	0	0	0	0	0	0	0	0	16,078
TOTAL CASH OUTFLOW	47,842	22,191	25,146	28,102	34,398	34,562	36,571	36,709	36,847	36,985	37,123	0
Increase in fixed assets	44,253	0	0	0	0	0	0	0	0	0	0	0
Increase in net working capital	3,590	501	501	501	4	0	0	0	0	0	0	0
Operating costs	0	20,690	23,646	26,601	29,557	29,600	29,600	29,600	29,600	29,600	29,600	0
Marketing and Distribution cost	0	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	0
Income (corporate) tax		0	0	0	3,837	3,963	5,971	6,109	6,247	6,385	6,524	0
NET CASH FLOW	-47,842	14,832	17,166	19,499	18,492	18,328	16,319	16,181	16,043	15,905	15,767	16,078
CUMULATIVE NET CASH FLOW	-47,842	33,010	-15,845	3,654	22,146	40,473	56,792	72,974	89,017	104,921	120,688	136,766
Net present value	-47,842	13,484	14,186	14,650	12,630	11,380	9,212	8,303	7,484	6,745	6,079	6,199
Cumulative net present value	-47,842	34,359	-20,172	-5,522	7,107	18,487	27,699	36,003	43,487	50,232	56,311	62,510

NET PRESENT VALUE 62,510
INTERNAL RATE OF RETURN 33.96%
NORMAL PAYBACK 3 years