

**82. PROFILE ON THE PRODUCTION OF
RECYCLED PLASTIC WASTE**

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I. SUMMARY

This profile envisages the establishment of a plant for the production of recycled plastic waste with a capacity of 1,104 tons per annum. The recycled plastic wastes can be reused alone or regenerated by mixing with fresh raw material in suitable ratio.

The country's requirement of plastic resin is met through import. The present (2012) demand for recycled plastic is estimated at 11,396 tons. The demand for the product is projected to reach 20,189 tones and 39,345 tones by the years 2018 and 2025, respectively.

The principal raw materials required are styrene and butadiene which have to be imported.

The total investment cost of the project including working capital is estimated at Birr 14.93 million. From the total investment cost the highest share (Birr 6.57 million or 44.03%) is accounted by fixed investment cost followed by pre operation cost (Birr 4.40 million or 29.47%) and initial working capital (Birr 3.95 million or 26.50%). From the total investment cost Birr 3.60 million or 24.09% is required in foreign currency.

The project is financially viable with an internal rate of return (IRR) of 24.52% and a net present value (NPV) of Birr 11.15 million, discounted at 10%.

The project can create employment for 19 persons. The establishment of such factory will have a foreign exchange saving effect to the country by substituting the current imports. The project will create forward linkage with the plastic products manufacturing sub sector and contribute to the mitigation of the adverse environmental impact created by plastic waste. The project will also generate income for the Government in terms of tax revenue and payroll tax.

II. PRODUCTION DESCRIPTION AND APPLICATION

The project envisaged here is the recycling of waste plastic materials such as material made from PE, Polypropylene, PET, PVC, Polyurethane, and Polystyrene, etc.

The recycled plastic wastes can be reused alone or regenerated by mixing with fresh raw material in suitable ratio. Products made with simple regenerated plastics alone belong to low-grade products, acceptable only in developing countries while the latter can be accepted by advanced countries. Some of the products made from simple regenerated plastics alone include disposable products, such as, dish, knife and fork, and plastic bags.

III. MARKET STUDY AND PLANT CAPACITY

A. MARKET STUDY

1. Past Supply and Present Demand

The raw materials required by the local plastic products manufacturing sub sector i.e. plastic resins are entirely imported. During the period 2009 – 2011, the local plastic manufacturing sub sector has imported on average 67,235 tons of various type plastic polymers of which the largest share (40.58%) is accounted by polyethylene and related polymers followed by polypropylene and related polymers (19.48%) and polyvinyl chloride and related polymers (see Table 3.1).

Table 3.1**IMPORT OF PLASTIC RESINS (TONS)**

Type/ Year	2009	2010	2011	Average	% share
Polyethylene and related	27,006.1	27,006.1	27,839.1	27,283.8	40.58
Polypropylene and related	9,270.3	13,071.0	16,955.7	13,099.0	19.48
Polyvinyl chloride and related	14,836.3	9,251.2	8,928.2	11,005.2	16.37
Ethylene-vinyl acetate and related	5,484.7	5,647.7	7,990.2	6,374.2	9.48
Other polyethers	3,042.2	2,454.9	2,447.8	2,648.3	3.94
POLY(ETHYLENE TEREPHTHALATE)	1,215.0	1,971.3	4,081.5	2,422.6	3.60
polyesters	828.7	1,152.7	1,143.9	1,041.7	1.55
Polymers of halogenated olefins	935.3	491.4	944.6	790.4	1.18
Alkyd resins	446.1	555.5	1,154.5	718.7	1.07
Polystyrene and related polymers	29.0	1,152.7	349.2	510.3	0.76
Acrylic	1,011.7	156.8	292.6	487.1	0.72
Polyamides	167.0	980.4	130.3	425.9	0.63
Epoxide resins	343.2	12.6	887.5	414.4	0.62
Polycarbonates	5.5	0.3	16.7	7.5	0.01
POLY(METHYL METHACRYLATE)	0.6	5.9	10.7	5.8	0.01
Total	64,622	63,911	73,172	67,235	100

Source: – *Ethiopian Revenues & Customs Authority.*

During the period 2005 – 2010 ,the annual gross value of the plastic manufacturing sub sectors` out put at market price has increased from Birr 185.05 million to Birr 1.19 billion registering an average annual growth rate of 13%. Accordingly, assuming that the demand for the raw material required by the sub sector will grow at the same rate and taking the average supply during the 2009 -2011 period as a base the present (2012) level of demand for plastic resin is estimated at 75,975 tons. Moreover, conservatively assuming that 15% of the total demand for plastic resins

can be substituted by recycled plastic, the present demand for recycled plastic is estimated at 11,396 tons.

2. Demand Projection

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 construction sector is 20%. Accordingly, by considering the above factors the demand for recycled plastic is conservatively assumed to grow at a rate of 10%. Projected demand is presented in Table 3.2.

Table 3.2
PROJECTED DEMAND (TONS)

Year	Projected Demand
2013	12,536
2014	13,790
2015	15,169
2016	16,685
2017	18,354
2018	20,189
2019	22,208
2020	24,429
2021	26,872
2022	29,559
2023	32,515
2024	35,767
2025	39,343

3. Pricing and Distribution

Based on the current FOB price of HDPE resin in the world market and considering the cost of freight, insurance, inland transport, transit charges, bank charges and other costs the recommended factory gate price is Birr 19,311 per ton.

The product of the envisaged factory is an intermediate product used in the manufacturing other products and the end users are limited in number and their geographical distribution is limited and are mostly located in or around major cities and towns of the country. Accordingly, by taking the nature of the product and the characteristics of the end users direct distribution to end users is selected as the most appropriate distribution channel.

B. PLANT CAPACITY AND PRODUCTION PROGRAM

1. Plant Capacity

According to the market demand projection for plastic products the current effective demand is 11,396 tones per year. The demand is projected to reach 16,685 and 20,189 in the years 2016 and 2018, respectively.

In spite of the available big demand, the limiting factor here is the raw material. As there is no stabilized collection system in the town and the current trend is just damping, getting the required amount of plastic waste will remain challenging for the waste recycling industry.

The maximum hourly production capacity of the plant is 230 kg. The plant is proposed to operated 300 days per year based is double shift, and the total annual production capacity of the plant will be 1,104 tones of palatalized plastic.

2. Production Program

The production program is scheduled in such a way that plant will produce at 80% and 90% of its designed capacity in the first and second years, and attain 100% in the third year and then after. The gradual capacity build up is envisaged considering the time required for skill development and the market factors.

IV. MATERIALS AND INPUTS

A. RAW MATERIALS

The raw material inputs are different types of thermoplastic wastes such as sorted hard PP, and PE milk bottle, and beverage crates. The plastic waste will be collected and sorted into different categories based on the types of the material they are made from and its physical properties such as hardness and softness.

The annual quantity of waste plastic to be processed at full capacity would be 1,104 tones. It is assumed that the cost recovered waste plastic will be Birr 13 per kg and the total annual cost of the raw material (recovered plastics) is estimated to be Birr 14.352 million.

B. UTILITIES

The required utilities for the envisaged plant are electricity and water. Water is used for cooling purposes and cleaning/washing the raw material. The rate of utilities consumption is 260KW, 110V-220V, of electricity and 0.3 liter/hr of water. The total annual consumption of electricity is estimated to be 1.284 MWH and similarly the total annual water required is 1,440 m³.

The annual cost of electricity consumption is Birr 811,200 calculated with a cost rate of 0.58 Birr/KWH. In the same way, the total annual cost of water is Birr 14,300 calculated with a cost rate of 10 Birr/m³. Therefore, the total annual cost of electricity and water is estimated to be Birr 825.60 thousands.

V. TECHNOLOGY AND ENGINEERING

A. TECHNOLOGY

1. Process Description

The process for recovering plastic wastes comprises following main steps:

- Sorting,
- Crushing,
- Washing,

- Dehydrating and drying,
- Palletizing, and
- Processing to form products.

Among which, sorting is the critical step, plastic wastes must be sorted type by type, such as PE, PP and PVC, the higher the homogeneity of the sorted plastic waste is, the better it is for subsequent steps. In case of unclear cut sorting or the plastic garbage contaminated with laminated material, such as aluminum foil, or draft paper, the producing process will not proceed anymore.

2. Environmental Impact

Plastic waste is not biodegradable material and the accumulation of the plastic waste on the environment has already become the great concern for the environment. Collecting and recycling used plastic material reduce the quantity of plastic waste and therefore it has positive effect in creating better environment for living. Besides, the process of plastic waste recycling does not have any adverse effect on the environment.

B. ENGINEERING

1. Machinery and Equipment

The total cost of machinery and equipment is estimated at Birr 4.5 million, of which Birr 3.6 million will be required in foreign currency. The list of machinery and equipment required and cost estimated are shown in Table 5.1.

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

Description	Qty
Crusher (combined with screw type automatic washing machine)	1
Washing tank	1
Screw type conveyor	1
Automatic dehydrating machine	1
Automatic drying machine	1
Twin palletizing machine (including main extruder, co-extruder, and cutting device)	1
Storage hopper and pneumatic automatic pellet conveying device	1

2. Land, Building and Civil Works

The total land requirement for the envisaged plant is 1,000 m² with a built -up area of 450 m². The total estimated building cost based on a rate of Birr 5,000/ m² is Birr 1.35 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 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 project creates direct job opportunity for about 19 persons. The annual cost of labor is estimated at Birr 480,000. The required human resource list and the corresponding costs are shown in Table 6.1.

Table 6.1**HUMAN RESOURCE REQUIREMENT AND COST**

Sr. No.	Description	No. of Person	Monthly Salary (Birr)	Annual Salary (Birr)
1	Manager	1	7,000	84,000
2	Secretary/accountant	1	3,000	36,000
3	Sales Person	1	3,000	36,000
4	Supervisor	2	4,000	48,000
5	Technician	2	6,000	2,000
6	Operator	2	4,000	48,000
7	Manual Sorting	6	9,000	108,000
8	Guards	4	4,000	48,000
	Sub-total	19	40,000	480,000
	Employees benefit(25% of basic salary)			120,000
	Grand Total			600,000

B. TRAINING REQUIREMENT

The project does not require special technical know-how and training is not proposed.

VII. FINANCIAL ANALYSIS

The financial analysis of the waste plastic recycling 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 14.93 million (see Table 7.1). From the total investment cost the highest share (Birr 6.57 million or 44.03%) is accounted by fixed investment cost followed by pre operation cost (Birr 4.40 million or 29.47%) and initial working capital (Birr 3.95 million or 26.50%). From the total investment cost Birr 3.60 million or 24.09% 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	0.18
1.2	Building and civil work	1,350.00		1,350.00	9.04
1.3	Machinery and equipment	900.00	3,600.00	4,500.00	30.12
1.4	Vehicles	450.00		450.00	3.01
1.5	Office furniture and equipment	250.00		250.00	1.67
	Sub- total	2,976.60	3,600.00	6,576.60	44.03
2	Pre operating cost *				
2.1	Pre operating cost	3,425.00		3,425.00	22.93
2.2	Interest during construction	977.24		977.24	6.54
	Sub- total	4,402.24		4,402.24	29.47
3	Working capital	3,958.98		3,958.98	26.50
	Grand Total	11,337.83	3,600.00	14,937.83	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 4.93 million. However, only the initial working capital of Birr 3.95 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 19.35 million (see Table 7.2). The cost of raw material account for 74.14% of the production cost. The other major components of the production cost are depreciation, financial cost and utility which account for 9.06%, 4.86% and 4.27%, respectively. The remaining 7.67% 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	14,350.00	74.14
Utilities	825.60	4.27
Maintenance and repair	135.00	0.70
Labor direct	480.00	2.48
Labor overheads	120.00	0.62
Administration Costs	250.00	1.29
Land lease cost	-	-
Cost of marketing and distribution	500.00	2.58
Total Operating Costs	16,660.60	86.08
Depreciation	1,754.00	9.06
Cost of Finance	940.59	4.86
Total Production Cost	19,355.19	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 1.31 million to Birr 3.19 million during the life of the project. Moreover, at the end of the project life the accumulated net cash

flow amounts to Birr 27.41 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.

$$\text{Break -Even Sales Value} = \frac{\text{Fixed Cost} + \text{Financial Cost}}{\text{Variable Margin ratio (\%)}} = \text{Birr } 9,316,860$$

$$\text{Break-Even Capacity utilization} = \frac{\text{Break -even Sales Value}}{\text{Sales revenue}} \times 100 = 44\%$$

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 4 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 24.52 % 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 11.15 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 19 persons. The project will generate Birr 7.74 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 create forward linkage with the plastic products manufacturing sub sector and contribute to the mitigation of the adverse environmental impact created by plastic waste. The project will also generate 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	11,480	12,915	14,350	14,350	14,350	14,350	14,350	14,350	14,350	14,350
Utilities	660	743	826	826	826	826	826	826	826	826
Maintenance and repair	108	122	135	135	135	135	135	135	135	135
Labour direct	384	432	480	480	480	480	480	480	480	480
Labour overheads	96	108	120	120	120	120	120	120	120	120
Administration Costs	200	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	13,428	15,045	16,661	16,661	16,669	16,669	16,669	16,669	16,669	16,669
Depreciation	1,754	1,754	1,754	1,754	1,754	79	79	79	79	79
Cost of Finance	0	1,075	941	806	672	537	403	269	134	0
Total Production Cost	15,182	17,874	19,355	19,221	19,095	17,286	17,151	17,017	16,883	16,748

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	17,055	19,186	21,318	21,318	21,318	21,318	21,318	21,318	21,318	21,318
Less variable costs	12,928	14,545	16,161	16,161	16,161	16,161	16,161	16,161	16,161	16,161
VARIABLE MARGIN	4,127	4,641	5,157	5,157	5,157	5,157	5,157	5,157	5,157	5,157
in % of sales revenue	24.20	24.19	24.19	24.19	24.19	24.19	24.19	24.19	24.19	24.19
Less fixed costs	2,254	2,254	2,254	2,254	2,263	588	588	588	588	588
OPERATIONAL MARGIN	1,873	2,387	2,903	2,903	2,895	4,570	4,570	4,570	4,570	4,570
in % of sales revenue	10.98	12.44	13.62	13.62	13.58	21.44	21.44	21.44	21.44	21.44
Financial costs		1,075	941	806	672	537	403	269	134	0
GROSS PROFIT	1,873	1,312	1,963	2,097	2,223	4,032	4,167	4,301	4,435	4,570
in % of sales revenue	10.98	6.84	9.21	9.84	10.43	18.92	19.55	20.18	20.81	21.44
Income tax	0	0	0	629	667	1,210	1,250	1,290	1,331	1,371
NET PROFIT	1,873	1,312	1,963	1,468	1,556	2,823	2,917	3,011	3,105	3,199
in % of sales revenue	10.98	6.84	9.21	6.89	7.30	13.24	13.68	14.12	14.56	15.01

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	10,002	22,032	19,191	21,323	21,318	21,318	21,318	21,318	21,318	21,318	21,318	6,753
Inflow funds	10,002	4,977	5	5	0	0	0	0	0	0	0	0
Inflow operation	0	17,055	19,186	21,318	21,318	21,318	21,318	21,318	21,318	21,318	21,318	0
Other income	0	0	0	0	0	0	0	0	0	0	0	6,753
TOTAL CASH OUTFLOW	10,002	18,406	17,958	19,440	19,440	19,352	19,760	19,666	19,572	19,478	18,040	0
Increase in fixed assets	10,002	0	0	0	0	0	0	0	0	0	0	0
Increase in current assets	0	4,000	495	495	0	1	0	0	0	0	0	0
Operating costs	0	12,928	14,545	16,161	16,161	16,169	16,169	16,169	16,169	16,169	16,169	0
Marketing cost	0	500	500	500	500	500	500	500	500	500	500	0
Income tax	0	0	0	0	629	667	1,210	1,250	1,290	1,331	1,371	0
Financial costs	0	977	1,075	941	806	672	537	403	269	134	0	0
Loan repayment	0	0	1,344	1,344	1,344	1,344	1,344	1,344	1,344	1,344	0	0
SURPLUS (DEFICIT)	0	3,627	1,233	1,883	1,878	1,966	1,558	1,652	1,746	1,840	3,278	6,753
CUMULATIVE CASH BALANCE	0	3,627	4,860	6,743	8,621	10,587	12,145	13,797	15,543	17,383	20,661	27,414

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	17,055	19,186	21,318	21,318	21,318	21,318	21,318	21,318	21,318	21,318	6,753
Inflow operation	0	17,055	19,186	21,318	21,318	21,318	21,318	21,318	21,318	21,318	21,318	0
Other income	0	0	0	0	0	0	0	0	0	0	0	6,753
TOTAL CASH OUTFLOW	13,961	13,918	15,534	16,661	17,291	17,336	17,879	17,919	17,959	18,000	18,040	0
Increase in fixed assets	10,002	0	0	0	0	0	0	0	0	0	0	0
Increase in net working capital	3,959	490	490	0	1	0	0	0	0	0	0	0
Operating costs	0	12,928	14,545	16,161	16,161	16,169	16,169	16,169	16,169	16,169	16,169	0
Marketing cost	0	500	500	500	500	500	500	500	500	500	500	0
Income tax		0	0	0	629	667	1,210	1,250	1,290	1,331	1,371	0
NET CASH FLOW	-13,961	3,137	3,652	4,657	4,027	3,982	3,439	3,399	3,359	3,318	3,278	6,753
CUMULATIVE NET CASH FLOW	-13,961	-10,824	-7,172	-2,515	1,513	5,495	8,934	12,333	15,691	19,010	22,287	29,040
Net present value	-13,961	2,852	3,018	3,499	2,751	2,472	1,941	1,744	1,567	1,407	1,264	2,604
Cumulative net present value	-13,961	-11,109	-8,091	-4,592	-1,841	632	2,573	4,317	5,884	7,291	8,555	11,158

NET PRESENT VALUE 11,158
INTERNAL RATE OF
RETURN 24.52%
PAYBACK 4 years

