

**112. PROFILE ON THE PRODUCTION OF GRINDING
STONE**

TABLE OF CONTENTS

	<u>PAGE</u>
I. SUMMARY	112-2
II. PRODUCT DESCRIPTION & APPLICATION	112-2
III. MARKET STUDY AND PLANT CAPACITY	112-3
A. MARKET STUDY	112-3
B. PLANT CAPACITY & PRODUCTION PROGRAM	112-5
IV. MATERIALS AND INPUTS	112-5
A. RAW & AUXILIARY MATERIALS	112-5
B. UTILITIES	112-6
V. TECHNOLOGY & ENGINEERING	112-7
A. TECHNOLOGY	112-7
B. ENGINEERING	112-7
VI. HUMAN RESOURCE & TRAINING REQUIREMENT	112-11
A. HUMAN RESOURCE REQUIREMENT	112-11
B. TRAINING REQUIREMENT	112-12
VII. FINANCIAL ANALYSIS	112-12
A. TOTAL INITIAL INVESTMENT COST	112-13
B. PRODUCTION COST	112-14
C. FINANCIAL EVALUATION	112-15
D. ECONOMIC AND SOCIAL BENEFITS	112-17

I. SUMMARY

This profile envisages the establishment of a plant for the production of grinding stone with a capacity of 3,000 tons per annum. Grinding stone are mainly used for grinding of cereals into starch and flour.

The demand for grinding stone is met through both local production and imports. The present (2012) demand for grinding stone is 4,894 tons. The demand for grinding stone is projected to reach 7,882 tons and 12,693 tons by the year 2017 and 2022, respectively.

The principal raw materials required are graphite, silicon carbide, and ferro silicon, all of which have to be imported.

The total investment cost of the project including working capital is estimated at Birr 44.25 million. From the total investment cost the highest share (Birr 25.51 million or 57.64%) is accounted by fixed investment cost followed by initial working capital (14.92 million or 33.71%) and pre operation cost (Birr 3.82 million 8.64%). From the total investment cost Birr 16.42 million or 37.11% is required in foreign currency.

The project is financially viable with an internal rate of return (IRR) of 17.77% and a net present value (NPV) of Birr 18.77 million discounted at 10%.

The project can create employment for 32 persons. The project will generate Birr 16.73 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 mining sector and forward linkage with the small-scale grain milling sub sector and also generates other income for the Government.

II. PRODUCT DESCRIPTION AND APPLICATION

Grinding stone is an implement for small-scale grain milling industries. It is made of abrasive material which in general including a wide range of materials extensively used in almost every branch of industry for cutting, polishing, grinding, etc of various materials. The abrasive materials employed are required to be hard, tough and sharp.

Depending upon its application and purpose, the grinding stone can be made of fire clay, magnetite, silicate of soda and bonding material mixed with resin. The ratio of abrasive to bonding material determines the hardness and density of the grinding stone. Grinding stones are made in different sizes, shape and specifications.

Grinding stones are mainly used for grinding of cereals into starch and flour. They are also required for grinding vitreous bricks, glass, granite, lather, porcelain and slate etc.

III. MARKET STUDY AND PLANT CAPACITY

A. MARKET STUDY

1. Past Supply and Present Demand

There is substantially large local demand for grinding stone which mainly emanates from the large number of grain mills. However, so far there is only one grinding stone producer locally, thus the dominant supplier is import. Table 3.1 shows the annual import of grinding stone for the period 2002 - 2011.

Table 3.1
IMPORT OF GRINDING STONE (TONS)

Years	Import
2002	1,865
2003	2,320
2004	2,564
2005	4,258
2006	2,322
2007	3,249
2008	2,673
2009	2,163
2010	4,612
2011	4,148

Source: – Ethiopian Revenue and Customs Authority

As can be seen from Table 3.1, import of grinding stones shows a general increasing trend. For example the average annual import during the first five years 2002 – 2006 which was 2,666 tons has increased to an average annual of 3,369 tons during the recent five years (2007-2011). During the period under consideration (2002 – 2011) import of the product has registered an average annual growth rate of 17.97%.

In order to estimate the present demand for the product it is assumed that the average annual growth rate registered in the past will at least continue in the near future. Accordingly, using the 2011 level of import as a base and applying a growth rate of 17.97%, the present (2012) demand for grinding stone is estimated at 4,894 tons.

2. Demand Projection

Demand for grinding stone is related with the growth in agricultural outputs, particularly cereals production and consumption as well as the growth in the manufacturing sector. Accordingly, taking the anticipated growth of the agricultural and manufacturing sectors into consideration, the demand for grinding stone is assumed to grow by modest rate of 10% per annum (see Table 3.2).

Table 3.2

PROJECTED DEMAND FOR GRINDING STONE (TONS)

Years	Projected Demand
2013	5,383
2014	5,922
2015	6,514
2016	7,165
2017	7,882
2018	8,670
2019	9,537
2020	10,490
2021	11,540
2022	12,693

3. Pricing and Distribution

After assessing the current C.I.F price of grinding stone, an ex-factory price of Birr 23/kg is proposed for the envisaged project. The product will be distributed through specialized distribution agents of hardware having the relevant experience.

B. PLANT CAPACITY AND PRODUCTION PROGRAM

1. Plant Capacity

The production capacity of the plant is 3,000 tons of grinding stone per annum, working a single shift (8 hours) a day for a total of 300 days. Production can be increased by working in two or three shifts at later stages if the product is warranted by the market.

2. Production Program

Considering the time required for skill development in operation and market penetration, the plant will operate at 80% and 90% of the installed capacity during the first and second years, respectively. Full capacity operation could be attained from third year and onwards.

IV. MATERIAL AND INPUTS

A. RAW AND AUXILIARY MATERIALS

The main raw materials for grinding stone manufacturing are imported items obtained preferably from India or China. The main items are:

Graphite,

Silicon carbide,

Ferro Silicon, and

Other materials like binders.

Table 4.1 presents the list of raw and auxiliary materials required by the envisaged plant together with their quantities and costs.

Table 4.1

RAW AND AUXILIARY MATERIALS REQUIREMENT AT FULL CAPACITY

Materials	Qty	Cost (´000 Birr)		
		FC	LC	Total
Silicon Carbide	1,601 ton	17,692	5,897	23,590
Graphite	1,200 ton	11,298	3,766	15,064
Ferro-Silicon	801 ton	8,855	2,952	11,806
Other misc. materials like binder, etc		-	5,000	5,000
Total		37,845	17,615	55,460

B. UTILITIES

Utilities required by the plant include electricity and water. Quantities required and associated costs are given in Table 4.2.

Table 4.2

UTILITIES REQUIREMENT (AT FULL CAPACITY)

No.	Items	Qty.	Cost (Birr)
1	Electricity (kWh)	435,000	252,975
2	Water (m ³)	13,500	135,000
	Total		387,975

V. TECHNOLOGY AND ENGINEERING

A. TECHNOLOGY

1. Production Process

The production process of grinding stone comprises the following stages:

- Required ingredients, as per the desired application and purpose of the grinding stone/wheel are mixed with resin to prepare coated abrasive;
- Coated abrasives are mixed with resin and moulds are prepared and put under a hydraulic ram to exert pressure;
- Molded millstones are baked in oven at a required temperature and allowed to cool after baking;
- Millstone wheels are trued for outside diameter and finish; and
- Wheels are finally tested for Speed.

2. Environmental Impact Assessment

The production of grinding stone involves mainly a weighing, mixing, molding and pressing. These unit operations can be performed in a controlled manner. Hence, the plant does not have any adverse impact on environment.

B. ENGINEERING

1. Machinery and Equipment

The list of machinery and equipment required for manufacturing of grinding stones are given in Table 5.1. The total quoted cost for machinery and equipment is Birr 19.32 million out of which Birr 16.42 million is required in foreign currency. The list of the required machineries is shown in Table 5.1.

Table 5.1
MACHINERY AND EQUIPMENT REQUIREMENT

Sr. No.	Description	Qty
1	Ball mill, internal Lining and Grinding charge with accessories	1
2	Mixer/agitator and Accessories for Agitator	2
3	Hydraulic press and pressing dies	1
4	Dryer	1
5	Storage Tank	2
6	Kiln	1
7	Vibrating Screen	2
8	Magnetic separator	2
9	Standby generator 200 KVA	1

2. Land, Building and Civil Works

The total land required for the grinding stones manufacturing plant is 1,500 m². The total built-up area is 1,000 m². The estimated total cost of building at the rate of Birr 5,000 per m² amounts to Birr 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 399,000 of which 10% or Birr 39,900 will be paid in advance. The remaining Birr 359,100 will be paid in equal installments with in 28 years i.e. Birr 12,825 annually.

VI. HUMANRESOURCE AND TRAINING REQUIREMENTS

A. HUMANRESOURCE REQUIREMENT

The total human resource required by the plant is 32 personnel. Annual cost of labor is estimated at Birr 579, 600. The list of required human resource with the corresponding salary is presented in Table 6.1.

Table 6.1**HUMANRESOURCE REQUIREMENT AND COST**

No.	Description	No. Reqd.	Monthly salary (Birr)	Annual cost (Birr)
1	Manger	1	5,000	60,000
2	Accountant	1	2,000	24,000
3	Supervisor and Quality Inspector	2	2,500	60,000
4	Skilled workers(Operators & technicians)	14	1,200	201,600
5	Unskilled workers(Laborers)	12	800	115,200
6	sales officer	1	2,000	24,000
7	General Service	2	800	19,200
	Total	32		504,000
	Worker's benefit(15%)			75,600
	Grand Total			579,600

B. TRAINING REQUIREMENT

The supervisor and the 14 skilled production personnel need to have a five day on-the-job training on how to operate and inspect the machines. Estimated cost of training amounts to Birr 25,000.

VII. FINANCIAL ANALYSIS

The financial analysis of the grinding stone 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 44.25 million (see Table 7.1). From the total investment cost the highest share (Birr 25.51 million or 57.64%) is accounted by fixed investment cost followed by initial working capital (14.92 million or 33.71%) and pre operation cost (Birr 3.82 million 8.64%). From the total investment cost Birr 16.42 million or 37.11% 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	39.90		39.90	0.09
1.2	Building and civil work	5,000.00		5,000.00	11.30
1.3	Machinery and equipment	2,898.00	16,422.00	19,320.00	43.66
1.4	Vehicles	900.00		900.00	2.03
1.5	Office furniture and equipment	250.00		250.00	0.56
	Sub total	9,087.90	16,422.00	25,509.90	57.64
2	Pre operating cost *				
2.1	Pre operating cost	929.60		929.60	2.10
2.2	Interest during construction	2,895.12		2,895.12	6.54
	Sub total	3,824.72		3,824.72	8.64
3	Working capital **	14,919.39		14,919.39	33.71
	Grand Total	27,832.01	16,422.00	44,254.01	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 18.70 million. However, only the initial working capital of Birr 14.19 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 65.63 million (see Table 7.2). The cost of raw material account for 84.50% of the production cost. The other major components of the production cost are depreciation, financial cost, marketing and distribution, and repair and maintenance which account for 6.79%, 4.25%, 1.14% and 1.47% respectively. The remaining 1.85% is the share of labor, and 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 (000 Birr)	%
Raw Material and Inputs	55,460	84.50
Utilities	388	0.59
Maintenance and repair	966	1.47
Labor direct	504	0.77
Labor overheads	76	0.12
Administration Costs	250	0.38
Land lease cost	0	0.00
Cost of marketing and distribution	750	1.14
Total Operating Costs	58,394	88.97
Depreciation	4,455	6.79
Cost of Finance	2,787	4.25
Total Production Cost	65,635	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 2.63 million to Birr 7.26 million during the life of the project. Moreover, at the end of the project life the accumulated net cash flow amounts to Birr 60.52 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.

$$\text{Break Even Sales Value} = \frac{\text{Fixed Cost} + \text{Financial Cost}}{\text{Variable Margin ratio (\%)}} = \text{Birr } 28,980,000$$

$$\text{Break Even Capacity utilization} = \frac{\text{Break even Sales Value}}{\text{Sales revenue}} \times 100 = 45.83 \%$$

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 7 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 17.77% 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 18.77 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 32 persons. The project will generate Birr 16.73 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 mining sector and forward linkage with the small-scale grain milling 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	44,368	49,914	55,460	55,460	55,460	55,460	55,460	55,460	55,460	55,460
Utilities	310	349	388	388	388	388	388	388	388	388
Maintenance and repair	773	869	966	966	966	966	966	966	966	966
Labour direct	403	454	504	504	504	504	504	504	504	504
Labour overheads	61	68	76	76	76	76	76	76	76	76
Administration Costs	200	225	250	250	250	250	250	250	250	250
Land lease cost	0	0	0	0	13	13	13	13	13	13
Cost of marketing and distribution	750	750	750	750	750	750	750	750	750	750
Total Operating Costs	46,865	52,630	58,394	58,394	58,407	58,407	58,407	58,407	58,407	58,407
Depreciation	4,455	4,455	4,455	4,455	4,455	225	225	225	225	225
Cost of Finance	0	3,185	2,787	2,388	1,990	1,592	1,194	796	398	0
Total Production Cost	51,320	60,269	65,635	65,237	64,852	60,224	59,826	59,428	59,030	58,632

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	55,200	62,100	69,000	69,000	69,000	69,000	69,000	69,000	69,000	69,000
Less variable costs	46,115	51,880	57,644	57,644	57,644	57,644	57,644	57,644	57,644	57,644
VARIABLE MARGIN	9,085	10,220	11,356	11,356	11,356	11,356	11,356	11,356	11,356	11,356
in % of sales revenue	16.46	16.46	16.46	16.46	16.46	16.46	16.46	16.46	16.46	16.46
Less fixed costs	5,205	5,205	5,205	5,205	5,218	988	988	988	988	988
OPERATIONAL MARGIN	3,880	5,015	6,151	6,151	6,138	10,368	10,368	10,368	10,368	10,368
in % of sales revenue	7.03	8.08	8.91	8.91	8.90	15.03	15.03	15.03	15.03	15.03
Financial costs		3,185	2,787	2,388	1,990	1,592	1,194	796	398	0
GROSS PROFIT	3,880	1,831	3,365	3,763	4,148	8,776	9,174	9,572	9,970	10,368
in % of sales revenue	7.03	2.95	4.88	5.45	6.01	12.72	13.30	13.87	14.45	15.03
Income (corporate) tax	0	0	0	1,129	1,244	2,633	2,752	2,872	2,991	3,110
NET PROFIT	3,880	1,831	3,365	2,634	2,904	6,143	6,422	6,700	6,979	7,258
in % of sales revenue	7.03	2.95	4.88	3.82	4.21	8.90	9.31	9.71	10.11	10.52

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	26,440	73,113	62,112	69,012	69,000	69,000	69,000	69,000	69,000	69,000	69,000	24,570
Inflow funds	26,440	17,913	12	12	0	0	0	0	0	0	0	0
Inflow operation	0	55,200	62,100	69,000	69,000	69,000	69,000	69,000	69,000	69,000	69,000	0
Other income	0	0	0	0	0	0	0	0	0	0	0	24,570
TOTAL CASH OUTFLOW	26,440	64,778	61,664	67,031	65,892	65,624	66,613	66,334	66,055	65,777	61,517	0
Increase in fixed assets	26,440	0	0	0	0	0	0	0	0	0	0	0
Increase in current assets	0	15,017	1,869	1,869	0	1	0	0	0	0	0	0
Operating costs	0	46,115	51,880	57,644	57,644	57,657	57,657	57,657	57,657	57,657	57,657	0
Marketing and Distribution cost	0	750	750	750	750	750	750	750	750	750	750	0
Income tax	0	0	0	0	1,129	1,244	2,633	2,752	2,872	2,991	3,110	0
Financial costs	0	2,895	3,185	2,787	2,388	1,990	1,592	1,194	796	398	0	0
Loan repayment	0	0	3,981	3,981	3,981	3,981	3,981	3,981	3,981	3,981	0	0
SURPLUS (DEFICIT)	0	8,335	448	1,982	3,108	3,376	2,387	2,666	2,945	3,223	7,483	24,570
CUMULATIVE CASH BALANCE	0	8,335	8,783	10,764	13,872	17,249	19,636	22,302	25,246	28,470	35,952	60,522

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	55,200	62,100	69,000	69,000	69,000	69,000	69,000	69,000	69,000	69,000	24,570
Inflow operation	0	55,200	62,100	69,000	69,000	69,000	69,000	69,000	69,000	69,000	69,000	0
Other income	0	0	0	0	0	0	0	0	0	0	0	24,570
TOTAL CASH OUTFLOW	41,359	48,722	54,487	58,394	59,524	59,651	61,040	61,159	61,278	61,398	61,517	0
Increase in fixed assets	26,440	0	0	0	0	0	0	0	0	0	0	0
Increase in net working capital	14,919	1,857	1,857	0	1	0	0	0	0	0	0	0
Operating costs	0	46,115	51,880	57,644	57,644	57,657	57,657	57,657	57,657	57,657	57,657	0
Marketing and Distribution cost	0	750	750	750	750	750	750	750	750	750	750	0
Income (corporate) tax		0	0	0	1,129	1,244	2,633	2,752	2,872	2,991	3,110	0
NET CASH FLOW	-41,359	6,478	7,613	10,606	9,476	9,349	7,960	7,841	7,722	7,602	7,483	24,570
CUMULATIVE NET CASH FLOW	-41,359	34,881	-27,268	16,662	-7,186	2,163	10,123	17,964	25,686	33,288	40,771	65,341
Net present value	-41,359	5,889	6,292	7,968	6,472	5,805	4,493	4,024	3,602	3,224	2,885	9,473
Cumulative net present value	-41,359	35,470	-29,178	21,210	-14,737	-8,933	-4,439	-415	3,187	6,411	9,296	18,768

NET PRESENT VALUE 18,768
INTERNAL RATE OF RETURN 17.77%
NORMAL PAYBACK 7 years

112-24