

**181. PROFILE ON THE PRODUCTION OF PIPE
FITTINGS AND VALVE**

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I. SUMMARY

This profile envisages the establishment of a plant for the production of pipe fittings and valve with a capacity of 285 tons of valves and 300 pipe fittings per annum. Pipe fittings are fittings that serve to connect straight pipes, to change the direction, to connect from bigger diameter to smaller diameter and valves are devices that are fitted on the outlet tip or at the gate of the water supply pipe lines in order to control the flow of water.

The demand for pipe fittings and valve is met through import and domestic production. The present (2012) unsatisfied demand for pipe fittings and valve is estimated at 4,818 tones and 2,196 tons, respectively. The unsatisfied demand for pipe fittings and valve is projected to reach 7,759 tones and 3,536 tones by the year 2017, respectively and 12,496 tones and 5,696 tones by the year 2022, respectively.

The principal raw materials required are metal and brass scraps as melt input and a plastic and rubber bushings discs which have to be imported.

The total investment cost of the project including working capital is estimated at Birr 20.38 million. From the total investment cost the highest share (Birr 11.80 million or 57.91%) is accounted by fixed investment cost followed by initial working capital (Birr 6.73 million or 33.01%) and pre operation cost (Birr 1.85 million or 9.08%). From the total investment cost Birr 4.30 million or 21.10% is required in foreign currency.

The project is financially viable with an internal rate of return (IRR) of 31.92% and a net present value (NPV) of Birr 23.71 million discounted at 10%.

The project can create employment for 30 persons. The establishment of such factory will have a foreign exchange saving effect to the country by substituting the current imports and also generates income for the Government in terms of tax revenue and payroll tax.

II. PRODUCT DESCRIPTION AND APPLICATION

Valves are devices that are fitted on the outlet tip or at the gate of the water supply pipe lines in order to control the flow of water. The valve at the intake end of the pipe system is called the Gate valve. The valve at the outlet end of the pipe is called the tap. Both have their own designs and manufacturing system.

Pipe fittings are fittings that serve different purposes on the pipe line. They serve to connect straight pipes, to change the direction, to connect from bigger diameter to smaller diameter. They are known as elbow, union, tee, Nipples, etc...Valves and pipes are made to fit mainly on the following sizes, namely, 3/8", 3/4", 1/2"etc....

III. MARKET STUDY AND PLANT CAPACITY

A. MARKET STUDY

1. Present Supply And Demand

The demand for pipe fittings and valve in Ethiopia is met through import and local production. However, since local production capacity is very limited the great majority of the total supply for the products is accounted by import. The historical data on the unsatisfied demand for the product which is met through import for the period 2002 - 2011 is provided in Table 3.1.

Table 3.1

IMPORT OF PIPE FITTINGS AND VALVE (TONES)

year	Pipe Fittings	Valves
2002	704	526
2003	1,117	887
2004	1,416	731
2005	4,386	1,145
2006	3,201	997
2007	5,644	1,737
2008	4,371	2,745
2009	3,308	2,205
2010	4,982	2,731
2011	5,784	1,561

Source: - Ethiopian Revenues & Customs Authority,

Scrutiny of Table 3.1 reveals that imports of pipe fittings during the period under consideration (2002-2011) ranged from 704 tons (2002) to 5,784 tons (2010) with a mean import of 3,491 tons. Similarly, during the same period import of valve ranges from 526 tons in 2002 to 2,745 tons in 2008 averaging at 1,526 tons.

Accordingly, considering the trend in import of the products the recent five years (2007-2011) average import i.e., 4,818 tons for pipe fittings and 2,196 tons for valve is considered to approximate current (2012) unsatisfied demand for the products.

2. Projected Demand

The demand for pipe fittings and valve depends mainly on the performance of its end-user (i.e. the construction sector). Therefore, the demand for the products under consideration is a derived demand, which depends directly on the performance of its major end – user.

The construction sector of the country has undergone tremendous changes and development in recent years. The contribution of the construction sector to the GDP during the period 2001 – 2010 have been growing at annual average growth rate of 13 percent which is above the average annual growth rate of real GDP during the period under consideration (11.4 %), indicating a rise in the share of the construction sector within the overall economy. Moreover, during the GTP period (2010 – 2015), the construction sector is expected to grow at annual average growth rate of 20%.

On the other hand among the factors that influence the demand for pipe fittings and valve one of the critical factor is identified to be economic growth leading to growth of the construction sector. According to the government's "Growth and Transformation Plan" during the period 2010 – 2015 the GDP of the country is expected to grow at a minimum average annual growth rate of 11.2%.

Accordingly, based on the above discussion a growth rate of 10% which is slightly lower than the expected growth rate of the country's GDP during the GTP period (2011 – 2015) is used.

Based on the above assumption and using the estimated present unsatisfied demand as a base the projected unsatisfied demand for pipe fittings and valve is shown in Table 3.2.

Table 3.2**PROJECTED UNSATISFIED DEMAND FOR PIPE FITTINGS AND VALVE (TONS)**

Year	Pipe fittings	Valves
2013	5,299	2,415
2014	5,829	2,657
2015	6,412	2,923
2016	7,054	3,215
2017	7,759	3,536
2018	8,535	3,890
2019	9,388	4,279
2020	10,327	4,707
2021	11,360	5,178
2022	12,496	5,696
2023	13,745	6,265
2024	15,120	6,892
2025	16,632	7,581

3. Pricing and Distribution

Based on the average CIF value of the products during the period 2009-2011) the recommended factory gate price for the envisaged factory is Birr 55/kg and Birr 90/kg for pipe fittings and valves respectively. The products can be distributed by appointing agents in major urban centers of the country.

B. PLANT CAPACITY AND PRODUCTION PROGRAMME**1. Plant Capacity**

Based on the market study and available technologies the selected capacity of the plant is as 285 tons of valves and 300 pipe fittings per annum on a single shift.

2. Production Program

Considering the production process involved, time required for skill development and market penetration the plant is planned to operate at 75% of its installed capacity in the first year of operation. In the second and third year and then after it will increase to 85% and 100%, respectively as shown in Table 3.3.

Table 3.3

ANNUAL PRODUCTION PROGRAM

Type of product	Year 1	Year 2	Year 3
Valves (Tons)	214	242	285
Fittings (Tons)	225	255	300
Capacity %	75	85	100

IV. RAW MATERIAL AND INPUTS

A. RAW AND AUXILIARY MATERIALS

The selected product requires metal and brass scraps as melt input and a plastic and rubber bushings discs that are bought out. At full capacity operation a total of Birr 27.17 million is required for raw materials. The detail is shown on Table 4.1.

Table 4.1

ANNUAL RAW MATERIALS REQUIREMENT AND COST

No	Raw Materials	Annual input		Cost (000 Birr)		
		Units	Quantity	F.C	L.C	Total
1	Scrap metal, Pig iron	Ton	379.6	4,934.80	1,233.70	6,168.50
3	Brass scrap	“	379.6	15,943.20	3,985.80	19,929.00
4	Gaskets and seals	“	27.9	641.70	160.43	802.13
5	Screws	“	10.0	220.00	55.00	275.00
	Total			21,739.70	5,434.93	27,174.63

B UTILITIES

The major utility required by the plant is electricity and water. Annual cost of utilities is estimated at Birr 4.84 million. Quantity required and corresponding cost is indicated in Table 4.2.

Table 4.2
ANNUAL UTILITY REQUIREMENTS AND COST

Sr. No	Utility	Unit	Quantity	Cost (Birr)
1	Electricity	Kwh.	150,000	90,000
2	Water	Meter cube	25,000	250,000
3	Furnace oil	lit	250,000	4,500,000
	Total			4,840,000

V. TECHNOLOGY AND ENGINEERING

A. TECHNOLOGY

1. Process Description

The production of pipes and fittings has two different ways of manufacturing as shown below.

Pipe fittings

- Manufacture of pipe fittings involves sand mould preparation from patterns, melting of scrap steel in pit furnace using oil furnace,
- Trimming of the product, drilling and machining of the product, threading of the product..

Valves

Valves are manufactured by the process of

- Melting the scrap brass and pouring in metal mould.
- Trimming of the product; Drilling of the product; Threading of the final product.

2. Environmental Impact

The production process has some gaseous effluents; this exhaust smoke could be reduced to a minimum by using efficient and well serviced burners and chimney. The plant has no negative impact on the environment.

B. ENGINEERING

1. Machinery and Equipment

The total cost of machinery and equipment is estimated at Birr 5.6 million of which Birr 4.3 million is required in foreign currency. The list of the necessary machinery and equipment is shown in Table 5.1.

Table 5.1
LIST OF MACHINERY AND EQUIPMENT

Sr. No.	Machine	Unit	Qty.
1	Pit furnace	set	2
2	Pipe threading machine	pcs	3
3	Special purpose turning lathe	pcs ^c	2
4	Sand preparation equipment	set	1
5	Sand blasting Equipment	set	1
6	Compressor	pcs	2
7	Portable grinder.	pcs	3
8	Portable drill	pcs	3
9	Pillar Drilling Machine	Pcs	2
10	Pedestal Grinder	Pcs	2
11	Material Handling Equipment	pcs	2

2. Land Building and Civil Work

The plant requires a total of 2,000 m² area of land out of which 1,000 m² is built-up area which includes Processing area, raw material stock area, offices etc. Assuming construction rate of Birr 5,000 per m², the total investment cost for building and civil works is estimated at 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 532,000 of which 10% or Birr 53,200 will be paid in advance. The remaining Birr 478,800 will be paid in equal installments with in 28 years i.e. Birr 17,100 annually.

VI HUMAN RESOURCE AND TRAINING REQUIREMENT

A. HUMAN RESOURCE REQUIREMET

The plant will require a total of 30 workers of whom 21 are production workers. Annual cost of labour is Birr 547,200. The human resource required by type of job and the monthly and annual salary is indicated on Table 6.1.

Table 6.1
LIST OF HUMAN RESOURCE REQUIREMENT AND COST

Sr. No.	Description	No.	Salary (Birr)	
			Monthly	Annual
A. ADMINISTRATION				
1	Plant Manager	1	5,000	60,000
2	Secretary	1	2,500	30,000
3	Accountant	1	2,500	30,000
4	Salesman/purchaser	1	2,500	30,000
5	Clerk	1	1,500	18,000
6	Cashier	1	2,000	24,000
7	General Service	3	800	28,800
SUB TOTAL		9		220,800
B. PRODUCTION				
8	Foreman/	1	2,500	30,000
9	Machinery Operators	14	2,000	336,000
10	Assistant Operators	1	1,500	18,000
11	Machinist technicians	1	2,000	24,000
12	Electrician	1	2,000	24,000
13	Quality controller	1	1,500	18,000
14	Laborers	2	800	19,200
SUB TOTAL		21	-	469,200
TOTAL				690,000
EMPLOYEE'S BENEFIT (25% OF BASIC SALARY)		-	-	142800
TOTAL		30	-	547,200

B. TRAINING REQUIREMENT

On the job training of the operators would be enough for workers with technical back ground. A demonstration training of two months would be required for 18workers at cost of Birr 20,000.

VII. FINANCIAL ANALYSIS

The financial analysis of the pipe fittings and valve 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	3 years
Bank interest	10%
Discount cash flow	10%
Accounts receivable	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 20.38 million (See Table 7.1). From the total investment cost the highest share (Birr 11.80 million or 57.91%) is accounted by fixed investment cost followed by initial working capital (Birr 6.73 million or 33.01%) and pre operation cost (Birr 1.85 million or 9.08%). From the total investment cost Birr 4.30 million or 21.10% 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	53.20		53.20	0.26
1.2	Building and civil work	5,000.00		5,000.00	24.53
1.3	Machinery and equipment	1,300.00	4,300.00	5,600.00	27.47
1.4	Vehicles	900.00		900.00	4.42
1.5	Office furniture and equipment	250.00		250.00	1.23
	Sub total	7,503.20	4,300.00	11,803.20	57.91
2	Pre operating cost *				
2.1	Pre operating cost	518.00		518.00	2.54
2.2	Interest during construction	1,333.49		1,333.49	6.54
	Sub total	1,851.49		1,851.49	9.08
3	Working capital **	6,728.65		6,728.65	33.01
	Grand Total	16,083.34	4,300.00	20,383.34	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 9.67 million. However, only the initial working capital of Birr 6.72 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 36.96 million (see Table 7.2). The cost of raw material account for 73.53% of the production cost. The other major components of the production cost are depreciation, financial cost, utility, and cost of marketing and distribution which account for 4.41%, 2.98%, 13.10%, and 2.03% respectively. The remaining 3.95% is the share of direct labour, repair and maintenance, labour 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	27,175	73.53
Utilities	4,840	13.10
Maintenance and repair	280	0.76
Labour direct	690	1.87
Labour overheads	143	0.39
Administration Costs	350	0.95
Land lease cost	0	0.00
Cost of marketing and distribution	750	2.03
Total Operating Costs	34,228	92.62
Depreciation	1,629	4.41
Cost of Finance	1,100	2.98
Total Production Cost	36,957	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 3.06 million to Birr 4.80 million during the life of the project. Moreover, at the end of the project life the accumulated net cash flow amounts to Birr 51.85 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.

$$\text{Break Even Sales Value} = \frac{\text{Fixed Cost} + \text{Financial Cost}}{\text{Variable Margin ratio (\%)}} = \text{Birr } 17,356,000$$

$$\text{Break Even Capacity utilization} = \frac{\text{Break even Sales Value}}{\text{Sales revenue}} \times 100 = 21.25\%$$

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 31.92% 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 principal 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 23.71 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 30 persons. The project will generate Birr 12.40 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 generate 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	19,023	21,740	24,458	27,175	27,175	27,175	27,175	27,175	27,175	27,175
Utilities	3,388	3,872	4,356	4,840	4,840	4,840	4,840	4,840	4,840	4,840
Maintenance and repair	196	224	252	280	280	280	280	280	280	280
Labour direct	483	552	621	690	690	690	690	690	690	690
Labour overheads	100	114	129	143	143	143	143	143	143	143
Administration Costs	245	280	315	350	350	350	350	350	350	350
Land lease cost	0	0	0	0	17	17	17	17	17	17
Cost of marketing and distribution	750	750	750	750	750	750	750	750	750	750
Total Operating Costs	24,185	27,532	30,880	34,228	34,245	34,245	34,245	34,245	34,245	34,245
Depreciation	1,629	1,629	1,629	1,629	1,629	225	225	225	225	225
Cost of Finance	0	1,467	1,283	1,100	917	733	550	367	183	0
Total Production Cost	25,813	30,628	33,792	36,957	36,790	35,204	35,020	34,837	34,653	34,470

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	28,926	37,191	41,324	41,324	41,324	41,324	41,324	41,324	41,324	41,324
Less variable costs	23,435	26,782	30,130	33,478	33,478	33,478	33,478	33,478	33,478	33,478
VARIABLE MARGIN	5,492	10,409	11,193	7,846	7,846	7,846	7,846	7,846	7,846	7,846
in % of sales revenue	18.99	27.99	27.09	18.99	18.99	18.99	18.99	18.99	18.99	18.99
Less fixed costs	2,379	2,379	2,379	2,379	2,396	992	992	992	992	992
OPERATIONAL MARGIN	3,113	8,030	8,815	5,467	5,450	6,853	6,853	6,853	6,853	6,853
in % of sales revenue	10.76	21.59	21.33	13.23	13.19	16.58	16.58	16.58	16.58	16.58
Financial costs		1,467	1,283	1,100	917	733	550	367	183	0
GROSS PROFIT	3,113	6,563	7,531	4,367	4,533	6,120	6,303	6,487	6,670	6,853
in % of sales revenue	10.76	17.65	18.23	10.57	10.97	14.81	15.25	15.70	16.14	16.58
Income (corporate) tax	0	0	0	1,310	1,360	1,836	1,891	1,946	2,001	2,056
NET PROFIT	3,113	6,563	7,531	3,057	3,173	4,284	4,412	4,541	4,669	4,797
in % of sales revenue	10.76	17.65	18.23	7.40	7.68	10.37	10.68	10.99	11.30	11.61

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	12,321	37,045	37,199	41,332	41,324	41,324	41,324	41,324	41,324	41,324	41,324	13,974
Inflow funds	12,321	8,119	8	8	0	0	0	0	0	0	0	0
Inflow operation	0	28,926	37,191	41,324	41,324	41,324	41,324	41,324	41,324	41,324	41,324	0
Other income	0	0	0	0	0	0	0	0	0	0	0	13,974
TOTAL CASH OUTFLOW	12,321	32,303	31,793	34,958	39,432	38,357	38,648	38,520	38,391	38,263	36,301	0
Increase in fixed assets	12,321	0	0	0	0	0	0	0	0	0	0	0
Increase in current assets	0	6,785	960	960	960	2	0	0	0	0	0	0
Operating costs	0	23,435	26,782	30,130	33,478	33,495	33,495	33,495	33,495	33,495	33,495	0
Marketing and Distribution cost	0	750	750	750	750	750	750	750	750	750	750	0
Income tax	0	0	0	0	1,310	1,360	1,836	1,891	1,946	2,001	2,056	0
Financial costs	0	1,333	1,467	1,283	1,100	917	733	550	367	183	0	0
Loan repayment	0	0	1,834	1,834	1,834	1,834	1,834	1,834	1,834	1,834	0	0
SURPLUS (DEFICIT)	0	4,742	5,406	6,374	1,891	2,967	2,675	2,804	2,932	3,061	5,022	13,974
CUMULATIVE CASH BALANCE	0	4,742	10,148	16,522	18,413	21,380	24,055	26,859	29,791	32,852	37,874	51,848

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	28,926	37,191	41,324	41,324	41,324	41,324	41,324	41,324	41,324	41,324	13,974
Inflow operation	0	28,926	37,191	41,324	41,324	41,324	41,324	41,324	41,324	41,324	41,324	0
Other income	0	0	0	0	0	0	0	0	0	0	0	13,974
TOTAL CASH OUTFLOW	19,050	25,137	28,485	31,833	35,540	35,605	36,081	36,136	36,191	36,246	36,301	0
Increase in fixed assets	12,321	0	0	0	0	0	0	0	0	0	0	0
Increase in net working capital	6,729	952	952	952	2	0	0	0	0	0	0	0
Operating costs	0	23,435	26,782	30,130	33,478	33,495	33,495	33,495	33,495	33,495	33,495	0
Marketing and Distribution cost	0	750	750	750	750	750	750	750	750	750	750	0
Income (corporate) tax		0	0	0	1,310	1,360	1,836	1,891	1,946	2,001	2,056	0
NET CASH FLOW	-19,050	3,790	8,706	9,491	5,784	5,719	5,242	5,187	5,132	5,077	5,022	13,974
CUMULATIVE NET CASH FLOW	-19,050	15,260	-6,554	2,937	8,721	14,440	19,682	24,869	30,002	35,079	40,102	54,076
Net present value	-19,050	3,445	7,195	7,131	3,950	3,551	2,959	2,662	2,394	2,153	1,936	5,388
Cumulative net present value	-19,050	15,605	-8,409	-1,279	2,672	6,223	9,182	11,844	14,238	16,391	18,328	23,715

NET PRESENT VALUE 23,715
INTERNAL RATE OF RETURN 31.92%
NORMAL PAYBACK 4 years