

**200. PROFILE ON THE PRODUCTION OF
WOOD SCREW & RIVETS**

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I. SUMMARY

This profile envisages the establishment of a plant for the production of wood screw & rivet with a capacity of 182 tons per annum. Wood Screws and Rivets are items that are used in wood and metal technology for attaching together two parts of an object.

The demand for wood screw & rivet is met entirely through import. The present (2012) demand for wood screw & rivet is estimated at 210 tones. The demand for wood screw & rivet is projected to reach 338 tons and 545 tons by the year 2017 and 2022, respectively.

The principal raw materials required are various sizes of steel and aluminum wires which have to be imported.

The total investment cost of the project including working capital is estimated at Birr 8.30 million. From the total investment cost the highest share (Birr 5.39 million or 64.96%) is accounted by fixed investment cost initial followed by working capital (Birr 1.93 million or 23.29%) and pre operation cost (Birr 974.78 thousand or 11.74%). From the total investment cost Birr 2.43 million or 29.33% is required in foreign currency.

The project is financially viable with an internal rate of return (IRR) of 31.34% and a net present value (NPV) of Birr 9.14 million discounted at 10%.

The project can create employment for 22 persons. The establishment of such factory will have a foreign exchange saving effect to the country by substituting the current imports. The project will also create forward linkage with the manufacturing, construction, and furniture sub sectors and also generates income for the Government in terms of tax revenue and payroll tax.

II. PRODUCT DESCRIPTIONS AND APPLICATIONS

Wood Screws and Rivets are items that are used in wood and metal technology for attaching together two parts of an object. Wood screws attach two parts of an object usually wood, by the

spiral thread of its body. The rivets in this project are known as pop rivets. They are used to fasten together two different parts of an object.

The wood screws are made in sizes of rod diameter 1.6-4mm,3-6mm and 4-8mm with a Max lengths of 55mm,80mm and 115mm respectively. The pop rivets are made in a model with a length of 7.5 mm and diameter of 5mm

Wood screw and rivets have wide application in the manufacturing and construction sectors as well as during maintenance of various products.

III. MARKET STUDY AND PLANT CAPACITY

A. MARKET STUDY

1. Past Supply and Present Demand

As there is no local producer of wood screw and rivets the country's requirement is entirely met through import. Imported quantity of wood screw and rivets during the period 2002 - 2011 is shown in Table 3.1.

Table 3.1
IMPORT OF WOOD SCREW AND RIVETS (TONS)

Year	Import		
	Rivet	Wood screw	Total
2002	49	51	100
2003	48	68	116
2004	56	65	121
2005	36	82	118
2006	36	87	123
2007	73	44	117
2008	32	151	183
2009	42	203	245
2010	97	110	207
2011	83	57	140

Source: - Ethiopian Revenue and Customs Authority

Import of wood screw and rivets during the period 2002 - 2011 was fluctuating from year to year although there is a general increasing trend. During the first three years, 2003-2005, the annual average import stood at 118 tones. In the second three years, i.e. 2006-2008, the annual average level of import has increased to 141 tones. During the recent three years (2009 -2011) the yearly average has further increased to 197 tones. During the period under consideration import of wood screw and rivets has registered an average annual growth rate of 6.66%.

To determine the current effective demand for the products the recent three years average, which is 197 tones is taken as abase. Then the growth rate registered during period 2002--2011 i.e. 6.66% is applied to arrive at the current demand. Accordingly, current (2012) demand for wood screw and rivets is estimated at 210 tones.

2. Projected Demand

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 wood screw and rivets one of the critical factor is identified to be economic growth leading to growth of the construction and furinture manufacturing sectors. 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 and in order to be conservative 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 demand as a base the projected demand for wood screw and rivets is shown in Table 3.2.

Table 3.2**FORECASTED DEMAND FOR WOOD SCREW AND RIVETS (TONS)**

Year	Projected Demand
2013	231
2014	254
2015	280
2016	307
2017	338
2018	372
2019	409
2020	450
2021	495
2022	545
2023	599
2024	659

3. Pricing and Distribution

The average CIF price per ton of wood screw and rivets is found to be Birr 43,456. Allowing 40% for taxes, inland transport and other charges Birr 60,838 per tons is taken for sales revenue projection.

The product will find its market out let through the existing spare parts and building materials whole sale enterprises.

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

By considering the projected demand and the available technologies, a plan with a capacity that can manufacture 30 tons of rivets and 182 tons of wood screws per annum is selected

2 Production Program

Considering the production process, the time required for skill development and market penetration plant will operate at 75% of its installed capacity in the first year of operation. Then, it will increase to 85% and 100% in the second and third year and then after respectively. The production program is shown in Table 3.1.

Table 3.3
ANNUAL PRODUCTION PROGRAM (TONS)

	Product	Year 1	Year 2	Year 3-10
Annual production(Tons)	Rivets	23	25	30
	Wood Screws	137	154	182
Capacity %		75	85	100

IV. RAW MATERIAL AND INPUTS

A. RAW AND AUXILIARY MATERIALS

The required raw materials for the production of wood screws and rivets are various sizes of steel and aluminum wires. All the raw materials will be imported. Annual cost of raw materials is Birr 7.99 million. The details of the required raw materials with their corresponding cost are shown in Table 4.1.

Table 4.1**ANNUAL RAW MATERIALS REQUIREMENT AND COST**

No	Raw Materials	Description	Quantity (tons)	Cost (000 Birr)		
				F.C	L.C	Total
1	Steel Wires	Dia. 1.6mm	27	324	65	389
2	“ “	Dia. 2.5mm	60	4,212	842	5,054
3	“ “	Dia. 4mm	60	840	168	1,008
4	“ “	Dia. 6mm	70	1,050	210	1,260
5	Aluminum Wires	Dia. 6mm	10	240	48	288
	Total			6,666	1,333	7,999

B. UTILITIES

The Major Utility Requirement of the plant are electricity and water. Annual cost of utilities is estimated at Birr 200,000. Details of utility requirement at full capacity operation are indicated in Table 4.2.

Table 4.2**ANNUAL UTILITY REQUIREMENTS AND COST**

No	Utility	Unit	Quantity	Cost (Birr)
1	Electricity	Kwh.	250,000	150,000
2	Water	Meter cube	5,000	50,000
	Total			200,000

V. TECHNOLOGY AND ENGINEERING**A. TECHNOLOGY****1. Process Description****a) Wood screws**

The process required in the manufacture of wood screws is:

Head formation: - The different wire coils are fed into the proper double stroke heading machines for head formation and wire cutting.

Head slotting: - The formed heads are fed to the head slotting machine where the head of each piece of the product is slotted.

Head shaving: - The slotted pieces are fed to the slotting machine where the burrs are removed and smoothed out.

Threading: - The shaved and smoothed pieces are fed to the thread rolling machine, where the threads are rolled.

Finishing: - The threaded pieces are fed in the polishing barrel, where the surface is smoothed from burrs.

b) Pop rivets

Head Formation: - The aluminum wire of the proper dimension is fed to the head forming machine where the proper head of the pop rivet is formed.

Drilling: - The head of the formed pop rivet is drilled through

Nail formation: - The wire of proper dimension is fed to the heading machine where the nail head is formed.

Assembly: - The head of the drilled pop rivet and the nail are assembled to form the complete final pop rivet

2. Environmental Impact

The manufacturing techniques involve cutting, drilling forming of the wire rods with no effect on the surrounding. Thus the plant does not have any negative impact on the environment.

B. ENGINEERING

1. Machinery and Equipment

Total cost of machinery and equipment is estimated at Birr 2,722,000, of which Birr 2,435,000 is required in foreign currency. The necessary machinery and equipment for the production of the envisaged wood screw and rivets are shown in Table 5.1.

Table 5.1
LIST OF MACHINERY AND EQUIPMENT AND COST

Sr. No.	Machinery	Description	No
1	Automatic double Stroke cold Heading Machine	Blank dia1.6-4mm Max.wire 1.55mm	1
2	Automatic double Stroke Cold Heading Machine	Blank dia.3-6 Max.wire 1.80mm	1
3	Automatic double stroke cold Heading Machine	Blank dia.4-6mm Max wire1.90mm	1
4	Rivet Heading machine		1
5	Nail forming machine		1
6	Head shaving machine		1
7	Automatic thread rolling machine		1
8	Automatic head slotting machine		1
9	Hand tools		5set
10	Material Handling equipment		2set

2. Land Building and Civil Work

The total land required by the project is about 800 m², of which 300 m² is built-up area. The cost of building and civil works is estimated at Birr 1,500,000.

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 212,800 of which 10% or Birr 21,280 will be paid in advance. The remaining Birr 191,520 will be paid in equal installments with in 28 years i.e. Birr 6,840 annually.

VI. HUMAN RESOURCE AND TRAINING REQUIREMENT**A. HUMAN RESOURCE REQUIREMENT**

The envisaged plant requires 22 workers of whom 13 workers are technical workers. The total yearly salary, including employees benefit amounts to Birr 600,900. The details are shown in Table 6.1.

Table 6.1
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	5	2,000	120,000
10	Assistant Operators	2	1,500	36,000
11	Mechanics	2	2,000	48,000
12	Quality controller	1	1,500	18,000
13	Laborers	2	800	19,200
Sub Total		13	-	271,200
Total Basic Salary				492,000
Employee's Benefit (25% Of Basic Salary)		-	-	108,900
Grand Total		22	-	600,900

B. TRAINING REQUIREMENT

On the job training of the operators would be enough for workers with technical back ground.
The cost of training is estimated at Birr 20,000.

VII. FINANCIAL ANALYSIS

The financial analysis of the wood screw & rivet project is based on the data presented in the previous chapters and the following assumptions:-

Construction period	1 year
Source of finance	30 % equity and 70% loan
Tax holidays	5 years
Bank interest	10%
Discount cash flow	10%
Accounts receivable	30 days
Raw material local	30 days
Raw material imported	120 days
Work in progress	1 day
Finished products	30 days
Cash in hand	5 days
Accounts payable	30 days
Repair and maintenance	5% of machinery cost

A. TOTAL INITIAL INVESTMENT COST

The total investment cost of the project including working capital is estimated at Birr 8.30 million (See Table 7.1). From the total investment cost the highest share (Birr 5.39 million or 64.96%) is accounted by fixed investment cost initial followed by working capital (Birr 1.93 million or 23.29%) and pre operation cost (Birr 974.78 thousand or 11.74%). From the total investment cost Birr 2.43 million or 29.33% 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	21.28		21.28	0.26
1.2	Building and civil work	1,500.00		1,500.00	18.07
1.3	Machinery and equipment	287.00	2,435.00	2,722.00	32.79
1.4	Vehicles	900.00		900.00	10.84
1.5	Office furniture and equipment	250.00		250.00	3.01
	Sub total	2,958.28	2,435.00	5,393.28	64.96
2	Pre operating cost *				
2.1	Pre operating cost	431.66		431.66	5.20
2.2	Interest during construction	543.12		543.12	6.54
	Sub total	974.78		974.78	11.74
3	Working capital **	1,933.88		1,933.88	23.29
	Grand Total	5,866.93	2,435.00	8,301.93	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 2.75 million. However, only the initial working capital of Birr 1.93 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 10.77 million (see Table 7.2). The cost of raw material account for 74.23% of the production cost. The other major components of the production cost are depreciation, direct labour and financial cost, which account for 8.31%, 4.57% and 4.16% respectively. The remaining 8.73% is the share of utility, 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	7,999.00	74.23
Utilities	200.00	1.86
Maintenance and repair	82.00	0.76
Labour direct	492.00	4.57
Labour overheads	109.00	1.01
Administration Costs	200.00	1.86
Land lease cost	-	-
Cost of marketing and distribution	350.00	3.25
Total Operating Costs	9,432.00	87.53
Depreciation	895.73	8.31
Cost of Finance	448.07	4.16
Total Production Cost	10,775.80	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 994 thousand to Birr 1.93 million during the life of the project. Moreover, at the end of the project life the accumulated net cash flow amounts to Birr 19.81 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.

$$\text{Break Even Sales Value} = \frac{\text{Fixed Cost} + \text{Financial Cost}}{\text{Variable Margin ratio (\%)}} = \text{Birr } 4,781,380$$

$$\text{Break Even Capacity utilization} = \frac{\text{Break even Sales Value}}{\text{Sales revenue}} \times 100 = 39\%$$

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 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 31.34% 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 9.14 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 22 persons. The project will generate Birr 3.91 million in terms of tax revenue. The establishment of such factory will have a foreign exchange saving effect to the country by substituting the current imports. The project will also create forward linkage with the manufacturing, construction, and furniture sub sectors 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	5,599	6,399	7,199	7,999	7,999	7,999	7,999	7,999	7,999	7,999
Utilities	140	160	180	200	200	200	200	200	200	200
Maintenance and repair	57	66	74	82	82	82	82	82	82	82
Labour direct	344	394	443	492	492	492	492	492	492	492
Labour overheads	76	87	98	109	109	109	109	109	109	109
Administration Costs	140	160	180	200	200	200	200	200	200	200
Land lease cost	0	0	0	0	7	7	7	7	7	7
Cost of marketing and distribution	350	350	350	350	350	350	350	350	350	350
Total Operating Costs	6,707	7,616	8,524	9,432	9,439	9,439	9,439	9,439	9,439	9,439
Depreciation	896	896	896	896	896	85	85	85	85	85
Cost of Finance	0	597	523	448	373	299	224	149	75	0
Total Production Cost	7,603	9,109	9,942	10,776	10,708	9,823	9,748	9,673	9,599	9,524

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	8,597	11,053	12,282	12,282	12,282	12,282	12,282	12,282	12,282	12,282
Less variable costs	6,357	7,266	8,174	9,082	9,082	9,082	9,082	9,082	9,082	9,082
VARIABLE MARGIN	2,240	3,788	4,108	3,200	3,200	3,200	3,200	3,200	3,200	3,200
in % of sales revenue	26.05	34.27	33.45	26.05	26.05	26.05	26.05	26.05	26.05	26.05
Less fixed costs	1,246	1,246	1,246	1,246	1,253	442	442	442	442	442
OPERATIONAL MARGIN	994	2,542	2,862	1,954	1,947	2,758	2,758	2,758	2,758	2,758
in % of sales revenue	11.56	23.00	23.31	15.91	15.86	22.46	22.46	22.46	22.46	22.46
Financial costs		597	523	448	373	299	224	149	75	0
GROSS PROFIT	994	1,945	2,340	1,506	1,574	2,459	2,534	2,609	2,683	2,758
in % of sales revenue	11.56	17.59	19.05	12.26	12.82	20.02	20.63	21.24	21.85	22.46
Income (corporate) tax	0	0	0	0	0	738	760	783	805	827
NET PROFIT	994	1,945	2,340	1,506	1,574	1,722	1,774	1,826	1,878	1,931
in % of sales revenue	11.56	17.59	19.05	12.26	12.82	14.02	14.44	14.87	15.29	15.72

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	5,825	11,108	11,058	12,287	12,282	12,282	12,282	12,282	12,282	12,282	12,282	4,215
Inflow funds	5,825	2,510	5	5	0	0	0	0	0	0	0	0
Inflow operation	0	8,597	11,053	12,282	12,282	12,282	12,282	12,282	12,282	12,282	12,282	0
Other income	0	0	0	0	0	0	0	0	0	0	0	4,215
TOTAL CASH OUTFLOW	5,825	9,218	9,237	10,070	10,904	10,560	11,222	11,170	11,118	11,065	10,266	0
Increase in fixed assets	5,825	0	0	0	0	0	0	0	0	0	0	0
Increase in current assets	0	1,967	277	277	277	1	0	0	0	0	0	0
Operating costs	0	6,357	7,266	8,174	9,082	9,089	9,089	9,089	9,089	9,089	9,089	0
Marketing and Distribution cost	0	350	350	350	350	350	350	350	350	350	350	0
Income tax	0	0	0	0	0	0	738	760	783	805	827	0
Financial costs	0	543	597	523	448	373	299	224	149	75	0	0
Loan repayment	0	0	747	747	747	747	747	747	747	747	0	0
SURPLUS (DEFICIT)	0	1,890	1,821	2,216	1,378	1,722	1,060	1,112	1,164	1,217	2,016	4,215
CUMULATIVE CASH BALANCE	0	1,890	3,711	5,928	7,306	9,028	10,088	11,200	12,364	13,581	15,596	19,812

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	8,597	11,053	12,282	12,282	12,282	12,282	12,282	12,282	12,282	12,282	4,215
Inflow operation	0	8,597	11,053	12,282	12,282	12,282	12,282	12,282	12,282	12,282	12,282	0
Other income	0	0	0	0	0	0	0	0	0	0	0	4,215
TOTAL CASH OUTFLOW	7,759	6,980	7,888	8,796	9,433	9,439	10,177	10,199	10,221	10,244	10,266	0
Increase in fixed assets	5,825	0	0	0	0	0	0	0	0	0	0	0
Increase in net working capital	1,934	272	272	272	1	0	0	0	0	0	0	0
Operating costs	0	6,357	7,266	8,174	9,082	9,089	9,089	9,089	9,089	9,089	9,089	0
Marketing and Distribution cost	0	350	350	350	350	350	350	350	350	350	350	0
Income (corporate) tax		0	0	0	0	0	738	760	783	805	827	0
NET CASH FLOW	-7,759	1,618	3,166	3,486	2,849	2,843	2,105	2,083	2,060	2,038	2,016	4,215
CUMULATIVE NET CASH FLOW	-7,759	-6,141	-2,976	510	3,360	6,203	8,308	10,391	12,451	14,489	16,505	20,720
Net present value	-7,759	1,471	2,616	2,619	1,946	1,765	1,188	1,069	961	864	777	1,625
Cumulative net present value	-7,759	-6,288	-3,672	-1,053	893	2,658	3,847	4,916	5,877	6,741	7,518	9,143

NET PRESENT VALUE 9,143
INTERNAL RATE OF RETURN 31.34%
NORMAL PAYBACK 3 years