

**92. PROFILE ON THE PRODUCTION OF TWINE
AND ROPE**

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I. SUMMARY

This profile envisages the establishment of a plant for the production of twine and rope with a capacity of 300 tons per annum. Twine and rope are a linear collection of plies, yarns or strands which are twisted or braided together in order to combine them into a larger and stronger form and are used for dragging and lifting.

The demand for synthetic twine and rope is met entirely from import. The present (2012) demand for twine and rope is estimated at 235 tons. The demand for twine and rope is projected to reach 378 tons and 610 tons by the year 2017 and 2022, respectively.

The principal raw materials required are poly propylene (polyethylene) resin and pigment (master batch) which have to be imported.

The total investment cost of the project including working capital is estimated at Birr 24.06 million. From the total investment cost, the highest share (Birr 18.91 million or 78.59%) is accounted by fixed investment cost followed by initial working capital (Birr 2.86 million or 11.89%) and pre operation cost (Birr 2.29 million or 9.52%). From the total investment cost Birr 10.49 million or 43.59% is required in foreign currency.

The project is financially viable with an internal rate of return (IRR) of 19.10% and a net present value (NPV) of Birr 10.78 million, discounted at 10%.

The project can create employment for 55 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 have backward linkage with plastic sub sector and forward linkage with the construction and industrial sectors and also generates income for the Government in terms of tax revenue and payroll tax.

II. PRODUCT DESCRIPTION AND APPLICATION

Twine and rope are a linear collection of plies, yarns or strands which are twisted or braided together in order to combine them into a larger and stronger form. Ropes have tensile strength and so can be used for dragging and lifting. Rope is thicker and stronger than similarly constructed cord, line, string, and twine.

Twine and rope may be constructed of any long, stringy, fibrous material, but generally is constructed of certain natural or synthetic fibers. Synthetic fiber ropes are significantly stronger than their natural fiber counterparts, but also possess certain disadvantages, including slipperiness.

Synthetic fibers used for twine and rope making include polypropylene, nylon, polyesters (e.g. PET, LCP, HDPE, Vectran), polyethylene (e.g. Dyneema and Spectra), Aramids (e.g. Twaron, Technora and Kevlar) and acrylics (e.g. Dralon). Some ropes are constructed of mixtures of several fibers or use co-polymer fibers. Synthetic twine and rope are extensively used in the construction and industrial sectors.

III. MARKET STUDY AND PLANT CAPACITY

A. MARKET STUDY

1. Past Supply and Present Demand

Currently, there are no local manufacturers of synthetic twine and ropes; hence the demand for the product is met entirely from import. Accordingly, Table 3.1 presents the annual import or total supply of synthetic twine and ropes during the period 2002 – 2011.

Table 3.1
IMPORTED SYNTHETIC TWINE AND ROPE (TONS)

Year	Quantity
2002	67
2003	34
2004	83
2005	27
2006	59
2007	77
2008	98
2009	198
2010	217
2011	222

Source: -Ethiopian Revenue and Customs Authority.

As can be seen from Table 3.1, import or total supply of synthetic twine and rope shows a significant growth. During the first three years (2002--2005) import of the products shows fluctuations. Import, which was 67 tons in 2002 has decreased to 34 tons in 2003. However, in 2004 import has increased to 83 tons which then decreased to 27 tons in 2005. Nevertheless beginning from year 2006 import has exhibited consistent year to year increase reaching an all time high of 222 tons in 2011.

For estimating the present demand for the products under consideration, it is assumed that the average annual growth rate registered by the total supply or apparent consumption of the product during the recent three years (2009-2011), which is 6%, will continue in the near future.

Accordingly, taking the 2011 level of apparent consumption as a base and applying a growth rate of 6%, the present (2012) demand for synthetic twine and rope is estimated at 235 tons.

2. Demand Projection

The demand for synthetic twine and ropes depends on the performance of the construction and industrial sectors. According to the GTP, during the period 2010/11--2014/15 the real GDP of the country (at a base case scenario) is expected to grow at an average annual growth rate of 11.2%. Moreover, during the same period the annual average planned targets of growth for the industrial sector is 20%.

Accordingly, by considering the above factors the demand for synthetic twine and ropes is conservatively assumed to grow at a rate of 10%. Projected demand is presented in Table 3.2.

Table 3.2

PROJECTED DEMAND FOR SYNTHETIC TWINE & ROPES (TONS)

Year	Projected Demand
2013	259
2014	284
2015	313
2016	344
2017	378
2018	416
2019	458
2020	504
2021	554
2022	610
2023	671
2024	738
2025	811

3. Pricing and Distribution

After assessing the current (2011) C.I.F price of synthetic twine and ropes which was Birr 49.40 per kg and adding 35% for duty and other import related expense, an ex-factory price of Birr 66.69/kg is proposed for the envisaged project.

The product can be distributed directly to bulk end users. More over, it can be distributed by establishing own distribution outlets in major towns or by using construction materials retailers.

B. PLANT CAPACITY AND PRODUCTION PROGRAM

1. Plant Capacity

The production capacity of the plant is 300 ton of twine and rope per year. The envisaged plant will operate in two shifts sixteen hours per day for three hundred days within a year considering 13 holidays and 52 Sunday per year and assuming that maintenance activities will be performed during off hours and Sunday

2. Production Program

The plant will operate at different capacity after the implementation until all production factors start to function properly and also till the operators develop skills and experience for operation and troubleshooting as shown in Table 3.2.

Table 3.2

PRODUCTION PROGRAM

Description	Year		
	1	2	3
Capacity utilization rate (%)	75	85	100
Twine and rope (tons)	225	255	300

IV. MATERIALS AND INPUTS

A. MATERIALS

The major raw material required for production of twine and rope is poly propylene (polyethylene) resin and pigment (master batch) as an indirect material for coloring purpose. All the raw materials have to be imported. The annual requirement and related cost of the raw materials is shown in Table 4.1.

Table 4.1**ANNUAL RAW MATERIAL REQUIREMENT & COST**

Sr.No.	Description	Annual Requir.	UOM	Unit Cost (Birr /Ton)	Cost (000 Birr)		
					LC	FC	Total (Birr)
1	Poly propylene (resin)	315	ton	25,600		8,064.00	8,064.00
2	Master batch (pigment)	16	ton	38,400		604.80	604.80
Total FOB						8,668.80	8,668.80
3	CIF (15%)				1,300.32		1,300.32
Grand Total Cost					1,300.32	8,668.80	9,969.12

B. UTILITES

The main utilities of the envisaged plant are electricity and water. Annual cost of utilities is Birr 2,020,000. For details of the required quantity and cost see Table 4.2.

Table 4.2**ANNUAL UTILITIES REQUIREMENT & COST**

Sr. No.	Description	Annual Consumption	UOM	Unit Cost (Birr)	Cost (`000 Birr)
1	Electricity	3,000,000	kWh	0.58	1,740.00
2	Water	28,000	m ³	10.00	280.00
Total Cost					2,020.00

V. TECHNOLOGY AND ENGINEERING

A. TECHNOLOGY

1. Production Process

The raw material are extruded in the form of filaments by extrusion machine and the desired number of monofilament is cooked and solidified in the quenching bath followed by sequential processing from one roller to the second roller so as to stretch the length of monofilament.

The stretched monofilament is annealed and each filament is wound round the winder bobbin and its thickness is controlled by the extrusion rate and stretching ratio. The monofilament is set and twisted by the required number of strand bobbin so as to manufacture the desired diameter of strands.

The strands bobbins are set on the rope layer and twisted to produce ropes and rewound by coiling machine to become a product

2. Environmental Impact

The envisaged plant is a manufacturing plant with no chemical or any hazardous waste to the surrounding environment and process scrapes and wastes will be sold to surrounding market for different application. Therefore, there will not be additional investment for environmental protection

B. ENGINEERING

1. Machinery and Equipment

Total cost of machinery and equipment is Birr 12,213,290, out of which Birr 10,494,000 is required in foreign currency. The machineries and equipments required for the envisaged plant together with their associated cost is as shown in Table 5.1.

Table 5.1**MACHINERY AND EQUIPMENTS REQUIREMENT & COST**

Sr.No.	Description	Qty.	Unit Cost (Birr)	Cost (000 Birr)		
				LC	FC	Total (Birr)
1	Extrusion machine	1.00	4,500,000.00		4,500.00	4,500.00
2	4 spindle stranding machine	9.00	450,000.00		4,050.00	4,050.00
3	2 spindle rope layer	5.00	270,000.00		1,350.00	1,350.00
4	Balling machine	1.00	540,000.00		540.00	540.00
5	Rope coiling machine	1.00	54,000.00		54.00	54.00
6	Quenching bath	1.00	48,397.50	48.40		48.40
7	Stretching bath	1.00	58,077.00	58.08		58.08
8	Roller stand	1.00	38,718.00	38.72		38.72
Sub-Total				145.19	10,494.00	10,639.19
9	CIF (15%)			1,574.10		1,574.10
Grand Total Cost				1,719.29	10,494.00	12,213.29

2. Land, Building and Civil Works

The total estimated area of land requirement for the plant is 2,000 m², out of which the factory build up area is 1,200 m². At the rate of Birr 5,000 per m², the total cost of building and civil work is estimated at Birr 6 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	1,686
	2 nd	1,535
	3 rd	1,323
	4 th	1,085
	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. HUMANRESOURCEAND TRAINING REQUIREMENTS

A. HUMANRESOURCEREQUIREMENT

Total human resource required by the plant is 55 persons. Annual cost of labor is Birr 1,247,014. The total direct and indirect labor requirement together with corresponding labor cost in two shifts is given in Table 6.1.

Table 6.1**HUMAN RESOURCE REQUIREMENT & LABOR COST**

Sr. No.	Description	Reqd. No.	Monthly Salary	Annual salary
1	Plant manager	1	10,000.00	120.0
2	Secretary	1	2,500.00	30.0
3	Operators	30	1,400.00	504.0
4	Administration and finance	1	4,500.00	54.0
5	Accountant	1	3,000.00	36.0
6	Clerk	1	800.00	9.6
7	Cashier	1	1,800.00	21.6
8	Mechanic	4	2,200.00	105.6
9	Electrician	2	2,200.00	52.8
10	Assistant operators	10	700.00	84.0
11	Guards	3	600.00	21.6
Sub-total		55	29,700.00	1,039.2
16	Employment benefits and		5,940.00	207.8
Total Annual Labor Cost (Direct +Indirect)				1,247.04

B. TRAINING REQUIREMENT

On- job training can be arranged by hiring both for the maintenance workers and operators before machinery commissioning and involve them both at installation and commissioning stage of the plant machineries and equipments with an estimated training cost of Birr 125,000

VII. FINANCIAL ANALYSIS

The financial analysis of the twine and rope 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 24.06 million (see Table 7.1). From the total investment cost, the highest share (Birr 18.91 million or 78.59%) is accounted by fixed investment cost followed by initial working capital (Birr 2.86 million or 11.89%) and pre operation cost (Birr 2.29 million or 9.52%). From the total investment cost Birr 10.49 million or 43.59% 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	0.22
1.2	Building and civil work	6,000.00		6,000.00	24.93
1.3	Machinery and equipment	1,719.29	10,494.00	12,213.29	50.74
1.4	Vehicles	450.00		450.00	1.87
1.5	Office furniture and equipment	200.00		200.00	0.83
	Sub -total	8,422.49	10,494.00	18,916.49	78.59
2	Pre operating cost *				
2.1	Pre operating cost	716.40		716.40	2.98
2.2	Interest during construction	1,574.61		1,574.61	6.54
	Sub- total	2,291.01		2,291.01	9.52
3	Working capital **	2,861.52		2,861.52	11.89
	Grand Total	13,575.02	10,494.00	24,069.02	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 3.57 million. However, only the initial working capital of Birr 2.86 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 18.50 million (see Table 7.2). The cost of raw material account for 53.88% of the production cost. The other major components of the production cost are depreciation, utility and financial cost, which account for 15.87%, 10.92% and 8.19%, respectively. The remaining 11.15 % is the share of marketing and distribution, 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	%
Raw Material and Inputs	9,969.00	53.88
Utilities	2,020.00	10.92
Maintenance and repair	366.00	1.98
Labor direct	1,039.00	5.62
Labor overheads	208.00	1.12
Administration Costs	150.00	0.81
Land lease cost	-	-
Cost of marketing and distribution	300.00	1.62
Total Operating Costs	14,052.00	75.94
Depreciation	2,935.94	15.87
Cost of Finance	1,515.56	8.19
Total Production Cost	18,503.50	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 661 thousand to Birr 3.97 million

during the life of the project. Moreover, at the end of the project life the accumulated net cash flow amounts to Birr 31.58 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.

$$\text{Break- Even Sales Value} = \frac{\text{Fixed Cost} + \text{Financial Cost}}{\text{Variable Margin ratio (\%)}} = \text{Birr } 10,350,346$$

$$\text{Break -Even Capacity utilization} = \frac{\text{Break- even Sales Value}}{\text{Sales revenue}} \times 100 = 52 \%$$

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 6 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 19.10% 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 10.78 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 55 persons. The project will generate Birr 8.95 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 backward linkage with plastic sub sector and forward linkage with the construction and industrial 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	7,975	8,972	9,969	9,969	9,969	9,969	9,969	9,969	9,969	9,969
Utilities	1,616	1,818	2,020	2,020	2,020	2,020	2,020	2,020	2,020	2,020
Maintenance and repair	293	329	366	366	366	366	366	366	366	366
Labour direct	831	935	1,039	1,039	1,039	1,039	1,039	1,039	1,039	1,039
Labour overheads	166	187	208	208	208	208	208	208	208	208
Administration Costs	120	135	150	150	150	150	150	150	150	150
Land lease cost	0	0	0	0	17	17	17	17	17	17
Cost of marketing and distribution	300	300	300	300	300	300	300	300	300	300
Total Operating Costs	11,302	12,677	14,052	14,052	14,069	14,069	14,069	14,069	14,069	14,069
Depreciation	2,936	2,936	2,936	2,936	2,936	260	260	260	260	260
Cost of Finance	0	1,732	1,516	1,299	1,083	866	650	433	217	0
Total Production Cost	14,238	17,345	18,503	18,287	18,088	15,195	14,979	14,762	14,546	14,329

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	16,006	18,006	20,007	20,007	20,007	20,007	20,007	20,007	20,007	20,007
Less variable costs	11,002	12,377	13,752	13,752	13,752	13,752	13,752	13,752	13,752	13,752
VARIABLE MARGIN	5,004	5,629	6,255	6,255	6,255	6,255	6,255	6,255	6,255	6,255
in % of sales revenue	31.27	31.26	31.26	31.26	31.26	31.26	31.26	31.26	31.26	31.26
Less fixed costs	3,236	3,236	3,236	3,236	3,253	577	577	577	577	577
OPERATIONAL MARGIN	1,768	2,393	3,019	3,019	3,002	5,678	5,678	5,678	5,678	5,678
in % of sales revenue	11.05	13.29	15.09	15.09	15.00	28.38	28.38	28.38	28.38	28.38
Financial costs		1,732	1,516	1,299	1,083	866	650	433	217	0
GROSS PROFIT	1,768	661	1,504	1,720	1,919	4,812	5,028	5,245	5,461	5,678
in % of sales revenue	11.05	3.67	7.51	8.60	9.59	24.05	25.13	26.22	27.30	28.38
Income (corporate) tax	0	0	0	516	576	1,444	1,509	1,573	1,638	1,703
NET PROFIT	1,768	661	1,504	1,204	1,344	3,368	3,520	3,671	3,823	3,975
in % of sales revenue	11.05	3.67	7.51	6.02	6.72	16.84	17.59	18.35	19.11	19.87

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	19,633	20,536	18,018	20,019	20,007	20,007	20,007	20,007	20,007	20,007	20,007	8,800
Inflow funds	19,633	4,530	12	12	0	0	0	0	0	0	0	0
Inflow operation	0	16,006	18,006	20,007	20,007	20,007	20,007	20,007	20,007	20,007	20,007	0
Other income	0	0	0	0	0	0	0	0	0	0	0	8,800
TOTAL CASH OUTFLOW	19,633	15,831	16,940	18,099	18,032	17,894	18,544	18,392	18,241	18,089	15,772	0
Increase in fixed assets	19,633	0	0	0	0	0	0	0	0	0	0	0
Increase in current assets	0	2,955	366	366	0	2	0	0	0	0	0	0
Operating costs	0	11,002	12,377	13,752	13,752	13,769	13,769	13,769	13,769	13,769	13,769	0
Marketing and Distribution cost	0	300	300	300	300	300	300	300	300	300	300	0
Income tax	0	0	0	0	516	576	1,444	1,509	1,573	1,638	1,703	0
Financial costs	0	1,575	1,732	1,516	1,299	1,083	866	650	433	217	0	0
Loan repayment	0	0	2,165	2,165	2,165	2,165	2,165	2,165	2,165	2,165	0	0
SURPLUS (DEFICIT)	0	4,704	1,077	1,920	1,975	2,113	1,463	1,615	1,766	1,918	4,235	8,800
CUMULATIVE CASH BALANCE	0	4,704	5,782	7,702	9,677	11,789	13,253	14,867	16,634	18,552	22,786	31,586

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	16,006	18,006	20,007	20,007	20,007	20,007	20,007	20,007	20,007	20,007	8,800
Inflow operation	0	16,006	18,006	20,007	20,007	20,007	20,007	20,007	20,007	20,007	20,007	0
Other income	0	0	0	0	0	0	0	0	0	0	0	8,800
TOTAL CASH OUTFLOW	22,494	11,656	13,031	14,052	14,570	14,645	15,513	15,578	15,643	15,708	15,772	0
Increase in fixed assets	19,633	0	0	0	0	0	0	0	0	0	0	0
Increase in net working capital	2,862	355	355	0	2	0	0	0	0	0	0	0
Operating costs	0	11,002	12,377	13,752	13,752	13,769	13,769	13,769	13,769	13,769	13,769	0
Marketing and Distribution cost	0	300	300	300	300	300	300	300	300	300	300	0
Income (corporate) tax		0	0	0	516	576	1,444	1,509	1,573	1,638	1,703	0
NET CASH FLOW	-22,494	4,350	4,975	5,955	5,437	5,362	4,494	4,429	4,364	4,299	4,235	8,800
CUMULATIVE NET CASH FLOW	-22,494	-18,145	-13,170	-7,215	-1,778	3,584	8,079	12,508	16,873	21,172	25,407	34,207
Net present value	-22,494	3,954	4,111	4,474	3,714	3,329	2,537	2,273	2,036	1,823	1,633	3,393
Cumulative net present value	-22,494	-18,540	-14,429	-9,955	-6,241	-2,911	-375	1,898	3,934	5,758	7,390	10,783

NET PRESENT VALUE 10,783
INTERNAL RATE OF RETURN 19.10%
NORMAL PAYBACK 6 years