

**115. PROFILE ON THE PRODUCTION OF MATCH
STICK OR SPLINT**

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I. SUMMARY

This profile envisages the establishment of a plant for the production of the match stick or splint with a capacity of 180 tons per annum. The match stick or splint is a plunder length of wood or other fairly rigid material used for making matches.

The demand for the match stick or splint is entirely met through import. The present (2012) demand for the match stick or splint is estimated at 1,597 tons. The demand for match stick or splint is projected to reach 1,763 tons and 1,946 tons by the year 2017 and 2022, respectively.

The principal raw materials required is wood splints or bamboo which are locally available.

The total investment cost of the project including working capital is estimated at Birr 10.91 million. From the total investment cost the highest share (Birr 9.49 million or 86.96%) is accounted by fixed investment cost initial followed by pre operation cost (Birr 1.21 million or 11.08%) and working capital (Birr 213.54 thousand or 1.96%). From the total investment cost Birr 3.73 million or 34.18% is required in foreign currency.

The project is financially viable with an internal rate of return (IRR) of 19.56% and a net present value (NPV) of Birr 4.99 million discounted at 10%.

The project can create employment for 32 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 backward linkage with the forestry subsector and forward linkage with the match manufacturing sub sector and also generates income for the Government in terms of tax revenue and payroll tax.

II. PRODUCT DESCRIPTION AND APPLICATION

Match stick or splint is a plunder length of wood or other fairly rigid material used for making matches. Match sticks are made by veneering method whereby “SASA” or “Zigba” wood is peeled from a section of a log and cut into splints which have a square cross-section. Standard sizes for splints are 45 mm in length and 2x2 in cross section. Match stick materials are selected

based on their combustibility, hardness, color and machinability. Match splints are used as raw materials for fabrication plants.

III. MARKET STUDY AND PLANT CAPACITY

A. MARKET STUDY

1. Past Supply and Present Demand

Match sticks are used by safety match producers. Therefore, the local demand for the product is largely influenced by the expansion of the local safety match industry. Currently, some safety match producers with trade marks such as RAINBOW and SCISSORSRS have become operational and marketed domestically. As a result of the establishment of the factories the import of finished safety much is declining, while the import of inputs required, such as match sticks, is on the increasing trend. Since there is no plant that manufactures splints / match sticks for match making, the product is imported from overseas. Import of splints for exclusive use in the manufacture of match is given in Table 3.1.

Table 3.1
IMPORT OF MATCH STICKS

Year	Quantity (Tone)	Value (`000 Birr)
2000	-	-
2001	25.9	138
2002	249.2	1,632
2003	929.7	6,171
2004	454.6	2,665
2005	1,052.2	6,764
2006	1,716.2	12,823
2007	524.9	5,074
2008	1,506.6	19,810
2009	1,502.5	20,058
2010	1,047.5	18,326
2011	1,545.7	30,877

Source: - Ethiopian Revenues & Customs Authority.

As could be seen from Table 3.1, import data of splints for exclusive use in the manufacture of match shows a strong growth trend starting from year 2001. According to the data source of Ethiopian Revenues & Customs Authority, there was no recorded data on the product for the years before 2001. The reason is that before 2001 there were not operational establishments that produce safety match, which require splints/match sticks as an input.

The strong growth in the import of match sticks can be clearly seen when the data set is analyzed by grouping in to different periods. Accordingly, the yearly average level of import which was only 402 tones by the year 2001--2003 has increased to about 1,074 tones during the period 2004--2006, which is higher by 2.67 times (or 267%) compared to the previous three years average. Similarly, imported quantity increased to an annual average of 1,178 tones and 1,297 tones by the year 2007--2009 and 2010/11. Compared to their respective previous three years average the total growth rate is about 10% or a yearly growth rate of 3.3%.

To estimate the current demand the trend in the imported quantity of the past five years is taken in to account. Accordingly, taking year 2011 as a base and applying a 3.3% growth rate current demand is set at 1,597 tones.

2. Projected Demand

The demand for match sticks is a derived demand of safety match. The demand for safety match in turn is influenced by the growth of both urban and rural population. Assuming that the existing factories are satisfying most of the demand of the country a 2% growth rate is applied in forecasting the future demand for match sticks (see Table 3.2).

Table 3.2

PROJECTED DEMAND (TONE)

Year	Projected demand
2013	1,628
2014	1,661
2015	1,694
2016	1,782
2017	1,763
2018	1,798

Year	Projected demand
2019	1,834
2020	1,870
2021	1,908
2022	1,946

The demand for the product will increase from 1,628 tones in the year 2013 to 1,798 tones and 1,946 tones by the year 2018 and 2022, respectively.

3. Pricing and Distribution

A factory gate price of Birr 25,000 per tone is recommended based on the CIF import data. The product is an industrial input which is required exclusively by safety match manufacturers. Since the numbers of safety match manufacturers are very few and are found in a limited geographical area, mainly in Addis Ababa, direct supply to the end users without involving intermediaries is recommended.

B. PLANT CAPACITY AND PRODUCTION PROGRAMME

1. Plant Capacity

The annual capacity of the envisaged mach stick/splint plant is proposed to be 180 tones based on the market study, and technological considerations, period required for implementation of the project and full capacity attainment and considering about 10% market share at the 2018's estimation. The plant operates 300 days per year with two shifts.

2. Production Programme

The envisaged plant is recommended to start at relatively lower capacity to get enough time to penetrate market and develop skill. The production build-up programme is, hence, made to start at relatively lower (75%) and then gradually rise to full capacity in the 3rd year of operation. The production programme is set considering Sundays and public holidays and assuming that maintenance works will be carried out during off-working hours. The detailed production programme is given in Table 3.3 below.

Table 3.3**ANNUAL PRODUCTION PROGRAM**

No.	Description	production year		
		1	2	3
1	Capacity utilization rate (%)	75	85	100
2	Mach stick/splint production(tones)	135.00	153.00	180.00

IV. MATERIALS AND INPUTS**A. RAW MATERIALS**

The major raw material for match industry is wood splints. Aspen wood is being preferentially used for manufacture of match splints. As the supply of aspen wood is limited, other species such as bamboo has been identified as alternative species for match splints. There is a gap between demand and supply of wood raw material and the demand is always been higher. Scarcity of wood raw material has compelled the industrialists to cut down their production.

The use of bamboo as match splint has several advantages. It is cheap and renewable resource, because bamboo is short rotation species. It can be easily converted into splints of required size by using simple tools. The splints once made have a clean surface and the stick possesses high tensile strength and do not break easily. Post incandescent treatment is given to prevent afterglow for match splint with boric acid which also offers good resistance to borer attack. The total annual cost of raw material is estimated at Birr 563,000.00. The total annual materials requirement and cost of the plant is given in Table 4.1.

Table 4.1**ANNUAL CONSUMPTION OF RAW MATERIALS AND COST**

NO.	Description	Annual consumption	Unit	Unit Cost (Birr)	Cost ("000) Birr		
					LC	FC	Total
1	Raw bamboo	190	ton	2,000.00	380.00	-	380.00
2	Boric acid	As req	kg	-		53.00	53.00
3	Sodium meta silicate	As req	lit	-		80.00	80.00
4	wax	As req	kg	-	50.00		50.00
Total cost						-	563.00

B. UTILITIES

Utilities required for manufacturing mach stick include electric power and water. The total annual cost of utilities is estimated at Birr 97,680.00 (See Table 4.2).

Table 4.2

ANNUAL CONSUMPTION OF UTILITIES AND COST

No.	Description	Quantity	Unit	Unit Cost (Birr)	Total Cost (`000 Birr)
1	Electricity	150,000	kwh	0.65	97.50
2	Water	18	m ³	10.00	0.18
Total Annual cost					97.68

V. TECHNOLOGY AND ENGINEERING

A. TECHNOLOGY

1. Production Process

Dry bamboo is usually used for making match splints. Bamboo after cross cutting are split either manually or mechanically. Split bamboo is converted into slabs and later sized into splints of 37mm length and 1.5mm x 1.5mm cross section. Some green bamboo are yellowish to reddish in colour is bleached although bleaching is option. Bleaching is followed by carbonization, which improves easy quenching of afterglow of the match stick. The splints are then subjected to waxing and head fixing to make match stick.

2. Environmental Impact Assessment

The plant does not have significant adverse effect on environment. But, since chemicals are involved precautions must be taken against fire hazard. So, about Birr 300,000.00 is estimated to establish well equipped fire-extinguisher facility in the plant, in addition to investment cost.

B. ENGINEERING

1. Machinery and Equipment

The total cost of plant machinery and equipment is estimated at Birr 4.85 million, out of which Birr 3.73 million will be required in foreign currency. The list of production machinery and equipment required for the plant is provided in Table 5.1.

Table 5.1

LIST OF MACHINERY AND EQUIPMENT REQUIRED

	Machinery and Equipment Description	Quantity
1	Circular saw	2 pcs
2	Peeling machine	1
3	Chopping machine	1
4	Slitter	1
5	Grinding machine	2
6	Box filling machine	1
7	Oil furnace	1
8	Splint collecting machine	1
9	Wooden frames	100 pcs
10	Trays for bleaching	10 pcs
11	Trays for carbonization	10 pcs
12	Hot plate for melting wax	1 set
13	Head fixing trays	2 set
14	Hot air chamber for drying	1 set
15	Packing machine	1
16	Others (conveyors, work tables ... etc)	1 set

2. Land, Building and Civil Works

The total area will be 1,500 m². The built-up area of the plant will be 800 m². The plant will have production buildings, stores, office buildings and other civil structures. The total cost of buildings and civil works at the rate of Birr 5,000 per m² is estimated at shall be Birr 4,000,000.

According to the Federal Legislation on the Lease Holding of Urban Land (Proclamation No 272/2002) 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 5000 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

Zone	Level	Floor price/m²
	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 criterions 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. HUMAN RESOURCE AND TRAINING REQUIREMENT

A. HUMAN RESOURCE REQUIREMENT

The total human resource requirement of the plant will be 32. The total annual cost of human resource is estimated at Birr 650,880. The monthly and annual salaries and wages are summarized in Table 6.1.

Table 6.1

HUMAN RESOURCE REQUIREMENT AND LABOUR COST (BIRR)

Sr. No	Job Title	No. of Persons	Salary (Birr)	
			Monthly	Annual
1	General Manager	1	4,000	48,000
2	Secretary	1	1000	12,000
3	Production & Technical Head	1	2,500	30,000
4	Commercial Head	1	2,500	30,000
5	Finance & Administration Head	1	2,500	30,000
6	Personnel	1	2000	24,000
7	Accountant	1	2000	24,000
9	Cashier	1	1500	18,000
10	Sales person	1	1000	12,000
11	Purchaser	1	1500	18,000
12	Store Keeper	1	1500	18,000
13	Quality Controller	1	1500	18,000
15	Operator	5	1500	90,000
16	Assistant Operation	5	1000	60,000

Sr. No	Job Title	No. of Persons	Salary (Birr)	
			Monthly	Annual
17	Labourer	3	600	21,600
18	Mechanic	1	1500	18,000
19	Electrician	1	1500	18,000
20	Driver	2	1000	24,000
21	Guard	3	800	28,800
	Sub – Total	32		542,400
	Employee's Benefit 20% basic salary			108,480
	Grand Total	32		650,880

B. TRAINING REQUIREMENT

On-the-Job training for production and technical workers on operation, quality and maintenance of machinery shall be carried out during plant erection and commissioning. Therefore, the cost of training is estimated at Birr 50,000.

VII. FINANCIAL ANALYSIS

The financial analysis of the match stick or splint 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 10.91 million (See Table 7.1). From the total investment cost the highest share (Birr 9.49 million or 86.96%) is accounted by fixed investment cost initial followed by pre operation cost (Birr 1.21 million or 11.08%) and working capital (Birr 213.54 thousand or 1.96%). From the total investment cost Birr 3.73 million or 34.18% 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	0.37
1.2	Building and civil work	4,000.00		4,000.00	36.65
1.3	Machinery and equipment	1,120.00	3,730.00	4,850.00	44.44
1.4	Vehicles	450.00		450.00	4.12
1.5	Office furniture and equipment	150.00		150.00	1.37
	Sub total	5,759.90	3,730.00	9,489.90	86.96
2	Pre operating cost *				
2.1	Pre operating cost	495.50		495.50	4.54
2.2	Interest during construction	713.93		713.93	6.54
	Sub total	1,209.43		1,209.43	11.08
3	Working capital **	213.54		213.54	1.96
	Grand Total	7,182.87	3,730.00	10,912.87	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 334.47 thousand. However, only the initial working capital of Birr 213.56 thousand 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 4.00 million (see Table 7.2). Depreciation account for 33.53% of the production cost. The other major components of the production cost are financial cost, raw material cost, labor, and cost of marketing and distribution which account for 17.27%, 14.15%, 13.62% and 8.80% respectively. The remaining 12.63% 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	563	14.15
Utilities	98	2.46
Maintenance and repair	146	3.67
Labour direct	542	13.62
Labour overheads	108	2.71
Administration Costs	150	3.77
Land lease cost	0	0.00
Cost of marketing and	350	8.80
Total Operating Costs	1,957	49.19
Depreciation	1,334	33.53
Cost of Finance	687	17.27
Total Production Cost	3,978	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 560 thousand to Birr 1.77 million during the life of the project. Moreover, at the end of the project life the accumulated net cash

flow amounts to Birr 14.20 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.

$$\text{Break Even Sales Value} = \frac{\text{Fixed Cost} + \text{Financial Cost}}{\text{Variable Margin ratio (\%)}} = 1,965,600 \text{ Birr}$$

$$\text{Break Even Capacity utilization} = \frac{\text{Break even Sales Value}}{\text{Sales revenue}} \times 100 = 54.80 \%$$

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 5 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 19.56% 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 4.99 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 4.01 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 the forestry subsector and forward linkage with the match manufacturing 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	450	507	563	563	563	563	563	563	563	563
Utilities	78	88	98	98	98	98	98	98	98	98
Maintenance and repair	117	131	146	146	146	146	146	146	146	146
Labour direct	434	488	542	542	542	542	542	542	542	542
Labour overheads	86	97	108	108	108	108	108	108	108	108
Administration Costs	120	135	150	150	150	150	150	150	150	150
Land lease cost	0	0	0	0	13	13	13	13	13	13
Cost of marketing and distribution	350	350	350	350	350	350	350	350	350	350
Total Operating Costs	1,636	1,796	1,957	1,957	1,970	1,970	1,970	1,970	1,970	1,970
Depreciation	1,334	1,334	1,334	1,334	1,334	175	175	175	175	175
Cost of Finance	0	785	687	589	491	393	294	196	98	0
Total Production Cost	2,970	3,916	3,978	3,880	3,795	2,537	2,439	2,341	2,243	2,145

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	3,744	4,212	4,680	4,680	4,680	4,680	4,680	4,680	4,680	4,680
Less variable costs	1,286	1,446	1,607	1,607	1,607	1,607	1,607	1,607	1,607	1,607
VARIABLE MARGIN	2,458	2,766	3,073	3,073	3,073	3,073	3,073	3,073	3,073	3,073
in % of sales revenue	65.66	65.66	65.66	65.66	65.66	65.66	65.66	65.66	65.66	65.66
Less fixed costs	1,684	1,684	1,684	1,684	1,697	538	538	538	538	538
OPERATIONAL MARGIN	774	1,082	1,389	1,389	1,376	2,535	2,535	2,535	2,535	2,535
in % of sales revenue	20.68	25.68	29.68	29.68	29.40	54.17	54.17	54.17	54.17	54.17
Financial costs		785	687	589	491	393	294	196	98	0
GROSS PROFIT	774	296	702	800	885	2,143	2,241	2,339	2,437	2,535
in % of sales revenue	20.68	7.03	14.99	17.09	18.92	45.78	47.88	49.98	52.07	54.17
Income (corporate) tax	0	0	0	240	266	643	672	702	731	761
NET PROFIT	774	296	702	560	620	1,500	1,568	1,637	1,706	1,775
in % of sales revenue	20.68	7.03	14.99	11.96	13.24	32.05	33.51	34.98	36.45	37.92

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	9,985	4,717	4,218	4,686	4,680	4,680	4,680	4,680	4,680	4,680	4,680	3,415
Inflow funds	9,985	973	6	6	0	0	0	0	0	0	0	0
Inflow operation	0	3,744	4,212	4,680	4,680	4,680	4,680	4,680	4,680	4,680	4,680	0
Other income	0	0	0	0	0	0	0	0	0	0	0	3,415
TOTAL CASH OUTFLOW	9,985	2,609	3,592	3,655	3,768	3,709	3,987	3,918	3,849	3,781	2,730	0
Increase in fixed assets	9,985	0	0	0	0	0	0	0	0	0	0	0
Increase in current assets	0	259	29	29	0	1	0	0	0	0	0	0
Operating costs	0	1,286	1,446	1,607	1,607	1,620	1,620	1,620	1,620	1,620	1,620	0
Marketing and Distribution cost	0	350	350	350	350	350	350	350	350	350	350	0
Income tax	0	0	0	0	240	266	643	672	702	731	761	0
Financial costs	0	714	785	687	589	491	393	294	196	98	0	0
Loan repayment	0	0	982	982	982	982	982	982	982	982	0	0
SURPLUS (DEFICIT)	0	2,108	626	1,031	912	971	693	762	831	899	1,950	3,415
CUMULATIVE CASH BALANCE	0	2,108	2,734	3,765	4,678	5,649	6,342	7,103	7,934	8,833	10,783	14,198

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	3,744	4,212	4,680	4,680	4,680	4,680	4,680	4,680	4,680	4,680	3,415
Inflow operation	0	3,744	4,212	4,680	4,680	4,680	4,680	4,680	4,680	4,680	4,680	0
Other income	0	0	0	0	0	0	0	0	0	0	0	3,415
TOTAL CASH OUTFLOW	10,199	1,659	1,819	1,957	2,198	2,235	2,613	2,642	2,671	2,701	2,730	0
Increase in fixed assets	9,985	0	0	0	0	0	0	0	0	0	0	0
Increase in net working capital	214	23	23	0	1	0	0	0	0	0	0	0
Operating costs	0	1,286	1,446	1,607	1,607	1,620	1,620	1,620	1,620	1,620	1,620	0
Marketing and Distribution cost	0	350	350	350	350	350	350	350	350	350	350	0
Income (corporate) tax		0	0	0	240	266	643	672	702	731	761	0
NET CASH FLOW	-10,199	2,085	2,393	2,723	2,482	2,445	2,067	2,038	2,009	1,979	1,950	3,415
CUMULATIVE NET CASH FLOW	-10,199	-8,114	-5,721	-2,998	-516	1,928	3,996	6,034	8,042	10,021	11,971	15,386
Net present value	-10,199	1,896	1,977	2,046	1,695	1,518	1,167	1,046	937	839	752	1,317
Cumulative net present value	-10,199	-8,303	-6,326	-4,280	-2,585	-1,067	100	1,146	2,083	2,922	3,674	4,990

NET PRESENT VALUE 4,990
INTERNAL RATE OF RETURN 19.56%
NORMAL PAYBACK 5 years