

**125. PROFILE ON THE PRODUCTION OF
CORRUGATED PAPER BOARD**

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I. SUMMARY

This profile envisages the establishment of a plant for the production of corrugated paper board with a capacity of 500 tons per annum. Corrugated paper board is widely used for diverse packing applications.

The demand for corrugated paper board is met through domestic producers and import. The present (2012) demand for corrugated paper board is estimated at 2,311 tons. The demand for corrugated paper board is projected to reach 3,242 tons and 4,546 tons by the year 2017 and 2022, respectively.

The principal raw materials required are Kraft paper of different grades, adhesive or glue and printing inks. Starch, glue, ink are available locally while flute medium, kraft, liner, and test liner have to be imported.

The total investment cost of the project including working capital is estimated at Birr 10.13 million. From the total investment cost the highest share (Birr 7.53 million or 74.41%) is accounted by fixed investment cost followed by initial working capital (Birr 1.46 million or 14.45%) and pre operation cost (Birr 1.12 million or 11.14%). From the total investment cost Birr 3.09 million or 30.49% is required in foreign currency.

The project is financially viable with an internal rate of return (IRR) of 23.29% and a net present value (NPV) of Birr 6.65 million discounted at 10%.

The project can create employment for 42 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 chemical manufacturing sub sector and forward linkage with the food, textile, pharmaceuticals, cigarette, soaps, cosmetics and consumer durables manufacturing sub sectors. The project also generates income for the Government in terms of tax revenue and payroll tax.

II. PRODUCTION DESCRIPTION AND APPLICATION

Corrugated paper board (also called carton) is widely used for diverse packing applications. It is used in various industries like food, textile, pharmaceuticals, cigarette, soaps, cosmetics and consumer durables, due to its inherent advantages. They are the most suitable to pack consignments and recently.

Corrugated board is produced by gluing fluted or corrugated paper (middle layer) with two facing (inner and outer) layers to form a continuous board which is finished into boxes of various dimensions by slotting and creasing operations.

Based on the number of layers used, three types of corrugated board can be produced: single faced (or two ply), double faced (or three ply) and double walled boards. The double-faced corrugated board is most commonly used for different packing applications.

III. MARKET STUDY AND PLANT CAPACITY

A. MARKET STUDY

1. Past Supply and Present Demand

Corrugated paper board is supplied to the local market both by domestic producers and through import. Data on the domestic production is provided only on aggregate production of paper board. On the other hand the data from the Ethiopian Revenues and Customs Authority indicates that the proportion of the imported quantity of corrugated paperboard is on average about 15% of the total paperboard imports during the years 2002-2011. Accordingly, it is assumed that the local production of corrugated paperboard had similar proportion from the total local production of paperboard during the same period. Hence, the local production and the imported quantity of corrugated paperboard are indicated in Table 3.1.

Table 3.1**DOMESTIC PRODUCTION & IMPORT OF CORRUGATED PAPER BOARD
(TONES)**

Year	Domestic Production¹	Imported²	Total
2002	259	323	582
2003	206	323	529
2004	641	155	796
2005	668	187	855
2006	893	180	1,073
2007	1,269	188	1,457
2008	1,725	550	2,275
2009	1,682	447	2,129
2010	1,538	482	2,020
2011	1,614	546	2,160

Source: 1. CSA, Annual Survey of Manufacturing Industries;

2. Ethiopian Revenues and Customs Authority,

The data on Table 3.1 indicates that the total demand for corrugated paperboard shows a general increasing trend during the period under consideration (2002-2011). Accordingly, the average total demand which was 691 tons during the years (2002-2005) has increased to 1,265 tons during the years (2006-2007). This annual average has reached 2,146 tons during the last four years (2008-2011). The average growth rate which was registered during the year 2011 which was about 7% is used to estimate the present (2012) effective demand for the product as it is expected to have a relatively better influence than the growth rates during the previous years. Accordingly, the current effective demand for corrugated paper board is estimated at 2,311 tones.

2. Projected Demand

The demand for corrugated paper board as an all-purpose product is related with the overall economic development of the country. Manufacturers' usage of new boards rather than using previously used boards is one of the reasons for the ever increasing demand for corrugated paper board. Growth anticipated in the manufacturing and agro-industries will result in more demand for suitable packaging. In view of this, the average growth rate of 7 % achieved during the year 2011 in the demand for corrugated paper board is adopted to project the demand for this product. Hence, the projected demand for corrugated paper board is presented in Table 3.2.

Table 3.2

PROJECTED DEMAND FOR CORRUGATED PAPER BOARD(TONES)

Year	Demand
2013	2,473
2014	2,646
2015	2,831
2016	3,030
2017	3,242
2018	3,468
2019	3,711
2020	3,971
2021	4,249
2022	4,546

3. Pricing and Distribution

Based on the year 2011, CIF value and subsequent local cost estimates, an ex-factory price of Birr 12 per pcs (550 x 550 x 250 mm) is recommended. This piece has a weight of 0.5 kg.

Distribution of corrugated paper board by the new entrants in the market shall be handled through direct delivery to customers.

B. PLANT CAPACITY AND PRODUCTION PROGRAMME

1. Plant Capacity

Based on the demand projection and other technical factors the plant capacity of envisaged plan is proposed at 500 tones of corrugated paper box per annum having different sizes. The plant will operate 300 days per year, and 8hrs single shift per day.

2. Production Programme

The production program is scheduled in such a way that the plant will start operation at 75% of its full capacity in the first year, grow to 85% during the second year, and finally attain its full capacity in the third year and afterwards.

IV. MATERIALS AND INPUTS

A. MATERIALS

The major raw materials used to manufacture corrugated paper box are Kraft paper of different grades, adhesive or glue and printing inks.

For a double – faced corrugated paper box, which is proposed type for most packing purposes, three grades of Kraft paper raw materials are required. These are:

- Kraft liner – the outermost flat layer with a specific weight of 170 -180 g/m²;
- Test liner – the innermost flat layer with a specific weight of 160 – 180 g/m²;
- Fluting medium – the middle corrugated layer having a specific weight of 112 – 127 g/m² and higher stiffness.

The adhesive material commonly used in the paper packing industry is either silicates adhesive (water glass) or starch adhesive. All the three types of paper raw materials acquired through import. Adhesive and printing inks are locally available. The total cost of raw material required

is Birr 6.55 million out of which Birr 5.55 million is in foreign currency. Details are shown in Table 4.1

Table 4.1

ANNUAL RAW & AUXILIARIES MATERIALS REQUIRED AND COST

No	Item	Standards	Qty	Unit Prices	Cost ('000 Birr)		
					F.C.	L.C.	Total Cost
1	Flute Medium	112 - 127 g/m ²	183.33	9,125	1,672.89	-	1,672.89
2	Kraft Liner	170- 180 g/m ²	166.67	10,812	1,802.04	-	1,802.04
3	Test Liner	160 - 180 g/m ²	153.33	10,250	1,571.63	-	1,571.63
4	Starch	Corn starch	13.33	18,150	-	241.94	241.94
5	Glue	Vinyl acetate	5.80	52,750	-	305.95	305.95
6	Ink	Oil ink	1.67	40,175	-	67.09	67.09
	Total				5,047.00	615.00	5,662.00

B. UTILITIES

Utilities required by the envisaged plant consist of electricity, water and fuel oil. The annual cost of utilities required will be Birr 976.25 thousand which is depicted in Table 4.2 below.

Table 4.2

ANNUAL UTILITIES REQUIREMENT

Sr. No.	Items	Unit	Unit Cost (Birr)	Quantity	Total Cost (000 Birr)
1	Electricity	kwh	0.58	450,000	270.25
2	Water	m ³	10.00	30,000	300.00
3	Fuel Oil	litre	14.50	28000	406.00
	Total				976.25

V. TECHNOLOGY AND ENGINEERING

A. TECHNOLOGY

1. Production Process

The conventional technology of corrugated paper box production is continuous process where four major operations are involved, namely:

- Corrugator ----- Slitter/Scoring----- Printer Slotter,----- Folder Gluer

The reels of paper are fed into the corrugator, the paper is conditioned with heat and steam and fed between large corrugating rolls which give the paper its fluted shape in the Single Facer. Starch is applied to the tips of the flutes on one side and the inner liner is glued to the fluting. The corrugated fluting medium with one liner attached to it is called single face web and travels along the machine towards Double Backer where the single face web meets the outer liner and forms corrugated board. The corrugated board is then cut and stacked.

The single-walled board (3-ply) board production in such away is directed to the silotter- scorer for the sizing and finally to the printer-slotter for the specific box (carton) designed and necessary printing patters.

2. Environmental Impact

The production process of corrugated paper board does not have any negative impact on the environment.

B. ENGINEERING

1. Machinery and Equipment

Corrugators are a set of machines in line, designed to bring together three, five or seven sheets of paper to form single, double or triple wall board. This operation is achieved in a continuous process. The total cost of machinery and equipment for the envisaged project is Birr 3.86 Million out of which 80% is in foreign currency. The machinery and equipment required and cost estimated are shown in Table 5.1.

Table 5.1**MACHINERY AND EQUIPMENT REQUIRED AND COST**

No.	Description	Qty	Unit Price ('000 Birr)	Cost ('000 Birr)		
				F.C.	L.C.	T.C.
1	Corrugator Machine	1	720.00	720.00	-	720.00
2	Slitter/Scorer	1	270.00	270.00	-	270.00
3	Printer Machine	1	250.00	250.00	-	250.00
4	Rotary Slotter	1	230.00	230.00	-	230.00
5	Folding / Gluing Machine	1	180.00	180.00	-	180.00
6	Boiler (8 bar)	1	540.00	540.00	-	540.00
7	Fork Lift (5 tonnes)	1	630.00	630.00	-	630.00
8	Others			270.00	-	270.00
	Sub-Total (F.O.B)			3,090.00	-	3,090.00
	Freight, Insurance, Inland Transport, and Bank Charge etc (25%FOB Price).		-	-	772.50	772.00
	Total			3,090.00	772.50	3,862.50

2. Building and civil works

Taking into account reserve area for future expansion, accommodation of vehicles and trucks, and space for gardening, the total site area required is estimated to be 1,000 m². The total built-up area of the plant comprised of main factory building, warehouses, offices, and cafeteria and guard houses. The total building area covers an area of 500 square meters. The estimated construction cost is Birr 2.50 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 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
	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 266,000 of which 10% or Birr 26,600 will be paid in advance. The remaining Birr 239,400 will be paid in equal installments within 28 years i.e. Birr 8,550 annually.

VI. HUMAN RESOURCE AND TRAINING REQUIREMENT

A. HUMAN RESOURCE REQUIREMENT

The total human resource required for operating the plant will be 42 and the total cost of human resource requirement is Birr 1.96 million. The human resources requirement and the corresponding labor cost is shown in Table 6.1.

Table 6.1
HUMAN RESOURCES REQUIREMENT AND LABOR COSTS (BIRR)

No.	Position Held	No.	Monthly	Monthly	Annual
1	Manager	1	10,000.00	10,000.00	120,000.00
2	Secretary	1	3,000.00	3,000.00	36,000.00
3	Administration and Finance Head	1	6,000.00	6,000.00	72,000.00
4	Commercial Head	1	5,000.00	5,000.00	60,000.00
5	Technical Head	1	8,000.00	8,000.00	96,000.00
6	Production Head	1	7,000.00	7,000.00	84,000.00
7	Clerk	1	2,000.00	2,000.00	24,000.00
8	Messenger and Cleaner	2	800.00	1,600.00	19,200.00
9	Guard	3	1,000.00	3,000.00	36,000.00
10	Production supervisor	3	5,000.00	15,000.00	180,000.00
11	Technicians	4	4,000.00	6,000.00	192,000.00
12	Operators	10	2,500.00	5,000.00	300,000.00
13	Assistant Operators	5	2,000.00	10,000.00	120,000.00
14	Mechanics and electricians	4	2,500.00	10,000.00	120,000.00
15	General Services	1	2,500.00	2,500.00	30,000.00
16	Personnel	1	2,500.00	2,500.00	30,000.00
17	Store Head	1	2,000.00	2,000.00	24,000.00
18	Cashier	1	2,000.00	2,000.00	24,000.00
	Subtotal				1,567,200.00
	Workers Benefit (25%)				391,800.00
	Total	42			1,959,000.00

B. TRAINING REQUIREMENT

The project requires no special technical know-how. Training has not therefore been envisaged.

VII. FINANCIAL ANALYSIS

The financial analysis of the corrugated paper board 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 10.13 million (See Table 7.1). From the total investment cost the highest share (Birr 7.53 million or 74.41%) is accounted by fixed investment cost followed by initial working capital (Birr 1.46 million or 14.45%) and pre operation cost (Birr 1.12 million or 11.14%). From the total investment cost Birr 3.09 million or 30.49% 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	26.60		26.60	0.26
1.2	Building and civil work	2,500.00		2,500.00	24.68
1.3	Machinery and equipment	772.50	3,090.00	3,862.50	38.12
1.4	Vehicles	900.00		900.00	8.88
1.5	Office furniture and equipment	250.00		250.00	2.47
	Sub total	4,449.10	3,090.00	7,539.10	74.41
2	Pre operating cost *				
2.1	Pre operating cost	465.88		465.88	4.60
2.2	Interest during construction	662.82		662.82	6.54
	Sub total	1,128.70		1,128.70	11.14
3	Working capital **	1,463.88		1,463.88	14.45
	Grand Total	7,041.69	3,090.00	10,131.69	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 2.07 million. However, only the initial working capital of Birr 1.46 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 10.98 million (see Table 7.2). The cost of raw material account for 51.56% of the production cost. The other major components of the production cost are depreciation, financial cost, labour, and utility which account for 10.66%, 4.98%, 14.27% and 8.89% respectively. The remaining 9.64% is the share of marketing and distribution, 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	5,662.00	51.56
Utilities	976.00	8.89
Maintenance and repair	116.00	1.06
Labour direct	1,567.00	14.27
Labour overheads	392.00	3.57
Administration Costs	200.00	1.82
Land lease cost	-	-
Cost of marketing and distribution	350.00	3.19
Total Operating Costs	9,263.00	84.36
Depreciation	1,170.68	10.66
Cost of Finance	546.83	4.98
Total Production Cost	10,980.50	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 640 thousand to Birr 1.82 million during the life of the project. Moreover, at the end of the project life the accumulated net cash flow amounts to Birr 16.66 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.

$$\text{Break Even Sales Value} = \frac{\text{Fixed Cost} + \text{Financial Cost}}{\text{Variable Margin ratio (\%)}} = \text{Birr } 5,911,277$$

$$\text{Break Even Capacity utilization} = \frac{\text{Break even Sales Value}}{\text{Sales revenue}} \times 100 = 49 \%$$

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 23.29% 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 6.65 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 42 persons. The project will generate Birr 4.26 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 chemical manufacturing sub sector and forward linkage with the food, textile, pharmaceuticals, cigarette, soaps, cosmetics and consumer durables manufacturing sub sectors. It 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	3,963	4,530	5,096	5,662	5,662	5,662	5,662	5,662	5,662	5,662
Utilities	683	781	878	976	976	976	976	976	976	976
Maintenance and repair	81	93	104	116	116	116	116	116	116	116
Labour direct	1,097	1,254	1,410	1,567	1,567	1,567	1,567	1,567	1,567	1,567
Labour overheads	274	314	353	392	392	392	392	392	392	392
Administration Costs	140	160	180	200	200	200	200	200	200	200
Land lease cost	0	0	0	0	9	9	9	9	9	9
Cost of marketing and distribution	350	350	350	350	350	350	350	350	350	350
Total Operating Costs	6,589	7,480	8,372	9,263	9,272	9,272	9,272	9,272	9,272	9,272
Depreciation	1,171	1,171	1,171	1,171	1,171	125	125	125	125	125
Cost of Finance	0	729	638	547	456	365	273	182	91	0
Total Production Cost	7,760	9,380	10,180	10,981	10,898	9,761	9,670	9,579	9,488	9,397

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	8,400	10,800	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000
Less variable costs	6,239	7,130	8,022	8,913	8,913	8,913	8,913	8,913	8,913	8,913
VARIABLE MARGIN	2,161	3,670	3,978	3,087	3,087	3,087	3,087	3,087	3,087	3,087
in % of sales revenue	25.73	33.98	33.15	25.73	25.73	25.73	25.73	25.73	25.73	25.73
Less fixed costs	1,521	1,521	1,521	1,521	1,529	484	484	484	484	484
OPERATIONAL MARGIN	640	2,149	2,458	1,566	1,558	2,603	2,603	2,603	2,603	2,603
in % of sales revenue	7.62	19.90	20.48	13.05	12.98	21.70	21.70	21.70	21.70	21.70
Financial costs		729	638	547	456	365	273	182	91	0
GROSS PROFIT	640	1,420	1,820	1,019	1,102	2,239	2,330	2,421	2,512	2,603
in % of sales revenue	7.62	13.15	15.16	8.50	9.18	18.66	19.42	20.18	20.94	21.70
Income (corporate) tax	0	0	0	306	331	672	699	726	754	781
NET PROFIT	640	1,420	1,820	714	771	1,567	1,631	1,695	1,759	1,822
in % of sales revenue	7.62	13.15	15.16	5.95	6.43	13.06	13.59	14.12	14.66	15.19

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	8,005	10,625	10,814	12,014	12,000	12,000	12,000	12,000	12,000	12,000	12,000	4,269
Inflow funds	8,005	2,225	14	14	0	0	0	0	0	0	0	0
Inflow operation	0	8,400	10,800	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	0
Other income	0	0	0	0	0	0	0	0	0	0	0	4,269
TOTAL CASH OUTFLOW	8,005	8,814	9,340	10,140	11,246	10,970	11,219	11,155	11,092	11,028	10,053	0
Increase in fixed assets	8,005	0	0	0	0	0	0	0	0	0	0	0
Increase in current assets	0	1,562	219	219	219	1	0	0	0	0	0	0
Operating costs	0	6,239	7,130	8,022	8,913	8,922	8,922	8,922	8,922	8,922	8,922	0
Marketing and Distribution cost	0	350	350	350	350	350	350	350	350	350	350	0
Income tax	0	0	0	0	306	331	672	699	726	754	781	0
Financial costs	0	663	729	638	547	456	365	273	182	91	0	0
Loan repayment	0	0	911	911	911	911	911	911	911	911	0	0
SURPLUS (DEFICIT)	0	1,811	1,474	1,874	754	1,030	781	845	908	972	1,947	4,269
CUMULATIVE CASH BALANCE	0	1,811	3,285	5,159	5,913	6,943	7,724	8,568	9,477	10,449	12,397	16,666

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	8,400	10,800	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	4,269
Inflow operation	0	8,400	10,800	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	0
Other income	0	0	0	0	0	0	0	0	0	0	0	4,269
TOTAL CASH OUTFLOW	9,469	6,794	7,685	8,577	9,570	9,602	9,943	9,971	9,998	10,025	10,053	0
Increase in fixed assets	8,005	0	0	0	0	0	0	0	0	0	0	0
Increase in net working capital	1,464	205	205	205	1	0	0	0	0	0	0	0
Operating costs	0	6,239	7,130	8,022	8,913	8,922	8,922	8,922	8,922	8,922	8,922	0
Marketing and Distribution cost	0	350	350	350	350	350	350	350	350	350	350	0
Income (corporate) tax		0	0	0	306	331	672	699	726	754	781	0
NET CASH FLOW	-9,469	1,606	3,115	3,423	2,430	2,398	2,057	2,029	2,002	1,975	1,947	4,269
CUMULATIVE NET CASH FLOW	-9,469	-7,863	-4,748	-1,325	1,105	3,503	5,560	7,589	9,592	11,566	13,514	17,783
Net present value	-9,469	1,460	2,574	2,572	1,660	1,489	1,161	1,041	934	837	751	1,646
Cumulative net present value	-9,469	-8,009	-5,435	-2,863	-1,203	286	1,447	2,488	3,422	4,260	5,011	6,657

NET PRESENT VALUE 6,657
INTERNAL RATE OF RETURN 23.29%
NORMAL PAYBACK 4 years