PROFILE ON THE PRODUCTION OF PLYWOOD

Table of Contents

I. SUMMARY

This profile envisages the establishment of a plant for the production of plywood with a capacity of 3,800 m^3 per annum. Plywood is used for general construction purposes as interior material for housing, ships, vehicles and furniture.

The demand for plywood is met both from domestic production and import. The present (2012) demand for plywood is estimated at 1.5 million cubic meters. The demand for plywood is projected to reach 2,203,992 cubic meters and 3,238,387 cubic meters by the year 2017 and 2022, respectively.

The principal raw materials required are logs, which are suitable for plywood, urea resin, glue and ammonium chloride. The materials required are locally available except for urea resin and ammonium chloride which have to be imported.

The total investment cost of the project including working capital is estimated at Birr 29.53 million. From the total investment cost the highest share (Birr 24.53 million or 83.09%) is accounted by fixed investment cost followed by pre operation cost (Birr 2.84 million or 9.64%) and initial working capital (Birr 2.14 million or 7.26%). From the total investment cost Birr 17 million or 57.56% is required in foreign currency.

The project is financially viable with an internal rate of return (IRR) of 18.31% and a net present value (NPV) of Birr 11.28 million discounted at 10%.

The project can create employment for 48 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 sub sector and forward linkage with the construction, automotive and furniture sub sectors and also generates income for the Government in terms of tax revenue and payroll tax.

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II. PRODUCT DESCRIPTION AND APPLICATION

A product obtained as a result of several even numbered boards bonded together is called plywood. Plywood, thus, produced has the particular features of being a wood with the least defects, wide size, high length and strength mechanically or physically. It is used for general construction purposes as interior material for housing, ships, vehicles and furniture

III. MARKET STUDY AND PLANT CAPACITY

A. MARKET STUDY

1. Past Supply and Present Demand

Demand for plywood is met both from domestic production and import. The Ethiopian Plywood Enterprise is the only producer of plywood in Ethiopia. Domestic production and import of plywood for the past ten years is shown in Table 3.1.

Table 3.1

DOMESTIC PRODUCTION AND IMPORT OF PLYWOOD (MT.CU)

Year	Domestic Production	Import	Total
2002	677	633,168	633,845
2003	1,168	844,956	846,124
2004	-	1,583,332	1,583,332
2005	8,722	2,148,028	2,156,750
2006	357	240,292	240,649
2007	511	2,374,195	2,374,706
2008	930	800,645	801,575
2009	133	1,668,000	1,668,133
2010	5,303	497,009	502,312
2011	N.A	1,487,328	1,487,328

Source: - For domestic; production Statistical Abstract of Ethiopia, CSA.
For import; Ethiopian Revenues & Customs Authority

Table 3.1 reveals that import and mainly domestic production has been fluctuating extremely. Domestic production during the initial three years of 2002--2004 ranges from nil to 1,168 cubic meters. During 2004 there was no domestic production of plywood probably either due to renovation or maintenance. In the year 2005 the domestic production has enormously expanded and has reached to a level of 8,722 cubic meters. During the following four consecutive years, i.e. 2006--2009, the production level ranged from 133 cubic meters to 930 cubic meters , which is very low compared to year 2005. By the year 2010 it again sharply increased to 5,303 cubic meters.

The import trend was relatively better compared to domestic production, especially during the first five years of 2002--2007. During this period the imported quantity has been growing consistently (except a slight decline in 2007) from a level of 633,168 cubic meters in the year 2002 to about 2.4 million cubic meters during 2006/07. In the remaining four yeas of 2008--2011 a decline of import in one year was followed by a huge increase in the following year and vice versa.

In general, what can be deduced from Table 3.1 is that the supply emanating from domestic production was extremely very low compared to import throughout the time covered by the data series. If we take the highest domestic production, which is 8,722 cubic meters and compare with the imported quantity in the same year its share is less than one percent or 0.4%. This indicates that there is a huge market in the country through import substitution using locally available raw materials.

To determine the current effective demand for plywood the domestic production of year 2010 (since data is not available for year 2011) plus the quantity imported in the year 2011 is considered to reflect the current demand. Accordingly, current demand is estimated at about 1.5 million cubic meters.

2. Projected Demand

The demand for plywood is directly related with the growth of the housing construction sector, household and office furniture's, vehicles assembly and repair service. Plywood has various uses

in housing construction for floors, roots, walls and doors. Inside a house, plywood often is used in a variety of furnishings, including cabinetry, shelves, tables and wall paneling. The demand for these items in turn will depend on income, population growth, urbanization, and the manufacturing sector. Hence, by considering the recent past growth of the construction and the manufacturing sector a modest growth of rate of 8% per annum is deemed to be realistic to project demand for plywood. The total projected demand, the existing local capacity and the unsatisfied demand for plywood is shown in Table 3.2.

Table 3.2

PROJECTED DEMAND FOR PLYWOOD (CU.MT)

Year	Total Demand	Existing Domestic Capacity*	Unsatisfied Demand
2013	1,620,000	5,500	1,614,450
2014	1,749,600	5,500	1,744,100
2015	1,889,568	5,500	1,884,068
2016	2,040,733	5,500	2,035,233
2017	2,203,992	5,500	2,198,492
2018	2,380,311	5,500	2,374,811
2019	2,570,736	5,500	2,565,236
2020	2,776,395	5,500	2,770,895
2021	2,998,507	5,500	2,993,007
2022	3,238,387	5,500	3,232,887

*Existing domestic capacity is estimated by considering the actual production of year 2010.

As per the projection worked out in Table 3.2, the unsatisfied demand for ply wood will increase from about 1.6 million cubic meters in the year 2013 to about 2.4 million cubic meters and 3.2 million cubic meters in the year 2018 and 2022, respectively. Hence, a number of small to medium and large industries can be established to satisfy the demand for plywood.

3. Pricing and Distribution

The current producer's price of locally produced plywood is Birr 4,750 per cubic meter. The envisaged project can adopt a similar price.

Distribution of plywood would be handled through direct delivery to major construction companies and furniture manufacturing enterprise. In addition, the existing building materials enterprise can be used to reach for non-bulk purchasers.

B. PLANT CAPACITY AND PRODUCTION PROGRAMME

1. Plant Capacity

As per the projection worked out in Table 3.2, the unsatisfied demand for ply wood will increase from about 1.6 million cubic meters in the year 2013 to about 2.4 million cubic meters and 3.2 million cubic meters in the year 2018 and 2022, respectively. Hence, a number of small to medium and large industries can be established to satisfy the demand for plywood.

Taking account of various factors, the proposed plant estimated to have a capacity of 3,800 m^3 per annum. This quantity of plywood of 4mm thickness, which is a product mostly, used for general construction purposes such as interior materials for housing, ships, vehicles, and furniture, etc. Its demand is ever on the increase. However, additional market requirement can be met by running the production unit on a second or third shift.

2. Production Program

The unit is planned to operate one shift of 8 hours a day for a total working of 300 days a year by taking Sundays and national holidays into considerations. It is also anticipated to operate at 75% and 85% of installed capacity in the first and second year, respectively. Full capacity production is expected to be achieved in the successive years. The low production level at the initial stage is planned to develop substantial market outlets for the product and to build up production capacity of new equipment.

IV. RAW MATERIAL AND INPUTS

A. RAW AND AUXILIARY MATERIALS

Logs, which are suitable for plywood, urea resin, glue and ammonium chloride are the materials used to produce plywood. Except for urea resin and ammonium chloride which are to be imported, the other materials required are locally available. The annual raw material requirement is calculated on the bases of the final output. Thus, the total cost of materials at full operation capacity of the plant is estimated to be Birr 8,045,282. The detail breakdown is shown in Table 4.1.

Table 4.1

RAW AND AUXILIARY MATERIALS REQUIREMENT AND COST

Sr. No.	Description	Qty.	Cost ('000 Birr)		
			FC	LC	Total
1	Logs (m^3)	8,750	-	7000	7000.0
2	Urea resin (tone)	290	794.8	-	794.8
3	Ammonium chloride (kg)	100	0.482	-	0.482
4	Glue (tone)	15	-	250	250.0
	Grand Total		**795.28**	**7,250**	**8045.282**

B. UTILITIES

The major utilities of the project are electricity, furnace oil and water. The total annual expenditure on utilities is, thus, about Birr 1.34 million. Annual requirement and cost of utilities is indicated in Table 4.2.

Table 4.2

UTILITIES REQUIREMENT AND COST

No.	Description	Annual consumption	Unit	Unit Cost (Birr)	Total Cost ("000 Birr)
1	Electricity	93,000	kwh	0.65	60.45
2	Furnace oil	64,000	lt	15.00	960.00
3	Water	32,000	m^3	10.00	320.00
Total Annual cost					**1,340.50**

V. TECHNOLOGY AND ENGINEERING

A. TECHNOLOGY

1. Process Description

The manufacturing of plywood comprises of three major steps. These are:-

- Preparation of logs;
- Veneer manufacturing from logs; and
- Plywood manufacturing from veneer.

a) Preparation of logs

This section consists of two major log treatment operations. In the first one, logs are cut by chain saw to a desired length and fed to the lathe to make veneer sheets, while in the second high-density logs are cooked in cooking vats or steam chambers to facilitate the cutting operation.

b) Veneer Manufacturing

Under this process several physical actions such as cutting, clipping, drying, joining, etc. are conducted on the log obtained from the first section in order to prepare good quality veneer suitable for plywood making.

c) Plywood manufacturing from veneer

In plywood making, the initial operation is the preparation of glue for the process. The proceeding step is the spreading of glue on the core veneer sheets and the final is the pre-pressing of the stacked sheets by the cold press.

After pre-pressing, the obtained plywood is fed to hot-press machine, where it is subjected to a pressure at a specified temperature. Then, the plywood is cut to a pre-determined size by cutting machine and stored for delivery.

2. Environmental impact

The envisaged plant is a manufacturing plant with no hazardous chemical or any hazardous waste to the surrounding environment. But, in the process of raw material collection care must be taken not to disseminate the risk of deforestation, and to counter this, Birr 100,000 is would be allocated to support forestation projects in the country.

B. ENGINEERING

1. Machinery and Equipment

Cutting, slicing, clipping or pressing and drying units are some of the major machinery and equipment required in the production of plywood. The total cost of machinery and equipment is estimated at Birr 18.84 million, of which Birr 17 million is required in foreign currency. Table 5.1 shows the list of machinery and equipment required by the envisaged plant.

Table 5.1

LIST OF MACHINERY AND EQUIPMENT

Sr. No.	Description	Qty.
1	Peeler	1
2	Veneer router	1
3	Veneer clipper	1
4	Veneer drying machine	1
5	Veneer splinter	1
6	Veneer splicer	1
7	Gluing machine	1
8	Conveyor (roller)	1
9	Pressing machine	1
10	Drying press	1
11	Plywood edger	1
12	Sanding machine (scraper belt, drum)	1
13	Boiler with its accessories	1
14	Polishing	1

2. Building and Civil Works

The plant requires a total of 1,800 m^2 area of land out of which 1,000 m^2 is built-up area which includes Processing area, raw material stock area, offices etc. Assuming construction rate of Birr 4500 per m^2. The total investment cost for building and civil works is estimated at Birr 4.5 million.

According to the Federal Legislation on the Lease Holding of Urban Land (Proclamation No 721/2004) in principle, urban land permit by lease is on auction or negotiation basis, however, the time and condition of applying the proclamation shall be determined by the concerned regional or city government depending on the level of development.

The legislation has also set the maximum on lease period and the payment of lease prices. The lease period ranges from 99 years for education, cultural research health, sport, NGO , religious and residential area to 80 years for industry and 70 years for trade while the lease payment period ranges from 10 years to 60 years based on the towns grade and type of investment.

Moreover, advance payment of lease based on the type of investment ranges from 5% to 10%.The lease price is payable after the grace period annually. For those that pay the entire amount of the lease will receive 0.5% discount from the total lease value and those that pay in installments will be charged interest based on the prevailing interest rate of banks. Moreover, based on the type of investment, two to seven years grace period shall also be provided.

However, the Federal Legislation on the Lease Holding of Urban Land apart from setting the maximum has conferred on regional and city governments the power to issue regulations on the exact terms based on the development level of each region.

In Addis Ababa, the City's Land Administration and Development Authority is directly responsible in dealing with matters concerning land. However, regarding the manufacturing sector, industrial zone preparation is one of the strategic intervention measures adopted by the City Administration for the promotion of the sector and all manufacturing projects are assumed to be located in the developed industrial zones.

Regarding land allocation of industrial zones if the land requirement of the project is below 5,000 m^2, 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 m^2, 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 m^2. 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 m^2 .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 m^2 (see Table 5.2).

Table 5.2

NEW LAND LEASE FLOOR PRICE FOR PLOTS IN ADDIS ABABA

Zone	Level	Floor price/m^2
Central Market District	1st	1686
	2nd	1535
	3rd	1323
	4th	1085
	5th	894
Transitional zone	1st	1035
	2nd	935
	3rd	809
	4th	685
	5th	555
Expansion zone	1st	355
	2nd	299
	3rd	217
	4th	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 m^2 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 m^2 is estimated at Birr 478,800 of which 10% or Birr 47,880 will be paid in advance. The remaining Birr 430,920 will be paid in equal installments within 28 years i.e. Birr 15,390 annually

NB: The land issue in the above statement narrates or shows only Addis Ababa's city administration land lease price, policy and regulations.
Accordingly the project profile prepared based on the land lease price of Addis Ababa region.
To know land lease price, police and regulation of other regional state of the country updated information is available at Ethiopian Investment Agency's website www.eia.gov.et on the factor cost.

VI. HUMAN RESOURCE AND TRAINING REQUIREMENT

A. HUMAN RESOURCE REQUIREMENT

The plywood manufacturing plant will create job opportunities for about 48 workers, of these 36 of the employees are production workers while the remaining are administrative staff. Annual cost of labor is Birr 982,080. The detail is indicated in Table 6.1.

Table 6.1

HUMAN RESOURCE REQUIREMENT AND LABOUR COST

Sr. No	Job Title	No. of Persons	Salary (Birr)	
			Monthly	Annual (000 Birr)
1	General Manager	1	4,000	48.00
2	Secretary	1	1000	12.00

3	Production & Technical Head	1	2,500	30.00
4	Commercial Head	1	2,500	30.00
5	Finance & Administration Head	1	2,500	30.00
6	Personnel	1	2000	24.00
7	Accountant	1	2000	24.00
8	Accounts Clerk	1	1000	12.00
9	Cashier	1	1500	18.00
10	Sales person	1	1000	12.00
11	Purchaser	1	1500	18.00
12	Store Keeper	1	1500	18.00
13	Quality Controller	1	1500	18.00
14	Shift Leader	3	2000	72.00
15	Operator	9	1500	162.00
16	Assistant Operation	9	1000	108.00
17	Labourer	3	600	21.60
18	Mechanic	3	1500	54.00
19	Electrician	3	1500	54.00
20	Driver	2	1000	24.00
21	Guard	3	800	28.80
	Sub – Total	**48**		**818.40**
	Employee's Benefit 20% basic salary			163.68
	Grand Total			**982.08**

B. TRAINING REQUIREMENT

Imparting skill both on the supervisor and the operators who will be directly involved in the plywood production is an essential task. Thus, on-job-training by the machinery supplier for about two weeks should be given locally. The training cost is estimated to be Birr 80,000.

VII. FINANCIAL ANALYSIS

The financial analysis of the plywood 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 29.53 million (See Table 7.1). From the total investment cost the highest share (Birr 24.53 million or 83.09%) is accounted by fixed investment cost followed by pre operation cost (Birr 2.84 million or 9.64%) and initial working capital (Birr 2.14 million or 7.26%). From the total investment cost Birr 17 million or 57.56% 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	47.88		47.88	0.16
1.2	Building and civil work	4,500.00		4,500.00	15.24
1.3	Machinery and equipment	1,840.00	17,000.00	18,840.00	63.80
1.4	Vehicles	900.00		900.00	3.05
1.5	Office furniture and equipment	250.00		250.00	0.85

	Sub total	**7,537.88**	**17,000.00**	**24,537.88**	**83.09**
2	**Pre operating cost ***				
2.1	Pre operating cost	915.20		915.20	3.10
2.2	Interest during construction	1,931.87		1,931.87	6.54
	Sub total	**2,847.07**		**2,847.07**	**9.64**
3	**Working capital ****	**2,145.11**		**2,145.11**	**7.26**
	Grand Total	**12,530.07**	**17,000.00**	**29,530.07**	**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 2.81 million. However, only the initial working capital of Birr 2.14 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 17.35 million (see Table 7.2). The cost of raw material account for 46.35% of the production cost. The other major components of the production cost are depreciation, financial cost and utility, which account for 24.98%, 10.71% and 5.88% respectively. The remaining 12.08% is the share of labour, 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	8,045.00	46.35

Utilities	1,020.00	5.88
Maintenance and repair	565.00	3.26
Labour direct	818.00	4.71
Labour overheads	164.00	0.94
Administration Costs	200.00	1.15
Land lease cost	-	-
Cost of marketing and distribution	350.00	2.02
Total Operating Costs	**11,162.00**	**64.31**
Depreciation	4,336.04	24.98
Cost of Finance	1,859.43	10.71
Total Production Cost	**17,357.47**	**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 244 thousand to Birr 4.66 million during the life of the project. Moreover, at the end of the project life the accumulated net cash flow amounts to Birr 33.85 million. For profit and loss statement and cash flow projection see Appendix 7.A.3 and 7.A.4 respectively.

2. Ratios

In financial analysis financial ratios and efficiency ratios are used as an index or yardstick for evaluating the financial position of a firm. It is also an indicator for the strength and weakness of the firm or a project. Using the year-end balance sheet figures and other relevant data, the most important ratios such as return on sales which is computed by dividing net income by revenue, return on assets (operating income divided by assets), return on equity (net profit divided by

equity) and return on total investment (net profit plus interest divided by total investment) has been carried out over the period of the project life and all the results are found to be satisfactory.

3. Break-even Analysis

The break-even analysis establishes a relationship between operation costs and revenues. It indicates the level at which costs and revenue are in equilibrium. To this end, the break-even point for capacity utilization and sales value estimated by using income statement projection are computed as followed.

$$\text{Break Even Sales Value} = \frac{\text{Fixed Cost + Financial Cost}}{\text{Variable Margin ratio (\%)}} = \text{Birr } 11{,}685{,}966$$

$$\text{Break Even Capacity utilization} = \frac{\text{Break even Sales Value}}{\text{Sales revenue}} \times 100 = 65\ \%$$

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 18.31%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 11.28 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 48 persons. The project will generate Birr 9.85 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 sub sector and forward linkage with the construction,, automotive and furniture sub sectors and also generates other income for the Government.

Appendix 7.A

FINANCIAL ANALYSES SUPPORTING TABLES

Appendix 7.A.1

NET WORKING CAPITAL (in 000 Birr)

Items	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11
Total inventory	1,508.44	1,709.56	2,011.25	2,011.25	2,011.25	2,011.25	2,011.25	2,011.25	2,011.25	2,011.25
Accounts receivable	704.92	795.02	930.17	930.17	931.45	931.45	931.45	931.45	931.45	931.45
Cash-in-hand	18.20	20.62	24.26	24.26	24.48	24.48	24.48	24.48	24.48	24.48
CURRENT ASSETS	**2,231.55**	**2,525.20**	**2,965.68**	**2,965.68**	**2,967.18**	**2,967.18**	**2,967.18**	**2,967.18**	**2,967.18**	**2,967.18**
Accounts payable	86.44	97.96	115.25	115.25	115.25	115.25	115.25	115.25	115.25	115.25
CURRENT LIABILITIES	**86.44**	**97.96**	**115.25**	**115.25**	**115.25**	**115.25**	**115.25**	**115.25**	**115.25**	**115.25**
TOTAL WORKING CAPITAL	**2,145.11**	**2,427.24**	**2,850.43**	**2,850.43**	**2,851.93**	**2,851.93**	**2,851.93**	**2,851.93**	**2,851.93**	**2,851.93**

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	6,034	6,838	8,045	8,045	8,045	8,045	8,045	8,045	8,045	8,045
Utilities	765	867	1,020	1,020	1,020	1,020	1,020	1,020	1,020	1,020
Maintenance and repair	424	480	565	565	565	565	565	565	565	565
Labour direct	614	695	818	818	818	818	818	818	818	818
Labour overheads	123	139	164	164	164	164	164	164	164	164
Administration Costs	150	170	200	200	200	200	200	200	200	200
Land lease cost	0	0	0	0	17	15	15	15	15	15
Cost of marketing and distribution	350	350	350	350	350	350	350	350	350	350
Total Operating Costs	**8,459**	**9,540**	**11,162**	**11,162**	**11,177**	**11,177**	**11,177**	**11,177**	**11,177**	**11,177**
Depreciation	4,336	4,336	4,336	4,336	4,336	205	205	205	205	205
Cost of Finance	0	2,125	1,859	1,594	1,328	1,063	797	531	266	0
Total Production Cost	**12,795**	**16,001**	**17,357**	**17,092**	**16,842**	**12,445**	**12,179**	**11,914**	**11,648**	**11,382**

Appendix 7.A.3
NET 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	14,440	16,245	18,050	18,050	18,050	18,050	18,050	18,050	18,050	18,050
Less variable costs	8,109	9,190	10,812	10,812	10,812	10,812	10,812	10,812	10,812	10,812
VARIABLE MARGIN	**6,331**	**7,055**	**7,238**	**7,238**	**7,238**	**7,238**	**7,238**	**7,238**	**7,238**	**7,238**
in % of sales revenue	43.84	43.43	40.10	40.10	40.10	40.10	40.10	40.10	40.10	40.10
Less fixed costs	4,686	4,686	4,686	4,686	4,701	570	570	570	570	570
OPERATIONAL MARGIN	**1,645**	**2,369**	**2,552**	**2,552**	**2,537**	**6,668**	**6,668**	**6,668**	**6,668**	**6,668**
in % of sales revenue	11.39	14.58	14.14	14.14	14.05	36.94	36.94	36.94	36.94	36.94
Financial costs		2,125	1,859	1,594	1,328	1,063	797	531	266	0
GROSS PROFIT	**1,645**	**244**	**693**	**958**	**1,208**	**5,605**	**5,871**	**6,136**	**6,402**	**6,668**
in % of sales revenue	11.39	1.50	3.84	5.31	6.69	31.05	32.52	34.00	35.47	36.94
Income (corporate) tax	0	0	0	287	363	1,682	1,761	1,841	1,921	2,000
NET PROFIT	**1,645**	**244**	**693**	**671**	**846**	**3,924**	**4,109**	**4,295**	**4,481**	**4,667**
in % of sales revenue	11.39	1.50	3.84	3.72	4.69	21.74	22.77	23.80	24.83	25.86

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	**25,453**	**18,603**	**16,257**	**18,067**	**18,050**	**18,050**	**18,050**	**18,050**	**18,050**	**18,050**	**18,050**	**7,532**
Inflow funds	25,453	4,163	12	17	0	0	0	0	0	0	0	0
Inflow operation	0	14,440	16,245	18,050	18,050	18,050	18,050	18,050	18,050	18,050	18,050	0
Other income	0	0	0	0	0	0	0	0	0	0	0	7,532
TOTAL CASH OUTFLOW	**25,453**	**12,622**	**14,615**	**16,118**	**15,700**	**15,526**	**16,578**	**16,392**	**16,206**	**16,020**	**13,178**	**0**
Increase in fixed assets	25,453	0	0	0	0	0	0	0	0	0	0	0
Increase in current assets	0	2,232	294	440	0	1	0	0	0	0	0	0
Operating costs	0	8,109	9,190	10,812	10,812	10,827	10,827	10,827	10,827	10,827	10,827	0
Marketing and Distribution cost	0	350	350	350	350	350	350	350	350	350	350	0
Income tax	0	0	0	0	287	363	1,682	1,761	1,841	1,921	2,000	0
Financial costs	0	1,932	2,125	1,859	1,594	1,328	1,063	797	531	266	0	0
Loan repayment	0	0	2,656	2,656	2,656	2,656	2,656	2,656	2,656	2,656	0	0
SURPLUS (DEFICIT)	**0**	**5,981**	**1,641**	**1,949**	**2,350**	**2,524**	**1,472**	**1,658**	**1,844**	**2,030**	**4,872**	**7,532**
CUMULATIVE CASH BALANCE	**0**	**5,981**	**7,622**	**9,571**	**11,922**	**14,446**	**15,918**	**17,576**	**19,420**	**21,450**	**26,323**	**33,854**

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**	**14,440**	**16,245**	**18,050**	**18,050**	**18,050**	**18,050**	**18,050**	**18,050**	**18,050**	**18,050**	**7,532**
Inflow operation	0	14,440	16,245	18,050	18,050	18,050	18,050	18,050	18,050	18,050	18,050	0
Other income	0	0	0	0	0	0	0	0	0	0	0	7,532
TOTAL CASH OUTFLOW	**27,598**	**8,741**	**9,963**	**11,162**	**11,451**	**11,540**	**12,859**	**12,939**	**13,018**	**13,098**	**13,178**	**0**
Increase in fixed assets	25,453	0	0	0	0	0	0	0	0	0	0	0
Increase in net working capital	2,145	282	423	0	1	0	0	0	0	0	0	0
Operating costs	0	8,109	9,190	10,812	10,812	10,827	10,827	10,827	10,827	10,827	10,827	0
Marketing and Distribution cost	0	350	350	350	350	350	350	350	350	350	350	0
Income (corporate) tax		0	0	0	287	363	1,682	1,761	1,841	1,921	2,000	0
NET CASH FLOW	**-27,598**	**5,699**	**6,282**	**6,888**	**6,599**	**6,510**	**5,191**	**5,111**	**5,032**	**4,952**	**4,872**	**7,532**
CUMULATIVE NET CASH FLOW	**-27,598**	**-21,899**	**-15,618**	**-8,730**	**-2,131**	**4,379**	**9,571**	**14,682**	**19,714**	**24,666**	**29,538**	**37,070**
Net present value	-27,598	5,181	5,191	5,175	4,507	4,042	2,930	2,623	2,347	2,100	1,878	2,904
Cumulative net present value	-27,598	-22,417	-17,226	-12,051	-7,544	-3,501	-571	2,052	4,399	6,499	8,378	11,281

NET PRESENT VALUE	11,281
INTERNAL RATE OF RETURN	18.31%
NORMAL PAYBACK	6 years