183. PROFILE ON ASSEMBLY OF REFRIGERATOR

TABLE OF CONTENTS

I. SUMMARY

This profile envisages the establishment of a plant for the assembly of refrigerator with a capacity of 3,000 units per annum. Refrigerator is electro-mechanical equipment and is used at homes, bars, restaurants, hotels, etc for preserving fresh vegetables, fruits, meats, beverage etc. for a long time.

The demand for refrigerator is met entirely through import. The present (2012) demand for refrigerator assembly is estimated at 108,670 units. The demand for refrigerator is projected to reach 159,672 units and 234,610 units by the year 2017 and 2022, respectively.

The principal raw materials required by the project consists of cold-rolled steel plate, silicate steel plate, resin, urethane foams, R-12 Freon gas, acrylic antistatic agent which have to be imported.

The total investment cost of the project including working capital is estimated at Birr 11.32 million. From the total investment cost the highest share (Birr 5.89 million or 52.00%) is accounted by fixed investment cost followed by initial working capital (Birr 4.29 million or 37.91%) and pre operation cost (Birr 1.14 million or 10.09%). From the total investment cost Birr 1.26 million or 11.14% is required in foreign currency.

The project is financially viable with an internal rate of return (IRR) of 30.10% and a net present value (NPV) of Birr 13.65 million discounted at 10%.

The project can create employment for 56 persons. The establishment of such factory will have a foreign exchange saving effect to the country by substituting the current imports and also generates income for the Government in terms of tax revenue and payroll tax.

II. PRODUCT DESCRIPTION AND APPLICATION

Refrigerator is electro-mechanical equipment and is used at homes, bars, restaurants, hotels, etc for preserving fresh vegetables, fruits, meats, beverage etc. for a long time. It utilizes mechanical or heat energy to produce and maintain low temperature as low as - 20^{0} C.

Refrigerator use refrigerant gas to absorb heat. Refrigerant gases can be ammonia, carbon dioxide, chlorofloro carbons (CFC), etc. The cooling action in a refrigerator is carried out by refrigeration cycle consisting of compressor, radiator, capillary tubes, and cooler. The cabinet compartment of a refrigerator can be manufactured from cold-rolled steel sheets by using conventional metal workshop machines, while the parts involved in a refrigeration cycle consisting of compressor, radiator, capillary tubes, and cooler. The cabinet compartment of a refrigerator can be manufactured from cold-rolled steel sheets by using conventional metal workshop machines, while the parts involved in a refrigeration cycle can be purchase and assembled.

III. MARKET STUDY AND PLANT CAPACITY

A. MARKET STUDY

1. Past Supply and Present Demand

Refrigerators are used for lowering the temperature and maintaining it in a given space for the purpose of chilling foods, preserving certain substance or providing an atmosphere. It is one of the most essential domestic equipment to keep perishable food items and cool for certain period of time so as to more hygienic and economical.

There is no plant in the country that manufactures refrigerators. Hence, the demand for the item is met through import each year. The demand for refrigerator is directly related with factors like supply of electricity, urbanizations, income and price of the product. According to the Ethiopian Electric and Power Corporation, all urban areas including the small towns that have been given urban status are supplied with electric power. Currently, according to knowledgeable persons in the corporation, there are about 2 million people (clients) who use electricity in the country.

According to the data obtained from the Ethiopian Customs Authority Trade Statistics, the country imports a variety of refrigerators and freezers from various countries. These include:

- Combined refrigerators-freezers with separate external doors.
- Compression type house hold refrigerators
- Absorption type house hold refrigerators
- Other types of house hold refrigerators
- Freezers of chest type with capacity of = < 800 liters and capacity of = < 900 liters
- Other refrigerating/freezing chests, cabinets and similar refrigerating furniture's and
- CFC free refrigerators and freezers.

The total quantity and value of the various types of refrigerators and freezers imported to the country during the period 2000-2011 is presented in Table 3.1.

Table 3.1

IMPORT OF REFRIGERATORS

Year	Import (No.)	Value (Birr)
2000	18,082	49,967,605
2001	49,698	53,394,329
2002	187,826	65,874,152
2003	51,053	98,505,662
2004	55,717	78,345,536
2005	59,967	155,221,711
2006	75,029	189,979,441
2007	84,122	219,375,316
2008	2,884	10,484,478
2009	12,043	384,788,862
2010	111,435	336,678,709
2011	105,906	415,528,327
Total	813,762	2,058,144,128
Average	67,814	171,512,011

Source: *- Ethiopian Revenues & Customs Authority.*

The data in Table 3.1 shows that the country imported on average 67,814 refrigerators during the period 2000 to 2011. The table also shows that the quantity of refrigerators and freezers that were imported to the country has shown some fluctuations during the period under consideration. The import figure increased from 18,082 in 2000 to 49,698 in 2001, and it jumped to 187,826 in 2002, which is about four times. Although the import data sharply declined from 2002 to 2003, from year 2004 to year 2007, it has shown an increasing trend. During the four years period the import figure ranges from lowest figure 55,717 in2004 to the highest figure 84,122 refrigerators with an average of figure of 68,709 refrigerators. The imported quantity for years 2008 &2009 is 2,884, 12,043 respectively. These import data are extremely low compared to other years. This may be due to previous stock or because of currency shortage.

On the other hand the import data shows an increasing trend for the resent years (2010&2011). Hence, in order to determine the present demand, the average import data of the two years (108,670 refrigerators) has been considered.

2. Projected Demand

There are various factors that influence the demand for refrigerators. Some of these are income, level of urbanization, price and expansion of the service sector such as hotels, bars and other recreation areas. When income increases households tend to buy modem equipments. When urbanization expands the service sector grows parallel to meet the needs of the urban population. Hence, hotels, bars, cafe houses, etc. are established which require equipments such as refrigerators. The availability of the product at reasonable price will also attract persons to buy durable household items. Considering the combined effect of the above factors, the demand for the product is assumed to grow by about 8% per annum. The projected demand to the years 2011- 2020 is shown in Table 3.2.

Table 3.2

PROJECTED DEMAND FOR REFRIGERATORS & FREEZERS (No.)

Year	Projected Demand
2013	117,364
2014	126,753
2015	136,893
2016	147,844
2017	159,672
2018	172,446
2019	186,242
2020	201,141
2021	217,232
2022	234,610
2023	253,79

The demand for refrigerators & freezers will increase from 117,364 units in year 2013 to 172,446units and 253,79units by the year 2018 and year 2023, respectively.

3. Pricing and Distribution

The price of refrigerators varies according to its size or capacity (cc) and country of origin. According to the data collected from some shops in Addis Ababa, the price of refrigerator varies from about Birr 5,000 (for 140 cc) to Birr 14,000 (400 cc). For the purpose of financial analysis Birr 8,000 is adopted.

The product can be distributed through the existing house hold and office equipments enterprises.

B. PLANT CAPACITY AND PRODUCTION PROGRAM

1. Plant Capacity

The project envisages assembling of 3,000 units of refrigerator per annum, based on 300 working days and single shift (8 hours) per day.

2. Production Program

The plant will start production at 75% of its installed capacity (2,250 pieces), and then grows to 85% in the second year. Full capacity production can be attained in the third year and thereafter.

The fact that the production equipment are new and operators usually take some time to develop the specific skill and know how, the production program is made to start at relatively low level and gradually rise to full capacity.

IV. MATERIALS AND INPUTS

A. RAW AND AUXILIARY MATERIALS

Raw and auxiliary materials required by the project consists of cold-rolled steel plate, silicate steel plate, resin, urethane foams, R-12 Freon gas, acrylic antistatic agent and others. The total annual raw materials requirement and its cost are indicated in Table 4.1.

Table 4.1

RAW AND AUXILLIARY MATERIALS AND COST

Sr. No.	Raw material	Unit	Qty.	Cost ('000 birr)		
				FC	LC	Total
1	Cold-rolled steel plate	Ton	150	2,400	360	2,760
2	Silicate steel plate	Ton	200	3,800	570	4,370
3	Resin	Ton	25	1,125	169	1,294
4	Urethane foam	m^3	75	3,000	600	3,600
5	Acrylic antistatic agent	Ton	25	450	68	518
6	R-12 Freon gas	m^3	100	1,500	300	1,800
7	Set of cooling system (compressor, tubes switches, thermostat, bulbs, etc.	Ton	30	1,500	300	1,800
8	Packing Materials	Ton	100	1,600	320	1,920
	Total			**15,375**	**2,687**	**18,062**

B. UTILITIES

Electricity and water are major utilities of the project. Annual cost of utilities is Birr 52,890. The annual utility consumptions and its cost are indicated in Table 4.2.

Table 4.2

ANNUAL UTILITIES REQUIRMENT AND COST

Description	Unit of Measure	Qty	Cost ('000 Birr)
Electricity	kWh	50,000	28.89
Water	m^3	2,400	24.00
Total			**52.89**

V. TECHNOLOGY AND ENGINEERING

A. TECHNOLOGY

1. Production Process

The cold-rolled steel plate first undergoes shearing, multi-notching, cold rolling, and forming, and bending. It is then to be welded and assembled with such press formed cabinet component parts as a front plate, bottom plate, angle structure and other components into a cabinet.

The cabinet moved by a conveyor, enters the coating lines, where it is decreased, coated, washed with de-mineralized water, pre-dried, coated with antistatic agent for glazing and dried to be moved to the assembly section by a conveyor.

Interiors are made of plastic sheet by vacuum forming and further processed by pressing and forming, and welded with radiated pipes prior to assembly. It is then coated with acrylic antistatic agent for glazing and for further assembly. The freezer and evaporator are argon welded to be assembled with a cooler, undergoing through leak tests by helium leak tests.

On completion of assembling of interiors, cooler, back plate and the cabinet is preliminarily treated with urethane and place in a preheating furnace. The urethane liquid is then foamed by means of the high pressure foaming device for the cabinets. It is then placed in a cure- heating furnace and assembled with welded refrigeration cycle system along with a compressor.

The welded and assembled refrigerator is vacuum dried and filled with R-12 Freon gas to be followed by wiring.

A start-up test and low-pressure leak test are also conducted. The upper and lower doors are press formed, coated with acrylic resin for glazing. The doors are fixed with inside component parts and also insulated by urethane foaming for the final assembly.

2. Environmental Impact

The major assembling processes of refrigerator includes shearing, multi-notching, cold rolling, forming, and bending welded and assembled and which do not have any negative impact on the environment.

B. ENGINEERING

1. Machinery and Equipment

The list of machinery and equipment is indicated in Table 5.1. The total cost of machinery is Birr 1,709,200 out of which Birr 1,261,000 is in foreign currency.

Table 5.1

MACHINERY AND EQUIPMENT REQUIREMENT

Sr. No.	Description	Quantity
1.	Spot welding Machine	2 sets
3.	Tapping Machine	1 set
4.	Power Press (hydraulic)	1 pcs
5.	Vacuum forming machine	1 pcs
6.	Helium Leak Tester	1 pcs
7.	Crank Press	1 pcs
8.	Grinding Machine	1 pcs
9.	Projection welding machine	1 pcs
10.	Shearing Machine	1 pcs
11.	Cold-rolled forming machine	1 pcs
12.	Painting machine	1 pcs
13.	Packing machine	1 pcs
14.	High speed precision press	1 pcs

2. Land, Building and Civil Works

The envisaged plant requires a total land area of 1,000 $m^{2,}$ of which 600 m^2 would be built-up area. Building construction cost at a rate of Birr 5,000/m^2 is estimated to be Birr 3 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 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 with in 28 years i.e. Birr 8,550 annually.

VI. HUMAN RESOURCE AND TRAINING REQUIREMENT

A. HUMAN RESOURCE REQUIREMENT

The envisaged project will require a total of 56 persons. The annual labor cost is estimated at Birr 672,000. The list of human resource and cost are indicated in Table 6.1.

B. TRAINING REQUIRMENT

On-the Job training shall be carried out by the experts of machinery supplier during the plant erection and commissioning. The cost of training is estimated at Birr 50,000

Table 6.1

HUMAN RESOURCE REQUIRMENT AND COST

Sr. No.	Job Position	Req. Qty.	Monthly Salary (Birr)	Annual Salary (Birr)
1	General Manager	1	4,375	52,500
2	Secretary	1	1,050	12,600
3	Production & Technical Head	1	3,500	42,000
4	Commercial Section Head	1	3,500	42,000
5	Administration and Finance Head	1	3,500	42,000
6	Sales man	2	3,500	42,000
7	Accountant	1	2,100	25,200
8	Clerks	3	2,100	25,200
9	Store man	1	1,225	14,700
10	Skilled Technicians	6	10,500	126,000
11	Laborers	10	5,250	63,000
12	General Service	8	4,200	50,400
Sub-Total		**36**	**44,800**	**537,600**
Workers Benefit =25% of Basic Salary			11,200	134,400
Total			**56,000**	**672,000**

VII. FINANCIAL ANALYSIS

The financial analysis of the refrigerator assembly 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	5 years
Bank interest	10%
Discount cash flow	10%
Accounts receivable	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 11.32 million (See Table 7.1). From the total investment cost the highest share (Birr 5.89 million or 52.00%) is accounted by fixed investment cost followed by initial working capital (Birr 4.29 million or 37.91%) and pre operation cost (Birr 1.14 million or 10.09%). From the total investment cost Birr 1.26 million or 11.14% 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	0.24
1.2	Building and civil work	3,000.00		3,000.00	26.50
1.3	Machinery and equipment	448.20	1,261.00	1,709.20	15.10
1.4	Vehicles	900.00		900.00	7.95
1.5	Office furniture and equipment	250.00		250.00	2.21
	Sub total	**4,624.80**	**1,261.00**	**5,885.80**	**52.00**
2	**Pre operating cost ***				
2.1	Pre operating cost	401.28		401.28	3.55
2.2	Interest during construction	740.47		740.47	6.54
	Sub total	**1,141.75**		**1,141.75**	**10.09**
3	**Working capital ****	**4,291.08**		**4,291.08**	**37.91**
	Grand Total	**10,057.64**	**1,261.00**	**11,318.64**	**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 6.16 million. However, only the initial working capital of Birr 4.29 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 21.05 million (see Table 7.2). The cost of raw material account for 85.81% of the production cost. The other major components of the production cost are depreciation, financial cost, direct labor, and cost of marketing and distribution which account for 3.55%, 3.39%, 2.56%, and 2.38% respectively. The remaining 2.31% is the share of utility, repair and maintenance, labor overhead and administration cost. For detail production cost see Appendix 7.A.2.

Table 7.2

ANNUAL PRODUCTION COST AT FULL CAPACITY (year three)

Items	Cost (000 Birr)	%
Raw Material and Inputs	18,062	85.81
Utilities	53	0.25
Maintenance and repair	51	0.24
Labor direct	538	2.56
Labor overheads	134	0.64
Administration Costs	250	1.19
Land lease cost	0	0.00
Cost of marketing and distribution	500	2.38
Total Operating Costs	**19,588**	**93.06**
Depreciation	747	3.55
Cost of Finance	713	3.39
Total Production Cost	**21,048**	**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 3.15 million to Birr 2.98 million during the life of the project. Moreover, at the end of the project life the accumulated net cash

flow amounts to Birr 31.07 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.

$$\text{Break Even Sales Value} = \frac{\text{Fixed Cost + Financial Cost}}{\text{Variable Margin ratio (\%)}} = \text{Birr } 10{,}080{,}000$$

$$\text{Break Even Capacity utilization} = \frac{\text{Break even Sales Value}}{\text{Sales revenue}} \times 100 = 25.39\%$$

4. Pay-back Period

The pay- back period, also called pay – off period is defined as the period required for recovering the original investment outlay through the accumulated net cash flows earned by the project. Accordingly, based on the projected cash flow it is estimated that the project's initial investment will be fully recovered within 3 years.

5. Internal Rate of Return

The internal rate of return (IRR) is the annualized effective compounded return rate that can be earned on the invested capital, i.e., the yield on the investment. Put another way, the internal rate of return for an investment is the discount rate that makes the net present value of the investment's income stream total to zero. It is an indicator of the efficiency or quality of an investment. A project is a good investment proposition if its IRR is greater than the rate of return that could be earned by alternate investments or putting the money in a bank account. Accordingly, the IRR of this project is computed to be 30.10% indicating the viability of the project.

6. Net Present Value

Net present value (NPV) is defined as the total present (discounted) value of a time series of cash flows. NPV aggregates cash flows that occur during different periods of time during the life of a project in to a common measuring unit i.e. present value. It is a standard method for using the time value of money to appraise long-term projects. NPV is an indicator of how much value an investment or project adds to the capital invested. In principle, a project is accepted if the NPV is non-negative. Accordingly, the net present value of the project at 10% discount rate is found to be Birr 13.65 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 56 persons. The project will generate Birr 6.08 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 generate 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	3,160.85	4,063.95	4,515.50	4,515.50	4,515.50	4,515.50	4,515.50	4,515.50	4,515.50	4,515.50
Accounts receivable	1,155.13	1,473.27	1,632.33	1,632.33	1,633.05	1,633.05	1,633.05	1,633.05	1,633.05	1,633.05
Cash-in-hand	9.46	12.16	13.51	13.51	13.63	13.63	13.63	13.63	13.63	13.63
CURRENT ASSETS	**4,325.44**	**5,549.38**	**6,161.35**	**6,161.35**	**6,162.18**	**6,162.18**	**6,162.18**	**6,162.18**	**6,162.18**	**6,162.18**
Accounts payable	34.36	44.18	49.08	49.08	49.08	49.08	49.08	49.08	49.08	49.08
CURRENT LIABILITIES	**34.36**	**44.18**	**49.08**	**49.08**	**49.08**	**49.08**	**49.08**	**49.08**	**49.08**	**49.08**
TOTAL WORKING CAPITAL	**4,291.08**	**5,505.20**	**6,112.26**	**6,112.26**	**6,113.10**	**6,113.10**	**6,113.10**	**6,113.10**	**6,113.10**	**6,113.10**

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	12,643	16,256	18,062	18,062	18,062	18,062	18,062	18,062	18,062	18,062
Utilities	37	48	53	53	53	53	53	53	53	53
Maintenance and repair	36	46	51	51	51	51	51	51	51	51
Labour direct	377	484	538	538	538	538	538	538	538	538
Labour overheads	94	121	134	134	134	134	134	134	134	134
Administration Costs	175	225	250	250	250	250	250	250	250	250
Land lease cost	0	0	0	0	9	9	9	9	9	9
Cost of marketing and distribution	500	500	500	500	500	500	500	500	500	500
Total Operating Costs	**13,862**	**17,679**	**19,588**	**19,588**	**19,597**	**19,597**	**19,597**	**19,597**	**19,597**	**19,597**
Depreciation	747	747	747	747	747	145	145	145	145	145
Cost of Finance	0	815	713	611	509	407	305	204	102	0
Total Production Cost	**14,609**	**19,241**	**21,048**	**20,946**	**20,853**	**20,149**	**20,047**	**19,945**	**19,843**	**19,742**

Appendix 7.A.3
INCOME STATEMENT (in 000 Birr)

Item	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11
Sales revenue	16,800	21,600	24,000	24,000	24,000	24,000	24,000	24,000	24,000	24,000
Less variable costs	13,362	17,179	19,088	19,088	19,088	19,088	19,088	19,088	19,088	19,088
VARIABLE MARGIN	**3,438**	**4,421**	**4,912**	**4,912**	**4,912**	**4,912**	**4,912**	**4,912**	**4,912**	**4,912**
in % of sales revenue	20.47	20.47	20.47	20.47	20.47	20.47	20.47	20.47	20.47	20.47
Less fixed costs	1,247	1,247	1,247	1,247	1,256	654	654	654	654	654
OPERATIONAL MARGIN	**2,191**	**3,174**	**3,665**	**3,665**	**3,656**	**4,258**	**4,258**	**4,258**	**4,258**	**4,258**
in % of sales revenue	13.04	14.69	15.27	15.27	15.23	17.74	17.74	17.74	17.74	17.74
Financial costs		815	713	611	509	407	305	204	102	0
GROSS PROFIT	**2,191**	**2,359**	**2,952**	**3,054**	**3,147**	**3,851**	**3,953**	**4,055**	**4,157**	**4,258**
in % of sales revenue	13.04	10.92	12.30	12.73	13.11	16.05	16.47	16.90	17.32	17.74
Income (corporate) tax	0	0	0	0	0	1,155	1,186	1,216	1,247	1,278
NET PROFIT	**2,191**	**2,359**	**2,952**	**3,054**	**3,147**	**2,696**	**2,767**	**2,838**	**2,910**	**2,981**
in % of sales revenue	13.04	10.92	12.30	12.73	13.11	11.23	11.53	11.83	12.12	12.42

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	**6,287**	**21,866**	**21,610**	**24,005**	**24,000**	**24,000**	**24,000**	**24,000**	**24,000**	**24,000**	**24,000**	**8,680**
Inflow funds	6,287	5,066	10	5	0	0	0	0	0	0	0	0
Inflow operation	0	16,800	21,600	24,000	24,000	24,000	24,000	24,000	24,000	24,000	24,000	0
Other income	0	0	0	0	0	0	0	0	0	0	0	8,680
TOTAL CASH OUTFLOW	**6,287**	**18,928**	**20,736**	**21,931**	**21,217**	**21,125**	**22,177**	**22,106**	**22,035**	**21,964**	**20,874**	**0**
Increase in fixed assets	6,287	0	0	0	0	0	0	0	0	0	0	0
Increase in current assets	0	4,325	1,224	612	0	1	0	0	0	0	0	0
Operating costs	0	13,362	17,179	19,088	19,088	19,097	19,097	19,097	19,097	19,097	19,097	0
Marketing and Distribution cost	0	500	500	500	500	500	500	500	500	500	500	0
Income tax	0	0	0	0	0	0	1,155	1,186	1,216	1,247	1,278	0
Financial costs	0	740	815	713	611	509	407	305	204	102	0	0
Loan repayment	0	0	1,018	1,018	1,018	1,018	1,018	1,018	1,018	1,018	0	0
SURPLUS (DEFICIT)	**0**	**2,938**	**874**	**2,074**	**2,783**	**2,875**	**1,823**	**1,894**	**1,965**	**2,036**	**3,126**	**8,680**
CUMULATIVE CASH BALANCE	**0**	**2,938**	**3,812**	**5,887**	**8,669**	**11,545**	**13,368**	**15,262**	**17,227**	**19,263**	**22,389**	**31,069**

Appendix 7.A.5
DISCOUNTED CASH FLOW (in 000 Birr)

Item	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Scrap
TOTAL CASH INFLOW	**0**	**16,800**	**21,600**	**24,000**	**24,000**	**24,000**	**24,000**	**24,000**	**24,000**	**24,000**	**24,000**	**8,680**
Inflow operation	0	16,800	21,600	24,000	24,000	24,000	24,000	24,000	24,000	24,000	24,000	0
Other income	0	0	0	0	0	0	0	0	0	0	0	8,680
TOTAL CASH OUTFLOW	**10,578**	**15,076**	**18,286**	**19,588**	**19,589**	**19,597**	**20,752**	**20,782**	**20,813**	**20,844**	**20,874**	**0**
Increase in fixed assets	6,287	0	0	0	0	0	0	0	0	0	0	0
Increase in net working capital	4,291	1,214	607	0	1	0	0	0	0	0	0	0
Operating costs	0	13,362	17,179	19,088	19,088	19,097	19,097	19,097	19,097	19,097	19,097	0
Marketing and Distribution cost	0	500	500	500	500	500	500	500	500	500	500	0
Income (corporate) tax		0	0	0	0	0	1,155	1,186	1,216	1,247	1,278	0
NET CASH FLOW	**-10,578**	**1,724**	**3,314**	**4,412**	**4,411**	**4,403**	**3,248**	**3,218**	**3,187**	**3,156**	**3,126**	**8,680**
CUMULATIVE NET CASH FLOW	**-10,578**	**-8,854**	**-5,540**	**-1,128**	**3,283**	**7,686**	**10,935**	**14,152**	**17,339**	**20,496**	**23,621**	**32,302**
Net present value	-10,578	1,568	2,739	3,315	3,013	2,734	1,833	1,651	1,487	1,339	1,205	3,347
Cumulative net present value	-10,578	-9,011	-6,272	-2,957	56	2,790	4,623	6,274	7,761	9,100	10,305	13,652

NET PRESENT VALUE	13,652
INTERNAL RATE OF RETURN	30.10%
NORMAL PAYBACK	3 years