PROFILE ON THE PRODUCTION OF NYLON YARN

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I. SUMMARY

This profile envisages the establishment of a plant for the production of nylon yarn with a capacity of 200 tons per annum. Nylon yarn is used for the production of different consumer goods such as textile fabrics, upholstery, umbrella clothes, tire cords, fishnet ropes, carpets, etc.

The demand for nylon yarn is met through import. The present (2012) demand for nylon yarn is estimated at 113 tons. The demand for nylon yarn is projected to reach 190 tons and 306 tons by the year 2017 and 2022, respectively.

The principal raw material required is nylon fiber which has to be imported.

The total investment cost of the project including working capital is estimated at Birr 18.71 million. From the total investment cost, the highest share (Birr 14.31 million or 76.52%) is accounted by fixed investment cost followed by initial working capital (Birr 2.57 million or 13.76%) and pre operation cost (Birr 1.82 million or 9.72%). From the total investment cost, Birr 6.79 million or 36.30% is required in foreign currency.

The project is financially viable with an internal rate of return (IRR) of 18.81% and a net present value (NPV) of Birr 8.30 million, discounted at 10%.

The project can create employment for 21 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 packaging sub sector and forward linkage with the textile, leather, tire cords manufacturing and handicraft sub sectors and also generates income for the Government in terms of tax revenue and payroll tax.

II. PRODUCT DESCRIPTION & APPLICATION

Nylon filaments yarn can be manufactured in different degree of orientation such as low oriented (conventional), partly oriented and full oriented yarn. The yarn may be produced as multifilament or mono-filament in a wide range of deniers. It is also available in bright and semi-

dull lusters. The filament yarn is generally specified by fines grade (deniers), number of filaments and twists per length. The nylon yarn has the following properties:

- Excellent orientation and crystallinity characteristics;
- Good fatigue and prolonged heating resistance (at a temperature lower than its melting point);and
- High resistance to chemical and biological degradation and strains.

Nylon yarn is used for the production of different consumer goods such as textile fabrics, upholstery, umbrella clothes, tire cords, fishnets ropes, carpets, etc.

III. MARKET STUDY AND PLANT CAPACITY

A. MARKET STUDY

1. Past Supply and Present Demand

Currently, the demand for nylon yarn in Ethiopia is totally met through import. Some of the biggest textile mills in the country import nylon yarn for internal use i.e. as a raw material for fabric production. A variety of nylon yarn is imported to the country which includes the following.

- High tenancy yarn of nylon;
- Textured yarn of nylon;
- Single yarn of nylon;
- Multiple or cabled yarn of nylon;
- Synthetic filament tow of nylon; and
- Synthetic stable fibers of nylon.

A ten years series of import data pertaining to nylon yarn is provided in Table 3.1.

Table 3.1

IMPORT OF NYLON YARN

Year	Quantity (Tons)	Value (`000 Birr)
2002	121	2,624
2003	83	1,986
2004	218	4,360
2005	16	675
2006	131	2,500
2007	76	2,046
2008	29	642
2009	35	603
2010	69	1,621
2011	98	4,062

Source: *- Compiled from Ethiopian Revenues & Customs Authority*

The imported quantity of nylon yarn was generally erratic during the past ten years. During the period 2002-2007 the imported quantity ranged from the lowest 16 tons to the highest 218 tons with a mean figure of about 108 tons. The imported quantity fell sharply to a level of 29 tons and 35 tons during the period 2008 and 2009, respectively. According to knowledgeable persons in the sector the main reason for the decline of demand during the periods specified above was due to the low capacity utilization of Ethio-Japan Textile Factory, which is the major and oldest nylon yarn consumer in the country. The imported quantity has again started to rise during the last two recent years of 2010 and 2011 to 69 tons and 98 tons, respectively.

Generally, after showing a declining trend up to year 2008 the trend has been changed in the last three recent years. Imported quantity of year 2010 was almost double when compared to year 2009. Similarly, the imported quantity of year 2011 is higher by 42% compared to year 2010.

The increase in the recent years might be due to the improved capacity utilization of Ethio-Japan Textile Factory and emergence of other end users.

To estimate the present demand a15% growth rate is applied, which is much below the observed trend in the past four years, by taking year 2011 import as a base. Accordingly, the present demand for nylon yarn is set at 113 tons.

2. Demand Projection

The demand for nylon yarn depends on the performance of the textile sector. In the past, the sector was beset by diverse problems, the major ones being stiff competition from legally and illegally imported fabrics and clothing.

There are, however, favorable prospects for the sector stemming from opening of the markets of the United States and the European Union countries to Ethiopian textile products. The Ethiopian Government is also taking various supportive initiatives including credit on easy terms and availing land for factory premises to boost the foreign exchange earning capacity of the sector.

The target set for the industrial sector during the GTP period is to register an average annual growth rate of 20% and there by to increase the sector's share in overall GDP. In this regard continuous investment support and expansion activities will be carried out by the Government. Hence, when these factors are taken into account, it won't be unreasonable to assume that the demand for nylon yarn to grow by an average of 10% per annum. The demand projection worked based on this assumption is given in Table 3.1.

Based on the projection worked out in Table 3.2, the demand for nylon yarn will grow from 130 tines in the year 2013 to 209 tons and 306tons by the years 2018 and 2022, respectively.

Table 3.2

PROJECTED DEMAND FOR NYLON YARN (TONS)

Year	Projected Demand
2013	130
2014	143
2015	157
2016	173
2017	190
2018	209
2019	230
2020	253
2021	278
2022	306

3. Pricing and Distribution

The latest (2011) average CIF price for nylon yarn was Birr 61,449 per ton although prices for different specifications vary. Price suggested for the project's output is, therefore, to be based on the CIF prices of imports and the additional costs of customs duty as well as other handling charges, which are estimated at about 30% of the CIF price. Accordingly, a factory gate price of Birr 79,884 per ton is taken for sales revenue projection.

Direct sale to bulk purchasers, such as textile mills, as well as the use of existing yarn distributing enterprises for small purchasers is recommended.

B. PLANT CAPACITY AND PRODUCTION PROGRAM

1. Plant Capacity

According to the market study, the demand for nylon yarn will grow from 130 tons in the year 2013 to 209 tons and 306 tons by the years 2018 and 2022, respectively. Based on the market and the technology considerations the plant is proposed to have a production capacity of 200 tons per annum. The plant will operate single shift, 8 hours a day and for 300 days a year.

2. Production Program

Considering a period needed for production skill development and market penetration, the capacity utilization rates of 60%,70%, 80%, 90%, and 100% in the first, second, third, fourth, and fifth year respectively are selected. Table 3.3 shows the proposed production program.

Table 3.3

PRODUCTION PROGRAM

Year	1	2	3	4	5-10
Capacity utilization (%)	60	70	80	90	100
Production (tons)	120	140	160	180	200

IV. MATERIALS AND INPUTS

A. RAW MATERIALS

The major raw material for the production nylon yarn is nylon fiber. Annual requirement and cost of raw & auxiliary materials at full capacity operation is Birr 10.77 million. For details see Table 4.1.

Table 4.1

RAW MATERIALS REQUIREMENTS AND COST

Description	Unit	Qty	Cost ('000 Birr)		
			FC	LC	TC
Nylon fiber	Tons	210.0	8,736.00	1,310.40	10,046.40
Caustic soda	Tons	6.3	-	93.24	93.24
Sodium hydrosulpite	Tons	4.2	124.70	18.70	143.40
Dyestuff	Tons	10.5	262.50	39.38	301.88
Packaging material	Tons	15.75	-	189.00	189.00
Grand Total		**-**	**9,123.20**	**1,650.72**	**10,773.92**

B. UTILITIES

Electricity and water are utilities required for the envisaged plant. The total annual expenditure on utilities will be Birr 181,000. The details are shown in Table 4.2 below.

TABLE 4.2

ANNUAL UTILITIES REQUIREMENT& COST

No.	Description	Annual Consumption	Unit	Unit Cost (Birr)	Total Cost (000 Birr)
1	Electricity	240,000	kWh	0.65	156.00
2	Water	2,500	m^3	10.00	25.00
Total Annual Cost					**181.00**

V. TECHNOLOGY AND ENGINEERING

A. TECHNOLOGY

1. Production Process

The production process involves the following sub- processes.

- Opening, Blending and Cleaning ;
- Carding;
- Drawing;
- Roving;
- Spinning ;
- Winding; and
- Twisting.

The process starts with cleaning and mixing operations. The Nylon fibers are then straightened and drawn out into the form of sliver, which resembles a rope, but with the fibers having no twist. Twisting is required to provide sufficient strength to prevent breakage in its manipulation. Thus, a fine roving is produced which is finally twisted into yarn.

2. Environmental Impact

To overcome some environmental problems created on the production process and the wastes during production additional investment for environmental protection of about Birr 200,000.00 is estimated.

B. ENGINEERING

1. Machinery and Equipment

The total cost of machinery is estimated to be Birr 8.15 million. The list of machinery and equipment required for the production of Nylon Yarn is indicated in Table 5.1.

Table 5.1

LIST OF MACHINERY AND EQUIPMENT REQUIREMENT AND COST

S/N	Description	Qty	Cost ('000 Birr)		
			FC	LC	TC
1	Ring frame-400 spindle	1	1680.0	-	1680.0
2	Twisting machine of 200 spindles German type with bottom and tap rollers and aluminum pulley	1	576.0	-	576.0
3	Intersection gill box 2Hx2 balls Japan type 48 fallers, high speed	1	384.0	-	384.0
4	Intersection gill box 2H x 4 balls Japan type 48 fallers, high speed	1	720.0	-	720.0
5	Intersection gill box 2Hx4 balls Japan type 48 fallers, high speed	1	720.0	-	720.0
6	Robbins machine 10H x 20 balls	1	288.0	-	288.0
7	Robbins machine 15Hx30 balls	1	408.0	-	408.0
8	Cheese winder 30 spindles CI drum	1	216.0	-	216.0
9	Two rolling machine 40 page cards	1	408.0	-	408.0
10	Carding machine	1	576.0	-	576.0
11	Hand building press 5 kg. capacity		120.0	-	120.0
12	Electrical fitting	Set	576.0	-	576.0
13	Temperature and humidity control	Set	120.0	-	120.0
14	**Total FOB**		**6,792.00**		**6,792.00**
15	**Port handling, insurance, inland transport etc (20% of FOB)**			**1,358.40**	**1,358.40**
	Grand Total		**6,792.00**	**1,358.40**	**8,150.40**

2. Land, Building and Civil Works

The envisaged plant requires a total land area of 1,500 $m^{2,}$ of which 1,000 m^2 would be built-up area. Building construction cost at a rate of Birr 4,500/m^2 is estimated to be Birr 5.5 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 blow 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 399,000 of which 10% or Birr 39,900 will be paid in advance. The remaining Birr 359,100 will be paid in equal installments with in 28 years i.e. Birr 12,825 annually.

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

A total of 21 persons would be required for the envisaged plant. The annual cost would be Birr198, 000.00.The details are given in Table 6.1.

Table 6.1

HUMAN RESOURCE REQUIREMENT AND LABOR COST

No.	Description	No. of Persons	Salary(Birr)	
			Monthly	Annual
1	Plant Manager	1	4,000	48,000
2	Secretary	1	800	9,600
3	Production Supervisor	1	1,500	18,000
4	Operator	6	3,600	43,200
5	Laborer	3	1050	12,600
6	Cleaner	1	350	4,200
7	Personnel	1	900	10,800
8	Accountant	1	1,000	12,000
10	Cashier	1	700	8,400
11	Technician	1	800	9,600
11	Sales Man	1	600	7,200
16	Driver	1	500	6,000
17	Guard	2	700	8,400
	Total	**21**	**16,500**	**198,000**

B. TRAINING REQUIREMENT

Training will be required for supervisor and production workers. It is recommended that machinery supplier will provide on-the-job training for two weeks. The cost of training is estimated at Birr 120,000; 75% of which would be in foreign currency.

VII. FINANCIAL ANALYSIS

The financial analysis of the nylon yarn project is based on the data presented in the previous chapters and the following assumptions:-

Construction period	1 year
Source of finance	30 % equity and 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 18.71 million (see Table 7.1). From the total investment cost, the highest share (Birr 14.31 million or 76.52%) is accounted by fixed investment cost followed by initial working capital (Birr 2.57 million or 13.76%) and pre operation cost (Birr 1.82 million or 9.72%). From the total investment cost, Birr 6.79 million or 36.30% is required in foreign currency.

Table 7.1

INITIAL INVESTMENT COST ('000 Birr)

Sr. No	Cost Items	Local Cost	Foreign Cost	Total Cost	% Share
1	**Fixed investment**				
1.1	Land Lease	39.90		39.90	0.21
1.2	Building and civil work	5,500.00		5,500.00	29.40
1.3	Machinery and equipment	1,358.40	6,792.00	8,150.40	43.57
1.4	Vehicles	450.00		450.00	2.41
1.5	Office furniture and equipment	175.00		175.00	0.94
	Sub total	**7,523.30**	**6,792.00**	**14,315.30**	**76.52**
2	**Pre operating cost ***				
2.1	Pre operating cost	594.51		594.51	3.18
2.2	Interest during construction	1,223.89		1,223.89	6.54
	Sub total	**1,818.40**		**1,818.40**	**9.72**
3	**Working capital ****	**2,574.30**		**2,574.30**	**13.76**
	Grand Total	**11,916.00**	**6,792.00**	**18,708.00**	**100**

* *N.B Pre operating cost include project implementation cost such as installation, startup, commissioning, project engineering, project management etc and capitalized interest during construction.*

** *The total working capital required at full capacity operation is Birr 3.73 million. However, only the initial working capital of Birr 2.57 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 15.07 million (see Table 7.2). The cost of raw material account for 71.47% of the production cost. The other major components of the production cost are depreciation, financial cost, Maintenance and repair, and cost of marketing and distribution which account for 13.78%, 6.70%, 1.63%, and 2.32%, respectively. The remaining 5.47% is the share of utility, direct labor, 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 five)

Items	Cost (000 Birr)	%
Raw Material and Inputs	10,774	71.47
Utilities	181	1.20
Maintenance and repair	245	1.63
Labor direct	198	1.31
Labor overheads	40	0.27
Administration Costs	200	1.33
Land lease cost	0	0.00
Cost of marketing and distribution	350	2.32
Total Operating Costs	**11,988**	**79.53**
Depreciation	2,076	13.78
Cost of Finance	1,010	6.70
Total Production Cost	**15,074**	**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 2.30 million to Birr 2.77 million during the life of the project. Moreover, at the end of the project life the accumulated net cash flow amounts to Birr 24.72 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.

$$\text{Break- Even Sales Value} = \frac{\text{Fixed Cost + Financial Cost}}{\text{Variable Margin ratio (\%)}} = \text{Birr } 6{,}804{,}000$$

$$\text{Break -Even Capacity utilization} = \frac{\text{Break- even Sales Value}}{\text{Sales revenue}} \times 100 = 42.38\ \%$$

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 18.81% 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 8.30 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 21 persons. The project will generate Birr 5.44 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 ward linkage with the packaging sub sector and forward linkage with the textile, leather, tire cords manufacturing and handicraft 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	1,885.45	2,154.80	2,424.15	2,693.50	2,693.50	2,693.50	2,693.50	2,693.50	2,693.50	2,693.50
Accounts receivable	708.05	805.03	902.02	999.00	1,000.07	1,000.07	1,000.07	1,000.07	1,000.07	1,000.07
Cash-in-hand	6.64	7.59	8.54	9.49	9.66	9.66	9.66	9.66	9.66	9.66
CURRENT ASSETS	**2,600.14**	**2,967.42**	**3,334.70**	**3,701.99**	**3,703.23**	**3,703.23**	**3,703.23**	**3,703.23**	**3,703.23**	**3,703.23**
Accounts payable	25.84	29.53	33.23	36.92	36.92	36.92	36.92	36.92	36.92	36.92
CURRENT LIABILITIES	**25.84**	**29.53**	**33.23**	**36.92**	**36.92**	**36.92**	**36.92**	**36.92**	**36.92**	**36.92**
TOTAL WORKING CAPITAL	**2,574.30**	**2,937.89**	**3,301.48**	**3,665.07**	**3,666.32**	**3,666.32**	**3,666.32**	**3,666.32**	**3,666.32**	**3,666.32**

Appendix 7.A.2
PRODUCTION COST (in 000 Birr)

Item	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11
Raw Material and Inputs	7,542	8,619	9,697	10,774	10,774	10,774	10,774	10,774	10,774	10,774
Utilities	127	145	163	181	181	181	181	181	181	181
Maintenance and repair	172	196	221	245	245	245	245	245	245	245
Labour direct	139	158	178	198	198	198	198	198	198	198
Labour overheads	28	32	36	40	40	40	40	40	40	40
Administration Costs	140	160	180	200	200	200	200	200	200	200
Land lease cost	0	0	0	0	13	13	13	13	13	13
Cost of marketing and distribution	350	350	350	350	350	350	350	350	350	350
Total Operating Costs	**8,497**	**9,660**	**10,824**	**11,988**	**12,001**	**12,001**	**12,001**	**12,001**	**12,001**	**12,001**
Depreciation	2,076	2,076	2,076	2,076	2,076	238	238	238	238	238
Cost of Finance	0	1,346	1,178	1,010	841	673	505	337	168	0
Total Production Cost	**10,573**	**13,083**	**14,079**	**15,074**	**14,919**	**12,911**	**12,743**	**12,575**	**12,407**	**12,238**

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	11,340	14,580	16,200	16,200	16,200	16,200	16,200	16,200	16,200	16,200
Less variable costs	8,147	9,310	10,474	11,638	11,638	11,638	11,638	11,638	11,638	11,638
VARIABLE MARGIN	**3,193**	**5,270**	**5,726**	**4,562**	**4,562**	**4,562**	**4,562**	**4,562**	**4,562**	**4,562**
in % of sales revenue	28.16	36.14	35.34	28.16	28.16	28.16	28.16	28.16	28.16	28.16
Less fixed costs	2,426	2,426	2,426	2,426	2,439	600	600	600	600	600
OPERATIONAL MARGIN	**767**	**2,843**	**3,299**	**2,136**	**2,123**	**3,962**	**3,962**	**3,962**	**3,962**	**3,962**
in % of sales revenue	6.76	19.50	20.37	13.18	13.10	24.45	24.45	24.45	24.45	24.45
Financial costs		1,346	1,178	1,010	841	673	505	337	168	0
GROSS PROFIT	**767**	**1,497**	**2,121**	**1,126**	**1,281**	**3,289**	**3,457**	**3,625**	**3,793**	**3,962**
in % of sales revenue	6.76	10.27	13.09	6.95	7.91	20.30	21.34	22.38	23.42	24.45
Income (corporate) tax	0	0	0	0	0	987	1,037	1,088	1,138	1,189
NET PROFIT	**767**	**1,497**	**2,121**	**1,126**	**1,281**	**2,302**	**2,420**	**2,538**	**2,655**	**2,773**
in % of sales revenue	6.76	10.27	13.09	6.95	7.91	14.21	14.94	15.66	16.39	17.12

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	**14,910**	**15,164**	**14,584**	**16,204**	**16,200**	**16,200**	**16,200**	**16,200**	**16,200**	**16,200**	**16,200**	**8,230**
Inflow funds	14,910	3,824	4	4	0	0	0	0	0	0	0	0
Inflow operation	0	11,340	14,580	16,200	16,200	16,200	16,200	16,200	16,200	16,200	16,200	0
Other income	0	0	0	0	0	0	0	0	0	0	0	8,230
TOTAL CASH OUTFLOW	**14,910**	**12,321**	**13,057**	**14,052**	**15,048**	**14,526**	**15,343**	**15,226**	**15,108**	**14,990**	**13,189**	**0**
Increase in fixed assets	14,910	0	0	0	0	0	0	0	0	0	0	0
Increase in current assets	0	2,600	367	367	367	1	0	0	0	0	0	0
Operating costs	0	8,147	9,310	10,474	11,638	11,651	11,651	11,651	11,651	11,651	11,651	0
Marketing and Distribution cost	0	350	350	350	350	350	350	350	350	350	350	0
Income tax	0	0	0	0	0	0	987	1,037	1,088	1,138	1,189	0
Financial costs	0	1,224	1,346	1,178	1,010	841	673	505	337	168	0	0
Loan repayment	0	0	1,683	1,683	1,683	1,683	1,683	1,683	1,683	1,683	0	0
SURPLUS (DEFICIT)	**0**	**2,843**	**1,527**	**2,151**	**1,152**	**1,674**	**857**	**974**	**1,092**	**1,210**	**3,011**	**8,230**
CUMULATIVE CASH BALANCE	**0**	**2,843**	**4,370**	**6,522**	**7,674**	**9,347**	**10,204**	**11,179**	**12,271**	**13,481**	**16,491**	**24,722**

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**	**11,340**	**14,580**	**16,200**	**16,200**	**16,200**	**16,200**	**16,200**	**16,200**	**16,200**	**16,200**	**8,230**
Inflow operation	0	11,340	14,580	16,200	16,200	16,200	16,200	16,200	16,200	16,200	16,200	0
Other income	0	0	0	0	0	0	0	0	0	0	0	8,230
TOTAL CASH OUTFLOW	**17,484**	**8,860**	**10,024**	**11,188**	**11,989**	**12,001**	**12,987**	**13,038**	**13,088**	**13,139**	**13,189**	**0**
Increase in fixed assets	14,910	0	0	0	0	0	0	0	0	0	0	0
Increase in net working capital	2,574	364	364	364	1	0	0	0	0	0	0	0
Operating costs	0	8,147	9,310	10,474	11,638	11,651	11,651	11,651	11,651	11,651	11,651	0
Marketing and Distribution cost	0	350	350	350	350	350	350	350	350	350	350	0
Income (corporate) tax		0	0	0	0	0	987	1,037	1,088	1,138	1,189	0
NET CASH FLOW	**-17,484**	**2,480**	**4,556**	**5,012**	**4,211**	**4,199**	**3,213**	**3,162**	**3,112**	**3,061**	**3,011**	**8,230**
CUMULATIVE NET CASH FLOW	**-17,484**	**-15,004**	**-10,448**	**-5,436**	**-1,225**	**2,974**	**6,186**	**9,349**	**12,460**	**15,521**	**18,532**	**26,762**
Net present value	-17,484	2,254	3,765	3,766	2,876	2,607	1,813	1,623	1,452	1,298	1,161	3,173
Cumulative net present value	-17,484	-15,230	-11,464	-7,699	-4,823	-2,215	-402	1,221	2,672	3,971	5,131	8,304

NET PRESENT VALUE	8,304
INTERNAL RATE OF RETURN	18.81%
NORMAL PAYBACK	6 years