PROFILE ON THE PRODUCTION OF ACRYLIC FIBER AND YARN

Table of Contents

I. SUMMARY

This profile envisages the establishment of a plant for the production of acrylic fiber and yarn with a capacity of 168 per annum. Acrylic fiber and yarn is a synthetic fiber and has wide applications in apparel, fabrics, home furnishings, and in others such as auto tops, awnings, hand-knitting and craft yarns, and industrial fabrics, filters, paint rollers, stuffed toys.

The demand for acrylic fiber and yarn is met through import and domestic production. The present (2012) demand for acrylic fiber and yarn is estimated at 15,000 ton. The demand for acrylic fiber and yarn is projected to reach 22,040 ton and 32,384 ton by the year 2017 and 2022, respectively.

The principal raw materials required are acrylonitrile, methyl acryl ate and various chemicals which have to be imported.

The total investment cost of the project including working capital is estimated at Birr 22.03 million. From the total investment cost the highest share (Birr 17.06 million or 77.45%) is accounted by fixed investment cost followed by initial working capital (Birr 2.87 million or 13.03%) and pre operation cost (Birr 2.10 million or 9.51%). From the total investment cost Birr 8.83 million or 40.10% is required in foreign currency.

The project is financially viable with an internal rate of return (IRR) of 32.96% and a net present value (NPV) of Birr 25.44 million discounted at 10%.

The project can create employment for 28 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 forward linkage with the textile manufacturing, handicraft, and chemical sub sector and also generates income for the Government in terms of tax revenue and payroll tax.

II. PRODUCT DESCRIPTION AND APPLICATION

Acrylic is wool like synthetic fiber that was developed by DuPont in 1944 and commercially produced in 1950. It is soft and warm, wool like, quick drying, resilient, retaining shape and resistant to moths, sunlight, oil and chemicals. Acrylic has wide applications in apparel (dresses,

infant wear, knitted garments, ski wear, socks, sportswear, sweaters), in fabrics such as simulated furs and jerseys) in home furnishings (blankets, carpets, draperies, upholstery) and in others (such as auto tops, awnings, hand-knitting and craft yarns, and industrial fabrics).

Similarly Modacrylic is a soft, resilient, abrasion and flame-resistant material, quick drying, resistant to acids and alkalis and retaining shape. It has got applications in apparel (deep pile coats, trims, linings, simulated fur, wigs and hairpieces) in fabrics (fleece fabrics, industrial fabrics, knit-pile fabric backings, non-woven fabrics) in home furnishings (awnings, blankets, carpets, flame-resistant draperies and curtains, scatter rugs) and in other uses (such as filters, paint rollers, stuffed toys etc).

Acrylic yarn appears in Ethiopian market as Multiple or cabled yarn not less than 85% acrylic or modacrylic staple fibers, single yarn with not less than 85% acrylic or modacrylic staple fibers, and Yarn less than 85% acrylic or modacrylic staple fibers. However, Multiple or cabled yarn not less than 85% acrylic or modacrylic staple fibers is the single most used(more than 98%) acrylic yarn in this market.

III. MARKET STUDY AND PLANT CAPACITY

A. MARKET STUDY

1. Past Supply and Present Demand

For many years, the demand for acrylic yarn and fiber in Ethiopia was entirely met through import. However, the production of acrylic yarn by importing in a semi-finished form is currently undertaken by one privately owned factory although the major part of the demand is still covered by importing from various countries. A variety of acrylic yarn is imported to the country which includes the following.

- Acrylic or modacrylic synthetic staple fibers, not carded;
- Acrylic or modacrylic synthetic fibers, carded;
- Single yarn, with greater than 85% acrylic;
- Multiple or cabled yarn of acrylic; and
- Synthetic filament tow of, acrylic or modacrylic.

A ten years series of import data for acrylic yarn and fiber and a five years domestic production pertaining to acrylic yarn is provided in Table 3.1.

Table 3.1

IMPORT OF ACRYLIC YARN AND FIBERS (TONS)

Year	Import	Domestic Production	Total
2002	5,993	-	5,993
2003	6,189	-	6,189
2004	5,743	-	5,743
2005	7,158	-	7,158
2006	5,136	-	5,136
2007	5,380	3,747	9,127
2008	7,217	3,299	10,516
2009	5,668	N.A	5,668
2010	7,663	10,104	17,767
2011	8,781	2,834	11,615

Source: *- For import the Ethiopian Revenues & Customs Authority.*
- For domestic production Central Statistical Authority.

The imported quantity of acrylic yarn and fibers has generally shown an increasing trend during the past ten years although there were some fluctuations. During the period 2002-2011 the imported quantity ranged from the lowest 5,136 tons (year 2006) to the highest 8,781ton (year 2011). During the past ten years import has registered an annual average growth of 5%.

Local production of acrylic yarn in the past few years has been highly erratic. During year 2007 and 2008 the production level was 3,747 tons and 3,299 tons. As per the data source of the Central Statistical Authority production in the year 2009 was nil. Surprisingly, the domestic production sharply increased to a level of 10,104 tons in the year 2010 and again decreased drastically to a level of 2,834 tons in the following year of 2011.

The lowest and highest apparent consumption (import plus domestic production) in the past five years were 5,668 tons and 17,767tons in the year 2009 and year 2010, respectively. In the remaining three years it ranged from 9,127 tons to 11,615 tons.

To estimate the present demand the recent two years average has been taken by considering the nature of the data. Accordingly, the present demand for acrylic yarn and fibers is set at an adjusted figure of 15,000.

2. Projected Demand

The demand for acrylic yarn and fibers 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 thereby 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 acrylic yarn to grow by an average of 8 % per annum. The total demand projection, the existing domestic capacity and the unsatisfied demand is given in Table 3.2.

Table 3.2

PROJECTED DEMAND FOR ACRYLIC YARN (TONS)

Year	Total Projected Demand	Existing Capacity*	Unsatisfied Demand
2013	16,200	6,500	9,700
2014	17,496	6,500	10,996
2015	18,895	6,500	12,395
2016	20,407	6,500	13,907
2017	22,040	6,500	15,540
2018	23,803	6,500	17,303

Year	Total Projected Demand	Existing Capacity*	Unsatisfied Demand
2019	25,707	6,500	19,207
2020	27,764	6,500	21,264
2021	29,985	6,500	23,485
2022	32,384	6,500	25,884

Note: - *Existing capacity is assumed 6,500 by taking year 2010 and 2011 actual average Production.*

The unsatisfied demand for acrylic yarn and fiber will increase from 9,700 tons in the year 2013 to 17,303 tons and 25,884 tons during the period 2018 and 2022, respectively.

3. Pricing and Distribution

The current factory gate price of locally produced acrylic yarn is Birr 325 per 2.5 kg. Accordingly, a factory gate price of Birr 130 per kg is taken for sales revenue projection.

Direct sale to bulk purchasers, such as sweater and hosiery producers, as well as the use of existing yarn distributing enterprises for small purchasers is recommended.

B. PLANT CAPACITY AND PRODUCION PROGRAM

1. Plant Capacity

Considering the economic scale of production, available technology and production management, the annual total production capacity of the plant is set to be 168 tons of acrylic fiber and yarn. The envisaged plant will operate in two shifts eight hours per day for three hundred days within a year considering 13 holidays and 52 Sunday per year and assuming that maintenance activities will be performed during off hours and Sunday

2. Production Program

The nature of production of blue acrylic fiber and yarn is mainly processing and it requires the manpower to take little time until they develop a skill and knowledge of the production process specification to produce acceptable standard product .The envisaged plant will run in full load after two years from beginning of operation.

Table 3.3

PRODUCTION PROGRAM

No.	Description	Production Year		
		1	2	3-10
1	Capacity utilization rate (%)	75.00	85.00	100.00
2	Acrylic fiber and yarn (ton)	126.00	142.80	168.00

IV. MATERIALS AND INPUTS

A. RAW MATERIALS

The major raw materials required are acrylonitrile, methyl acryl ate and various chemicals which have to be imported. Annual cost of raw and auxiliary materials is Birr 11,998,810. The direct and auxiliary raw materials required for annual plant production capacity with their quantity and related cost is shown in Table 4.1.

Table 4.1

ANNUAL RAW MATERIAL REQUIREMENT AND COST

No.	Description	Qty	Unit	Unit Cost (Birr) /Ton	Cost (`000 Birr)		
					LC	FC	Total (Birr)
1	Acrylonitrile	176	ton	54,000		9,525.60	9,525.60
2	Methyl acryl ate	9	ton	64,800		571.54	571.54
3	aqueous solution of K2S2O8	4	ton	27,000		119.07	119.07
4	aqueous sodium thiocyanate	4	ton	27,000		108.00	108.00
5	Sulfuric Acid	3	ton	41,400		109.54	109.54
Total FOB						**10,433.75**	**10,433.75**
7	CIF (15%)				1,565.06	1,565.06	1,565.06
Total Raw Material Annual Cost					**1,565.06**	**10,433.75**	**11,998.81**

B. UTILITES

Electricity as a source of energy and water as cleaning agent are the utilities required by the plant. Annual cost of utilities is estimated at Birr 232,800. The annual consumption and cost for the envisaged plant at full capacity production as shown in Table 4.2.

Table 4.2

ANNUAL UTILITIES CONSUMPTION & COST

No.	Description	Annual Quantity	Unit	Unit Cost (Birr)	Total Cost ("000) Birr
1	Electricity	298,000	kWh	0.58	172.84
2	Water	6,000	m^3	10.00	60.00
Total Annual Cost					**232.84**

V. TECHNOLOGY AND ENGINNERING

A. TECHNOLOGY

1. Production Process

The production process of acrylic fiber starts by free-radical polymerization in aqueous suspension. The fibre is produced by dissolving the polymer in a solvent such as N,N-dimethylformamide or aqueous sodium thiocyanate, metering it through a multi-hole spinner and coagulating the resultant filaments in an aqueous solution of the same solvent (wet spinning) or evaporating the solvent in a stream of heated inert gas (dry spinning). Washing, stretching, drying and crimping complete the processing.

The fibre is subjected will be subjected to offering, blending and cleaning and it is fed from the bales by and during this process any forign impurities are eliminated .Ttrash
falls out of the lattice grid into waste chambers and the opened mass of fibbers further fed to other section of the opening and blowing range .The mass of fiber is subjected to repetitive opening ,blending, and cleaning at various section of range .

From blow room cotton is fed automatically through chute duct to carding machine for further procuring. After opening, blending and cleaning in the blow room the fibre is again subjected to cleaning of trash. Removal of entangle and separation of small tuffs .The attenuation is achieved by straightening the product when it is passed through couple of rollers pressed together where the speed of the preceding pair being less than the follower one then the final product from the draw frame is ready for spinning.

Spinning machine are fed with the prepared fibres where rotating rollers complete separation in to fibres and the fibres coming from the opening rollers are drawn by vacuum in to the rotor at fast speed. The yarn passes through the thread monitor and yarn take up system and wind on cylindrical paper or plastic tubes to be packed or delivered to the weaving step either in the same compound or external garment and textile factory.

2. Environmental Impact

In terms of emissions, envisaged plant production is not overly polluting. It is energy-intensive, but the chemicals used are on a closed-loop and used over and over without needing to be disposed of. Acrylic fiber and yarn is not biodegradables. So to overcome this environmental problem the wastes during production should be recycled in the process with no additional investment for environmental protection

B. ENGINNERING

1. Machinery and Equipment

The total cost of machinery and equipment is estimated at Birr10.16 million. The list of direct and auxiliary machinery, tools and equipments required for the plant and their estimated cost is shown in Table 5.1.

Table 5.1
LIST OF MACHINERIES, TOOLS & EQUIPMENTS & COST

No.	Description	Qty	Unit	Unit Cost (Birr)	Total Cost (000 Birr)		
					LC	FC	Total (Birr)
1	Ring Frame Machine	1.00	pcs	1,764,000.00		1,764.00	1,764.00
2	Twisting Machine	1.00	pcs	1,710,000.00		1,710.00	1,710.00
3	Carding Machine	1.00	pcs	1,170,000.00		1,170.00	1,170.00
4	Cheese Winder	1.00	pcs	180,000.00		180.00	180.00
5	Rolling Machine	1.00	pcs	324,000.00		324.00	324.00
6	Hand Bounding Press	1.00	pcs	90,000.00		90.00	90.00
7	Injection Machine For Bobbin	1.00	pcs	630,000.00		630.00	630.00
8	Equipments and Tools	1.00	set	216,000.00		216.00	216.00
9	Temperature and Humidity Control Installation	1.00	set	126,000.00		126.00	126.00
10	Milling Machine	1.00	pcs	723,600.00		723.60	723.60
11	Drilling Machine	1.00	pcs	781,650.00		781.65	781.65
12	Welding	1.00	pcs	699,300.00		699.30	699.30
Total						8,414.55	8,414.55
13	Spare parts (5%)					420.73	420.73
Total Fob Price						8,835.28	8,835.28
14	CIF (15%)				1,325.29		1,325.29
Total Machinery Cost					**1,325.29**	**8,835.28**	**10,160.57**

2. Land, Building and Civil Works

The envisaged plant requires total land area of 2,000 sq.mt out of which built up area is 1,000 sq.mt and the remaining area will be open for various logistic activities The production and administration offices will be constructed with in the factory build up area and the view could be arranged in such a way that the control will be in nearby offices. The total cost of building and civil work at the rate of Birr 5,000 per m2 is estimated at Birr 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 532,000 of which 10% or Birr 53,200 will be paid in advance. The remaining Birr 478,800 will be paid in equal installments with in 28 years i.e. Birr 17,100 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 REQUIREMENTS

A. HUMAN RESOURCE REQUIREMENT

The plant will employ a total of 28 persons. The annual labor cost including fringe benefits is estimated at Birr 624,960. The list of direct and indirect labor requirement and their monthly and annual cost is shown in Table 6.1.

B. TRAINING REQUIREMENT

Individual operators will be trained during machinery commissioning and erection so that the operators and mechanics will be hired one month before the project implementation so the

training will be conducted on job base arrangement focused on the production process parameters and specifications.

Table 6.1

HUMAN RESOURCE REQUIREMENT AND COST

No.	Description	No.	Monthly Salary (Birr)	Annual Salary ("000) Birr
1	Plant manager	1	6,000.00	72.0
2	Secretary	1	1,500.00	18.0
3	Administration and finance	1	3,500.00	42.0
4	Accountant	1	2,000.00	24.0
5	Mechanic	1	2,200.00	26.4
6	Electrician	1	2,200.00	26.4
7	operators	7	1,400.00	117.6
8	production foreman	1	3,000.00	36.0
9	Clerk	1	800.00	9.6
10	Cashier	1	1,000.00	12.0
11	Assistant operator	5	700.00	42.0
12	Quality supervisor	2	1,600.00	38.4
13	store keeper	1	1,400.00	16.8
14	time keeper	1	1,200.00	14.4
15	Guards	3	700.00	25.2
Total		**28**	**29,200.00**	**520.8**
16	Employment benefits and allowances 20%		5,840.00	104.2
Total Annual Labor Cost (Direct +Indirect)				**624.96**

VII. FINANCIAL ANALYSIS

The financial analysis of the acrylic fiber and 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 & 70% loan
Tax holidays	3 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 22.03 million (see Table 7.1). From the total investment cost the highest share (Birr 17.06 million or 77.45%) is accounted by fixed investment cost followed by initial working capital (Birr 2.87 million or 13.03%) and pre operation cost (Birr 2.10 million or 9.51%). From the total investment cost Birr 8.83 million or 40.10% 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	53.20		53.20	0.24
1.2	Building and civil work	5,000.00		5,000.00	22.70
1.3	Machinery and equipment	1,325.29	8,835.28	10,160.57	46.12
1.4	Vehicles	1,500.00		1,500.00	6.81
1.5	Office furniture and equipment	350.00		350.00	1.59
	Sub total	**8,228.49**	**8,835.28**	**17,063.77**	**77.45**
2	**Pre operating cost ***				
2.1	Pre operating cost	654.82		654.82	2.97
2.2	Interest during construction	1,441.29		1,441.29	6.54
	Sub total	**2,096.11**		**2,096.11**	**9.51**
3	**Working capital ****	**2,871.24**		**2,871.24**	**13.03**
	Grand Total	**13,195.84**	**8,835.28**	**22,031.12**	**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 4.18 million. However, only the initial working capital of Birr 2.87 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 17.60 million (see Table 7.2). The cost of raw material account for 68.18% 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 15.33%, 6.76%, 2.96%, and 1.99% respectively. The remaining 4.78% 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	11,999	68.18
Utilities	233	1.32
Maintenance and repair	305	1.73
Labor direct	521	2.96
Labor overheads	104	0.59
Administration Costs	200	1.14
Land lease cost	0	0.00
Cost of marketing and	350	1.99
Total Operating Costs	**13,712**	**77.91**
Depreciation	2,698	15.33
Cost of Finance	1,189	6.76
Total Production Cost	**17,599**	**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 4.96 million to Birr 5.51 million during the life of the project. Moreover, at the end of the project life the accumulated net cash

flow amounts to Birr 53.61 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.

$$\text{Break Even Sales Value} = \frac{\text{Fixed Cost + Financial Cost}}{\text{Variable Margin ratio (\%)}} = \text{Birr } 9{,}172{,}800$$

$$\text{Break Even Capacity utilization} = \frac{\text{Break even Sales Value}}{\text{Sales revenue}} \times 100 = 31.06\%$$

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 32.96% 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 25.44 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 28 persons. The project will generate Birr 11.22 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 forward linkage with the textile manufacturing, handicraft, and chemical sub sector 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	2,099.83	2,399.80	2,699.78	2,999.75	2,999.75	2,999.75	2,999.75	2,999.75	2,999.75	2,999.75
Accounts receivable	808.62	919.97	1,031.32	1,142.67	1,144.09	1,144.09	1,144.09	1,144.09	1,144.09	1,144.09
Cash-in-hand	10.99	12.56	14.13	15.69	15.93	15.93	15.93	15.93	15.93	15.93
CURRENT ASSETS	**2,919.43**	**3,332.32**	**3,745.22**	**4,158.11**	**4,159.77**	**4,159.77**	**4,159.77**	**4,159.77**	**4,159.77**	**4,159.77**
Accounts payable	48.18	55.07	61.95	68.83	68.83	68.83	68.83	68.83	68.83	68.83
CURRENT LIABILITIES	**48.18**	**55.07**	**61.95**	**68.83**	**68.83**	**68.83**	**68.83**	**68.83**	**68.83**	**68.83**
TOTAL WORKING CAPITAL	**2,871.24**	**3,277.26**	**3,683.27**	**4,089.28**	**4,090.94**	**4,090.94**	**4,090.94**	**4,090.94**	**4,090.94**	**4,090.94**

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	8,399	9,599	10,799	11,999	11,999	11,999	11,999	11,999	11,999	11,999
Utilities	163	186	210	233	233	233	233	233	233	233
Maintenance and repair	214	244	275	305	305	305	305	305	305	305
Labour direct	365	417	469	521	521	521	521	521	521	521
Labour overheads	73	83	94	104	104	104	104	104	104	104
Administration Costs	140	160	180	200	200	200	200	200	200	200
Land lease cost	0	0	0	0	17	17	17	17	17	17
Cost of marketing and distribution	350	350	350	350	350	350	350	350	350	350
Total Operating Costs	**9,703**	**11,040**	**12,376**	**13,712**	**13,729**	**13,729**	**13,729**	**13,729**	**13,729**	**13,729**
Depreciation	2,698	2,698	2,698	2,698	2,698	235	235	235	235	235
Cost of Finance	0	1,585	1,387	1,189	991	793	595	396	198	0
Total Production Cost	**12,401**	**15,323**	**16,461**	**17,599**	**17,418**	**14,757**	**14,559**	**14,360**	**14,162**	**13,964**

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	15,288	19,656	21,840	21,840	21,840	21,840	21,840	21,840	21,840	21,840
Less variable costs	9,353	10,690	12,026	13,362	13,362	13,362	13,362	13,362	13,362	13,362
VARIABLE MARGIN	**5,935**	**8,966**	**9,814**	**8,478**	**8,478**	**8,478**	**8,478**	**8,478**	**8,478**	**8,478**
in % of sales revenue	38.82	45.62	44.94	38.82	38.82	38.82	38.82	38.82	38.82	38.82
Less fixed costs	3,048	3,048	3,048	3,048	3,065	602	602	602	602	602
OPERATIONAL MARGIN	**2,887**	**5,918**	**6,766**	**5,430**	**5,413**	**7,876**	**7,876**	**7,876**	**7,876**	**7,876**
in % of sales revenue	18.88	30.11	30.98	24.86	24.78	36.06	36.06	36.06	36.06	36.06
Financial costs		1,585	1,387	1,189	991	793	595	396	198	0
GROSS PROFIT	**2,887**	**4,333**	**5,379**	**4,241**	**4,422**	**7,083**	**7,281**	**7,480**	**7,678**	**7,876**
in % of sales revenue	18.88	22.04	24.63	19.42	20.25	32.43	33.34	34.25	35.15	36.06
Income (corporate) tax	0	0	0	0	0	2,125	2,184	2,244	2,303	2,363
NET PROFIT	**2,887**	**4,333**	**5,379**	**4,241**	**4,422**	**4,958**	**5,097**	**5,236**	**5,374**	**5,513**
in % of sales revenue	18.88	22.04	24.63	19.42	20.25	22.70	23.34	23.97	24.61	25.24

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	**17,719**	**19,649**	**19,663**	**21,847**	**21,840**	**21,840**	**21,840**	**21,840**	**21,840**	**21,840**	**21,840**	**8,585**
Inflow funds	17,719	4,361	7	7	0	0	0	0	0	0	0	0
Inflow operation	0	15,288	19,656	21,840	21,840	21,840	21,840	21,840	21,840	21,840	21,840	0
Other income	0	0	0	0	0	0	0	0	0	0	0	8,585
TOTAL CASH OUTFLOW	**17,719**	**14,064**	**15,020**	**16,158**	**17,296**	**16,703**	**18,629**	**18,490**	**18,351**	**18,212**	**16,092**	**0**
Increase in fixed assets	17,719	0	0	0	0	0	0	0	0	0	0	0
Increase in current assets	0	2,919	413	413	413	2	0	0	0	0	0	0
Operating costs	0	9,353	10,690	12,026	13,362	13,379	13,379	13,379	13,379	13,379	13,379	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	2,125	2,184	2,244	2,303	2,363	0
Financial costs	0	1,441	1,585	1,387	1,189	991	793	595	396	198	0	0
Loan repayment	0	0	1,982	1,982	1,982	1,982	1,982	1,982	1,982	1,982	0	0
SURPLUS (DEFICIT)	**0**	**5,585**	**4,643**	**5,689**	**4,544**	**5,137**	**3,211**	**3,350**	**3,489**	**3,628**	**5,748**	**8,585**

CUMULATIVE CASH BALANCE	**0**	**5,585**	**10,228**	**15,917**	**20,461**	**25,598**	**28,809**	**32,159**	**35,648**	**39,276**	**45,024**	**53,610**

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**	**15,288**	**19,656**	**21,840**	**21,840**	**21,840**	**21,840**	**21,840**	**21,840**	**21,840**	**21,840**	**8,585**
Inflow operation	0	15,288	19,656	21,840	21,840	21,840	21,840	21,840	21,840	21,840	21,840	0
Other income	0	0	0	0	0	0	0	0	0	0	0	8,585
TOTAL CASH OUTFLOW	**20,590**	**10,109**	**11,446**	**12,782**	**13,714**	**13,729**	**15,854**	**15,914**	**15,973**	**16,032**	**16,092**	**0**
Increase in fixed assets	17,719	0	0	0	0	0	0	0	0	0	0	0
Increase in net working capital	2,871	406	406	406	2	0	0	0	0	0	0	0
Operating costs	0	9,353	10,690	12,026	13,362	13,379	13,379	13,379	13,379	13,379	13,379	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	2,125	2,184	2,244	2,303	2,363	0
NET CASH FLOW	**-20,590**	**5,179**	**8,210**	**9,058**	**8,126**	**8,111**	**5,986**	**5,926**	**5,867**	**5,808**	**5,748**	**8,585**
CUMULATIVE NET CASH FLOW	**-20,590**	**-15,411**	**-7,201**	**1,857**	**9,984**	**18,095**	**24,081**	**30,007**	**35,874**	**41,682**	**47,430**	**56,015**
Net present value	-20,590	4,708	6,785	6,806	5,550	5,036	3,379	3,041	2,737	2,463	2,216	3,310
Cumulative net present value	-20,590	-	-9,097	-2,291	3,259	8,296	11,675	14,716	17,453	19,916	22,132	25,442

		15,882										

NET PRESENT VALUE	25,442
INTERNAL RATE OF RETURN	32.96%
NORMAL PAYBACK	3 years