

**PROFILE ON THE PRODUCTION OF POLYESTER
YARN**

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I. SUMMARY

This profile envisages the establishment of a plant for the production of polyester yarn with a capacity of 1,750 ton per annum. Polyester yarn is used for making wrinkle free and stain resistant clothing that can retain its shape and as for making draperies and furniture coverings.

The demand for polyester yarn is entirely met through import. The present (2012) demand for polyester yarn is estimated at 4,497 tons. The demand for polyester yarn is projected to reach 7,242 tons and 11,664 tons by the year 2017 and 2022, respectively.

The principal raw materials required by the envisaged plant are PET granules/Chips; spin finish oil, anti-microbial agent, caustic soda, sodium hydrosulfite, acetic acid (98% Glacial), retarding agent and packaging material. All the raw materials have to be imported except caustic soda and packing.

The total investment cost of the project including working capital is estimated at Birr 35.03 million. From the total investment cost the highest share (Birr 18.06 million or 51.56%) is accounted by fixed investment cost followed by initial working capital (Birr 14.00 million or 39.97%) and pre operation cost (Birr 2.97 million or 8.47%). From the total investment cost Birr 9.04 million or 25.83% is required in foreign currency.

The project is financially viable with an internal rate of return (IRR) of 27.04% and a net present value (NPV) of Birr 32.00 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 backward linkage with the chemical and packaging manufacturing sub sectors and forward linkage with the textile sub sector and also generates income for the Government in terms of tax revenue and payroll tax.

II. PRODUCT DESCRIPTION AND APPLICATION

Polyester fibers, the synthetic fibers, are long chain polymers derived from coal, air, water, and petroleum. They are formed through chemical reaction between an acid and alcohol. In this reaction, two or more molecules combine to make a large molecule whose structure repeats throughout its length. These molecules are very stable and strong. There are variations in the compositions and therefore in the properties of polyester fibers.

The polyester fibers are generally available in two varieties- PET (polyethylene terephthalate) and PCDT (poly-1, 4-cyclohexylene-dimethylene terephthalate). PET is the most common production. It is stronger than PCDT, while PCDT has more elasticity and resilience. PET can be used alone or blended with other fabrics for making wrinkle free and stain resistant clothing that can retain its shape. PCDT is more suitable for heavier applications, such as draperies and furniture coverings. Modifications can be introduced in each of these varieties for obtaining specific properties.

III. MARKET STUDY AND PLANT CAPACITY

A. MARKET STUDY

1. Past Supply and present demand

The supply of polyester yarn to the local market at present is from imports. Polyester yarn is supplied to the local market in different forms which include; high tenacity yarn of polyesters, textured yarn of polyesters, single yarn of polyesters, and multiple or cabled yarn of polyesters. The total import of the different types of polyester yarn during the period 2001--2011 is shown in Table 3.1.

Table 3.1

IMPORT OF POLYESTER YARN

Year	Quantity (Tones)	Value (million Birr)
2001	1,984	23
2002	1,699	19
2003	1,703	21
2004	1,102	15
2005	1,275	20
2006	1,449	26
2007	1,955	31
2008	2,386	46
2009	3,215	63
2010	5,335	130
2011	4,980	186

Source: – *Ethiopian Revenues and Customs Authority*

As can be seen from Table 3.1, the import of polyester yarn during the period under consideration has shown a noticeable increasing trend although there were fluctuations in some years. The highest quantity of import (5,335 tones) was in the year 2010 while the lowest (1,102 tones) was in the year 2004. The average quantity of import during the years (2001-2004) and (2005-2008) was 1,622 tones and 1,766 tones respectively. This average quantity of import has increased to 4,510 tons during the last recent three years (2009-2011) which indicates a general supply growth during the period under consideration and a sharp increase during the recent three years.

The value of imported polyester yarn which was in the range of Birr 15 to 63 million during the years 2002--2009 has reached to a level of Birr 130 million and Birr 186 million by the year 2010 and year 2011, respectively.

In order to estimate the current effective demand for polyester yarn the “Time Trend Extrapolation” method is applied. Accordingly, the principle of least squares is employed to fit a linear trend to the historical data of supply (y) and time (t) and the relation is expressed by the following equation:

$$Y = a + bt,$$

Where ‘a’ is the intercept and

‘b’ is the slope.

Accordingly, the estimated linear equations become,

$$y = -677788.1059 + 339.107744t$$

Based on the above equation the present (2012) effective demand for polyester yarn is estimated at 4,497 tons.

2. Projected Demand

The demand for polyester yarn mainly depends on the performance of its end-user industries i.e. the textile fabrics manufacturing sub-sector. There are also other factors which can influence the performance of the textile sub-sector and consequently the market for the product. The variables that are essential in determining the magnitude and trend of the local demand for polyester yarn include income rise of the population or performance of the national economy; and rate of population growth and urbanization.

The GDP of the country has registered an average annual growth rate of about 11% during the past seven years and is believed to continue at a minimum in the same rate. The textile sub-sector is also given high priority from the manufacturing sector. During the GTP the manufacturing sector is planned to grow by about 20% per annum. As a result, demand for textile products and

hence that of polyester yarn is reasonably expected to increase as economic expansion continues. Considering the above factors the demand for of polyester yarn is conservatively projected to grow by 10% per annum as given in Table 3.2

Table 3.2

PROJECTED DEMAND OF POLYESTER YARN (TONE)

Year	Quantity
2013	4,947
2014	5,441
2015	5,985
2016	6,584
2017	7,242
2018	7,967
2019	8,763
2020	9,640
2021	10,604
2022	11,664

The demand for polyester yarn will grow from 4,947 tones in the year 2013 to 7,967 tones and 11,664 tones by the year 2018 and 2022, respectively.

3. Pricing and Distribution

The year 2011 average CIF price for polyester yarn was about Birr 37,350 per ton although prices for different specifications vary. Based on the average CIF prices of imports and additional costs of customs duty as well as other handling charges, which may be estimated at about 20%, of the CIF price, a factory gate price of Birr 44,820 per ton is taken for sales revenue projection.

The major end users of the product will be textile mills that produce synthetic fabrics. Hence, since their number is small and found in a limited geographical area direct sale to the end user

enterprises is recommended as an appropriate channel of distribution without involving intermediaries.

B. PLANT CAPACTIY AND PRODUCTION PROGRAMME

1. Plant Capacity

Based on the expected demand for polyester yarn as presented earlier, and the planned technology, the envisaged plant is set to produce 1750 ton, taking about 15% of the 2018's estimate.

2. Production Program

The program is scheduled based on the consideration that the envisaged plant will work 275 days in a year in 2 shifts, where the remaining days will be holidays and for maintenance. During the first year of operation the plant will operate at 75 percent capacity and then it grows to 85 percent in the 2nd year. The capacity will reach to 100% in the 3rd year and then after (see Table 3.3).

Table 3.3
ANNUAL PRODUCTION PROGRAMME

No.	Description	production year		
		1	2	3
1	Capacity utilization rate (%)	75.00	85.00	100.00
2	Polyester yarn(ton)	1,312.50	1,487.50	1,750.00

IV. RAW MATERIAL AND INPUTS

A. RAW AND AUXILIARY MATERIALS

The basic raw material needed for the production of polyester yarns are PET granules/Chips, spin finish oil, anti –microbial agent, anti microbial agent, caustic soda, sodium hydrosulphite,

acetic acid (98%Glacial), retarding agent and packaging material. Except caustic soda and packing material all the raw materials are imported. The raw materials required the envisaged plant at full capacity operation and related annual cost is indicated in table 4.1:

Table 4.1

ANNUAL RAW AND AUXILIARY MATERIAL REQUIREMENT AND COST

Sr. No.	Raw Material	Qty (Tons)	Unit Price Birr/kg	Total Cost (000 Birr)		
				FC	LC	Total
1	PET Granules/Chips(Semi dull white)	1,737.00	23.73	41,219.01		41,219.01
2	Spin finish oil	353.79	12.00	4,245.52		4,245.52
3	Anti microbial agent	0.35	250.00	88.45		88.45
4	Caustic soda	14.84	15.00		222.67	222.67
5	Sodium hydrosulpite	29.69	18.00	534.40		534.40
6	Acetic Acid (98%Glacial)	14.84	16.00	237.51		237.51
7	Retarding Agent	6.19	15.00	92.78		92.78
8	Wetting Agent	6.19	21.00	129.89		129.89
9	Dispersing Agent	14.84	28.00	415.65		415.65
10	Dyestuff	23.50	135.00	3,173.01		3,173.01
11	Softener	12.37	23.00	284.52		284.52
12	Effluent Treatment Chemicals	17.00	20.00	340.00		340.00
13	Packaging material	212.35	30.00		6,370.41	6,370.41
	Total			50,760.74	6,593.07	57,353.81

B. UTILITY

The annual utility requirements such as electricity as a source of energy and water as cleaning agent are estimated with their associated cost for the envisaged plant with planned production program and capacity shown above. Thus, the annual utility requirement at full capacity of operation is estimated at Birr 8.97 million, and indicated in Table 4.2.

Table 4.2

ANNUAL UTILITY REQUIREMENT & COST

Sr. No.	Description	Quantity	Unit	Unit Cost (Birr)	Total Cost (000 Birr)
1	Electricity	2,500,000	kwh	0.65	1,625.00
2	Furnace Oil (and lubricant)	300,000	Lt	19.50	5,850.00
3	Water	150,000	m ³	10.00	1,500.00
Total Annual cost					8,975.00

V. TECHNOLOGY AND ENGINEERING

A. TECHNOLOGY

1. Process Description

The man-made chemically created fiber is referred to as polyester. The yarn is developed by first producing the polyester filament. The process begins with the raw material -Pet Flakes, which are petroleum- as well as natural gas- based. Two different combinations of chemicals are cooked in high temperatures producing solid, porcelain-like chips, which are then melt-spun. It is then solidified to form continuous polyester filaments which are then pulled into a winding tube and stretched. The filaments are twisted to add stretch and elasticity which produces the polyester yarn.

The first chemical combination is composed of dimethyl terephthalate and ethylene glycol. The second combination is terephthalic acid and ethylene glycol.

Melting and spinning the chips is the process of making a honey-like liquid, which is then extracted and pressed out through a spinneret machine. The liquid is then solidified once again to form continuous filaments.

Pulling the filaments through a winding tube is the mechanism used to stretch the filament many times its original length. It is pulled and taken up through the tube to stretch.

Twisting the stretched filament is the process which adds strength and elasticity. The number of filaments and the amount of twist determines the size and texture of the yarns.

Crimping and cutting the yarn in specific lengths produces polyester staple yarns. It is used to make taffeta, satin and lightweight apparel for men and women. The staple yarn is also used in fabric blends such as 50 percent cotton/50 percent polyester. Textured yarns are used to make women's and men's knitted slacks. Spun yarns which are soft and fuzzy, are used to make textured fabrics with cotton- and wool-like surfaces.

2. Environmental Impact

The environmental impact of the envisaged plant is associated with discharge of contaminated waste water. However, the appropriate waste water treatment is considered and the cost of which is included in the machinery costs.

B. ENGINEERING

1. Machinery and Equipment

The total cost of machinery and equipment including freight insurance and bank cost is estimated to be about Birr 10.85 million; of which about 9.04 is needed in foreign currency. 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

MACHINERIES AND EQUIPMENT REQUIREMENT AND TOTAL COST

Sr. No.	Description	Qty.	Unit Price (Birr)	Total Cost (000 Birr)		
				FC	LC	Total
1	Winder	15	336,000	5,040.00		5,040.00
2	Extruder	1	60,000	60.00		60.00

Sr. No.	Description	Qty.	Unit Price (Birr)	Total Cost (000 Birr)		
				FC	LC	Total
3	Dryer	1	36,000	36.00		36.00
4	Crysteliser	1	7,080	7.08		7.08
5	Control Panel	2	36,000	72.00		72.00
6	Metering Pump	15	5,640	84.60		84.60
7	Spin Pack Set	45	4,200	189.00		189.00
8	Metering Pump Motor	15	5,640	84.60		84.60
9	Extruder Motor	1	27,600	27.60		27.60
10	Quenching Hood	15	564	8.46		8.46
11	Spinneret	90	1,920	172.80		172.80
12	Ceramic Guide	270	4	0.97		0.97
13	Ceramic Finish Nozzle	90	13	1.19		1.19
14	Manifold	1	2,856	2.86		2.86
15	Chips Hopper	1	2,856	2.86		2.86
16	Sailo	1	12,000	12.00		12.00
17	Conveying Pipe	1	5,640	5.64		5.64
18	Spinning Beam	1	2,856	2.86		2.86
19	Air Gun	1	286	0.29		0.29
20	Salt Bath	1	4,200	4.20		4.20
21	Fluidised Bed	1	5,640	5.64		5.64
22	Microscope	1	2,856	2.86		2.86
23	Pre-Pack Heater	1	2,856	2.86		2.86
24	Trolley	10	286	2.86		2.86
25	Pressure dyeing	4	111,857	447.43		447.43
26	Waste Water Treatment	1 Set	834,267	834.27		834.27
27	Quality Control	1 Set	1,326,500	1326.5		1,326.50
28	Horizontal smoke pipe	1 Set	611351	611.35		611.35
	Total FOB			9,048.75	-	9,048.75

Sr. No.	Description	Qty.	Unit Price (Birr)	Total Cost (000 Birr)		
				FC	LC	Total
	Freight, port handling, bank charge, inland				1,809.75	1,809.75
	Grand Total			9,048.75	1,809.75	10,858.50

2. Land, Building and Civil Works

The total land requirement is 2,000 m². The total built-up area of the plant is estimated to be 1,200 m². At the rate of Birr 5,000 m² the cost of building and civil works is estimated at Birr 6 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 m², the land lease request is evaluated and decided upon by the Industrial Zone Development and Coordination Committee of the City's Investment Authority. However, if the land request is above 5,000 m², the request is evaluated by the City's Investment Authority and passed with recommendation to the Land Development and Administration Authority for decision, while the lease price is the same for both cases.

Moreover, the Addis Ababa City Administration has recently adopted a new land lease floor price for plots in the city. The new prices will be used as a benchmark for plots that are going to be auctioned by the city government or transferred under the new "Urban Lands Lease Holding Proclamation."

The new regulation classified the city into three zones. The first Zone is Central Market District Zone, which is classified in five levels and the floor land lease price ranges from Birr 1,686 to Birr 894 per m². The rate for Central Market District Zone will be applicable in most areas of the city that are considered to be main business areas that entertain high level of business activities.

The second zone, Transitional Zone, will also have five levels and the floor land lease price ranges from Birr 1,035 to Birr 555 per m². This zone includes places that are surrounding the city and are occupied by mainly residential units and industries.

The last and the third zone, Expansion Zone, is classified into four levels and covers areas that are considered to be in the outskirts of the city, where the city is expected to expand in the future. The floor land lease price in the Expansion Zone ranges from Birr 355 to Birr 191 per m² (see Table 5.2).

Table 5.2

NEW LAND LEASE FLOOR PRICE FOR PLOTS IN ADDIS ABABA

Zone	Level	Floor price/m²
Central Market District	1 st	1686
	2 nd	1535
	3 rd	1323
	4 th	1085
	5 th	894
Transitional zone	1 st	1035
	2 nd	935
	3 rd	809
	4 th	685
	5 th	555
Expansion zone	1 st	355
	2 nd	299
	3 rd	217
	4 th	191

Accordingly, in order to estimate the land lease cost of the project profiles it is assumed that all new manufacturing projects will be located in industrial zones located in expansion zones. Therefore, for the profile a land lease rate of Birr 266 per m² which is equivalent to the average floor price of plots located in expansion zone is adopted.

On the other hand, some of the investment incentives arranged by the Addis Ababa City Administration on lease payment for industrial projects are granting longer grace period and extending the lease payment period. The criteria are creation of job opportunity, foreign exchange saving, investment capital and land utilization tendency etc. Accordingly, Table 5.3 shows incentives for lease payment.

Table 5.3

INCENTIVES FOR LEASE PAYMENT OF INDUSTRIAL PROJECTS

Scored point	Grace period	Payment Completion Period	Down Payment
Above 75%	5 Years	30 Years	10%
From 50 - 75%	5 Years	28 Years	10%
From 25 - 49%	4 Years	25 Years	10%

For the purpose of this project profile the average i.e. five years grace period, 28 years payment completion period and 10% down payment is used. The land lease period for industry is 60 years.

Accordingly, the total land lease cost at a rate of Birr 266 per m² is estimated at Birr 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 within 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 REQUIREMENT

A. HUMAN RESOURCE REQUIREMENT

The list of direct and indirect labor requirement and their monthly and annual cost is estimated. The total Human resource cost including employment allowances and benefits is estimated at Birr 624,960.00, as indicated in table 6.1.

Table 6.1

HUMAN RESOURCE REQUIREMENT AND COST

No.	Description	Qty	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		5,840.00	104.2
Total Annual Labor cost (Direct +Indirect)				624.96

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 with a total estimated amount of Birr 150,000.00

VII. FINANCIAL ANALYSIS

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

Construction period	1 year
Source of finance	30 % equity & 70 loan
Tax holidays	3 years
Bank interest	10%
Discount cash flow	10%
Accounts receivable	30 days
Raw material local	30 days
Raw material imported	120 days
Work in progress	5 days
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 35.03 million (See Table 7.1). From the total investment cost the highest share (Birr 18.06 million or 51.56%) is accounted by fixed investment cost followed by initial working capital (Birr 14.00 million or 39.97%) and pre operation cost (Birr 2.97 million or 8.47%). From the total investment cost Birr 9.04 million or 25.83% 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	0.15
1.2	Building and civil work	6,000.00		6,000.00	17.13
1.3	Machinery and equipment	1,809.75	9,048.75	10,858.50	31.00
1.4	Vehicles	900.00		900.00	2.57
1.5	Office furniture and equipment	250.00		250.00	0.71
	Sub total	9,012.95	9,048.75	18,061.70	51.56
2	Pre operating cost *				
2.1	Pre operating cost	675.75		675.75	1.93
2.2	Interest during construction	2,291.55		2,291.55	6.54
	Sub total	2,967.30		2,967.30	8.47
3	Working capital **	13,998.91		13,998.91	39.97
	Grand Total	25,979.16	9,048.75	35,027.91	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 19.96 million. However, only the initial working capital of Birr 13.99 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 73.09 million (see Table 7.2). The cost of raw material account for 78.47% of the production cost. The other major components of the production cost are financial cost, depreciation, utility, and marketing and distribution, which account for 2.59%, 3.77%, 12.28% and 0.96% respectively. The remaining

1.93% is the share of labour, repair and maintenance, labour overhead and administration cost. For detail production cost see Appendix 7.A.2.

Table 7.2

ANNUAL PRODUCTION COST AT FULL CAPACITY (year three)

Items	Cost (000 Birr)	%
Raw Material and Inputs	57,354	78.47
Utilities	8,975	12.28
Maintenance and repair	543	0.74
Labour direct	521	0.71
Labour overheads	104	0.14
Administration Costs	250	0.34
Land lease cost	0	0.00
Cost of marketing and distribution	700	0.96
Total Operating Costs	68,447	93.65
Depreciation	2,752	3.77
Cost of Finance	1,891	2.59
Total Production Cost	73,089	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 3.74 million to Birr 6.79 million during the life of the project. Moreover, at the end of the project life the accumulated net cash

flow amounts to Birr 75.53 million. For profit and loss statement and cash flow projection see Appendix 7.A.3 and 7.A.4, respectively.

2. Ratios

In financial analysis financial ratios and efficiency ratios are used as an index or yardstick for evaluating the financial position of a firm. It is also an indicator for the strength and weakness of the firm or a project. Using the year-end balance sheet figures and other relevant data, the most important ratios such as return on sales which is computed by dividing net income by revenue, return on assets (operating income divided by assets), return on equity (net profit divided by equity) and return on total investment (net profit plus interest divided by total investment) has been carried out over the period of the project life and all the results are found to be satisfactory.

3. Break-even Analysis

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

$$\text{Break Even Sales Value} = \frac{\text{Fixed Cost} + \text{Financial Cost}}{\text{Variable Margin ratio (\%)}} = \text{Birr } 32,942,700$$

$$\text{Break Even Capacity utilization} = \frac{\text{Break even Sales Value}}{\text{Sales revenue}} \times 100 = 19.77\%$$

4. Pay-back Period

The pay-back period, also called pay-off period is defined as the period required for recovering the original investment outlay through the accumulated net cash flows earned by the project. Accordingly, based on the projected cash flow it is estimated that the project's initial investment will be fully recovered within 4 years.

5. Internal Rate of Return

The internal rate of return (IRR) is the annualized effective compounded return rate that can be earned on the invested capital, i.e., the yield on the investment. Put another way, the internal rate of return for an investment is the discount rate that makes the net present value of the investment's income stream total to zero. It is an indicator of the efficiency or quality of an investment. A project is a good investment proposition if its IRR is greater than the rate of return that could be earned by alternate investments or putting the money in a bank account. Accordingly, the IRR of this project is computed to be 27.04% 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 32.00 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 16.91 million in terms of tax revenue. The establishment of such factory will have a foreign exchange saving effect to the country by substituting the current imports. The project will also create backward linkage with the chemical and packaging manufacturing sub sectors and forward linkage with the textile sub sector and 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	10,036.9 5	11,470.8 0	12,904.6 5	14,338.5 0	14,338.5 0	14,338.5 0	14,338.5 0	14,338.5 0	14,338.5 0	14,338.5 0
Accounts receivable	4,010.24	4,574.80	5,139.35	5,703.91	5,705.34	5,705.34	5,705.34	5,705.34	5,705.34	5,705.34
Cash-in-hand	13.79	15.75	17.72	19.69	19.93	19.93	19.93	19.93	19.93	19.93
CURRENT ASSETS	14,060.9 7	16,061.3 5	18,061.7 3	20,062.1 0	20,063.7 7	20,063.7 7	20,063.7 7	20,063.7 7	20,063.7 7	20,063.7 7
Accounts payable	62.06	70.93	79.79	88.66	88.66	88.66	88.66	88.66	88.66	88.66
CURRENT LIABILITIES	62.06	70.93	79.79	88.66	88.66	88.66	88.66	88.66	88.66	88.66
TOTAL WORKING CAPITAL	13,998.9 1	15,990.4 2	17,981.9 3	19,973.4 4	19,975.1 1	19,975.1 1	19,975.1 1	19,975.1 1	19,975.1 1	19,975.1 1

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	40,148	45,883	51,619	57,354	57,354	57,354	57,354	57,354	57,354	57,354
Utilities	6,283	7,180	8,078	8,975	8,975	8,975	8,975	8,975	8,975	8,975
Maintenance and repair	380	434	489	543	543	543	543	543	543	543
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	175	200	225	250	250	250	250	250	250	250
Land lease cost	0	0	0	0	17	17	17	17	17	17
Cost of marketing and distribution	700	700	700	700	700	700	700	700	700	700
Total Operating Costs	48,123	54,898	61,672	68,447	68,464	68,464	68,464	68,464	68,464	68,464
Depreciation	2,752	2,752	2,752	2,752	2,752	265	265	265	265	265
Cost of Finance	0	2,521	2,206	1,891	1,575	1,260	945	630	315	0
Total Production Cost	50,875	60,170	66,630	73,089	72,791	69,989	69,674	69,359	69,044	68,729

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	54,905	70,592	78,435	78,435	78,435	78,435	78,435	78,435	78,435	78,435
Less variable costs	47,423	54,198	60,972	67,747	67,747	67,747	67,747	67,747	67,747	67,747
VARIABLE MARGIN	7,482	16,394	17,463	10,688	10,688	10,688	10,688	10,688	10,688	10,688
in % of sales revenue	13.63	23.22	22.26	13.63	13.63	13.63	13.63	13.63	13.63	13.63
Less fixed costs	3,452	3,452	3,452	3,452	3,469	982	982	982	982	982
OPERATIONAL MARGIN	4,030	12,943	14,011	7,236	7,219	9,706	9,706	9,706	9,706	9,706
in % of sales revenue	7.34	18.33	17.86	9.23	9.20	12.37	12.37	12.37	12.37	12.37
Financial costs		2,521	2,206	1,891	1,575	1,260	945	630	315	0
GROSS PROFIT	4,030	10,422	11,805	5,346	5,644	8,446	8,761	9,076	9,391	9,706
in % of sales revenue	7.34	14.76	15.05	6.82	7.20	10.77	11.17	11.57	11.97	12.37
Income (corporate) tax	0	0	0	1,604	1,693	2,534	2,628	2,723	2,817	2,912
NET PROFIT	4,030	10,422	11,805	3,742	3,951	5,912	6,132	6,353	6,574	6,794
in % of sales revenue	7.34	14.76	15.05	4.77	5.04	7.54	7.82	8.10	8.38	8.66

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	18,737	71,258	70,601	78,444	78,435	78,435	78,435	78,435	78,435	78,435	78,435	25,920
Inflow funds	18,737	16,353	9	9	0	0	0	0	0	0	0	0
Inflow operation	0	54,905	70,592	78,435	78,435	78,435	78,435	78,435	78,435	78,435	78,435	0
Other income	0	0	0	0	0	0	0	0	0	0	0	25,920
TOTAL CASH OUTFLOW	18,737	64,475	62,569	69,029	77,092	74,885	75,409	75,188	74,968	74,747	71,376	0
Increase in fixed assets	18,737	0	0	0	0	0	0	0	0	0	0	0
Increase in current assets	0	14,061	2,000	2,000	2,000	2	0	0	0	0	0	0
Operating costs	0	47,423	54,198	60,972	67,747	67,764	67,764	67,764	67,764	67,764	67,764	0
Marketing and Distribution cost	0	700	700	700	700	700	700	700	700	700	700	0
Income tax	0	0	0	0	1,604	1,693	2,534	2,628	2,723	2,817	2,912	0
Financial costs	0	2,292	2,521	2,206	1,891	1,575	1,260	945	630	315	0	0
Loan repayment	0	0	3,151	3,151	3,151	3,151	3,151	3,151	3,151	3,151	0	0
SURPLUS (DEFICIT)	0	6,782	8,031	9,415	1,343	3,550	3,026	3,247	3,467	3,688	7,059	25,920
CUMULATIVE CASH BALANCE	0	6,782	14,814	24,228	25,571	29,121	32,147	35,393	38,861	42,548	49,608	75,527

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	54,905	70,592	78,435	78,435	78,435	78,435	78,435	78,435	78,435	78,435	25,920
Inflow operation	0	54,905	70,592	78,435	78,435	78,435	78,435	78,435	78,435	78,435	78,435	0
Other income	0	0	0	0	0	0	0	0	0	0	0	25,920
TOTAL CASH OUTFLOW	32,736	50,114	56,889	63,664	70,052	70,157	70,998	71,092	71,187	71,281	71,376	0
Increase in fixed assets	18,737	0	0	0	0	0	0	0	0	0	0	0
Increase in net working capital	13,999	1,992	1,992	1,992	2	0	0	0	0	0	0	0
Operating costs	0	47,423	54,198	60,972	67,747	67,764	67,764	67,764	67,764	67,764	67,764	0
Marketing and Distribution cost	0	700	700	700	700	700	700	700	700	700	700	0
Income (corporate) tax		0	0	0	1,604	1,693	2,534	2,628	2,723	2,817	2,912	0
NET CASH FLOW	-32,736	4,791	13,703	14,771	8,383	8,278	7,437	7,343	7,248	7,154	7,059	25,920
CUMULATIVE NET CASH FLOW	-32,736	27,946	-14,243	528	8,911	17,189	24,626	31,969	39,217	46,371	53,430	79,350
Net present value	-32,736	4,355	11,325	11,098	5,725	5,140	4,198	3,768	3,381	3,034	2,722	9,993
Cumulative net present value	-32,736	28,381	-17,056	-5,959	-233	4,907	9,105	12,873	16,254	19,288	22,010	32,003

NET PRESENT VALUE 32,003
INTERNAL RATE OF RETURN 27.04%
NORMAL PAYBACK 4 years