33. PROFILE ON SILK YARN PLANT

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I. SUMMARY

This profile envisages the establishment of a plant for the production of silk yarn with a capacity of 22,000 tonnes per annum. Silk yarn is used to produce silk fabrics.

The raw material required is mainly of silk produced by silk worms.

The present demand for the proposed product is estimated at 14,211 tonnes per annum. The demand is expected to reach at 32,571 tonnes by the year 2025.

The total investment requirement is estimated at Birr 116.02 million, out of which Birr 3.03 million is required for plant and machinery. The plant will create employment opportunities for 57 persons.

The project is financially viable with an internal rate of return (IRR) of 18.82 % and a net present value (NPV) of Birr 56.04 million, discounted at 8.5%.

The silk yarn plant has a backward linkage effect with the silk worm producers and forward linkage with silk fabric producers. The establishment of such factory will have a foreign exchange saving effect to the country by substituting the current imports. There is also a substantial export potential.

II. PRODUCT DESCRIPTION AND APPLICATION

The only silk used in commercial textiles is produced from the cocoons of the silkworm. Several silk filaments can be gathered to produce textile yarn. The advent of synthetic fibers such as nylon and polyester, which are lower in price, but do not possess the same hand, or quality, are to some extent substituting silk.

In many countries silk is still used for clothing, including light weight suits, coats and slacks, jackets, shirts and neckties, robes, loungewear, underwear, hosiery, and gloves. Silk is also used in lace, napery, draperies, linings, narrow fabrics, and handbags.

III. MARKET STUDY AND PLANT CAPACITY

A. MARKET STUDY

1. Past Supply and Present Demand

Silk yarn is used to produce silk fabric which in turn is used for making various types of clothes and textile articles. The consumption of silk yarn in Ethiopia is regarded very low due to under developed silk garment manufacturing plants. Import of silk yarn during the past 10 years is presented in Table 3.1.

Table 3.1
IMPORT OF SILK YARN (TONNES)

Year	Import
1997	30.05
1998	-
1999	7.36
2000	2.00
2001	0.17
2002	-
2003	-
2004	0.03
2005	-
2006	0.06
Total	39.67

***Source**: - Ethiopian Customs Authority.*

As could be seen from Table 3.1 the yearly average quantity imported in the past 10 years was about 4 tonnes. On the other hand, silk has a very wide export market.

As of 2006 world total export of silk yarn was 8,605 tones valued at 305 million USD. China is the largest world producer and exporter of silk yarn followed by Brazil and Romania with a share of 36%, 13% and 10% respectively. Other notable exporters include: Vietnam, Italy and United Kingdom (see Table 3.2). During the period 2002 – 2006, world export of silk yarn has registered an average annual growth rate of 16% and 2% in terms of value and volume, respectively.

Table 3.2

VOLUME AND VALUE OF WORLD SILK YARN EXPORT

Country	Value In US$ Thousand	Quantity (Tonnes)	Annual Growth In Value between 2002-2006, %	Annual Growth In Quantity between 2002-2006, %	Share in World Imports, %
World Total	**305,084**	**8,605**	**16**	**2**	**100**
China	108,899	3,196	10	-3	36
Brazil	40,283	1,132	4	-7	13
Romania	31,147	873	51	22	10
Viet Nam	30,727	931	32	22	10
Italy	26,883	495	15	4	9
United Kingdom	21,372	129	223	58	7
Germany	17,834	482	8	1	6
United States of America	6,266	607	15	10	2
Austria	4,735	95	73	46	2
Hong Kong	3,680	167	10	-10	1
Others	13,247	498			4

Source *– ITC, calculation based on COMTRADE statistics.*

Italy is the world leading importer of silk yarn with a share of 29% from the total world import followed by Japan (23%), United Arab Emirates and Germany (7% each) (see Table 3.3). During the period 2002 – 2006, world import of silk yarn has registered an average annual growth rate of 18% and 4% in terms of value and volume, respectively.

Table 3.3

VOLUME AND VALUE OF WORLD SILK YARN IMPORT

Country	Value in US$ thousand	Quantity (tonnes)	Annual growth in Value between 2002-2006, %	Annual growth in Quantity between 2002-2006, %	Share in World imports, %
World total	**284,211**	**9,016**	**18**	**4**	**100**
Italy	82,394	2,800	14	7	29
Japan	66,715	1,891	14	2	23
United Arab Emirates	21,102	116	81		7
Germany	18,675	549	-2	-3	7
India	16,952	536	37	19	6
Republic of Korea	15,542	449	54	35	5
Romania	9,639	206	326	74	3
Thailand	6,482	205	19	8	2
United Kingdom	5,754	125	4	-2	2
United States of America	5,284	72	25	9	2
Others	35,672	2,067			14

Source *– ITC, calculation based on COMTRADE statistics.*

Assuming that the 2006 level of global silk yarn import approximate the current demand for the product, the present global demand for silk yarn is estimated to be 284,211 tonnes. Assuming that by maintaining product quality and aggressive promotion locally produced silk yarn could capture 5% market share, the present demand for locally produced silk yarn is estimated at 14,211 tonnes.

2. Projected Demand

As indicated earlier global silk yarn import has registered a substantial growth. However, in order to be conservative demand for Ethiopian silk yarn is assumed to grow by 5% per annum. The projected demand based on the above assumptions is presented in Table 3.3.

Table 3.3

PROJECTED DEMAND FOR SILK YARN (TONNES)

Year	Projected Demand
2009	14,921
2010	15,667
2011	16,450
2012	17,273
2013	18,137
2014	19,043
2015	19,996
2016	20,995
2017	22,045
2018	23,147
2019	24,305
2020	25,520
2021	26,796
2022	28,136
2023	29,543
2024	31,020
2025	32,571

3. Pricing and Distribution

Based on the world price for silk yarn a factory gate price of Birr 50 per kg is taken for sales revenue projection.

The product can be directly sold to silk processing industries in the country. An agent can be employed for the export market.

B. PLANT CAPACITY AND PRODUCTION PROGRAMME

1. Plant Capacity

The annual rated capacity of the plant will be 22,000 tones per 300 working days a year, 8 hours of three shifts per day.

2. Production Programme

The plant will operate at 75% of its rated capacity in the first year, 85% in the second year and at full capacity starting from the third year and thenafter. The production programme is shown in Table 3.3 below.

Table 3.3

PRODUCTION PROGRAMME

Year	1	2	3
Capacity Utilization (%)	75	85	100
Production (tonnes)	16,500	18,700	22,000

IV. MATERIALS AND INPUTS

A. RAW MATERIALS

The main material is silk fiber, and its annual requirement is indicated in Table 4.1 below. The major raw material is available locally in different regions like SNNPRS, and Oromia and the other materials can be sourced from China. The estimated annual cost of material and inputs at 100% capacity utilization is given in Table 4.1.

Table 4.1

ESTIMATED ANNUAL COST OF MATERIAL AND INPUTS

Sr. No.	Description	Qty.	Cost, 000 Birr		
			Foreign	Local	Total
1	Silk Fiber	23,285 tonnes	-	582,125	582,125
2	Spools, cops, reels & cons	L.S	85.00	35.00	120.00
	Total	**-**	**-**		**582,245**

B. UTILITIES

The major utilities required by the plant are electricity and water. The estimated annual requirement of utilities of the plant at 100% capacity utilization rate and their estimated costs are given in Table 4.2.

Table 4.2

ANNUAL UTILITIES REQUIREMENT AND ESTIMATED COST

Sr. No.	Description	Qty.	Cost, 000 Birr		
			Foreign	Local	Total
1	Electric power, kWh	875,000	-	414.40	414.40
3	Water, m^3	3000	-	9.75	9.75
	Total			**424.15**	**424.15**

V. TECHNOLOGY AND ENGINEERING

A. TECHNOLOGY

1. Production Process

Sericulture, or the raising of silkworms, involves the incubation of the tiny eggs of the silk worm moth until they hatch and becomes worms. After hatching, the worms are placed under a layer of gauze, on which is spread a layer of finely chopped mulberry leaves. For six weeks, the worms eat almost continuously. At the end of this period, they are ready to spin their cocoons, and branches of trees or shrubs are placed in their rearing houses. The worms climb these branches and make their cocoons in one continuous thread, taking about eight days for the process. The amount of usable silk in each cocoon is small, and about 5500 silk worms are required to produce 1 Kg (2.2lb) of raw silk. The silk fiber is obtained from the cocoons by a delicate process known as reeling, or filature. The cocoons are first heated in boiling water to dissolve the gummy substance that holds the cocoon filament in place. After this heating, the filaments from four to eight cocoons are joined and twisted and are then combined with a number of other similarly twisted filaments to make a thread that is wound on a reel.

When each cocoon is unwound, it is replaced with another cocoon. The resulting thread, called raw silk, consist usually 48 individual silk fibers. The thread is continuous and, unlike the threads spun from other natural fibers such as cotton and wool, is made up of extremely long fibers. Along with cocoons damaged by emerging worms used for breeding stock, the filaments from the coarse outer portion of the cocoon, which is removed by brushing before reeling, and the inner portion of the cocoon, which remains after reeling the raw silk, are mixed to produce a low grade of silk staple that is spun into yarn.

The next step in the processing of silk is the twisting of one or more threads of the raw silk into a strand sufficiently strong for weaving or knitting. This procedure is called throwing. Four different types of silk threads may thus be produced: organize, crepe, tram and thrown singles. In general, organize thread is used for the warp threads of materials, and tram threads for the weft, or filling. Crepe thread is employed in the weaving of characteristic crinkly fabrics, and single thread is used for shear fabrics. The technological process has no any adverse environmental impact.

2. Source of Technology

The technology of Silk Yarn production is simple. The equipment can be supplied from Europe, Far East or India. Contact can be made with the following suppliers:

i) Wujaang Wanshiy Silk Co.Ltd
Contact Person: Sherry
http//:www.wanshiyitex.com

B. ENGINEERING

1. Machinery and Equipment

The production equipment required by the plant and their estimated costs are given in Table 5.1.

Table 5.1

MACHINERY AND EQUIPMENT AND ESTIMATED COST

Sr. No.	Description	Qty.	Cost ('000 Birr)		
			FC	LC	TC
1	Ring spinning frame	2	330.00	-	330.00
2	Twisting Machine	2	528.00	-	528.00
3	Intersecting gill box	3	42.00	-	42.00
4	Robbins Machines	3	578.00	-	578.00
5	Cheese Winder	2	350.00	-	350.00
6	Double Rolling Machine	1	230.00	-	230.00
7	Carding Machine	1	125.00	-	125.00
8	Hand Binding Press	2	320.00	-	320.00
9	Temperature and humidity control	1	135.00	-	135.00
Total			**2,638.00**	**-**	**2,638.00**
Insurance, Bank, Customs Duty, Etc				396.75	396.75
Grand Total			**2,638.00**	**396.75**	**3,034.00**

2. Land, Building and Civil Works

The processing building does not require a special arrangement other than a steel structure covered with egga sheet roof. The total area of land required is estimated to be 2000 m^2, out of which 1300 m^2 will be built-up area. The production hall including the inspection will be installed in an area of 800m^2. The store for raw material and finished product needs an area of 300m^2 while the office building covers an area of 200m^2. The total cost of building and civil works at the unit cost of Birr 2,100 per m^2 is estimated at Birr 2,730,000.

According to the Federal Legislation on the Lease Holding of Urban Land (Proclamation No 272/2002) 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 5000 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.

The land lease price in the industrial zones varies from one place to the other. For example, a land was allocated with a lease price of Birr 284 /m^2 in Akakai-Kalti and Birr 341/ m^2 in Lebu and recently the city's Investment Agency has proposed a lease price of Birr 346 per m^2 for all industrial zones.

Accordingly, in order to estimate the land lease cost of the project profiles it is assumed that all manufacturing projects will be located in the industrial zones. Therefore, for the this profile since it is a manufacturing project a land lease rate of Birr 346 per m^2 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 5.2 shows incentives for lease payment.

Table 5.2

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 period of lease for industry is 60 years.

Accordingly, the total lease cost, for a period of 60 years with cost of Birr 346 per m^2, is estimated at Birr 41.52 million of which 10% or Birr 4,152,000 will be paid in advance. The remaining Birr 37.37 million will be paid in equal installments with in 28 years, i.e., Birr 1,334,571 annually.

VI. MANPOWER AND TRAINING REQUIREMENT

A. MANPOWER REQUIREMENT

The total manpower requirement of the plant is 57 persons. Details of manpower and estimated annual labor cost including fringe benefits are indicated in Table 6.1.

Table 6.1

MANPOWER REQUIREMENT AND ESTIMATED LABOUR COST

Sr. No.	Description	Req. No	Salary, Birr	
			Monthly	Annual
1	Manager	1	4,500	54,000
2	Secretary	1	1,000	12,000
3	Production head (supervisor)	1	3,000	36,000
4	Finance and Administration head	1	3000	36,000
5	Sales person	1	1,200	14,400
6	Store keeper	1	700	8,400
7	Purchaser	1	1200	14,400
8	Accountant	1	1200	14,400
9	Driver	2	800	9,600
10	Production	20	15,000	180,000
11	Laborers	24	8,400	100,800
11	Guard	3	1050	12,600
	Total	**57**		**492,600**
	Employees' Benefit (25% of Basic Salary)	-		123,150
	Grand Total	**-**		**615,750**

B. TRAINING REQUIREMENT

The production supervisor should be given a one week on-the-job training by skilled technician of the equipment supplier. The cost of training is estimated at Birr 45,000.

VII. FINANCIAL ANALYSIS

The financial analysis of the silk 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	5 years
Bank interest	8.5%
Discount cash flow	8.5%
Accounts receivable	30 days
Raw material local	30 days
Raw material import	90 days
Work in progress	1 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 116.02 million, of which 2 per cent will be required in foreign currency.

The major breakdown of the total initial investment cost is shown in Table 7.1.

Table 7.1

INITIAL INVESTMENT COST ('000 Birr)

Sr. No.	Cost Items	Local Cost	Foreign Cost	Total Cost
1	Land lease value	4,152.00	-	4,152.00
2	Building and Civil Work	2,730.00	-	2,730.00
3	Plant Machinery and Equipment	396.75	2,638.00	3,034.75
4	Office Furniture and Equipment	100.00	-	100.00
5	Vehicle	450.00	-	450.00
6	Pre-production Expenditure*	375.17	-	375.17
7	Working Capital	105,186.32	-	105,186.32
	Total Investment Cost	**113,390.24**	**2,638.00**	**116,028.24**

** N.B Pre-production expenditure includes interest during construction (Birr 375.17 thousand, training (Birr 45 thousand) and Birr 105 thousand costs of registration, licensing and formation of the company including legal fees, commissioning expenses, etc.*

B. PRODUCTION COST

The annual production cost at full operation capacity is estimated at Birr 586.83 million (see Table 7.2). The raw material cost accounts for 99.24 per cent of the production cost. The other major components of the production cost are financial cost and depreciation which account for 0.46 % and 0.10% respectively. The remaining 0.23 % is the share of direct labour. utility, repair and maintenance, labour overhead and other administration cost.

Table 7.2

ANNUAL PRODUCTION COST AT FULL CAPACITY ('000 BIRR)

Items	Cost	%
Raw Material and Inputs	582,245.00	99.22
Utilities	424.15	0.07
Maintenance and repair	151.70	0.03
Labour direct	246.30	0.04
Labour overheads	153.94	0.03
Administration Costs	369.45	0.06
Land lease cost	-	-
Total Operating Costs	**583,590.54**	99.45
Depreciation	569.98	0.10
Cost of Finance	2,672.16	0.46
Total Production Cost	**586,832.68**	**100**

C. FINANCIAL EVALUATION

1. Profitability

Based on the projected profit and loss statement, the project will generate a profit through out its operation life. Annual net profit after tax will grow from Birr 16.77 million to Birr 17.65 million during the life of the project. Moreover, at the end of the project life the accumulated cash flow amounts to Birr 178.31 million.

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 of the project including cost of finance when it starts to operate at full capacity (year 3) is estimated by using income statement projection.

$$BE = \frac{\text{Fixed Cost}}{\text{Sales} - \text{Variable Cost}} = 19\%$$

4. Payback Period

The pay back period, also called pay – off period is defined as the period required to recover 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 7 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 porject is computed to be 18.82 % indicating the vaiability 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 principal a project is accepted if the NPV is non-negative.

Accordingly, the net present value of the project at 8.5% discount rate is found to be Birr 56.04 million which is acceptable.

D. ECONOMIC BENEFITS

The project can create employment for 57 persons. In addition to supply of the domestic needs, the project will generate Birr 39.42 million in terms of tax revenue. The silk yarn plant has a backward linkage effect with the silk worm producers and forward linkage with silk fabric producers. The establishment of such factory will have a foreign exchange saving effect to the country by substituting the current imports. There is also a substantial export potential.