

**103. PROFILE ON SILK FARM AND SILK
PRODUCTION**

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I. SUMMARY

This profile envisages the establishment of a silk farm for the production of raw silk with a capacity of 21,500 kg per annum.

The raw materials required are rearing structures, eggs of the silk worm moth, layers of gauze, finely chopped mulberry leaves, etc. which are locally available.

The present demand for the proposed product is estimated at 16,315 tonnes per annum. The demand is expected to reach 29,300 tonnes by the year 2020.

The total investment requirement is estimated at Birr 2.80 million, out of which Birr 27.03 thousand is required for farm machinery. The plant will create employment opportunities for 9 persons.

The project is financially viable with an internal rate of return (IRR) of 18.29% and a net present value (NPV) of Birr 1.50 million, discounted at 8.5 %.

The project has a forward linkage with the garment industry. The establishment of such factory will have a foreign exchange saving effect to the country by substituting the current imports. Moreover, the product has export potential.

II. PROJECT DESCRIPTION AND APPLICATION

Silk is a fiber produced as a cocoon used to cover the pupa of the moth that is valuable for its use in fine fabrics and textiles. Cocoon coverings of fiber are made by numerous insects but only the mulberry silk moth and coarser silk moth and a few other moths are used by the silk industry.

The thread obtained through different processes is called raw silk which consists mostly about 48 individual silk fibers.

Silk is naturally beautiful with different colours, depending on the spaces and the feed. Silk is the strongest of all natural threads having very high elasticity. Unlike some threads, clothes made of silk thread do not change their shape and shrink.

III. MARKET STUDY AND FARM CAPACITY

A. MARKET STUDY

1. Past Supply and Present Demand

Silk has a miniscule percentage of the global textile fiber market—less than 0.2%. This figure, however, is misleading, since the actual trading value of silk and silk products is much more impressive. Silk is a multibillion dollar trade, with a unit price for raw silk roughly twenty times that of raw cotton.

As of 2006 world total export of raw silk was 8,804 tonnes valued at 256 million USD. China with a share of 77% of world's total raw silk export is the largest world producer and exporter of raw silk followed by Italy and Romania with a share of 15% and 3%, respectively (see Table 3.2).

Table 3.2**VOLUME AND VALUE OF WORLD RAW SILK EXPORT**

Countries	Value Exported In 2006, In USD Thousand	Quantity Exported in Tonnes	Share in World Exports, %
World total	256,212	8,804	100
China	198,389	6,712	77
Italy	38,626	1,140	15
Romania	8,382	254	3
Germany	3,822	112	1
Democratic People's Republic of Korea	1,762	223	1
Uzbekistan	1,507	209	1
Others	3,724	154	2

Source – ITC, calculation based on COMTRADE statistics.

India is the world leading importer of raw silk with a share of 29% from the total world import followed by Italy(20%), Japan and Romany 14% and 13%, respectively (see Table 3.3).

Table 3.3**VOLUME AND VALUE OF WORLD RAW SILK IMPORT**

Countries	Value Imported in US\$ Thousand	Quantity Imported in Tonnes	Share in World Imports, %
World total	326,309	11,117	100
India	94,890	3,408	29
Italy	66,869	2,014	20
Japan	44,757	1,295	14
Romania	40,885	1,242	13
Republic of Korea	35,059	1,095	11
Viet Nam	10,645	318	3
France	6,534	213	2
Pakistan	4,828	354	1
Germany	3,333	113	1
China	2,725	398	1
Others	15,784	667	6

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 raw silk is estimated to be 326,309 tonnes. Assuming that by maintaining product quality and aggressive promotion locally produced raw silk could capture 5% market share, the present demand for locally produced silk yarn is estimated at 16,315 tonnes.

2. Projected Demand

In the past global raw silk 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 RAW SILK (TONNES)

Year	Projected Demand
2009	17,131
2010	17,988
2011	18,887
2012	19,832
2013	20,823
2014	21,864
2015	22,957
2016	24,105
2017	25,311
2018	26,576
2019	27,905
2020	29,300

3. Pricing and Distribution

Based on the world price for raw silk a farm gate price of Birr 250 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. FARM CAPACITY AND PROGRAMME

1. Capacity

As a whole, the total production of silk is determined by the amount of feed available for feeding the larvae up to its pupa stage. The project is expected to produce about 21,500 kg of cocoon at its full capacity per annum.

2. Production Program

The project will presume with 25 % in the first year and its production capacity will grow to 50 % and 100 % in the second and third production seasons respectively. Planting of mulberry cuttings will be undertaken before six months from the time of introduction of moths required for cocoon production. About 60 per cent of the total cost of silk production will go for mulberry plants cultivation that is used as feed for the larvae. Before the introduction of moths into the farm, the mulberry plants should attain their appropriate vegetative developmental growth stages. In general terms, about 15,000 - 35,000 kg of mulberry leaves could be obtained from a hectare of land per annum. The average production at full capacity is estimated to be 21,500 kg per annum.

Table 3.3**PRODUCTION PROGRAMME**

Year	1	2	3-10
Capacity utilization (%)	25	50	100
Production (kg)	5,375	10,750	21,500

IV. MATERIALS AND INPUTS**A. RAW MATERIALS**

As all raw materials required for silk production are available in the local markets of the city and hence no foreign currency is required for raw materials procurement. The total quantity of materials and costs are shown in Table 4.1.

Table 4.1**RAW MATERIAL REQUIREMENT AND COST OF MULBERRY PLANTATION**

Sr. No.	Description	Qty.	Unit Cost (Birr)	Cost (Birr)
1	Mulberry cutting (pcs)	400,000	0.25	100,000
2	String (Roll)	20	35	700
	Total			100,700

B. UTILITIES

Utilities required for the project are water and electricity. The annual requirement of utilities and their corresponding cost is shown in the Table 4.2.

Table 4.2**ANNUAL UTILITIES REQUIREMENT AND COST**

Sr. No.	Utility	Qty	Unit Cost (Birr)	Cost (Birr)
1	Electricity (kWh)	2,920	0.4736	1,382.9
2	Water (m ³)	50,000	3.25	162,500
	Total			163,882.9

V. TECHNOLOGY AND ENGINEERING**A. TECHNOLOGY****1. Process Description**

The availability of mulberry leaf should be ensured before the introduction of the silk worm moth to the project site. Rearing of larvae is not possible unless the feed is readily available in the farm. Hence, planting of mulberry should be carried out before six months from the time of introducing the mulberry moths in order to get adequate leaves for feeding the larvae. The moths will be kept in the multiplication room and will lay eggs. Each moth will lay an average of about 400 eggs. The eggs will hatch into larva after 8-10 days. The larvae will go through different molting stages till it is fully matured and ready to pass into the pupa stage where it will spin silk on itself. The silk worm completes spinning from 48 -72 hours. After this the cocoons will be picked and sun dried to kill the pupa before it breaks out and completes its metamorphoses. Then after, the cocoon will be stored and will be ready for sale. Silk production is totally environmentally friendly business as there is no waste produced by the silk worms.

2. Source of Technology

Melkassa Agricultural Research Center and Alagie TVET will be the sources of the technologies required for silk production.

B. ENGINEERING

1. Machinery and Equipment

The project doesn't require sophisticated machinery as the operations are limited to producing cocoons for domestic or foreign markets. The cost for equipment is estimated at Birr 27,025 Birr. The quantity and costs of the items are shown in Table 5.1.

Table 5.1
MACHINERY AND EQUIPMENT REQUIREMENT & COST

Sr. No.	Description	Unit of Measurement	Qty.	Unit Price	Price
1	Hoe	pcs	10	20	200
2	Spade	Pcs	10	20	200
3	Meter tape (50m)	Pcs	2	50	100
4	Hammer	Pcs	5	25	125
5	3 Fingered hoe	Pcs	10	30	300
6	Pruning scissors	pcs	5	250	1250
7	Basket for mulberry leaf	No	50	20	1,000
8	Leaf cover cloth	meter	50	10	500
9	Rearing stand	No	50	200	10,000
10	Feeding tray	No	500	15	7,500
11	Chopping board	No	10	10	100
12	Chopping knife	No	10	25	250
13	Aluminum pail	No	20	50	100
14	Formalin	Liter	10	35	350
15	Sacks	No	500	5	2,500
16	Charcoal grate	No	2	25	50
17	Charcoal	Sack	10	60	600
18	Canvas sheet	meter	20	30	600
19	Boxes for storage	No	10	80	800
20	Watering can (plastic)		10	50	500
	Total				27,025

2. Land, Building and Civil Works

The total area of the site is estimated at about 10,000m². The built-up areas cover about 100 m² for office and store purpose. The total cost of building is estimated at Birr 210,000 assuming a construction rate of Birr 2,100 per m².

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.

In Addis Ababa the City's Land Administration and Development Authority is directly responsible in dealing with matters concerning land. 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.

However, the project under consideration is an urban agriculture project. Therefore, it is assumed that the project will be located outside the industrial zones. Accordingly, the initial land lease rate in Addis Ababa set by the City's Land Administration and Development Authority based on the location of land is as shown in Table 5.2.

Table 5.3**INITIAL LAND LEASE RATE IN ADDIS ABABA**

Sr. No.	Location of the land	Land Grade	Initial Price in m²
1	Central Business zones	1	1167.3
		2	1062.9
		3	916.2
		4	751.5
		5	619.2
2	Places that are Under Transit	1	716.4
		2	647.1
		3	559.8
		4	472.5
		5	384.3
3	Expansion Zones	1	245.7
		2	207
		3	150.3
		4	132.3

Source; Addis Ababa City Land Administration Authority.

As can be seen from Table 5.2 the initial land lease rate ranges from Birr 1,167.3 to 132.3 per m².

Considering the nature of the project the expansion zones of the city are recommended as the best locations. Moreover, as the project have to be located away from residential houses the lowest land lease rates in the expansion zones of the city which is Birr 132.3/ m² is adopted.

The Federal Legislation on the Lease Holding of Urban Land legislation has also set the maximum on lease period and the payment of lease prices (see Table 5.3 and Table 5.4).

Table 5.3
LEASE PERIOD

Type of Service	Lease Period (Years)
Residential area	99
Industry	80
Education, cultural research health, sport, NGO and religious	99
Trade	70
Urban Agriculture	15
Other service	70

Table 5.3
LEASE PAYMENT PERIOD

Sr. No.	Service Type	Period of Payment According to the Grade of Towns
1	Private residential are obtained through tender or negotiation	50 - 60 years
2	Trade	40 - 50 years
3	Industry	40 - 50 years
4	Real estate	40 -50 years
5	Urban Agriculture	8 - 10 years
6	Trade and social service	40 - 50 years
7	Others	40 – 50 years

Moreover, advance payment of lease based on the type of investment ranges from 5% to 10%. 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. The lease price is payable after the grace period annually.

Regarding, the terms and conditions of land lease the Addis Ababa City Government have adopted Article 6 of the Federal Legislation with very minimal changes. Therefore, for the purpose of this project profile since the project is urban agriculture , 15 years lease period, 10 years lease payment completion period, 10% down payment and two years grace period is used.

Accordingly, the land lease cost of the project, at rate of Birr 132.3 m² for 15 years of holding is estimated at Birr 19.85 million. Assuming 10% of the total cost (Birr 1,984,500) will be paid in advance as down payment and the remaining Birr 17.86 million will be paid in equal installments with in 10 years, the annual lease payment is estimated at Birr 1,786,050.

3. LOCATION AND SITE

The site is proposed to be located within an altitude range of 1500-2500 meters above sea level (masl). The PH of the soil in the area is preferred to be between 6.5 and 7.5 and it should be well drained. The mulberry cuttings and the mulberry moth could be supplied by Melkassa Research Center and Alage TVET located at about 118 km and 225 km from Addis Ababa respectively. The materials could be easily transported by pick up vehicle.

VI. MANPOWER AND TRAINING REQUIREMENT

A. MANPOWER REQUIREMENT

The manpower requirement for the project for both permanent and casual is given Table 6.1.

Table 6.1
MANPOWER REQUIREMENT AND LABOUR COST

Sr. No.	Description	Req. No.	Monthly Salary (Birr)	Annual Salary (Birr)
1	Manager	1	2,500	30,000
2	Attendants	6	3,000	36,000
3	Casual laborers	-	-	45,000
4	Guards	2	700	8,400
	Sub total	9		119,400
	Employees benefit(25%of BS)			29,850
	Total			149,250

B. TRAINING REQUIREMENT

Since silk production is a new business for our country, special training is required for the manger and the attendants. The training will be given for at least 5 days at Melkassa Research Center by qualified personnel of the center. About Birr 10,000 is required for training 9 personnel's for 5 days at the Center.

VII. FINANCIAL ANALYSIS

The financial analysis of the silk farm 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	8.5%
Discount cash flow	8.5%
Accounts receivable	30 days
Raw material local	30 days
Work in progress	5 days
Finished products	7 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 2.80 million. 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	1,984.50	-	1,984.50
2	Building and Civil Work	210.00	-	210.00
3	Plant Machinery and Equipment	27.03	-	27.03
4	Office Furniture and Equipment	75.00	-	75.00
5	Vehicle	275.00	-	275.00
6	Pre-production Expenditure*	198.95	-	198.95
7	Working Capital	32.88	-	32.88
	Total Investment Cost	2,803.36	-	2,803.36

* *N.B Pre-production expenditure includes interest during construction (Birr 123.95 thousand), training (Birr 10 thousand) and Birr 65 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 4.26 million (see Table 7.2). The major components of the production cost are land lease, utility and raw material which account for 75.15 %, 6.90% and 4.24% respectively. The remaining 13.71% is the share of direct labour , depreciation, repair and maintenance, financial cost and other administration cost.

Table 7.2**ANNUAL PRODUCTION COST AT FULL CAPACITY ('000 BIRR)**

Items	Cost	%
Raw Material and Inputs	100.70	4.24
Utilities	163.88	6.90
Maintenance and repair	1.35	0.06
Labour direct	71.64	3.01
Labour overheads	29.85	1.26
Administration Costs	47.76	2.01
Land lease cost	1,786.05	75.15
Total Operating Costs	2,201.23	92.62
Depreciation	90.70	3.82
Cost of Finance	84.63	3.56
Total Production Cost	2,376.56	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 312.59 thousand to Birr 904.70 thousand during the life of the project. Moreover, at the end of the project life the accumulated cash flow amounts to Birr 3.70 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.

$$\text{BE} = \frac{\text{Fixed Cost}}{\text{Sales} - \text{Variable Cost}} = 28 \%$$

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 6 years.

5. Internal Rate of Return

The internal rate of return (IRR) is the annualized effective compounded return rate that can be earned on the invested capital, i.e., the yield on the investment. Put another way, the internal rate of return for an investment is the discount rate that makes the net present value of the investment's income stream total to zero. It is an indicator of the efficiency or quality of an investment. A project is a good investment proposition if its IRR is greater

than the rate of return that could be earned by alternate investments or putting the money in a bank account. Accordingly, the IRR of this project is computed to be 18.29 % 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 8.5% discount rate is found to be Birr 1.50 million which is acceptable.

D. ECONOMIC BENEFITS

The project can create employment for 9 persons. In addition to supply of the domestic needs, the project will generate Birr 855.88 thousand 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. Moreover, the product has export potential.