

**47. PROFILE ON COTTON GINNING
 PLANT**

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I. SUMMARY

This profile envisages the establishment of a plant for the production of 15,000 tonnes of ginned cotton.

The present demand for the proposed product is estimated at 29,938 tonnes per annum and it is projected to reach 47,901 tonnes by the year 2015.

The plant will create employment opportunities for 33 persons.

The total investment requirement is estimated at Birr 5.66 million, out of which Birr 2.25 million is for plant and machinery.

The project is financially viable with an internal rate of return (IRR) of 28 % and a net present value (NPV) of Birr 7 million, discounted at 10.5%

II. PRODUCT DESCRIPTION AND APPLICATION

Cotton ginning is the process of separating cotton seed from the lint so that the lint will be baled and goes to textile industries for further processing whereas the cotton seed is milled by oil mills to produce edible oil.

Cotton ginning, therefore, requires the unprocessed raw cotton, and then is applied on the cotton ginner in order to produce baled cotton and cottonseed. The cotton-ginning machine is the major equipment required. It would be advisable to install the ginning machine at the vicinity of cotton farm.

III. MARKET STUDY AND PLANT CAPACITY

A. MARKET STUDY

1. Past Supply and Present Demand

Lint Cotton is a major input for the textile industry. The demand for the product is therefore derived from the demand for textile products.

According to a textile sector survey conducted in 1996 by Chemonics International Inc., the annual cotton consumption capacity of spinning plants in Ethiopia when they operate at full capacity is 59876 tonnes. However, because the textile sector is at present constrained by market problems, the actual demand for lint cotton cannot be that much high. If it is assumed that these plants will operate at only 50% of their capacity, present demand for lint cotton would be 29,938 tonnes per annum.

Cotton is produced by state farms, private commercial farms and peasant farms. Cotton produced on the state farms and private commercial farms is ginned and used in commercial textile manufacturing, while that produced by peasant farms is for the larger part used by the hand loom industry.

The production of cotton by the state farms is undertaken by five enterprise, namely, Abobo, Middle Awash, North Omon, and Tendaho Agricultural Development Enterprises.

The annual production of raw cotton of these farms is as shown in Table 3.1. The annual average production over the period 1985/86 to 1994/95 is about 50,353 tonnes. This amount when converted to lint cotton using a conversion factor of 0.35 which is used by chemonics experts is 17,624 tonnes. The current supply of lint cotton does not satisfy present demand. The problem will further be aggravated when the textile sector gradually improves the level of capacity utilization.

Table 3.1
PRODUCTION OF COTTON BY STATE FARMS
(‘OOO TONNES)

Year	Raw Cotton					Converted to Lint Cotton
	Abobo	Middle Awash	North Omo	Tendaho	Total	
1985/1986	0.069	41.56	4.97	40.9	87.499	30.62
1986/1987	0.116	40.94	6.98	35.9	83.936	29.38
1987/1988	3.72	42.14	9.13	15.87	70.86	24.80
1988/1989	4.34	34.59	7.3	21.89	68.12	23.84
1989/1990	3.69	28.77	7.01	10.87	50.34	17.62
1990/1991	3.25	27.73	4.24	13.2	48.42	16.95
1991/1992	-	21.84	3.86	9.51	35.21	12.32
1992/1993	1.24	14.08	1.41	5.32	22.05	7.72
1993/1994	0.54	10.54	3.43	6.27	20.78	7.27
1994/1995	0.85	2.57	1.93	10.84	16.19	5.67
Average	1.98	26.48	5.03	17.06	50.34	17.62

2. Demand Projection

The performance of the textile sector will determine the demand for lint cotton. As stated above, the textile sector is currently facing a stiff competition from imports and smuggled used fabrics.

But there is also one favorable condition for the sector. The United States and the European Union countries are opening their markets to Ethiopian products. The textile sector is believed to be one of the beneficiaries from this wide market. Hence, taking these factors into account it may be conservatively assumed that the capacity utilization of the sector will gradually reach

about 80% in five years time. Based on this assumption, the demand for lint cotton is projected and the result is shown in Table 3.2.

Table 3.2
PROJECTED DEMAND FOR LINT COTTON
(TONNES)

	Projected Demand 'OOO Tonnes	Existing Production	Unsatisfied Demand
2001	35,926	17,120	18,806
2002	41,913	17,120	24,793
2003	47,901	17,120	30,781
2004	47,901	17,120	30,781
2005	47,901	17,120	30,781
2006	47,901	17,120	30,781
2007	47,901	17,120	30,781
2008	47,901	17,120	30,781
2009	47,901	17,120	30,781
2010	47,901	17,120	30,781
2011	47,901	17,120	30,781
2012	47,901	17,120	30,781
2013	47,901	17,120	30,781
2014	47,901	17,120	30,781
2015	47,901	17,120	30,781

3. Pricing and Distribution

The ginnery is a service giving enterprise . A present service charge for ginning (baling) cotton in the region ranges between Birr 30-40 per quintal. However, in order to be more competitive the envisaged plant service charge is set at Birr 20 per quintal.

B. PLANT CAPACITY AND PRODUCTION PROGRAMME

1. Plant Capacity

Market study of cotton ginning in Ethiopia indicates that the unsatisfied demand of lint cotton is 18,806 tonnes in 2001, and this figure will grow to 30,781 in year 2001, and will remain constant for the subsequent years.

Based on the data given for unsatisfied demand of lint cotton and the possibility of cotton production in the region, the envisaged cotton ginnery will have an annual capacity of 41,460 bales, each bale having an average weight of 750 lbs. This corresponds to annual lint cotton baling of 15,000 tonnes.

2. Production Programme

The plant is assumed to start production at 60% in the first year, 70% in the second year, 80% in the third year and 100% in the fourth year and remain constant thereafter. The envisaged ginning plant will operate 250 days per year, in a single shift of eight hours a day. The ginnery will produce 60 tonnes of baled lint cotton each day, which is about 177 bales.

IV. RAW MATERIALS AND INPUTS

A. MATERIALS

The raw materials required for operating the ginnery is raw cotton from cotton farms. Raw cotton produced in the farms of Somali Region or neighboring region of Afar is expected to come to the ginnery for processing and baling. Raw cotton from customers corresponding to baled lint cotton of 15,000 tonnes per annum are required.

Auxiliary materials consist of steel bands for fastening the bales, and hessian fabric and rope for wrapping and fastening the cottonseed. The total annual cost of auxiliary materials is estimated at Birr 200,000.-.

B. UTILITIES

Utilities required for cotton ginning plant include electricity and water. Electricity is supplied for production equipment to furnish motive power, and for power sockets and light bulbs. A total power of 100KVA or about 80 Kw is sufficient to supply power to all consumers of the ginnery. This is equivalent to 160,000 Kwh, which costs about Birr 76,000 per annum. Annual water requirement is estimated at 300 tonnes, which costs about Birr 400. The total annual cost of utilities will then be Birr 76,400.

V. TECHNOLOGY AND ENGINEERING

A. TECHNOLOGY

1. Process Description

The major unit operations involved in cotton ginning are: -

- a. Separation
- b. Drying
- c. Cleaning
- d. Extraction
- e. Distributing
- f. Feeding
- g. Ginning (gin stands)
- h. Lint cleaning
- i. Baling

- a. Raw cotton from the storage hall is manually transported to an intake separator where the cotton is screened out and allowed to pass to the next machine. Modern separators have rotating sealed wheels and curved screens which permit the air currents to pass directly to a fan. The separation process involves equipment like the separator, feeding hopper, fan with tubular air ducts.
- b. After the seed cotton (raw cotton) is separated from foreign materials (possibly carried over from cotton farms and during transportation), it is then passed to a hot gas drier. Here the seed cotton that is damp or wet will be dried. If seed cotton is wet some of the lint will be cut by the saws or packed into small dense tufts. The saws may become so clogged that the gin will not run at all. Hot gas dryers can be by passed when ginning during dry weather.
- c. Cleaners are types of machines having concave screens or grid bars utilizing beater cylinders and are frequently supplied with a down wash of hot air. Cleaners would, therefore, clean the seed cotton by threshing over screens.
- d. Extractors are equipment that employ a toothed "carding" action on the locks of cotton in conjunction with stripper cylinders that beat off the hulls, burs and stems, while the lock passes onto a doffing brush. Extractors perform functions of cleaning and extracting of large piece of foreign materials.
- e. Cotton gins (ginneries) use mechanical forms of distribution between overhead machinery and the feeders on the gin stands. Each gin stand in a multiple of gin stands is supplied with all the cottons it can handle. Distributors thus supply cotton to all gin stands installed in the ginnery.
- f. Feeders are devices, located over each gin stand, that supply the gin saws with a regulated streams of clean, dry seed cotton. Feeder takes the form of regulated rollers with spiked drum and screen.

- g. Ginning is the process of separating the seed from the lint. This is accomplished by gin saws. These are steel disks approximately 0.037 inch thick and provided with about seven teeth per inch of periphery. Improved huller gins use saws 12 inches in diameter, having from 264 to 282 teeth and running at speeds from 650 to 700 revolutions per minute for maximum capacity.

Ribs of tough, highly polished iron are used in cotton gins to form grids through which the saws may pass. Ginning ribs are spaced about 1/8 inch apart, so that the saws carrying the lint may pass while the seeds are excluded.

The cotton gins employ rotating brushes to remove the cottons from the saw teeth. After the seed is separated from the lint, it is discharged in to self-cleaning belt and then in to self-cleaning blowpipe systems. The lint removed from the saws is carried by air blast to the condenser, which consists essentially of a large roller covered with wire screen and smaller wooden roller. From the condenser, the cotton drops in to the press box, over the bottom of which has been spread bale bagging. As the cotton collects in the box it is packed every minute or so by mechanical trampers. After enough has been accumulated to make approximately 750lbs bale, heavy pressure is applied by hydraulic press. When the cotton is under pressure, the bagging is fitted over the sides of the bale and six steel ties are put around it and fastened. Pressure is then released, and the cotton expands somewhat but is held firmly in a compact bale by the bagging and ties. The bale is now complete. The seed produced is bagged in hessian sacks and are dispatched to oil mills. The project is environmentally friendly since it does not emit any toxic chemicals.

2. Source of Technology

The machinery and equipment required can be obtained from the following company.

SRI DHANALAKSHMI C&r MILLS (P) LTD
GANAPAVARAM – 522 619 VIA CHILAKALURIPET,
GUNTUR DIST (A.P) S. INDIA
Tel: 0091 – 8647 – 54921
0091 – 8647 – 54330
Fax: 0091 –8647-54925,54927
E-mail: 521 Spin @ pol. Net.in
Cell: 09848105480

B. ENGINEERING

1. Machinery and Equipment

Machinery and Equipment required for a modern saw gin are presented in the Table 6.1. The total cost of machinery and equipment is estimated at about Birr 2.25 million, out of which about Birr 1.5 million will be required in foreign currency.

Table 6.1

LIST OF MACHINERY AND EQUIPMENT FOR COTTON GINNERY

S/N.	Description	Qty.
1	Separator	2
2	Dryer	2
3	Cleaning machine	2
4	Master extractor	1
5	Distributor	1
6	Feeders	As required
7	Gin stands	
8	Lint cleaners	
9	Hot gas generator	1
10	Ribs, mating devices and doffing devices	As required
11	Seed handling equipment (self-clearing belts and blow pipes)	As required
12	Condenser	As required
13	Presses	As required

2. Land, Building and Civil Works

The envisaged plant requires a total land area of 3,000 m². The type of buildings, areas assigned to each type and costs of civil construction are presented below. Construction materials to be used are reinforcement bars, hollow blocks and steel struss. The superstructure has to be made of concrete columns and beams. The walls for plant building will be constructed out of hollow blocks where they are properly finished. The roofs will be covered by EGA – sheets.

- a. Management office, workers canteen, dressing and wash rooms: 200m²

Cost = Birr 400,000.-

The wall are cement plastered and painter, while the floors are cement screed and plastic lined.

- b. Shed for machinery: 300m²

Cost = Birr 360,000.-

- c. Shed for raw cotton, lint cotton and cotton seed: 600m²

Cost = Birr 480,000.-

- d. Contingency: 10% of sub-total of (a+b+c) = Birr 124,000.-

Thus, the total cost of Civil Construction = Birr 1,364,000.-

- e. The average land lease value for rural areas in Somalia region is Birr 1.2.-. The expenditure of leasing 3000m² plot of land for 95 years, at the rate of 1.2 per m² will be Birr 342,000.-.

Therefore, total cost land, building and civil works will be Birr 1.706 million.

3. Proposed Location

A ginning factory or ginnery, comprising of the building housing, the machinery for ginning and baling the cotton, is normally located conveniently in the vicinity of the actual area of production. It can be located in Afder or Gode Zones.

VI. MANPOWER & TRAINING REQUIREMENT

A. MANPOWER REQUIREMENT

Like any other industry, the envisaged ginnery needs to be provided with administrative and production workers. Manpower required for accomplishing the various activities in the ginning process consist of production supervisor, machine operators and assistants, electricians and mechanics. Administrative workers consist of plant manager, secretary, accountant, store man, driver, cashier, clerks, and general service workers (guards and messengers).

Table 6.1 below presents the complete list of manpower required together with monthly salary and annual expenditure.

Table 6.1

MANPOWER REQUIREMENT OF COTTON GINNERY

Ser. No.	Description	Required No.	Monthly Salary	Annual Salary
1	Plant Manager	1	1,800.-	21,600.-
2	Secretary	1	750.-	9,000.-
3	Production and Technical Head	1	1,300.-	15,600.-
4	Production Supervisor	1	1,000.-	12,000.-
5	Machine Operators	5	450.-	27,000.-
6	Electrician	2	550.-	13,200.-
7	Mechanic	2	550.-	13,200.-
8	Accountant	1	750.-	9,000.-
9	Store Keeper	1	550.-	6,600.-
10	Cashier	1	550.-	6,600.-
11	Clerks	3	350.-	12,600.-
12	Unskilled Labour	6	180.-	12,960.-
13	Guard	4	250.-	12,000.-
14	Messenger	2	250.-	6,000.-
15	Driver	2	350	8,400.-
SUB-TOTAL		33		185,760
Employees' Benefit (25% of Sub-Total)				46,440
Total		33		232,200

B. TRAINING REQUIREMENT

Training on operation of production equipment will be provided for operators during erection and commissioning by the machinery supplier at the site of the project. A total of Birr 25,000.- is adequate to conduct the training programme.

VII. FINANCIAL ANALYSIS

The financial analysis of the ginnery project is based on the data presented in the previous chapters and the following assumptions.

Construction period	2 years
Source of finance	30% equity 70% loan
Tax holidays	3 years
Bank interest	10.5 %
Discounted cashflow	10.5%
Land value	Based on estimated lease rate of the region
Repair and maintenance	10% plant and machinery
Accounts receivable	30 days
Raw material local	60 days
Work in progress	5 days
Finished products	30 days
Cash in hand	2days
Accounts payable	30 days

A. TOTAL INITIAL INVESTMENT COST

The total initial investment cost of the envisaged project including working capital is estimated at about Birr 5.65 million, out of which 26 per cent is in foreign currency. The major breakdown of the total initial investment cost is shown in Table 7.1.

Table 7.1**SUMMARY OF THE INITIAL INVESTMENT COST ('000)**

No.	Cost Items	Foreign Currency	Local Currency	Total
1	Land		342.00	342.00
2	Building and Civil Work		1,364.00	1,364.00
3	Plant Machinery and Equipment	1,500.00	750.00	2,250.00
4	Office Furniture and Equipment		120.00	120.00
5	Vehicle		750.00	750.00
6	Pre-production Expenditure*		716.50	716.50
7	Total Investment Cost	1,500.00	4,042.50	5,542.5
8	Working Capital		114.60	114.60
	Total	1,500.00	4,157.10	5,657.10

B. PRODUCTION COST

The annual production cost at full operation capacity is estimated at Birr 1.5 million (See Table 7.2). The material and utility cost accounts for 18 per cent while repair and maintenance take 7.4 per cent of the production cost.

* *Pre-production expenditure include interest during construction (Birr 416,500), training (Birr 25,000) and cost of registration, licensing and formation of the company including legal fees, commissioning expenses, etc.*

Table 7.2
ANNUAL PRODUCTION COST ('000 BIRR)

I t e m s	Y e a r			
	3	4	7	10
Raw Material and Inputs	120.00	140.00	200.00	200.00
Labour direct	74.50	86.90	124.15	124.15
Utilities	45.80	53.50	76.40	76.40
Energy and power				
Spare parts				
Maintenance and repair	67.20	78.40	112.00	112.00
Factory overheads	27.90	32.50	46.40	46.40
Administration Overheads	64.66	64.60	64.60	64.60
Total operating costs	400.00	455.90	623.60	623.60
Depreciation	518.80	518.80	518.80	308.80
Cost of Finance	418.10	408.90	364.30	303.70
Total Production Cost	1,336.90	1,383.60	1,506.70	1,236.10

C. FINANCIAL EVALUATION

1. Profitability

According to the income statement of the project, profit will start generating in the first year of operation. Important ratios such as profit to total sales, net profit to equity (Return on equity) and net profit plus interest on total investment (return on total investment) will show an increasing trend during the life-time of the project.

The income statement and the other indicators of profitability show that the project is viable.

2. Break-even Analysis

The break-even point of the project is estimated by using income statement projection.

$$\text{BE} = \frac{\text{Fixed Cost}}{\text{Sales} - \text{Variable Cost}} = 24\%$$

3. Pay-Back Period

The investment cost and income statement projection are used to project the pay-back period. The project's initial investment will be fully recovered within 6 years.

4. Internal Rate of Return and Net Present Value

Based on the cashflow statement, the calculated IRR of the project is 28% and the net present value at 10.5% discount rate is Birr 7 million.

D. ECONOMIC BENEFITS

The project can create employment for 33 persons. In addition to supply of the domestic needs, the project will generate Birr 8 million thousand in terms of tax revenue. Moreover, the Regional Government can collect employment, income tax and sales tax revenue. The establishment of such factory will have a foreign exchange saving effect to the country by substituting the current imports.

