

7. PROFILE ON BAMBOO FARM

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I. SUMMARY

This profile envisages the establishment of a farm for the production of 3,600 tonnes of bamboo per annum.

The present demand for proposed product is estimated at 11,113 tonnes and it is projected to reach at 46,422 tonnes by the year 2019.

The plant will create employment opportunities for 35 persons.

The total investment requirement is estimated at Birr 3.42 million, out of which Birr 961,000 is required for plant and machinery.

The project is financially viable with an internal rate of return (IRR) of 11% and a net present value (NPV) of Birr 263,460, discounted at 10.5%.

II. PRODUCT DESCRIPTION AND APPLICATION

Bamboos have been described as the poor man's timber and they have a wide range of uses, such as poles for house building, furniture, screens, mats, agricultural poles, agricultural tool handles, spars for boats and a number of other purposes. They also produce excellent long-fibred pulp for high-grade paper making and many countries like India are now extensively planted for this purpose.

The rate of production, when the clumps are fully developed, is high but, being monocarpic and often flowering gregariously. There is a phase in the rotation when all the clumps may die simultaneously and the new crop may take six to ten years to come into production, but different species vary in this respect.

Harvesting is usually by selective cutting on a short rotation of a proportion of the older culms in each clump, leaving all the one and two-year old culms and a proportion of the older ones to nourish the rhizomes and maintain the productivity of the clumps.

There are only three bamboo species of importance which are common in Africa. Two of these, *Arundineria alpinea* and *Oxytenanthera Abyssinia*, are indigenous, of which the later one is the common species grown at lower elevations from sea level upto 2000 masl and is found under savanna conditions with a dry season of three to seven months. It tolerates a wide range of soils, even dry and shallow ones, on which it attains smaller sizes, but will not grow on very heavy clays or saline soils.

According to Green Wood (1969) it is so easier to manage *Oxytenanthera* plantation than plantations of Eucalyptus. It is very difficult to raise from cuttings, and the plants are raised from potted plants started from seed. As of Wahered Kahn (1966), in parts of Sudan, some plants of this bamboo were found to produce seed nearly every year, and do not flower gregariously.

III. MARKET STUDY AND PLANT CAPACITY

A. MARKET STUDY

1. Past Supply and Present Demand

Bamboos are among the plants most widely used by humans. They are used for constructing houses, rafts, bridges, and scaffolding. Split and flattened culms can be used as flooring and interwoven to make baskets, mats, hats, fish traps, and other articles; culms of large species may be used as containers for liquids. Paper is made from bamboo pulp, and fishing rods, water pipes, musical instruments and chopsticks from other parts. Many bamboos are planted as ornamentals and young shoots are eaten as a vegetable. The grain is also consumed as a food.

In the Benshangul-Gumuz region and its surrounding regions bamboo is mainly used for constructing houses and building fences and as a major source of fuel wood, human food and fodder for animals. The source of supply is the naturally grown bush. Until now, there are no commercial farms established in the country. In this profile, however, the

application of bamboo for house construction; building fences and fuel wood is only considered.

According to the Resource Potential Study of the region conducted by IPS, most of the construction wood (such as transmission poles and poles for house construction) comes from the natural bamboo stand in the region. The study further estimates that more than 90 per cent of the construction material used in light construction is bamboo.

Therefore, to estimate the demand for the housing construction the following assumptions are made:

- Only the rural population of the Benshangul- Gumuz region would use bamboo for constructing houses;
- The area of a typical rural house in the region is 16 m²;
- On the average, 350 pieces of bamboo trees are required for constructing the house;
- The weight of a single bamboo is 2.4 kg; and
- A rural household has an average family size of 5 persons.

The rural population of the region in the year 2004 is estimated at 594,000. Based on the above assumption, the number of rural households is, thus, about 120,000. If it is further assumed that 10 per cent of the population will construct new house residence either for replacement of old ones or for new family formation, the total bamboo demand would be 10,080 tonnes (12,000 houses X 350 bamboo X 0.0024 tonnes).

On top of this, the application of this product for fence building is estimated at 10 %, that of the residence buildings. The demand for bamboo emanating from housing construction and fence building is, thus, estimated at 11,088 tonnes.

As established in the fuel wood and lumber plantation project profile report, the present demand for fuel wood is estimated at 100 tonnes. The share of bamboo is conservatively estimated at 25 per cent of the total. Thus, demand for bamboo emanating from this application is estimated at 25 tonnes.

Combining the demands emanating from the above-mentioned applications, the present demand (2004) for bamboo is estimated at 11,113 tonnes.

2. Project Demand

The demand for bamboo is foreseen to grow with the expansion of the residence building construction. Accordingly, to project the demand for the product the growth of the building sector, which is estimated at 10 per cent per annum has been considered. Table 3.2 shows the details of the demand projection.

Table 3.2
PROJECTED DEMAND FOR BAMBOO

Year	Projected Bamboo Demand (Tonnes)
2005	12,224
2006	13,447
2007	14,791
2008	16,271
2009	17,898
2010	19,687
2011	21,656
2012	23,822
2013	26,204
2014	28,824
2015	31,707
2016	34,877
2017	38,365
2018	42,202
2019	46,422

3. Pricing and Distribution

The current level of retail price of firewood, as obtained from the household survey conducted by the region's Mining and Energy Bureau in Assosa town is Birr 0.45 /kg. Taking this price as a proxy for the price of bamboo, Birr 0.45 per kg is proposed as farm-gate price.

Bamboo could be distributed to the end-users through existing retailers.

B. FARM CAPACITY AND PRODUCTION PROGRAMME

1. Farm Capacity

The envisaged bamboo plantation project will have a production capacity of 3,600 tonnes of dry weight bamboos from 200 ha. of land at its full operation capacity.

2. Operation Programme

The bamboo farm will presume its planting operation with 75 per cent in the 2nd year and grow to 85 per cent and 100 per cent in the 3rd year and 4th year, respectively. The initial year (2005) will be a period for nursery establishment, raising seedlings and preparation of planting site for the first planting operation to be under taken in the 2nd year (2006) and planting will be concluded after 3 years by the year 2008. The first harvest from the first plantation is expected in the 4th year of operation.

IV. MATERIALS, INPUTS AND UTILITIES

A. MATERIALS AND INPUTS

In wholistic term, the bamboo plant is expected to be propagated asexually. Hence, rhizome offset will be the only inputs required for bamboo production. The total costs for this planting materials is estimated at Birr 6 thousand.

B. UTILITIES

Fuel, lubricants, electricity, water, office supplies and telephone are among the major utilities required for the envisaged plantation project. The total costs of fuel and lubricants for transporting planting materials and products and running generator are estimated to be Birr 0.25 million. In addition, the costs for electricity for operating workshop equipment and electrical appliance and for water are expected to be Birr 0.14

million. The utilities and their corresponding costs are given in Table 3.3.

Table 3.3
UTILITIES REQUIREMENT AND COST

Sr. No.	Description	Qty. (000)	Total Cost '000 Birr
1	Fuel (lt)	90	225
2	Lubricant (lt/kg)	9	25
3	Electricity (kWh)	147.7	70
4	Water (m ³)	35	70
	Grand Total		390

V. TECHNOLOGY AND ENGINEERING

A. TECHNOLOGY

1. Production Process

In asexual bamboo propagation, planting material preparation is the initial stage of bamboo production. The next operation is planting site preparation which includes clearance of the plantation area, burning of the brush, grass and other debris and plantation site layout in order to superimpose the patterns of the plantation blocks and compartments with their access roads and fire lines. Land preparation is concluded with digging of proper size planting pits.

Planting of rhizome offset in the field is carried out after pit preparation. Once the trees are established in the field, they are properly managed to maximize production and limit competition between trees by thinning. Tree felling, logging, loading and transporting of products are the final operations in commercial bamboo production.

2. Source of Technology

The machinery and equipment required by the envisaged project could be supplied by Ries Engineering Plc, Nazareth Tractor Assembly Share Company, Plc. etc.

B. ENGINEERING

1. Machinery and Equipment

The requirement of machinery and equipment is described in Table 5.1.

Table 5.1
MACHINERY AND EQUIPMENT REQUIREMENT AND
CORRESPONDING COSTS

Sr. No.	Description	Qty. (No.)	Unit Price (Birr)	Total cost ('000 Birr)		
				Foreign	Local	Total
1	Tractor 110-125 HP	2	270,000	540	-	540
2	Disc Plough	2	60,000	120	-	120
3	Trailers	1	90,000	-	90	90
4	Tree Management and Cutting equipment	19	-	-	50	50
5	Generator	1	155,000	155		155
6	Tools (Set)	LS	-	6	-	6
	Grand Total			821	140	961

2. Land, Building and Civil Works

The total cost for land development of 200 hectares (surveying, land clearing and leveling) with access roads and fire lines is estimated at Birr 0.25 million. The total area required for stores, houses, offices, staff canteen, shade house for machinery, etc. is 1500m². The total building and civil works cost at the rate of Birr 750 per m² is estimated at Birr 1.125 million.

According to the Regulation No. 4/2001 of the BGRS land for infrastructure construction, forestation and other related development could be granted free. Considering this condition, no cost is assumed for acquiring the land which would be utilized for the bamboo farm.

3. Proposed Location

The location for the envisaged project is proposed to be in Assosa zone, where construction materials are scarce because of the big deforestation since the settlement programme of the Derge regime.

VI. MANPOWER AND TRAINING REQUIREMENT

A. MANPOWER REQUIREMENT

The manpower requirement of the envisaged bamboo plantation project is 35 persons. The detailed list of manpower & corresponding cost are given in Table 6.1.

Table 6.1
MANPOWER REQUIREMENT AND ANNUAL
CORRESPONDING LABOUR COST

Sr. No.	Description	Reg. No.	Monthly Salary (Birr)	Annual Salary (Birr)
1	General Manager	1	1,500	180,000
2	Forester	1	1,250	15,000
3	Forest Technician	1	500	6,000
4	Secretary/Cashier	1	600	7,200
5	Accountant	1	700	8,400
6	Sales man/store keeper	1	500	6,000
7	Tractor operator	2	500	12,000
8	Asst. Tractor Operator	2	300	7,200
9	Driver	1	500	6,000
10	Generator operator	1	300	3,600
11	Guard	20	200	58,000
12	Genitor	1	200	2,400
13	Office Boy	1	200	2,400
14	Mechanic	1	500	6,000
	Total	35		148,200
	Employee benefits (25%)			37,050
	Grand Total	35		185,250

B. TRAINING REQUIREMENT

No special training is required for the envisaged Bamboo plantation project.

VII. FINANCIAL ANALYSIS

The financial analysis of the bamboo farm project is based on the data provided 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	Free of charge cost
Repair and maintenance	5 % of plant machinery and equipment
Accounts receivable	30 days
Raw material, local	30 days
Work in progress	30 days
Finished products	30 days
Cash at hand	5 days
Accounts payable	30 days

A. TOTAL INITIAL INVESTMENT COST

The total initial investment cost of the project including working capital is estimated at Birr 3.41 million, out of which about 24% will be required in foreign currency. Details are indicated in Table 7.1.

Table 7.1**INITIAL INVESTMENT COST ('000 BIRR)**

Sr. No.	Cost Items	Foreign Currency	Local Currency	Total
1	Land	-	-	-
2.	Building and Civil Work	-	1,375.00	1,375.00
3.	Farm Machinery and Equipment	821.00	140.00	961.00
4.	Office Furniture and Equipment	-	50.00	50.00
5.	Vehicle	-	250.00	250.00
6.	Pre-operation Expenditure*	-	454.19	454.19
	Total Investment cost	821.00	2,269.19	3090.19
7	Working Capital	-	326.76	326.76
	Grand Total	821.00	2,595.95	3,416.95

B. OPERATION COST

The annual operation cost at full capacity of the farm is estimated at Birr 1.02 million (see Table 7.2). The material and utility cost accounts for 39 per cent while repair and maintenance take 4.26 per cent of the production cost.

 * *Pre-operation expenditure include interest during construction (Birr 397,840) and costs of registration, licensing and formation of the company including legal fees, commissioning expenses, etc.*

Table 7.2
ANNUAL OPERATION COST ('000 BIRR)

Items	Year			
	3	4	7	10
Raw Material and Inputs	4.50	5.10	6.00	6.00
Labour direct	66.69	75.57	88.92	88.92
Utilities	292.50	331.47	390.00	390.00
Maintenance and repair	32.66	37.01	43.55	43.55
Labour overheads	44.46	50.38	59.28	59.28
Administration cost	27.79	31.49	37.05	37.05
Total Operating Cost	468.60	531.03	624.78	624.78
Depreciation	229.85	229.85	229.85	169.85
Cost of Finance	234.45	220.09	167.31	96.09
Total Production Cost	932.90	980.97	1,021.96	890.74

C. FINANCIAL EVALUATION

1. Profitability

According to the projected income statement, the project will start generating profit in the fourth year of operation. Important ratios such as the profit to total sales, net profit to equity (Return on equity) and net profit plus interest to total investment (return on total investment) will show an increasing trend throughout the production life of the project. The income statement and other profitability indicators show that the project is viable.

2. Break-even Analysis

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

$$\text{BE} = \frac{\text{Fixed Cost}}{\text{Sales} - \text{Variable cost}} = 29\%$$

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 9 years time.

4. Internal Rate of Return and Net Present Value

Based on the cash flow statement, the calculated IRR of the project is 11% and the net present value at 10.5% discount rate is Birr 263,460.

D. ECONOMIC BENEFITS

The project can create employment for 35 persons. In addition to supply of the domestic needs, the project will generate Birr 2.19 million in terms of tax revenue. Moreover, the Regional Government can collect employment, income tax and sales tax revenue.