58. SISAL ROPE

TABLE OF CONTENTS

I. SUMMARY

This profile envisages the establishment of a plant for the production of Sisal Rope with a capacity of 300 tonnes per annum.

The present demand for the proposed product is estimated at 1,10 tonnes per annum. The demand is expected to reach at 1,788 tonnes by the year 2010.

The plant will create employment opportunities for 19 persons.

The total investment requirement is estimated at Birr 1.6 million, out of which Birr 1.1 million is required for plant and machinery.

The project is financially viable with an internal rate of return (IRR) of 43.2 % and a net present value (NPV) of Birr 3.2 million, discounted at 8.5 %.

II. PRODUCT DESCRIPTION AND APPLICATION

Sisal is a naturally growing fibre plant extending lengthwise through pulpy tissues of long leaves or leaf stems of tropical plant, which are long and multiple-celled. This fibre can be woven into rope, which can be used for packing commodities of various types. At present the demand for sisal rope is met by local production. Sisal yarn is the major raw material. The production process resembles that of cotton yarn production.

Although sisal rope should have an ordinary standard diameter of 5mm in size, the product can be made with standard sized higher than the stated, depending upon the end-use. Sisal ropes are usually lighter in colour and some what stronger than hungmen ropes. Sisal ropes are mainly used as packing and parking and towering commodities of various types.

III. MARKET STUDY AND PLANT CAPACITY

A. MARKET STUDY

1. Past Supply And Present Demand

Sisal ropes and twines are used in the industrial sector to produce carpets, rugs, brushes and marine type ropes. Common sisal products are single, double and three ply sisal twines used for different purposes.

Sisal ropes and twines are produced from hard, coarse sisal fibers. Sisal grows best in warm, moisture climates. Brazil and Tanzania are the two largest sisal producers. Sisal ropes and twines are used mainly for packaging purposes. They are stronger, more durable, less flexible, easy to tie and knot. Even though synthetic ropes and twines are

substitutes, sisal ropes and twines are advantageous of ease to knot features in packaging and repackaging of consignments so that in some of their applications they cannot be substituted.

Sisal ropes and twines are produced in Ethiopia by two public enterprises, namely; Meher and Ethiopia Fiber Product Factories. The 1999-2003 production of the two factories was 357 tonnes while their installed capacity is 863 tonnes indicating 41 % capacity utilization. Though the recent performance by the two factories is below 400 tonnes, earlier they have supplied to the market around 700 tonnes and their production plan for 1997 E.C. is about 869 tonnes. As can be observed from the market study domestic rope and twine products are also made from mixed fibers like jute and *kenaf.*

The imported twine, cordage, rope and cables of sisal average for the last five years were 205 tonnes. Excluding the exceptional low record year of 2004, this average amounts to 241 tonnes. Considering the year 2005 production plan of the domestic producers and the average imports, the current effective demand for sisal ropes and twine is estimated at 1,110 tonnes. The imported twine, cordage, rope and cables of sisal are presented in Table 3.1.

Table 3.1
IMPORTED TWINE, CORDAGE, ROPE AND CABLES OF SISAL (KG)

Year	Import	Value (Birr)	Unit Value (Birr)
1999	257,936	2,207,081	9
2000	292,304	2,136,681	7
2001	219,987	1,621,848	7
2002	314,613	2,307,713	7
2003	120,403	919,806	8
2004	222,02	220,528	10
Average 1999-2004	**204,574**	**1,568,943**	**8**

Source : *Ethiopian Customs Authority.*

2. Projected Demand

The demand for sisal ropes and twines is mainly derived from the service sector activities of transporting goods from producers to wholesalers, from wholesalers to retailers, and from retailers to consumers. In this process of distributing goods both agricultural and industrial goods are repacked at each channel. The packaging of products according to the needs of consumers by retailers extensively use repacking materials like twines and ropes.

The second largest sector demanding the sisal twines is the manufacturing of carpets, rugs and brushes. Considering the wide application of twines and ropes, the demand for sisal ropes and twines is estimated to grow by 10 %, annually. Projected demand for sisal twines and ropes is presented in Table 3.2.

Table 3.2
PROJECTED DEMAND FOR SISAL TWINES AND ROPES IN TONNES

Year	Demand	Existing Capacity	Unsatisfied Demand
2006	1221	869	352
2007	1343	869	474
2008	1477	869	608
2009	1625	869	756
2010	1788	869	919
2011	1966	869	1097
2012	2163	869	1294
2013	2617	869	1510
2014	2879	869	1748
2015	3167	869	2010

3. Pricing and Distribution

The price of one kilogramme three ply twines is Birr 10. The recommended price for the same product of the new project is Birr 6. The outlet for the product will be the existing established retail channel.

B. PLANT CAPACITY AND PRODUCTION PROGRAMME

1. Plant Capacity

Based on the outcomes of the market study, the annual production capacity of the envisaged plant is 300 tonnes. The plant will be set into single shift operation of 8 hours a day, and working for 300 days a year.

2. Production Programme

The production of sisal rope mostly depends on availability of raw material and market. In order to facilitate the development of market outlets and ensure the availability of raw material, production will be made to start at 65% during the start-up year, and then will grow to 75%, 85% and 100% during the successive years. Table 3.3 shows production built-up programme.

Table 3.3
PRODUCTION PROGRAMME

Year	1	2	3	4-10
Capacity utilization [%]	65	75	85	100
Sisal Rope (tones)	195	225	255	300

IV. MATERIALS AND INPUTS

A. RAW MATERIALS

The sisal fibres are indispensable raw materials for the production of sisal rope. These are natural fibres obtained from a sisal plant or scientifically known as *Agave Sisalana* plant. Sisal plant could be cultivated in the region as it has a suitable climatic condition for the growth. The fibres are removed from the leaves by defibering operation. Physically, sisal fiber is stiff and harsh; it also possesses a length ranging from 70-140 Cms and is creamy white in colour. The annual requirement of this raw material is shown in Table 4.1 below.

Table 4.1
RAW MATERIAL REQUIREMENT AND COST

Description	Qty.	Cost ('000 Birr)
Sisal fibre (tonnes)	315	630
Total	**315**	**630**

B. UTILITIES

The utilities required for sisal ropes and twins project are electricity and water. The annual electrical energy consumption is estimated to be 50,000 kWh, and its cost is about Birr 23,700. Annual expenditure on water is estimated at Birr 2000. Thus, the total annual expenditure on utilities is Birr 25,700.

V. TECHNOLOGY AND ENGINEERING

A. TECHNOLOGY

1. Process Description

The technology of sisal rope production involves three major unit operation.

a) Yarn production
b) Strand production
c) Rope production

a) Yarn production

Sisal fibers obtained from the field are allowed to pass through fiber carding and spinning machinery to form twisted yarns.

b) Strand production

Twisted yarns are further twisted by stranding machinery to form strands.

c) Rope production

Stranded yarns are laid and twisted to the required specifications set to produce the final product, i.e, rope. If necessary, ropes can be steamed for setting of the twist.

After the three steps of operation are completed, the ropes of the required counts can be obtained.

2. Source of Technology

The following Indian Company can supply the machinery required for sisal rope production.

Malwa Machinery & Tools Works
BXXX - 63F, Gurudev Nagar
Ferozepur Road
Ludhiana - 141001

B. ENGINEERING

1. Machinery and Equipment

The list of machinery and equipment required for the production of sisal rope is shown in Table 5.1. The total investment cost for machinery and equipment is estimated at Birr 1.025 million. Of this, Birr 0.95 million is required in foreign currency, and the balance is in local currency.

Table 5.1
MACHINERY AND EQUIPMENT REQUIREMENT AND COST

Sr. No.	Description	Qty. (No.)	Cost, ['000 Birr]		
			LC	FC	TC
1	Fibre carding machine	1	-	120	120
2	Fibre spinning machine	1	-	145	145
3	Rope making machine	1	-	165	165
4	Automatic feed rope making machine	1	-	275	275
5	Rope stranding machine	1	-	65	65
6	Coil winding machine	1	-	60	60
7	Plat form type weighing balance and others	-	-	120	120
	FOB price			**950**	**950**
	Freight, Insurance, Banking and material handling cost		75	-	75
	Grand Total		**75**	**950**	**1025**

2. Land, Building and Civil Works

The total land requirement includes land for factory building, for administration building, and buildings for utilities and general purpose. Considering land area for expansion, gardening, internal roads and pathways, the total land site required for the rope production plant will be about 600m^2. Of this, a total of 200m^2 will be covered by buildings.

The cost of land leasing, at the rate of Birr 2.0 per m^2 and for 70 years of land holding will be Birr 84,000. Considering a unit cost of Birr 1,000 per m^2 for buildings, the investment requirement for building will be Birr 200,000. It means that total investment cost for land, building and civil works assuming that the total land lease cost will be paid in advance is estimated at Birr 284,000.

3. Proposed Location

The plant will have to be established in Assosa town.

VI. MANPOWER AND TRAINING REQUIREMENT

A. MANPOWER REQUIREMENT

The plant requires both production and administrative manpower. Production of sisal rope requires skilled and unskilled workers. The envisage project's manpower requirement is 19 persons. The details of manpower requirement and annual labour cost including fringe benefits is shown in Table 6.1.

Table 6.1
MANPOWER REQUIREMENT AND ASSOCIATED ANNUAL SALARY EXPENDITURE

Sr. No.	Description	Req. No.	Salary, Birr	
			Monthly	Annual
	A. Administration			
1	General manager	1	1800	21,600
2	Secretary	1	450	5400
3	Accountant	1	700	8400
4	Store keeper	1	600	7200
5	Clerk	1	350	4200
6	Cashier	1	400	4800
7	General Services	3	200	7200
	Sub - Total	**9**		**58,800**
	B. Production			
1	Supervisor	1	750	9000
2	Skilled workers	4	500	24000
3	Helpers	3	200	7200
4	Technicians	2	500	12000
	Sub -Total	**10**		**52,200**
	Employee Benefit (25% BS)			27,750
	Total	**19**		**138,750**

B. TRAINING REQUIREMENT

With regards to training requirement, a two weeks orientation for production workers by the machinery supplier will be sufficient. The associated cost will be covered by the machinery supplier. Training will be conducted during commissioning period.

VII. FINANCIAL ANALYSIS

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

Construction period	1 years
Source of finance	30 % equity
	70 % loan
Tax holidays	3 years
Bank interest	7.5 %
Discounted cashflow	8.5 %
Repair and maintenance	3 % of the total plant and machinery

Accounts receivable	30 days
Raw material, local	30 days
Raw materials, import	90 days
Work in progress	5 days
Finished products	30 days
Cash in 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 1.6 million, of which 61 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

Sr. No.	Cost Items	Total ('000 BIRR)
1	Land lease value	84
2.	Building and Civil Work	200
3.	Plant Machinery and Equipment	1025
4.	Office Furniture and Equipment	75
5.	Vehicle	-
6.	Pre-production Expenditure*	87.6
7	Working Capital	86.2
	Total Investment cost	**1,557.8**
	Foreign share	**61%**

B. PRODUCTION COST

The annual production cost at full operation capacity of the plant is estimated at Birr 1.1million (see Table 7.2). The material and utility cost accounts for 62.2 per cent while repair and maintenance take 4.7per cent of the production cost.

* *N.B Pre-production expenditure includes interest during construction (Birr 82.6 thousand),and (Birr5 thousand) costs of registration, licensing and formation of the company including legal fees, commissioning expenses, etc.*

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

Items	Cost	%
Raw Material and Inputs	630	59.8
Utilities	25.7	2.4
Maintenance and repair	50	4.7
Labour direct	65.3	6.2
Factory overheads	8.0	0.8
Administration Cost	77.2	7.3
Total Operating Costs	**856.2**	**81.2**
Depreciation	125.2	11.9
Cost of Finance	72.5	6.9
Total Production Cost	**1,053.8**	**100**

C. FINANCIAL EVALUATION

1. Profitability

According to the projected income statement, the project will start generating profit 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) show an increasing trend during the lifetime 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 including cost of finance when it starts to operates at full capacity (year 4) is estimated by using income statement projection.

$$BE = \frac{\text{Fixed Cost}}{\text{Sales} - \text{Variable cost}} = 27.8\%$$

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 3years.

4. Internal Rate of Return and Net Present Value

Based on the cash flow statement, the calculated IRR of the project is 43.2% and the net present value at 8.5% discount rate is Birr 3.2 million.

D. ECONOMIC BENEFITS

The project can create employment for 19 persons. In addition to supply of the domestic needs, the project will generate Birr 0.3 million per annum in terms of tax revenue when it starts to operate at full capacity. 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.