60. PROFILE ON PLYWOOD

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I. SUMMARY

This profile envisages the establishment of a plant for the production of 3,800 m^3 of plywood per annum.

The current demand for the proposed product is estimated at 1.45 million m^3 per annum and it is projected to reach at 2.48 million m^3 by the year 2015.

The plant will create employment opportunities for 42 persons.

The total investment requirement is estimated at Birr 14.86 million, out of which Birr 7.84 million is required for plant and machinery.

The project is financially viable with an internal rate of return (IRR) of 37% and a net present value (NPV) of Birr 29.86 million, discounted at 10.5%.

II. PRODUCT DESCRIPTION AND APPLICATION

A product obtained as a result of several even numbered boards bonded together is called plywood. Plywood, thus, produced has the particular features of being a wood with the least defects, wide size, high length and strength mechanically or physically. It is used for general construction purposes as interior material for housing, ships, vehicles and furniture.

III. MARKET STUDY AND PLANT CAPACITY

A. MARKET STUDY

1. Past Supply and Present Demand

Until recently, Ethiopian Plywood Enterprise located at Addis Ababa with a branch in Jimma is the only producer of plywood in Ethiopia. According to the annual manufacturing and industrial survey reports of CSA, the domestic annual production of

plywood during the period 1993-2002 was 485,000 cubic meters with an annual growth rate of 22.9 %. Imported plywood for the same period was 734,305 cubic meter. The annual volume of domestic production and import of plywood is presented in Table 3.1.

Table 3.1
DOMESTIC PRODUCTION AND IMPORTED PLYWOOD

Year	Domestic Production	Import	Total
	' 000m^3	'000m^3	'000m^3
1999	376	748	1124
2000	430	527	957
2001	455	880	1,335
2002	677	782	1,459

Source: *CSA*

Total supply of plywood which constitutes both import and local production on average during the period under consideration was 1.219 million m^3 with an annual average growth rate of 9%. In order to estimate the current (2004) demand for the product, it is assumed that the average growth rate registered by the product's total supply during the past will continue in the near future. Accordingly, applying a 9% growth rate on the average total supply during the period 1999-2002, current effective demand is estimated at 1.448 million m^3.

2. Projected Demand

Plywood demand is directly related with construction, particularly building construction, housing construction and real estate development. Moreover, industrial and institutional applications of plywood are also among the major segments demanding plywood. The gross domestic product during the period 1991-2003 by industrial sector indicates an average growth rate of 7% for construction sector; the last four years growth rate being 5%. In order to project demand for plywood, the latter growth rate is considered. The projected demand for plywood is presented in Table 3.2. The existing domestic production is assumed to cover 50% of the projected demand.

Table3.2
PROJECTED DEMAND FOR PLYWOOD (000 M^3)

Year	Demand
2005	1,520
2006	1,596
2007	1,676
2008	1,760
2009	1,848
2010	1,940
2011	2,037
2012	2,139
2013	2,246
2014	2,359
2015	2,477

3. Pricing And Distribution

The current producer's price of locally produced plywood is Birr 5,370 per m^3. For the envisaged product after taking consideration of distribution costs and distribution margin a factory-get price of Birr 4,500 per m^3 recommended.

Distribution of plywood would be handled through direct delivery to major construction companies and sales shops.

B. PLANT CAPACITY AND PRODUCTION PROGRAMME

1. Plant Capacity

The proposed plant will have a capacity of 3,800 m^3 per annum. This quantity of plywood of 4mm thickness which is a product mostly used for general construction purposes such as interior materials for housing, ships, vehicles, and furniture, etc. Its demand is ever on the increase. However, additional market requirement can be met by running the production unit on a second or third shift.

2. Production Programme

The unit is planned to operate one shift of 8 hours a day for a total working of 300 days a year by taking Sundays and national holidays into considerations.

It is also anticipated to operate at 70% and 80% of installed capacity in the first and second year, respectively. Full capacity production is expected to be achieved in the successive years. The low production level at the initial stage is planned to develop substantial market outlets for the product and to build up production capacity of new equipment.

IV. MATERIAL AND INPUTS

A. MATERIALS

Logs, which are suitable for plywood, urea resin, glue and ammonium chloride are the materials used to produce plywood. Except for urea resin and ammonium chloride which are to be imported, the other materials required are locally available logs required by the plant could be supplied from the dense forests of Wembera, Pawe, and Dangur woredas. The annual raw material requirement is calculated on the bases of the final output. Thus, the total cost of material at full operation capacity of the plant is estimated to be Birr 8,045,280. The detail breakdown is shown in Table 4.1.

Table 4.1

MATERIALS REQUIREMENT AND COST ('000 BIRR)

Sr. No.	Description	Qty.	Cost '000 Birr		
			FC	LC	Total
1	Logs (m^3)	8,750	-	7,000	7,000
2	Urea resin (tonne)	290	794.8	-	794.8
3	Ammonium chloride (kg)	100	0.482	-	0.482
4	Glue (tonne)	15	-	250	250
	Grand Total		**795.28**	**7,250**	**8,045.28**

B. UTILITIES

Electricity, water and lubricating oil are the major utilities required for the production of plywood. Consumption of electrical energy is estimated to be 93,000 kWh per year.

A certain amount of water is used in the process for the generation of steam in the boilers. The annual water requirement is about 32,000 m^3. The total annual expenditure on utilities is, thus, about Birr 199,400.

V. TECHNOLOGY AND ENGINEERING

A. TECHNOLOGY

1. Process Description

The manufacturing of plywood comprises of three major steps. These are:-

- Preparation of logs;
- Veneer manufacturing from logs; and
- Plywood manufacturing from veneer.

a) Preparation of logs

This section consists of two major log treatment operations. In the first one, logs are cut by chain saw to a desired length and fed to the lathe to make veneer sheets, while in the second high-density logs are cooked in cooking vats or steam chambers to facilitate the cutting operation.

b) Veneer Manufacturing

Under this process several physical actions such as cutting, clipping, drying, joining, etc. are conducted on the log obtained from the first section in order to prepare good quality veneer suitable for plywood making.

c) Plywood manufacturing from veneer

In plywood making, the initial operation is the preparation of glue for the process. The proceeding step is the spreading of glue on the core veneer sheets and the final is the pre-pressing of the stacked sheets by the cold press.

After pre-pressing, the obtained plywood is fed to hot-press machine, where it is subjected to a pressure at a specified temperature. Then, the plywood is cut to a pre-determined size by cutting machine and stored for delivery.

2. Source of Technology

The machinery required for the envisaged plant could be obtained from England company;

Scott & Sergeant Woodworking Machinery Ltd.
Blatchford Rd, Horsham, RH13SQR, England.
Tel. + 44 (0) 1403273000.
Email: sales@scorsarg.co.uk.

B. ENGINEERING

1. Machinery and Equipment

Cutting, slicing, clipping or pressing and drying units are some of the major machinery and equipment required in the production of plywood. Table 5.1 shows the list of machinery and equipment required by the envisaged plant. The total cost of machinery and equipment is estimated at Birr 7.84 million, of which Birr 7 million is required in foreign currency.

Table 5.1

LIST OF MACHINERY AND EQUIPMENT

Sr. No.	Description	Qty.
1	Peeler	1
2	Veneer router	1
3	Veneer clipper	1
4	Veneer drying machine	1
5	Veneer splinter	1
6	Veneer splicer	1
7	Gluing machine	1
8	Conveyor (roller)	1
9	Pressing machine	1
10	Drying press	1
11	Plywood edger	1
12	Sanding machine (scraper belt, drum)	1
13	Boiler with its accessories	1
14	Polishing	1

2. Land, Building and Civil Works

The plant requires an area of about 2,500 m^2 and about 1,200 m^2 for future expansion. The building consist of a store for raw stock storage and other materials, a large production area of 1,600m^2 with an area of workshop and offices. Considering the unit cost of construction to be Birr 1500/ m^2, the cost for building is calculated to be Birr 2.4 million. The cost includes all civil works.

Total land requirement is about 3700 m^2 including area for future expansion, and the land value as per lease rate of the region (1.2 Birr/m^2 per annum) is Birr 310,800 for 70 years. Thus the total investment cost on land, building and civil works assuming that the total land lease cost will be paid in advance is estimated at Birr 2.71 million.

3. Proposed Location

Based on the availability of basic raw material, Wembera, Dangur & Pawe woredas are proposed to be the location of the envisaged plant.

VI. MANPOWER AND TRAINING REQUIREMENT

A. MANPOWER REQUIREMENT

The plywood manufacturing plant will create job opportunities for about 42 workers, of these 36 of the employees are production workers while the remaining are administrative staff. The detail is indicated in Table 6.1.

Table 6.1

MANPOWER REQUIREMENT AND ANNUAL LABOUR COST (BIRR)

Sr. No.	Description	Req. No.	Monthly Salary	Annual Salary
A.	**Administration**			
1	Manager	1	1,800	21,600
2	Administrator	1	950	11,400
3	Accountant	1	750	9,000
4	Secretary	1	450	5,400
5	Salesperson	1	600	7,200
6	General service	1	350	4,200
	Sub-total	**6**		**38,800**
B.	**Production**			
1	Supervisor	1	1,050	1,050
2	Skilled workers	20	500	120,000
3	Unskilled workers	12	250	36,000
4	Technician	3	500	18,000
	Sub-total	**36**		**175,050**
	Total	**42**		**233,850**
	Benefits (25% of basic salary)			58,462.50
	Grand total	**42**		**292,312.50**

B. TRAINING REQUIREMENT

Imparting skill both on the supervisor and the operators who will be directly involved in the plywood production is an essential task. Thus, on-job-training by the machinery supplier for about two weeks should be given locally. The training cost is estimated to be Birr 15,000.

VII. FINANCIAL ANALYSIS

The financial analysis of plywood project is based on the data provided in the previous chatpers and the following assumptions:-

Construction period	2 years
Source of finance	30% equity
	70% loan
Tax holidays	3 years
Bank interest	10.5%
Discounted cash flow	10.5%
Repair and maintenance	5 % of Plant machinery and equipment
Accounts receivable	30 days
Raw material (local)	60 days
Raw materials (import)	90 days
Work in progress	2 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 14.86 million, out of which about 51 % 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 Cost
1	Land	-	310.80	310.80
2	Building and Civil Work	-	2,400.00	2,400.00
3	Plant Machinery and Equipment	7000.00	840.00	7,840.00
4	Office Furniture and Equipment	-	100.00	100.00
5	Vehicle	-	500.00	500.00
6	Pre-production Expenditure*	-	1,898.40	1,898.40
	Total Investment Cost	**7,000.00**	**6,049.20**	**13,049.20**
7	Working Capital	681.16	1,137.87	1,819.03
	Grand Total Cost	**7,681.16**	**7,187.10**	**14,868.26**

B. PRODUCTION COST

The annual production cost at full operation capacity of the plant is estimated at Birr 10.53 million (see Table 7.2). The material and utility cost accounts for 77.7 per cent while repair and maintenance take 3.72 per cent of the production cost.

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* *Pre-production expenditure include interest during construction (Birr1.75 million), training (Birr 15,000) and cost of registration, licensing and formation of the company including legal fees, commissioning expenses, etc.*

Table 7.2

ANNUAL PRODUCTION COST

('000 BIRR)

Items	Year			
	3	**4**	**7**	**10**
Raw Material and Inputs	5,632.58	2,437.19	8,045.81	8,045.81
Labour Direct	98.2	112.3	140.3	140.3
Utilities	139.6	159.5	199.4	199.4
Maintenance and repair	274.4	313.6	392	392
Labour overheads	40.9	46.8	58.5	58.5
Administration cost	65.5	74.8	93.5	93.5
Total operating costs	**8,259.90**	**9,439.80**	**11,798.10**	**11,798.00**
Depreciation	998.4	998.4	998.4	968.4
Cost of Finance	1,014.20	912.8	608.5	304.3
Total Production Cost	**8,263.91**	**9,055.49**	**10,536.05**	**10,100.27**

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 the percentage of net 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.

$$Be = \frac{\text{Fixed Cost}}{\text{Sales-Variable Cost}} = 16\ \%$$

3. Pay-Back Period

The investment cost and income statement projection are used to project the pay-back period. The project will fully recover the initial investment and working capital within 4 years time.

4. Internal Rate of Return and Net Present Value

Based on the cash flow statement, the calculated IRR of the project is 37 % and the net present value at 10.5% discount rate is Birr 29.86 million.

D. ECONOMIC BENEFITS

The project can create employment opportunities for 42 persons. In addition to supply of the domestic needs, the project will generate Birr 19.76 million 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.