59. PROFILE ON PREFABRICATED BUILDINGS

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I. SUMMARY

This profile envisages the establishment of a plant for the production of prefabricated building with a capacity of 20,000 tonnes per annum. Prefabricated homes, often referred to as prefab homes, are dwellings manufactured off-site in advance, usually in standard sections that can be easily shipped and assembled.

The major raw materials required are plates of different thickness, 2mm-20mm, pre coated sheet metal of thickness, 0.3mm-1mm and fasteners which have to be imported.

The present demand for the proposed product is estimated at 12,133 tonnes per annum. The demand is expected to reach at 37,745 tonnes by the year 2018.

The total investment requirement is estimated at Birr 42.88 million, out of which Birr 5.3 million is required for plant and machinery. The plant will create employment opportunities for 35 persons.

The project is financially viable with an internal rate of return (IRR) of 21.86% and a net present value (NPV) of Birr 37.76 million, discounted at 8.5%.

The project will have a forward linkage with the housing construction sector. The establishment of such factory will have a foreign exchange saving effect to the country by substituting the current imports.

II. PRODUCT DESCRIPTION AND APPLICATION

Prefabricated building is a type of building that consists of several factory-built components or units that are assembled on-site to complete the unit. The parts for the building are built in a controlled environment and transported in a protected state to a remote site for rapid installation. The reduction in cost and construction period has driven

the consumers towards buildings made from pre-fabricated light guage steel components of transportable sizes from 4’ to 30’ wide.

Prefabricated Steel buildings are found in many different industries and used for lots of different applications. The more common ones are steel garage buildings, steel air craft hangars, steel gymnasiums and recreational facilities, steel prisons and correctional facilities, steel school buildings, steel manufacturing buildings, metal warehouse and storage buildings, steel strip mall building, steel self storage and mini storage building, etc.

III. MARKET STUDY AND PLANT CAPACITY

A. MARKET STUDY

1. Past Supply and Present Demand

Prefabricated buildings are highly demanded by various developmental projects. Road, dam, agricultural, mining and other project prefer pre fabricated buildings for temporary shelter for their employees and offices. The main reason for the preference of prefabricated buildings is the short period of time required to assemble.

Although there are some efforts being made to manufacture prefabricated buildings in the country it is at a very low stage of development. Hence, most of prefabricated buildings are imported from abroad (see Table 3.1).

Table 3.1

IMPORT OF PREFABRICATED BUILDINGS (TONNES)

Year	Import
2001	950
2002	985
2003	2,875
2004	5,762
2005	7,368
2006	10,044

Source: - *Customs Authority.*

As could bee seen from Table 3.1, import of prefabricated buildings during the past six has shown a remarkable increase. The imported quantity which was about 967 tonnes during 2001/02 has increased to 2,875 tonnes and 5,762 tonnes by the year 2003 and 2004, respectively. By continuing the increasing trend, the imported quantity has reached to a level of 7,368 tonnes and 10,044 tonnes by the year 2005 and year 2006, respectively. Imported quantity during the last four years has shown an increase of about 240%, which gives and annual average of 60%.

In terms of value, the country spends a lot of foreign exchange. As per the data obtained from the Customs Authority in the year 2005 and year 2006 alone, Birr 182.3 million and Birr 251.4 million has been spent to import prefabricated buildings.

Although the past average growth was very high, which is about 60% per annum, a 10% annual growth is applied to determine the current effective demand by taking year 2006 as a base. Accordingly, current effective demand for prefabricated buildings is estimated at 12,153 tonnes.

2. Projected Demand

Demand for prefabricated buildings will continue to grow as far as there are development projects in the area of road, dams, agriculture, mining and other sectors of the economy. According to the Plan for Accelerated and Sustained Development to End Poverty (PASDEP), it is targeted construct almost 20,000 km of new roads. Under PASPED, power supply will be increased by three fold with the construction 5 major dams. In addition large and medium scale irrigation projects as well as a number of other projects are included in the plan. All these development activities require prefabricated houses. Considering this, an annual average growth rate of 12% is applied to forecast the future demand for prefabricated houses (see Table 3.2).

Table 3.2

PROJECTED DEMAND FOR PREFABRICATED HOUSES (TONNES)

Year	Projected Demand
2009	13,611
2010	15,244
2011	17,074
2012	19,123
2013	21,417
2014	23,988
2015	26,866
2016	30,090
2017	33,701
2018	37,745

Demand for prefabricated buildings is forecasted to grow from 13,611 tonnes in the year 2009 to 21,417 tonnes and 37,745 tonnes by the year 2013 and year 2018, respectively.

3. Pricing and Distribution

The CIF price per tonnes of prefabricated building in the year 2006 was Birr 15,029. Allowing 25% for inland transport, taxes and other clearing charges Birr 18,786 per tonne is recommended as a factory gate price.

The product will be sold directly to the end users at the factory-gate.

B. PLANT CAPACITY AND PRODUCTION PROGRAMME

1. Plant Capacity

The annual production capacity of the plant is 20,000 tonnes of prefabricated steel building elements. The capacity is based on 300 working days per annum and in single shift of 8 hours per day.

2. Production Programme

The production programme of the project is indicated in Table 3.3. It is anticipated that the plant would reach its full installed capacity within four years starting with 60% in the first year and growing to75%, 90% and 100% in the second year, third and fourth years respectively.

Table 3.3

PRODUCTION PROGRAMME

Sr. No.	Product	Production Year			
		1	2	3	4-10
1	Prefabricated steel building elements (tonnes)	12,000	15,000	18,000	20,000
2	Capacity utilization rate (%)	60	75	90	100

IV. MATERIALS AND INPUTS

A. RAW MATERIALS

The raw materials used in the manufacture of prefabricated steel building elements are as follows:

- Plates of different thickness , 2mm-20mm,
- Pre coated sheet metal of thickness, 0.3mm-1mm, and
- Fasteners.

All the above raw materials are to be imported.

The annual raw materials consumption (at full plant capacity) and cost is shown in Table 4.1. The total annual cost of raw material is estimated at Birr 294.15 million.

Table 4.1

ANNUAL RAW MATERIAL REQUIREMENT & COST (AT FULL CAPACITY)

Sr. No.	Raw Material	Qty(tonnes)	Cost ('000 Birr)		
			FC	LC	TC
1	Plate				
	1.1 truss	300	39,37.1	1,312.4	5,249.5
	1.2 stand	981.7	12,885	4,295	17,180
	1.3 wall bracing	2327	26,179	8,726	34,905
	1.4 purlin	6545	73,630	24,543	98,173
2	Pre coated sheet				
	2.1 roof	6668	70,019	23,340	93,359
	2.2 wall cladding	3105	32,604	1,087	43,472
3	Fasteners	72.72	13,63.5	454.5	1,818
	Grand Total		**215,317**	**63,757.90**	**294,156.5**

B. UTILITIES

Electricity and water are required utilities of the envisaged project. Total installed power is estimated at 150 kW. The annual requirement and cost of utilities is indicated in Table 4.2.

Table 4.2

ANNUAL UTILITIES REQUIREMENT & COST (AT FULL CAPACITY)

Sr. No.	Utility	Unit of Measure	Qty.	Cost ('000 Birr)
1	Electricity	kWh	288,000	136.22
2	Water	m^3	5000	16.25
	Total			**152.47**

V. TECHNOLOGY AND ENGINEERING

A. TECHNOLOGY

1. Production Process

The production process of prefabricated steel building elements comprises the manufacturing of the steel structures and pre coated sheet for wall cladding and roof. Steel structures such as truss, stand, wall bracing and purlin are manufactured from steel plate by cutting it to standard size using plasma and wire cutting machine and welding follows using the TIG and MIG welding.

The pre coated sheet will be rolled into different configurations (PBA, PBR, and PBU) by using the rolling machine and cut to different standard sizes to match the type of building

to be constructed. These roll formed pre coated steel sheets are used for roofing and wall cladding.

These parts manufactured in the above manner will be punched at the factory based on the design by using punching machine to make holes for fastening each other

All the components manufactured in the factory will be transported carefully to the site where the building is to be constructed and assembled in either concrete slab or pier foundation constructed depending on the location, land slope, soil type, building load, local building codes, and building design.

The project does not have nay negative impact on the environment.

2. Source of Technology

The following Turkey Company is one of the potential plant suppliers:

BIRLIK MAKINA
Mollabey yolu 4.km.Karaot
Cayiri Mevkii Alaoli-Zonguldak
Tel: 905326322429
Fax: 903723228903
Web site: www.tunaexim.com

B. ENGINEERING

1. Machinery and Equipment

The major plant components required for the production of the prefabricated steel building elements and the corresponding costs are indicated in Table 5.1.

Table 5.1

MACHINERY AND EQUIPMENT REQUIREMENT AND COST

Sr. No.	Description	Qty	Cost ('000 Birr)		
			LC	FC	TC
1	Plasma cutting machine	2	75,000	425,000	500,000
2	Wire cutting machine	2	45,000	255,000	300,000
3	TIG welding machine	3	54,000	306,000	360,000
4	MIG welding machine	3	36,000	204,000	240,000
5	Sheet roll forming machine	1	225,000	1,275,000	1,500,000
6	Punching machine	2	67,500	382,500	450,000
7	Press machine	2	60,000	340,000	400,000
8	Mobile crane	1	225,000	1,275,000	1,500,000
8	Tools	5sets	7,500	42,500	50,000
	Grand Total		**795,000**	**4,505,000**	**5,300,000**

2. Land, Building and Civil Works

The entire space required including the plants, storage, office and auxiliary premises, front yard, etc is estimated to be 2,500m^2 of this 1,500 m^2 is built-up area comprising production facility(900m^2), store(400m^2) and office and other service buildings(200m^2). Total cost of building at the rate of Birr 2,300 per m^2 is estimated to be Birr 3,450,000.

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.

The legislation has also set the maximum on lease period and the payment of lease prices. The lease period ranges from 99 years for education, cultural research health, sport, NGO , religious and residential area to 80 years for industry and 70 years for trade while

the lease payment period ranges from 10 years to 60 years based on the towns grade and type of investment.

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

However, the Federal Legislation on the Lease Holding of Urban Land apart from setting the maximum has conferred on regional and city governments the power to issue regulations on the exact terms based on the development level of each region.

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

Regarding land allocation of industrial zones if the land requirement of the project is blow 5000 m^2 the land lease request is evaluated and decided upon by the Industrial Zone Development and Coordination Committee of the City's Investment Authority. However, if the land request is above 5,000 m^2 the request is evaluated by the City's Investment Authority and passed with recommendation to the Land Development and Administration Authority for decision, while the lease price is the same for both cases.

The land lease price in the industrial zones varies from one place to the other. For example, a land was allocated with a lease price of Birr 284 /m^2 in Akakai-Kalti and Birr 341/ m^2 in Lebu and recently the city's Investment Agency has proposed a lease price of Birr 346 per m^2 for all industrial zones.

Accordingly, in order to estimate the land lease cost of the project profiles it is assumed that all manufacturing projects will be located in the industrial zones. Therefore, for this profile, which is a manufacturing project a land lease rate of Birr 346 per m^2 is adopted.

On the other hand, some of the investment incentives arranged by the Addis Ababa City Administration on lease payment for industrial projects are granting longer grace period and extending the lease payment period. The criterions are creation of job opportunity, foreign exchange saving, investment capital and land utilization tendency etc. Accordingly, Table 5.2 shows incentives for lease payment.

Table 5.2

INCENTIVES FOR LEASE PAYMENT OF INDUSTRIAL PROJECTS

Scored Point	Grace Period	Payment Completion Period	Down Payment
Above 75%	5 Years	30 Years	10%
From 50 - 75%	5 Years	28 Years	10%
From 25 - 49%	4 Years	25 Years	10%

For the purpose of this project profile the average, i.e., five years grace period, 28 years payment completion period and 10% down payment is used. The period of lease for industry is 60 years.

Accordingly, the total lease cost, for a period of 60 years with cost of Birr 346 per m^2, is estimated at Birr 51.90 million of which 10% or Birr 5,190,000 will be paid in advance. The remaining Birr 46.71 million will be paid in equal installments with in 28 years, i.e., Birr 1,668,214 annually.

VI. MANPOWER AND TRAINING REQUIREMENT

A. MANPOWER REQUIREMENT

The total manpower required is estimated to be 35 persons. The list of manpower and annual cost of labour is shown in Table 6.1.

Table 6.1

MANPOWER REQUIREMENT AND ESTIMATED LABOUR COST

Sr. No.	Manpower	Req. No.	Monthly Salary (Birr)	Annual Salary (Birr)
1	Manager	1	4,000	48,000
2	Secretary	1	1,000	12,000
3	Production & Technic head	1	3,000	36,000
4	Operators and fitters	6	5,400	64,800
5	Assistant operators	4	2,400	28,800
6	General mechanic	2	1,800	21,600
7	Quality controller	1	1,200	14,400
8	Store keeper	1	700	8,400
9	Purchaser	1	1,500	18,000
10	Sales Person	1	1,500	18,000
11	Driver	2	1,000	12,000
12	Accountant	2	3,000	36,000
13	Cashier	1	600	7,200
14	Cleaner	1	400	4,800
15	Labourers	6	2,400	28,800
16	Guards	3	1,050	12,600
17	Electrician	1	900	10,800
	Sub-Total	**35**		**382,200**
	Benefit (25% BS)			95,550
	Total	**35**		**477,750**

B. TRAINING REQUIREMENT

On-the-job training of production workers is carried out by the experts of machinery suppliers during plant erection and commissioning. The total training cost is estimated at Birr 40,000.

VII. FINANCIAL ANALYSIS

The financial analysis of the prefabricated building 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
Raw material import	90 days
Work in progress	1 days
Finished products	10 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 42.88 million, of which 11 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 ('000 Birr)

Sr. No.	Cost Items	Local Cost	Foreign Cost	Total Cost
1	Land lease value	5,190.00	-	5,190.00
2	Building and Civil Work	3,450.00	-	3,450.00
3	Plant Machinery and Equipment	795.00	4,505.00	5,300.00
4	Office Furniture and Equipment	100.00	-	100.00
5	Vehicle	450.00	-	450.00
6	Pre-production Expenditure*	1,416.19	-	1,416.19
7	Working Capital	26,977.52	-	26,977.52
	Total Investment cost	**38,378.71**	**4,505.00**	**42,883.71**

** N.B Pre-production expenditure includes interest during construction (1.27 million , training (Birr 40 thousand) and Birr 100 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 297.33 million (see Table 7.2). The raw material cost accounts for 98.93 per cent of the production cost. The other major components of the production cost are financial cost depreciation and repair and maintenance which account for 0.64 %, 0.13% and 0.09 % respectively. The remaining 0.21 % is the share of, direct labour, utility and other administration cost.

Table 7.2

ANNUAL PRODUCTION COST AT FULL CAPACITY ('000 BIRR)

Items	Cost	%
Raw Material and Inputs	294,156.50	98.93
Utilities	152.47	0.05
Maintenance and repair	265.00	0.09
Labour direct	229.32	0.08
Labour overheads	95.55	0.03
Administration Costs	137.59	0.05
Land lease cost	-	-
Total Operating Costs	**295,036.43**	99.23
Depreciation	382.00	0.13
Cost of Finance	1,912.71	0.64
Total Production Cost	**297,331.14**	**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 5.86 million to Birr 10.58 million during the life of the project. Moreover, at the end of the project life the accumulated cash flow amounts to Birr 97.30 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.

$$BE = \frac{\text{Fixed Cost}}{\text{Sales} - \text{Variable Cost}} = 26\ \%$$

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 porject is computed to be 21.86 % indicating the vaiability 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 principal 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 37.76 million which is acceptable.

D. ECONOMIC BENEFITS

The project can create employment for 35 persons. In addition to supply of the domestic needs, the project will generate Birr 25.67 million 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. The project will have a forward linkage with the housing construction sector.