

**264. PROFILE ON BRICKS  
MANUFACTURING**

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## **I. SUMMARY**

This profile envisages the establishment of a plant for the production of bricks with a capacity of 2.4 million pieces per annum.

The present demand for the proposed product is estimated at 23.94 million pieces per annum. The demand is expected to reach at 27.8 million pieces by the year 2020.

The plant will create employment opportunities for 16 persons.

The total investment requirement is estimated at Birr 14.23 million, out of which Birr 9.29 million is required for plant and machinery.

The project is financially viable with an internal rate of return (IRR) of 15 % and a net present value (NPV) of Birr 2.96 million, discounted at 8.5 %.

## **II. PRODUCT DESCRIPTION AND APPLICATION**

Bricks are the main building materials and are used in the construction of residential houses, commercial buildings, canals, dams, etc. They are usually produced in the form of common wall bricks, hollow bricks and roof tiles. The demand for bricks is mainly derived from building construction, especially wall construction and currently met through local production. The plant lies in the category of small industry. It has forward linkage effect with the construction sector.

### **III. MARKET STUDY AND PLANT CAPACITY**

#### **A. MARKET STUDY**

##### **1. Past Supply and Present Demand**

The demand for bricks is derived from building construction in general and wall construction in particular. Bricks are used in constructing residential, commercial and institutional buildings. However, the practice of using bricks for residential buildings in the country is limited. Due to the low level of income of the population and the relatively higher price of bricks compared to that of substitute products like hollow blocks, bricks are in most cases used for commercial and institutional buildings. Most residential buildings in the country are built with hollow blocks, albeit bricks are in some cases used for facing some parts of the front side.

Despite the significantly increased construction activities in the country, the rate of utilization of bricks doesn't tend to rise over time. This is reflected in the generally stagnating and mostly declining trend of the supply of the product, which constitutes only domestic production. The production of bricks during the ten years period between 1996 and 2005 is shown in Table 3.1. The quantity of bricks produced in the country averaged at 19712 pieces during the period under reference.

**Table 3.1**  
**SUPPLY OF BRICKS ('000 PCS)**

Year	Domestic Production
1996	15,664
1997	19,876
1998	19,789
1999	19,410
2000	20,152
2001	20,040
2002	22,111
2003	20,961
2004	14,334
2005	24,785
<b>Average</b>	<b>19,712</b>

*Source: CSA, Statistical Abstract, various issues.*

The low rate of utilization of bricks in building residential houses in SNNP Region is particularly evident from the 1994 population and housing census. The distribution of housing units by construction material in the Region based on the 1994 population and housing census is presented in Table 3.2. A look into the distribution of housing units by construction material of wall reveals wood and mud, Wood and Thatch, and Reed and Bamboo, constitute the dominant wall material, accounting for 57.05, 30.94, and 9.86 percent, respectively, of all the housing units in the region. According to the census data, from a total of 2,143,574 housing units in the region those built with bricks constituted only 1,044 units (0.05%).

**Table 3.2**  
**DISTRIBUTION OF HOUSING UNITS BY CONSTRUCTION**  
**MATERIAL, SNNP REGION, 1994**

<b>By Material of Wall</b>	<b>Number</b>	<b>%</b>
Wood and Mud	1,222,980	57.05
Wood and Thatch	663,269	30.94
Reed and Bamboo	211,413	9.86
Stone and Mud	7,967	0.37
Stone and Cement	2,733	0.13
Blockets	1,224	0.06
Bricks	1,044	0.05
Others	26,671	1.24
Not stated	6,273	0.29
<b>All Housing Units</b>	<b>2,143,574</b>	<b>100</b>

*Source: CSA, The 1994 Population and Housing Census of Ethiopia, Results for SNNP Region, 1995.*

As stated above, out of the 2,143,574 total housing units in the Region during 1994, only 1,044 units were built with bricks (i.e.0.05%). Applying the 2.9% rate of population growth in the country on the base year total housing data of 1994 (i.e. 3,108,410) for the Region, the current housing units in the Region that are built with bricks is estimated at 1,554 units. Making use of expert estimate of an average wall area of 230 meter square, the current effective demand (for 2007) for bricks in the SNNP Region is estimated at 23,947,140 pieces of bricks of 6 centimeters by 25 centimeters dimension.

## 2. Projected Demand

Taking into account the developments in the modern urban housing construction and the considerably substantial and growing number of modern urban houses in the Region, a conservative estimate of a 1% rate of growth, a quarter of the rate of urbanization in the country, is applied in projecting the demand for bricks in the Region. Table 3.3 depicts the projected demand for the product.

**Table 3.3**  
**PROJECTED DEMAND FOR BRICKS**

Year	Projected Demand (‘000 pieces)
2007	23,947,140
2008	24,186,611
2009	24,428,478
2010	24,672,762
2011	24,919,490
2012	25,168,685
2013	25,420,372
2014	25,674,575
2015	25,931,321
2016	26,190,634
2017	26,452,541
2018	26,717,066
2019	26,984,237
2020	27,254,079
2021	27,526,620
2022	27,801,886

### **3. Pricing and Distribution**

The current ex-factory unit price of bricks in Addis Ababa is Birr 1.50. Assuming the plant will produce a quality product; this price is proposed for the product of the envisaged plant.

The product can get its market outlet through direct sales to customers that include individuals and contractors.

## **B. PLANT CAPACITY AND PRODUCTION PROGRAMME**

### **1. Plant Capacity**

The envisaged plant will have a production capacity of 2,400,000 pieces of bricks per annum.

### **2. Production Programme**

The proposed plant is planned to function for about 240 days a year in three shifts of 8 hours each. The plant will start production at 80%, 90% and 100% capacity in the first, second and third year and then after, respectively.

## **IV. MATERIALS AND INPUTS**

### **A. RAW MATERIALS**

The raw material used for the production of ordinary type of bricks is clay. This raw material must possess special properties and composition or constituents such as hydrous silicates of aluminum together with some color in imparting materials like hematite and limonite. The annual requirement of clay is estimated at 8,800 tonnes, which cost Birr 78,350 for royalty since it will have its own quarry.

## B. UTILITIES

Major utilities for bricks production are fuel oil for drying and burning the product, electric power for machine drive and water for general purpose. The annual consumption of these utilities is shown in Table 4.1.

**Table 4.1**  
**ANNUAL CONSUMPTION OF UTILITIES AND COST**

Sr. No.	Description	Qty.	Cost '000 Birr
1	Fuel oil (tonnes)	112	288.00
2	Electric power (kWh)	24,000	48.00
3	Water (m <sup>3</sup> )	6,400	20.00
	<b>Grand Total</b>	-	<b>356.00</b>

## V. TECHNOLOGY AND ENGINEERING

### A. TECHNOLOGY

#### 1. Process Description

The most common practice of bricks production involves several unit of operations such as material excavation and transportation, grinding and mixing, brick shaping, drying of semi-finished brick, burning, classifying and packing of the finished product. In the proposed plant, the process starts from grinding operation in order to reduce investment cost.

The quarried raw material is subsequently crushed and wetted several time before it is passed or fed to the press vacuum chamber where air is extracted in order to obtain compact mix. Then a well prepared clay mix is extruded through a mold to get the required shape and dimensions. The wet semi-finished brick is transported to the batch

drying chamber, where drying is carried out by blowing in warm air and expelling of humid air with intensive fanning. Then, the dried batch is transported to the kiln for the final process. Burning of batch in the kiln is accomplished by a flame traveling in circle on top of the bricks. Upon completion of the burning of bricks, the products are sorted in a storage place where preliminary sorting is made. Finally, the selected bricks are made available for market.

## **2. Source of Technology**

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

Movers (India) Private Ltd.

BASAVA BHAVAN, High Grounds.

FAX 91-802263606.

## **B. ENGINEERING**

### **1. Machinery and Equipment**

The machinery and equipment required along with estimated cost are listed in Table 5.1.

The total cost of the machinery and equipment is estimated at Birr 1.43 million.

**Table 5.1****MACHINERY AND EQUIPMENT REQUIREMENT AND COST**

<b>Sr. No.</b>	<b>Items</b>	<b>Cost '000 Birr</b>		
		<b>FC</b>	<b>LC</b>	<b>Total</b>
1	Excavator	2786	-	2786
2	Loader	2090	-	2090
3	Box feeder	732	-	732
4	Roller crusher	976	-	976
5	Vacuum press with mixer	871	-	871
6	Cutter (Semi-automatic	523	-	523
7	Drying kiln	1219	-	1219
	<b>F.O.B</b>	<b>9,197.00</b>	<b>-</b>	<b>9,197.00</b>
	C & F	-	100	100
	<b>Grand Total</b>	<b>9,197.00</b>	<b>100</b>	<b>9,297.00</b>

**2. Land, Building and Civil Works**

The overall land required by the envisaged project is about 5,000 m<sup>2</sup>, of which 2000m<sup>2</sup> is allotted for building and production spaces. The total construction cost at a unit cost of Birr 1800 per m<sup>2</sup> is estimated to be Birr 3,600,000. Land lease cost, at the rate of Birr 0.10 per m<sup>2</sup> and for 70 years, is estimated to be Birr 35,000. Thus, the total land and construction cost assuming that the total land lease cost will be paid in advance amounts to Birr 3,635,000.

**3. Proposed Location**

Klacha town at Chena woreda is recommended as suitable location of the envisaged plant.

## VI. MANPOWER AND TRAINING REQUIREMENT

### A. MANPOWER REQUIREMENT

The envisaged bricks project requires a total of 16 workforces. The list of manpower required and corresponding labor cost is shown in Table 6.1.

**Table 6.1**  
**MANPOWER REQUIREMENT AND ANNUAL LABOUR COST**

Description	Required Number	Salary in Birr	
		Monthly	Annually
<b>A. Administrative staff</b>			
1. Manager	1	1600.00	19200.00
2. Secretary	1	450.00	5400.00
3. Accounting clerk	1	750.00	9000.00
4. Store man	1	350.00	4200.00
5. Guards	2	250.00	6000.00
<b>Sub-Total</b>			<b>43800.00</b>
<b>B. Production staff</b>			
1. Production head	1	1,200.00	14,400.00
2. Supervisor	1	1,050.00	12,600.00
3. Machine operators	2	400.00	9,600.00
4. Mechanic /Electrician	1	500.00	6,000.00
5. Unskilled /workers	5	250.00	15,000.00
<b>Sub-Total</b>	<b>16</b>		<b>44,600.00</b>
<b>Total (A+B)</b>			<b>88,400.00</b>
Benefits (25%)			22,100.00
<b>Grand Total</b>	<b>16</b>		<b>101,500.00</b>

## **B. TRAINING REQUIREMENT**

Due to focus of the government on technical training, skilled workers on construction materials production are available. So no special training is required.

## **VII. FINANCIAL ANALYSIS**

The financial analysis of the bricks 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%
Discount cash flow	8.5%
Accounts receivable	30 days
Raw material local	10 days
Work in progress	2 days
Finished products	30 days
Cash in hand	5 days
Accounts payable	30 days

## **A. TOTAL INITIAL INVESTMENT COST**

The total investment cost of the project including working capital is estimated at Birr 14.23 million, of which 23 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 Cost (‘000 Birr)
1	Land lease value	35.0
2	Building and Civil Work	3,600.0
3	Plant Machinery and Equipment	9,297.0
4	Office Furniture and Equipment	75.0
5	Vehicle	200.0
6	Pre-production Expenditure*	977.3
7	Working Capital	50.5
	<b>Total Investment cost</b>	<b>14,234.8</b>
	Foreign Share	23

\* *N.B Pre-production expenditure includes interest during construction ( Birr 827.30 thousand ) and Birr 150 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 2.66 million (see Table 7.2). The material and utility cost accounts for 16.28 per cent, while repair and maintenance take 10.50 per cent of the production cost.

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

<b>Items</b>	<b>Cost</b>	<b>%</b>
Raw Material and Inputs	78.35	2.94
Utilities	356	13.35
Maintenance and repair	280	10.50
Labour direct	53.04	1.99
Factory overheads	17.68	0.66
Administration Costs	35.36	1.33
Total Operating Costs	820.43	30.75
Depreciation	1187.2	44.50
Cost of Finance	660.01	24.74
<b>Total Production Cost</b>	<b>2,667.64</b>	<b>100</b>

**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 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 including cost of finance when it starts to operate at full capacity ( year ) is estimated by using income statement projection.

$$\text{BE} = \frac{\text{Fixed Cost}}{\text{Sales} - \text{Variable Cost}} = 45 \%$$

## 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 cash flow statement, the calculated IRR of the project is 15 % and the net present value at 8.5 % discount rate is Birr 2.96 million.

## D. ECONOMIC BENEFITS

The project can create employment for 16 persons. In addition to supply of the domestic needs, the project will generate Birr 2.75 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.