

## **75. PROFILE ON HOLLOW BLOCKS**

**TABLE OF CONTENTS**

	<b><u>PAGE</u></b>
I. SUMMARY	75 - 3
II. PRODUCT DESCRIPTION AND APPLICATION	75 - 3
III. MARKET STUDY AND PLANT CAPACITY	75 - 4
A. MARKET STUDY	75 - 4
B. PLANT CAPACITY AND PRODUCTION PROGRAMME	75 - 8
IV. MATERIALS AND INPUTS	75 - 8
A. MATERIALS	75 - 8
B. UTILITIES	75 - 9
V. TECHNOLOGY AND ENGINEERING	75 - 9
A. TECHNOLOGY	75 - 9
B. ENGINEERING	75 - 10
VI. MANPOWER AND TRAINING REQUIREMENT	75 - 12
A. MANPOWER REQUIREMENT	75 - 12
B. TRAINING REQUIREMENT	75 - 12
VII. FINANCIAL ANALYSIS	75 - 13
A. TOTAL INITIAL INVESTMENT COST	75 - 13
B. PRODUCTION COST	75 - 14
C. FINANCIAL EVALUATION	75 - 15
D. ECONOMIC BENEFITS	75 - 16

## **I. SUMMARY**

This profile envisages the establishment of a plant for the production of 700,000 pcs of hollow blocks per annum.

The present demand for the proposed product is estimated at 701,000 pcs and it is projected to reach 3,213,000 pcs by the year 2018.

The plant will create employment opportunities for 21 persons.

The total investment requirement is estimated at Birr 3.43 million, out of which Birr 1.24 million is required for plant and machinery.

The project is financially viable with an internal rate of return (IRR) of 16% and a net present value (NPV) of Birr 983,380, discounted at 10.5%.

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

Stone and bricks can be successfully replaced by concrete blocks made from cement and aggregate of various grades. Great hardness, resistance to atmospheric pressures and a simple production process are only a few advantages of concrete blocks which rank them among greatly appreciated materials for the construction of buildings and other industrial projects.

Hollow blocks of various dimensions can be produced according to moulds mounted on vibrating presses.

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

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

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

The demand for hollow block is derived from building construction activities. Since transporting and selling hollow block over a long distance is not a profitable operation, the relevant market is the local or regional market. Data and information on the amount of public and private sector building construction activity is thus critical to determine the present effective demand and project the future demand.

According to the Three - Years Development Plan of Benishangul -Gumuz region, 10 Health posts, 6 Health centers, 2 Hospitals, 33 Primary Village schools(PVS), 15 complete primary schools (CPS) and 4 Secondary Schools are envisaged to be built in different woredas during the plan period. Apart from these public investments, as a consequence of increased economic activity in the region, the private sector is also bound to invest in the construction of low rising (upto ground plus two) commercial, office, and residential buildings.

Table 3.1 details out the anticipated realization of the foregoing building construction activities over a three years period.

**Table 3.1**  
**PROJECTED IMPLEMENTATION OF CONSTRUCTION PROJECTS**  
**(NUMBER)**

Sr. No.	Item	Year			Total
		2005	2006	2007	
1.	Health Post	2	3	5	10
2.	Health Center	1	2	3	6
3	Hospital	1	1	-	2
4	Primary Village School(PVS)	8	10	15	33
5	Complete Primary School (CPS)	4	5	6	15
6	Secondary School	1	1	2	4
7	Residential House (G+0)	70	80	100	250
8	Commercial & Office Buildings				
	- G+0	30	35	40	105
	- G+1	1	3	5	9
	- G+2	-	1	2	3

In order to establish the wall area of various types of buildings, the Education and Health Sub-Sector Hand books of ESRDF were referred. For Commercial and Residential Buildings a sample of bill of quantity of various buildings was assessed to establish the average wall area. It is also known that for one meter square area of wall, 12.5 hollow blocks having 20X40 cm dimension are required.

The hollow block requirement calculated by type of building on the basis of the above is provided in Table 3.2.

**Table 3.2****HOLLOW BLOCK REQUIREMENT IN BENISHNGUL -GUMUZ REGION**

Type of Buildings	Wall Area (m <sup>2</sup> )	Forecasted Number of Buildings			Forecasted Hollow Block Requirements (pieces of 20X40 cm)		
		2005	2006	2007	2005	2006	2007
Health Post	157.4	2	3	5	3935	5902	9837
Health Center	1143.8	1	2	3	14297	28594	42891
Hospital	2300	1	1	-	28750	28750	-
Primary Village School (PVS)	398	8	10	15	39800	49750	74625
Complete Primary School(CPS)	783	4	5	6	39150	48937	58725
Secondary School	1570	1	1	2	19625	19625	39250
Residential House	230	70	80	100	201250	230,000	287500
Commercial & Office Buildings							
a) G+0	800	30	35	40	300000	35000	400000
b) G+1	1600	1	3	5	20000	60000	100,000
c) G+2	2400	-	1	2	-	30000	60,000
<b>Total</b>					<b>666807</b>	<b>851558</b>	<b>1,072,828</b>

As can be seen from Table 3.2, the total demand estimated for 2005, without considering wastage, is about 667,000 pieces of hollow blocks. When allowance is made for 5% wastage, the estimate comes to about 701,000 pieces.

## 2. Projected Demand

The Benishangul - Gumuz Region's demand for hollow block in the next three years is forecasted on the basis of projected implementation of building construction projects as depicted in Table 3.2 (with 5% adjustment for wastage). For the part of the forecasted period extending beyond the coming three years, an annual average growth rate of 10% is used to execute demand projection; the underlying assumption being that as observed in many countries, both developed and underdeveloped, the rate of growth of the construction sector had been consistently higher than that of the economy as a whole. Since the Ethiopian Economy has been growing at an average rate of 7% in the recent past, a 10% growth rate in the construction sector is not an unlikely scenario in the future. Table 3.3 shows the demand projection made on the basis of these assumptions.

**Table 3.3**  
**PROJECTED DEMAND FOR HOLLOW BLOCK**

<b>Year</b>	<b>Projected Demand (pieces)</b>
2005	701,000
2006	894,000
2007	1,126,000
2008	1,239,000
2009	1,362,000
2010	1,499,000
2011	1,649,000
2012	1,813,000
2013	1,995,000
2014	2,194,000
2015	2,414,000
2016	2,655,000
2017	2,920,000
2018	3,213,000

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

Due to the sudden rise in the price of cement, the price of hollow block has also soared. However, it is doubtful that the current price will be sustained for long time. Therefore, giving due consideration for past trends, a factory-gate price of Birr 2.75 per piece is recommended. The product can be distributed directly from the plant site with out involving intermediaries.

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

### **1. Plant Capacity**

The envisaged plant will have a capacity of producing 700,000 pcs of hollow blocks per year based on the market study & availability of the basic raw material (aggregate).

### **2. Production Programme**

The plant is planned to produce at 75% & 90% of its capacity considering the market penetration (since the technology is simple) in the first year and second year of operation, respectively. It will start producing at full capacity in the third year and thereafter.

The plant will operate in one shift of 7 hours of effective work per day and 300 days a year.

## **IV. MATERIALS AND INPUTS**

### **A. MATERIALS**

The basic raw materials used in the manufacture of concrete hollow blocks are cement and aggregate of various grades (sand and gravels). The aggregates are available in bulk in the region. Cement can be obtained from Muger or Mesebo cement factory through distributors. Detailed raw material requirements and their cost is depicted on the Table 4.1.

**Table 4.1****ANNUAL REQUIREMENT OF RAW MATERIALS AND COST**

<b>Sr. No.</b>	<b>Description</b>	<b>Unit of measure</b>	<b>Qty</b>	<b>Cost, Birr</b>
1	Cement	quintal	8,340	834,000
2	Sand / pumice	m <sup>3</sup>	3,000	171,000
	<b>Total</b>			<b>1,005,000</b>

**B. UTILITIES**

The utilities required by the plant are electricity for machinery operation and lighting, and water for the production process and general use. Annual requirement of electricity is estimated to be 40,000 kWh and its cost is about Birr 18,960. Annual requirement of water is estimated at 15,000 m<sup>3</sup> and its cost is about Birr 30,000. The total cost of utilities is estimated to be Birr 48,960.

**V. TECHNOLOGY AND ENGINEERING****A. TECHNOLOGY****1. Production Process**

Sand is transported by trucks and piled at the work site. The scraper with an arm for sand feeding is mounted on the turning support so that it can feed the piles located on at the work site to a belt conveyor of special construction. Cement and sand in a proportion of one to five is mixed in the concrete batch device by adding water. Cement is stored in telescopic cement silo. At the bottom section of the silo there is an opening for the out pouring of cement and corresponding connection to the screw conveyor.

Cement is transported to the precise scale located above the mixer. The scale chamber is opened by hydraulic cylinder. Water is fed to the mixer over the contact water meter and controlled by the electromagnetic valve.

Freshly prepared concrete mix that out poured from mixer is taken by the forklift trucks with mounted hydraulic buckets and conveyor to the self propelled movable vibrating press for manufacturing of blocks. Dried blocks are transported from the batch site to the storage by forklift trucks.

## **2. Source of Technology**

The technology and machinery can be obtained from Indonesia by the following address.

P.T.E- Commerce Nusantara  
Jalan pasar Baru Timur No. 11-D  
Jakarta 10710.  
Indonesia.

Telephone + 62-21-384 9906  
                  + 62-21-384 9910  
                  + 62-21-384 9912  
Fax           + 62-21-384 983.

E-mail, inquiries@ Indonesian Export. Com.

## **B. ENGINEERING**

### **1. Machinery And Equipment**

The machinery and equipment required for the production of hollow block are shown in Table 5.1. The total cost of machinery and equipment is estimated to be Birr 1,242,097, out of which Birr 993,677 is required in foreign currency.

**Table 5.1**  
**LIST OF MACHINERY AND EQUIPMENT**

<b>Sr. No.</b>	<b>Machinery &amp; Equipment Required</b>
1	A concrete plant, capacity 6 m <sup>3</sup> /hr consists of: <ul style="list-style-type: none"> <li>- Forced high capacity mixer</li> <li>- Sand feeding automatic scale</li> <li>- Cabinet feeding automatic scale</li> <li>- Water feed meter with electromagnetic control</li> <li>- Belt conveyor</li> <li>- Electric control cabinet</li> <li>- Scraper with arm for sand feeding</li> <li>- Screw conveyer</li> <li>- Telescopic cement silos</li> <li>- Cement fluidization device</li> </ul>
2	Fork lift truck with mouted hydraulic bucket
3	Self propelled vibrating press

## **2. Land, Buildings and Civil Works**

A total of about 3,000 m<sup>2</sup> is required for the envisaged plant which includes a store house, a site for raw materials, a liquid concrete plant, an auxiliary building and also open air for drying of the blocks. The built up area is about 1,000 m<sup>2</sup>. The construction cost is estimated at a rate of Birr 1,200/m<sup>2</sup>. The total cost of construction is estimated to be Birr 1,200,000. The land lease value, at a rate of Birr 1.2/m<sup>2</sup> for 70 years land holding, is calculated to be Birr 252,000. Thus, the 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 1.45 million.

## **3. Proposed Location**

Based on the availability of infrastructure and utility, Assosa town is proposed to be the location of the envisaged plant.

## VI. MANPOWER AND TRAINING REQUIREMENT

### A. MANPOWER REQUIREMENT

The proposed project will require 21 workers. The annual labour cost is estimated at Birr 175,000. The detailed list of manpower required with the corresponding salary payment is presented in Table 6.1.

**Table 6.1**  
**MAN POWER REQUIREMENT AND LABOUR COST (BIRR)**

Sr. No.	Description	Req. (No.)	Monthly Salary	Annual Salary
1	General Manager	1	1,500	18,000
2	Executive Secretary	1	700	8,400
3	Supervisor	1	900	10,800
4	Semi Skilled Workers	10	450	54,000
5	Forklift Operator	1	500	6,000
6	Driver	2	400	9,600
7	Store Man	1	500	6,000
8	Sales Man	1	600	7,200
9	Cashier	1	500	6,000
10	Mechanic	1	600	7,200
11	Electrician	1	600	7,200
	<b>Sub-Total</b>	<b>21</b>		<b>140,400</b>
	25% Employees Benefit			35,100
	<b>Grand Total</b>	<b>21</b>		<b>175,500</b>

### B. TRAINING REQUIREMENT

Since the process is very simple, on-job-training of the production personnel by the experts of machinery suppliers will be conducted for two weeks during erection and commissioning period of the plant. The total cost of training is estimated to be Birr 30,000.

## **VII. FINANCIAL ANALYSIS**

The financial analysis of hollow blocks project is based on the data provided 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	10.5%
Discounted cash flow	10.5%
Repair and maintenance	5 % of Plant machinery and equipment
Accounts receivable	30 days
Raw material (local)	30 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 3.43 million, out of which about 29% will be required in foreign currency. Details are indicated in Table 7.1.

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

<b>Sr. No.</b>	<b>Cost Items</b>	<b>Foreign Currency</b>	<b>Local Currency</b>	<b>Total</b>
1	Land	-	252.0	252.00
2	Building and Civil Work	-	1,200.00	1,200.00
3	Plant Machinery and Equipment	993.68	248.42	1,242.10
4	Office Furniture and Equipment	-	75.00	75.00
5	Vehicle	-	175.00	175.00
6	Pre-production Expenditure*	-	323.74	323.74
	<b>Total Investment Cost</b>	<b>993.68</b>	<b>2,274.06</b>	<b>3,267.74</b>
7	Working Capital		171.94	171.94
	<b>Grand Total</b>	<b>993.68</b>	<b>2,446.00</b>	<b>3,439.68</b>

## **B. PRODUCTION COST**

The annual production cost at full operation capacity of the plant is estimated at Birr 1.78 million (see Table 7.2). The material and utility cost accounts for 58 per cent while repair and maintenance take 3.48 per cent of the production cost.

---

\* *Pre-production expenditure include interest during construction (Birr 323,740), training (Birr 30,000) 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	753.75	904.50	1,005.00	1,005.00
Labour Direct	63.18	75.82	84.24	84.24
Utilities	22.50	27.00	30.00	30.00
Maintenance and repair	46.58	55.89	62.10	62.10
Labour overheads	26.32	31.59	35.10	35.10
Administration cost	42.12	50.54	56.16	56.16
<b>Total operating costs</b>	<b>954.45</b>	<b>1,145.34</b>	<b>1,272.60</b>	<b>1,272.60</b>
Depreciation	310.31	310.31	255.31	255.31
Cost of Finance	247.23	197.79	123.62	49.45
<b>Total Production Cost</b>	<b>1,512.00</b>	<b>1,780.70</b>	<b>1,651.53</b>	<b>1,577.36</b>

## C. FINANCIAL EVALUATION

### 1. Profitability

According to the projected income statement, the project will start generating profit in the second 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.

$$\text{Be} = \frac{\text{Fixed Cost}}{\text{Sales-Variable Cost}} = 40 \%$$

## 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 6 years time.

## 4. Internal Rate of Return and Net Present Value

Based on the cash flow statement, the calculated IRR of the project is 16 % and the net present value at 10.5% discount rate is Birr 983,380.

## D. ECONOMIC BENEFITS

The project can create employment opportunities for 21 persons. In addition to supply of the domestic needs, the project will generate Birr 1.57 million in terms of tax revenue. Moreover, the Regional Government can collect employment, income tax and sales tax revenue.