

**133. PROFILE ON PRODUCTION OF BROOM  
& BRUSH**

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## **I. SUMMARY**

This profile envisages the establishment of a plant for the production of broom and brush with a capacity of 1.25 million pieces per annum.

The present demand for the proposed product is estimated at 817,328 pieces per annum. The demand is expected to reach at 12.59 million pieces by the year 2022.

The plant will create employment opportunities for 20 persons.

The total investment requirement is estimated at about Birr 5.10 million, out of which Birr 2.36 million is required for plant and machinery.

The project is financially viable with an internal rate of return (IRR) of 12 % and a net present value (NPV) of Birr 971,350 discounted at 8.5%.

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

Brushes are hand operated tools designed or adapted for such uses as sweeping, scrubbing, painting and smoothing of surfaces. Brooms are bundle of firm natural or artificial fibers bound tightly together, usually on a long handle, and used for sweeping and brushing. Brushes for painting, shoe, hair and cloth as well as brooms are all manufactured from bristles-short stiff filaments, mainly of animal origin. Tooth brush is manufactured from plastic products.

Brush and broom frames and handles are wooden products. Standard sizes for paint brushes are 50,63, 75 and 100mm. and are either circular or rectangular. Standard sizes for cloth and shoe brushes are 75 mm and are rectangular. Standards sizes for broom upright are 200 and 300 mm. and are rectangular.

Brushes and brooms could be manufactured by hand or by an automated machine.

### III. MARKET STUDY AND PLANT CAPACITY

#### A. MARKET STUDY

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

Brushes used as sweeping, scrubbing, painting and smoothing of surfaces while brooms are used for sweeping and brushing. Import has been the only source of supply of brooms and brushes to the domestic market. Table 3.1 depicts imports of the products during 1997 – 2006. Apparently, the amount of imports was considerably fluctuating. During the period under reference, imports varied from 1070 in 1998 to 6094651 in 2004. On the average, the country imported 681106 brooms and brushes during the reference period.

**Table 3.1**  
**IMPORTS OF BROOMS AND BRUSHES (NUMBER)**

<b>Year</b>	<b>Imports</b>
1997	3524
1998	1070
1999	46465
2000	6641
2001	27818
2002	70274
2003	190737
2004	6094651
2005	93367
2006	276516
<b>Average</b>	<b>681106</b>

*Source: Customs Authority, External Trade  
Statistics, 1997-2006.*

Assuming supply was driven by demand, the average annual supply for the period under reference, which constitutes only imports, is considered as the effective demand for the product for the year 2006. The average rate of growth of imports of the product during the reference period is very high (about 880%). However, a conservative estimate of 205% rate of growth is adopted in estimating the demand for the product. The present demand for the product (i.e. 2007) is thus estimated at 817328.

## 2. Demand Projection

As stated above, a growth rate of 20% is considered in projecting the demand for brooms and brushes. The projected demand for the product is shown in Table 3.2.

**Table 3.2**

**PROJECTED DEMAND FOR BROOMS AND BRUSHES**

<b>Year</b>	<b>Projected Demand (Number)</b>
2007	817328
2008	980794
2009	1176952
2010	1412343
2011	1694811
2012	2033774
2013	2440528
2014	2928634
2015	3514361
2016	4217233
2017	5060680
2018	6072815
2019	7287379
2020	8744854
2021	10493825
2022	12592590

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

Based on the CIF price of the external trade statistics for 2006 (the latest data available), and allowing 30% for import duty and other clearing expenses, the factory gate price for the envisaged plant is estimated at Birr 3.85 per unit.

The product can get its market outlet through the existing wholesale and retail network

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

### **1. Plant Capacity**

According to market study indicated above, projected demand for brooms and brushes (paint brush; shoes, hair and cloth brushes; sweeping brooms and brushes) in year 2007 is 817,328 pieces. This demand will grow to 3,514,361 pieces and 8,744,854 pieces in 2015 and 2020, respectively. In 2010, the projected demand of the assorted products will be 1,412,343 pieces. It is therefore suggested that the envisaged plant will have annual production capacity of 1,250,000 pieces. The percentage share of each product can be decided on the basis of prevailing market demand. The plant will operate single shift 8 hours a day and 300 days a year.

### **2. Production Programme**

The production programme is scheduled in such a way that the plant will assume production at 75% of full capacity during the first year. Then production will rise to 85% and 100% in the 2<sup>nd</sup> and 3<sup>rd</sup> year, respectively. The product mix and corresponding quantity that would be produced at full capacity is ;

- Paint brushes – 500,000 pieces
- Shoes, hair and cloth brushes - 500,000 pieces
- Sweeping brooms & brushes - 250,000 pieces.

#### IV. MATERIALS AND INPUTS

##### A. RAW AND AUXILIARY MATERIALS

The major raw materials required for the production of brushes and brooms are bristles, ferrules and handles. Annual requirements at full capacity production and corresponding costs are given in Table 4.1 below.

Auxiliary materials include paints and varnish. Annual requirement at full capacity production is given in Table 4.1 below.

**Table 4.1**  
**RAW AND AUXILIARY MATERIALS REQUIREMENTS AND COSTS**

No.	Description	Qty	Cost ('000 Birr)		
			LC	FC	TC
	<b>A. <u>Raw Materials</u></b>				
1	Bristles – (ton)	85	-	2805	2805
2	Ferrule – (ton)	52	-	270.4	270.5
3	Wood – (ton)	115	149.5	-	149.5
	<b>Sub total</b>		<b>149.5</b>	<b>3075.4</b>	<b>3224.9</b>
	<b>B. <u>Auxiliary Materials</u></b>				
1	Paints and varnish (ton)	5	65	-	65
	<b>Sub total</b>		<b>65</b>	<b>-</b>	<b>65</b>
	Freight, insurance, bank customs		350	-	350
	<b>Total</b>		<b>564.5</b>	<b>3075.4</b>	<b>3639.90</b>

## **B. UTILITIES**

Electricity and water are utilities required for broom and brush manufacturing plant. Electricity is used to operate production equipment and for power sockets and lighting. Water is used for sanitation and general purpose. Annual consumption of electricity is estimated 120,000 kWh, which costs Birr 56,880. Water consumption is estimated to be 500 m<sup>3</sup>, and at the rate of Birr 10 per m<sup>3</sup>, annual expenditure will be Birr 5,000. Thus, the total annual expenditure on utilities will be Birr 61,880.

## **V. TECHNOLOGY AND ENGINEERING**

### **A. TECHNOLOGY**

#### **1. Production Process**

Tafts of filling materials of fibres are first picked up and automatically inserted in the ferrules knot picking machine. Mixing, metering and dispersion as well as assembly is carried out in the respective machines.

The bristles are then secured to the wooden handles by ferrules in the stapling machines. Trimming and sizing are performed in their respective machine. Finally, it is varnished or painted and then inspected.

#### **2. Sources of Technology**

Broom and brush manufacturing involves the application of simple technology. The machinery and equipment have been in use for several years in the past by different countries in Europe, Asia and even in Africa. There are thus well experienced machinery suppliers. Address of one such supplier is given below:

Maoyin g zi Hamlet, Dalianwan Town, Ganjingzi District

Dalian, CHINA

Tel. 86-411-81335615

Fax: 86-411-8711 2012

E-mail: [redwood125@163.com](mailto:redwood125@163.com)

## **B. ENGINEERING**

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

As indicated above the technology of broom and brush manufacturing involves simple machinery like picking machine, trimming machine, stapling and sanding machines, circular saw, etc. Details of machinery and equipment required by the envisaged plant and related investment in local and foreign component are given in Table 6.1 below.

**Table 6.1**  
**LIST OF MACHINERY AND EQUIPMENT**

No.	Description	Qty	Cost ('000 Birr)		
			LC	FC	TC
1	Circular saw	1	-	42	42
2	Planing & thickening machine	1	-	80	80
3	Two-sided shaper	1	-	65	65
4	Sanding machine	1	-	70	70
5	Flirting machine	1	-	115	115
6	Stapling machine	1	-	175	175
7	Trimming machine	1	-	215	215
8	Mixing, metering and dispersion machine	1	-	450	450
9	Assembly machine	1	-	520	520
10	Knot picking machine	1	-	280	280
	FOB Price	-	-	2012	2012
	Freight, insurance, customs, bank, material handling costs	-	350	-	350
	<b>CIF Landed Cost</b>	<b>-</b>	<b>350</b>	<b>2012</b>	<b>2362</b>

## **2. Land, Building and Civil Work**

Land is required for factory and administrative buildings. The factory building consists mainly of production hall, stores for raw materials and finished goods, workers dressing rooms and latrines, offices for production supervisors and foremen, quality control units, etc. Administration building will incorporate offices for management staff. Other social buildings (canteen, assembly hall, etc) can also be required. Land will also be secured for future expansion of the plant. Consequently, it is proposed that that 1,500 m<sup>2</sup> of land is required for broom and brush manufacturing plant. At a land lease rate of Birr 1.0 for a period of 80 years, the land lease value will be Birr 120,000. Of the total land proposed, the built-up are will be 600 m<sup>2</sup>. At the rate of Birr 2,000 per m<sup>2</sup>, the building cost will be Birr 1.2 million. Thus, the total investment on land, building and civil works will be Birr 1.32 million.

## **3. Proposed Location**

Location of a plant is determined on the basis of proximity to raw material, availability of infrastructure and distance from potential market outlets. Moreover, considering fair distribution of the projects among the SNNPRS woredas three woredas namely; Lemo, Sodo zuria and Decha are identified. Of these Decha woreda is selected. It is therefore suggested that the plant will be established in chiri town.

## **VI. MANPOWER AND TRAINING REQUIREMENTS**

### **A. MANPOWER REQUIREMENT**

The envisaged plant requires both skilled production workers and administrative staff. The details of manpower and monthly and annual salaries are given in Table 7.1 below.

**Table 7.1**  
**MANPOWER REQUIREMENT AND RELATED SALARIES**

No.	Job Title	Nos.	Monthly Salary	Annual Salary
	<b><u>A. Administration</u></b>			
1	Plant manager (Administration & Finance)	1	2000	24000
2	Secretary	1	600	7200
3	Sales man	1	800	9600
4	Store man	1	800	9600
5	Cashier	1	450	5400
6	General services	4	250	12000
	<b>Sub total</b>	<b>9</b>		<b>67800</b>
	<b><u>B. Production</u></b>			
1	Production head	1	1200	14400
2	Skilled workers	6	600	43200
3	Unskilled workers	3	250	9000
4	Technician	1	600	7200
	<b>Sub total</b>	<b>11</b>	<b>-</b>	<b>73800</b>
	Workers' benefit (25% BS)	-	-	35400
	<b>Total</b>	<b>20</b>		<b>177000</b>

## **B. TRAINING REQUIREMENT**

Production of brushes and brooms is not a complicated process. It requires and operational know-how related to wood working industries. Thus, training of operators and technician could be handled by making arrangements in one of local wood working industries. The total cost of such training is estimated at Birr 25,000.

## VII. FINANCIAL ANALYSIS

The financial analysis of the broom and brush 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	years
Bank interest	8 %
Discount cash flow	8.5%
Accounts receivable	30 days
Raw material local	30 days
Raw material, 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 investment cost of the project including working capital is estimated at Birr 5.10 million, of which 37 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	120.0
2	Building and Civil Work	1,200.0
3	Plant Machinery and Equipment	2,362.0
4	Office Furniture and Equipment	125.0
5	Vehicle	200.0
6	Pre-production Expenditure*	425.2
7	Working Capital	673.5
	<b>Total Investment cost</b>	<b>5,105.7</b>
	Foreign Share	37

\* *N.B Pre-production expenditure includes interest during construction ( Birr 275.22 thousand ) training (Birr 25 thousand ) and Birr 125 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 4.51 million (see Table 7.2). The material and utility cost accounts for 81.98 per cent, while repair and maintenance take 1.66 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	3,639.90	80.61
Utilities	61.88	1.37
Maintenance and repair	75	1.66
Labour direct	70.2	1.55
Factory overheads	23.4	0.52
Administration Costs	46.8	1.04
Total Operating Costs	3,917.18	86.75
Depreciation	378.7	8.39
Cost of Finance	219.57	4.86
<b>Total Production Cost</b>	<b>4,515.45</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 3) is estimated by using income statement projection.

$$\text{BE} = \frac{\text{Fixed Cost}}{\text{Sales} - \text{Variable Cost}} = 63 \%$$

## 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 7 years.

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

Based on the cash flow statement, the calculated IRR of the project is 12% and the net present value at 8.5% discount rate is Birr 971,350.

## D. ECONOMIC BENEFITS

The project can create employment for 20 persons. In addition to supply of the domestic needs, the project will generate Birr 959,360 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.