

202. PROFILE ON PRODUCTION OF AGRO CHEMICAL SPRAYER

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I. SUMMARY

This profile envisages the establishment of a plant for the production of agro chemical sprayer with a capacity of 45,000 pieces per annum.

The present demand for the proposed product is estimated at 386,121 pieces per annum. The demand is expected to reach at 3.14 million pieces by the year 2022.

The plant will create employment opportunities for 18 persons.

The total investment requirement is estimated at Birr 4.56 million, out of which Birr 1 million is required for plant and machinery.

The project is financially viable with an internal rate of return (IRR) of 32% and a net present value (NPV) of Birr 4.17 million discounted at 8.5%.

II. PRODUCT DESCRIPTION AND APPLICATION

Agro-Chemicals sprayer is equipment made of high-density polyethylene (HDPE) plastic material (tank) used for holding agro-chemicals (pesticide, insecticide) in liquid form.

The sprayer comprises of a high density polyethylene plastic tank for holding the agro-chemical in liquid form, detachable piston type hydraulic pump and pressure chamber made of brass, suction hose with strainer, steel frame/ stand, operating level, foam cushioned back pad and shoulder straps and delivery hose with cut-off device, goose-neck lance and adjustable triple action nozzle.

The following are the special features of the product:

- Sprayer can be operated either with left or right hand as per choice.

- Pump and pressure chamber assembly has been mounted outside the chemical tank for easy maintenance and to minimize direct contact with the chemical.
- High volumetric capacity of pressure chamber to minimize fluctuation in pressure and discharge rate.
- Chemical tank detachable from pump and pressure chamber assembly for easy replacement for spraying different types of agro-chemical.
- Longer length of pump operating lever higher mechanical advantage.
- Foam cushioned back pad and shoulder straps for fatigueless working with the sprayer.
- Light in weight for comfortable carriage of the sprayer on the back of the operator.

Level-operated knapsack sprayer fitted with a hydraulic pump is a high volume sprayer. It is operated at a normal working pressure of 300 KPa. The pressure is employed to atomize the spraying liquid into droplets. The droplet size (VMD) is about 400 micron. About 300 to 500 liters of solution is normally sprayed per hectare while working with this type of sprayer. The equipment is useful for spraying almost all types of agro-chemicals.

III. MARKET STUDY AND PLANT CAPACITY

A. MARKET STUDY

1. Past Supply and Present Demand

The country's requirement for the product has been essentially met through imports. The amount of imports of the product during 1997-2006 is shown in Table 3.1. As can be seen from the information depicted in the Table, the amount of imports considerably fluctuated with a rising trend. During the period under reference, imports increased from 5656 in 1997 to 1341091 in 2006. On the average, the country imported 335758 agro-chemical sprayers during the reference period.

Table 3.1
IMPORTS OF AGRO-CHEMICAL SPRAYERS

Year	Imports (Numbers)
1997	5656
1998	7676
1999	8801
2000	18375
2001	7658
2002	12474
2003	70787
2004	1124108
2005	760952
2006	1341091
Average	335758

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 computed to be about 240.35%. However, a conservative estimate of 15% 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 386121.

2. Demand Projection

As stated above, a growth rate of 15% is considered in projecting the domestic for agro-chemical sprayers. The projected demand for the product is shown in Table 3.2.

Table 3.2**PROJECTED DEMAND FOR AGRO-CHEMICAL SPRAYERS (NUMBERS)**

Year	Projected Demand
2007	386121
2008	444039
2009	510645
2010	587242
2011	675328
2012	776627
2013	893121
2014	1027090
2015	1181153
2016	1358326
2017	1562075
2018	1796386
2019	2065844
2020	2375721
2021	2732079
2022	3141890

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 289.71 per unit.

The product can get its market outlet through the existing wholesale and retail network for agricultural inputs. The envisaged plant can also supply its product directly to users or appoint agents at selected locations.

B. PLANT CAPACITY AND PRODUCTION PROGRAM

1. Plant Capacity

The plant is envisaged to produce 45,000 pieces of sprayers per year, in 300 working days and operating 24hrs/day.

2. Production Programme

The production programme is shown in Table 3.1. The production programme is set by considering just 300 working days per annum.

Table 3.1
PRODUCTION PROGRAMME

Year	1	2	3	4
Capacity utilisation (%)	70	80	90	100
Production programme (tons)	31,500	36,000	40,500	45,000

IV. MATERIALS AND INPUTS

A. RAW MATERIALS

Table 4.1 below provides list and costs of raw materials required for the project at full capacity operation.

Table 4.1
ANNUAL RAW MATERIAL REQUIREMENT

Sr. No	Raw Material	Unit	Annual Consumption	('000 Birr)		
				FC	LC	Total
1	M.S. Rod	ton	27		185.2	185.2
2	M.S. Strip	ton	78		535	535
3	M.S. Wire	ton	2.4		16.5	16.5
4	M.S. Pipe	ton	7.8		67	67
5	M.S. Channel with lever	pcs	45,000		392.3	392.3
6	Tank ,Strainer, Caps, handle grip, pump and all other sprayer components ,powder coating, spares and operational manuals and parts catalogue	set	45,000	7533	1,883	9,416
7	Packaging materials, plastic bags and cartons	set	45,000		627.8	627.8
	Total			7,533	3,706.8	11,239.8

B. UTILITIES

Utilities such as oil, water and electricity are required by the plant. The annual consumption is shown in Table 4.2 below.

Table 4.2
ANNUAL CONSUMPTION OF UTILITIES

Sr. No	Utility	Unit	Annual Consumption	('000 Birr)		
				F.C	L.C	Total
1	Water	m ³	300	-	1.7	1.7
2	Electricity	KWH	144,000		68.7	68.7
	Total			-	70.4	70.4

V. TECHNOLOGY AND ENGINEERING

A. TECHNOLOGY

1. Production Process

Lever-operated knapsack sprayer consists of about 150 components which are by different manufacturing processes as enlisted below:

- Brass forgings
- Brass castings
- Fabrication work such as sheet metal forming etc.
- Welding
- Brazing
- Soldering
- Plastic molding
- Machining & grinding
- Surface treatment such as chemical polishing, coating, painting etc.

Tools for production of components by different processes as enlisted above shall be developed and sources of supply shall be identified within the country.

The operations such as welding, brazing, soldering and chemical finishing etc. shall be performed with in-house facilities.

All the components and sub-assemblies shall undergo strict quality control measures before assembly of the spares.

The sprayer shall be thoroughly tested for performance as per relevant specifications in a modern laboratory proposed to be established at the works.

2. Source of Technology

The technical data and information are compiled from a document of National Research Development Corporation (NRDC) of India.

3. Proposed Location

The proposed location for the plant is Butajira town in Kebena woreda, Alaba Special Woreda.

B. ENGINEERING

1. Machinery and Equipment

The list of machinery and equipment required by the plant is given in Table 5.1. The total cost of machinery and equipment is estimated at Birr 334.8 thousands out of which Birr 279 thousands will be required in foreign currency.

Table 5.1
LIST OF MACHINERY AND EQUIPMENT

Sr. No	Item
1	Welding Set
2	Gas Welding Equipment
3	Drilling Machine
4	Pedestal Grinder
5	Portable Drilling Machine
6	Air Compressor
7	Spray Painting Gun
8	Roll Marking Machine
9	Impact Press
10	Test Rigs
11	Jigs, Fixtures, and press tools

2. Building and Civil Works

The total land requirement is close to 1,000 m². The built up area is estimated at 400 m² while the remaining part is for open space and for future expansion. The lease cost for 99 years lease holding will be Birr 79,200.

Building and civil works are estimated to cost about Birr 1,000,000.

VI. MANPOWER AND TRAINING REQUIREMENT

A. MANPOWER REQUIREMENT

The manpower requirement of the plant and the monthly and annual salary expenditure are shown in Table 6.1.

Table 6.1
REQUIRED MANPOWER

Sr. No	Manpower	Quantity	Monthly Salary	Annual Cost
1	General Manager	1	3,000	36,000
2	Technical "	1	2,500	30,000
3	Administrative Manager	1	1,200	14,400
4	Production Head	1	1,500	18,000
5	Supervisor	1	1,200	14,400
6	Skilled technicians	3	2,400	28,800
7	Semiskilled Operators	2	1,000	12,000
8	Maintenance crew	2	1,400	16,800
9	Unskilled (Labourers)	3	750	9,000
10	Guards	3	600	7,200
	Total	18	15,550	186,600

B. TRAINING REQUIREMENT

The technical personnel of the plant should be trained by qualified engineers. The cost of training is estimated at about Birr 30,000.

VII. FINANCIAL ANALYSIS

The financial analysis of the agro chemical sprayer 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	10.5%
Accounts receivable	30 days
Raw material local	30days
Raw material, import	90days
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 4.56 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	79.2
2	Building and Civil Work	1,000.00
3	Plant Machinery and Equipment	334.80
4	Office Furniture and Equipment	75
5	Vehicle	200
6	Pre-production Expenditure*	275.74
7	Working Capital	2601.45
	Total Investment cost	4,566.2
	Foreign Share	23

* *N.B Pre-production expenditure includes interest during construction (Birr 125.74 thousand) training (Birr 30 thousand) and Birr 120 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 3.40 million (see Table 7.2). The material and utility cost accounts for 76.89 per cent, while repair and maintenance take 1.21 per cent of the production cost.

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

Items	Cost	%
Raw Material and Inputs	11,239.80	94.55
Utilities	70.40	0.59
Maintenance and repair	75	0.63
Labour direct	111.96	0.94
Factory overheads *	37.32	0.31
Administration Costs **	74.64	0.63
Total Operating Costs	11,609.12	97.66
Depreciation	160.98	1.35
Cost of Finance	117.03	0.98
Total Production Cost	11,887.13	100

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.

$$\text{BE} = \frac{\text{Fixed Cost}}{\text{Sales} - \text{Variable Cost}} = 21 \%$$

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 4 years.

4. Internal Rate of Return and Net Present Value

Based on the cash flow statement, the calculated IRR of the project is 32 % and the net present value at 10.5% discount rate is Birr 4.17 million.

D. ECONOMIC BENEFITS

The project can create employment for 18 persons. In addition to supply of the domestic needs, the project will generate Birr 2.66 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.