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PRE-FEASIBILITY STUDY FOR THE PRODUCTION OF AGRICULTURAL TOOLS, IMPLEMENTS AND SIMPLE EQUIPMENT

UC/SOM/87/153

SOMALIA

Terminal report*

Prepared for the Government of Somalia
by the United Nations Industrial Development Organization

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* This document has not been edited.

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EXECUTIVE SUMMARY

1.1 PROJECT BACKGROUND AND HISTORY

1.1.1 OBJECTIVES OF THE PROJECT:

The prime objective of the project is to carry out a pre-feasibility study for the manufacture of agricultural tools, implements and simple equipment and thereby to provide necessary information to the decision maker, on whether or not to establish such manufacturing enterprise in Somalia. Moreover the study should advise on whether the unit should be established as an extension of the Foundry and Mechanical Workshop (FMW) or as a new independent enterprise.

The pre-feasibility study was partly financed by UNIDO and partly by a contribution in kind of the Government of China in the form of two consultants, the Government of Somalia covered the local costs of the two Chinese consultants.

1.1.2 ECONOMICS OF SOMALIAN AGRICULTURAL AND INDUSTRIAL SECTORS:

a) General Scenario:

Somalia, known as the horn of Africa is amongst the poorest countries in the world and is classified by the United Nations as a least developed country. Somalia's per capita income as per 1988 estimate was US $ 280 only. In an area of 638,000 square kilometers only 8.5 million people are living, thus the population density is only 13.3 persons per sq.kilometer. About 13 percent i.e. 8.2 million hectares out of total 63 million hectares of land is potentially suitable for agriculture. Per capita agricultural land is approximately one hectare. Only 12.2 percent i.e. 1 million out of 8.2 million hectares of potential agricultural land is cultivated at present. General lack of infrastructure --physical and institutional-- and the hostile physical environment, poor communication, lack of modern transportation system and scattered population centres have created serious obstacles to development of the country in general and to agricultural sector in particular. Presently 42 percent of the population are nomads and 31 percent are farmers, cultivating land along the Juba and Sheballe rivers and in the higher rainfall Bay and north-west regions. The rest are urban and semi-urban dwellers. Estimated total GDP during 1989 is 8.12 billion So.Sh. at 1977 constant prices and 426.7 billion So.Sh. at 1989 current prices.

The Somalian economy is dominated by the livestock sector, the principal foreign exchange earning source. Livestock sector provides a living to the large nomadic population and generates

about 46 percent of GDP at 1977 constant prices and 39 percent of GDP at 1989 current prices.

Crop production generates about 16 percent of GDP at 1977 constant prices and 19 percent of GDP at 1969 current prices. Major crops are banana, sugarcane, rice, maize, sorghum, sesame, groundnuts, cotton etc

b) Industrial Scenario:

Approximately 80 percent of the manufacturing enterprises are state-owned, but a shift in policy towards privatization is currently underway. Excepting a few capital intensive projects (mostly non-operative), most of the Industries are still based on processing of agricultural products. Contribution of the manufacturing sector to GDP during 1988 was 3.8 percent at 1977 constant prices and at current prices, it was 4.5 percent. The industrial sector's contribution to GDP is insignificant in comparison to the agricultural sector. At present, on weighted average, only 26 percent of the installed capacities are utilized by the running industries. Considering the weighted average point of break-even, the industrial sector as a whole is running at a loss. One of the major causes for the industrial stagnation is due to inefficient management of enterprises which is the result of low salaries/wages, non-accountability, lack of motivation, non-adherence to modern management systems, inadequate foreign exchange allocation for importing raw materials and spares, frequent load shading etc.

To deal with the deteriorating industrial situation, Government of Somalia has set-up a new set of broad based objectives; primarily to promote export oriented, import substitution, labour intensive industries with greater emphasis on more participation of the private entrepreneurs.

1.1.3 THE FOUNDRY AND MECHANICAL WORKSHOP (FMW) - SUMMARY REVIEW OF ITS PERFORMANCE:

The metal products sub-sector has contributed between 7 to 14 percent of manufacturing output. Government owned Foundry and Mechanical Workshop (FMW) is the only enterprise of its kind in Somalia and has some capacity to manufacture agricultural tools and implements. Therefore, review of the performance of FMW is important from the point of view of the present study.

The Foundry and Mechanical Workshop (FMW) was founded in 1975 with extensive assistance from UNIDO. Subsequently, this assistance has continued in the form of technical and managerial inputs. The objective was to create a nucleus for the development of metallurgical and engineering industries in Somalia and to develop a centre for the training of Somalian technicians.

At present, the plant has a small foundry, with an oil fired cupola furnace of one ton per hour capacity. It has also a medium-sized well-equipped machine shop for castings and production of other metal parts by cutting, forging, milling and welding.

There has been a falling trend in capacity utilization since 1982 when it was 33 percent. Present capacity utilization rate was estimated at 14 percent. Sales in 1986 was So.Sh 13.4 million, with a profit of So.Sh. 0.7 million.

Although the financial accounts have been indicating profits over the years, the figures have been constantly challenged by analysts from bilateral donors. The FMW has not generated any real profit due to operating at low capacity level for the past 5 years.

A study carried out by the International Science and Technology Institute, Inc., Washington, D.C., sponsored by USAID has recommended leasing out the venture to private entrepreneurs for a limited period. Their observations and recommendations were as follows:

Observations:

- The plant may become a viable, profit-making enterprise provided its management is completely restructured and its policies overhauled.
- Under its current budgetary and political constraints, the Government is unable to support the management restructuring process.
- The private sector is best equipped to provide the necessary profit-making incentives and management expertise.

Recommendations:

- As an interim solution, it is suggested that the plant and equipment be leased to a private entrepreneur with an option of ownership transfer to be exercised at a future date. Meanwhile, the entrepreneur will be guaranteed complete freedom of action, thereby completely separating management of the firm from its ownership.

1.1.4 STRENGTHS AND WEAKNESSES OF FMW:

On the basis of the analysis, observations and findings of the entire activities of the FMW, the following conclusions could be made on its strengths and weaknesses.

a) STRENGTHS:

1. FMW is the only industrial enterprise of its kind in Somalia. Therefore, rich experiences and skills of its employees acquired over a decade in metal based production will be an invaluable asset for the proposed plant.

2. Layout of the FMW is good and spacious, therefore, suitable for easy manipulation and subsequent inclusion of the proposed plant as an extension of the FMW.

3. Almost, all of its operating machines/equipment could be effectively assimilated after minor adjustments and overhauling, with the machines and equipment of the proposed plant; as such, sizable amount of investment cost could be saved.

4. Many of the non-operating machines and equipment (due to lack of proper maintenance and spare parts) could also be effectively utilized through major replacements and overhauling, therefore, additional savings in investment cost could be made.

5. Location of the FMW is excellent for an industrial establishment, therefore, the proposed plant would also enjoy the advantages of this location.

6. Site of the FMW is good and all sorts of modern facilities required for industrial establishments are available; as such, the proposed plant could also avail these facilities without incurring major investments in these aspects. Moreover, cost of land could also be saved by utilizing the same premises.

7. Existing building and infrastructure of the FMW could also be used by the proposed plant; as a result, sizable amount of investment costs, in respect of buildings and auxiliary buildings could be saved.

8. FMW has established close liaison and good relationship with some organizations like ONAT and AFMET related to agricultural mechanization in Somalia. The proposed plant could also take the advantages of this relationship for effective testing and marketing of its products.

9. FMW's managers and workers are relatively young, therefore, with improved packages of remuneration and incentives, their services could be utilized for longer time.

10. FMW's present production facilities could be effectively utilized as a training venue for the workers of the proposed plant.

11. Government support and protection are its greatest strength. Despite its poor performance and continuous financial loss, the FMW has not been liquidated or closed down by the Government, rather Government considers FMW as the nucleus for skill and technology development and training of Somalian workers.

b) WEAKNESSES:

1. Concept of modern management practices and systems are totally absent at FMW.

2. Tendency for non-adherence to the recommendations of the previous studies done for organizational development.

3. Serious liquidity problem due to blockade of cash money in inventory which are non-saleable.

4. Working forces are demotivated due to poor remuneration and lack of proper incentive systems.

5. FMW is a public sector enterprise, as such, Government rules and regulations are imposed on it, and it cannot operate like a private enterprise.

6. Modern concepts and proper rules are not followed in timely preparation and presentation of financial statements.

7. So far, it has not developed a good distribution channel for marketing of its products.

8. There is no R & D facilities for management, marketing, production planning and control, etc.

9. Each and every functional area, such as production, stores, purchase, marketing, finance and accounts, organization, personnel management etc. of the FMW are affected by serious performance problems.

1.2 MARKET AND PLANT CAPACITY:

1.2.1 DEMAND AND SUPPLY ANALYSIS:

The major market for agricultural tools and implements is in the seven regions scattered along the banks of the Shabelle and Juba rivers, namely, Hiipan, Mid-Shabelle, Lower Shabelle, Lower Juba, Mid Juba, Gedo and Bay. These regions cover 91 percent of the total irrigated area and 77 percent of the rainfed land.

Both secondary and primary data have been used for demand and supply analysis. The primary data was collected through a limited market survey in and around Mogadishu.

As a nationwide detailed market survey was not possible, hence, the approach of replacement demand has been considered as the base of demand estimation. However, the information from the limited market survey and various co-efficients developed from the secondary data such as, number of farm holdings, crop varieties, climatic effect, soil condition, total cultivable area of the country, ethnic characteristics of farmers, Government policies and programmes etc. have been used to estimate the demand for the product-mix of the proposed plant. The estimated demand for each product has been exhibited in table 3-1 at page 57 of chapter III.

1.2.2 PLANT CAPACITY:

On the basis of the market analysis, it is proposed to manufacture 30 types of implements plus some spare parts and adhoc equipment. The quantities to be produced of each type is shown in Table 3-1 on page 57. The products may be classified into six major groups as follows:

Groups	T y p e	Number of Products
A	Hand Tools	5
B	Manually Operated Implements	9
C	Animal Drawn Implements	5
D	Power Driven Equipment	4
E	Tractor Drawn Implements	7
F	Others(other implements, equipment and spare parts)	2
	T O T A L :	32

Product description and illustrated drawings are presented at Annex-4. At full capacity the plant will process a total of 1443.44 tons of metal in the fifth year and each year thereafter in one shift.

1.2.3 SALES ESTIMATES:

Product pricing has taken cognizance of local prices of imported and local products, current practices, margin charged by different types of distribution channels, quality of products etc. On the basis of these unit prices, revenues from sales of the proposed plant have been estimated. Thus, Schedule 3-2 page 64, and Table 3-2 presented at page 59 shows, yearly detailed sales revenues from the products. Summary of sales revenues and sales and distribution costs for first five years are presented below:

SALES REVENUES AND SALES AND DISTRIBUTION COSTS FOR FIVE YEARS

(Revenues and Costs in 1000 $)

Items	Year-1	Year-2	Year-3	Year-4	Year-5 & Onward
Sales Revenues	643.51	930.80	1,328.14	1,767.12	1,944.53
Sales and Distribution Costs	27.96	29.76	32.16	34.80	36.00

1.2.4 PRODUCTION PROGRAMME:

The proposed plant will utilize multi-purpose universal machines, which will enable it to produce a variety of implements and tools. The proposed production program for the first five years and thereafter is shown in Schedule 3-4 page 66 per product.

It is expected that full capacity utilization will be reached in the fifth year. The production program should be reviewed annually and adjusted in accordance with market demand. A higher production capacity may be reached through operating a second shift.

1.3 MATERIALS AND INPUTS:

Approximately US $ 1.17 millions will be required for materials, inputs and utilities during 5th year of production at full capacity in one shift. Out of this total amount the cost of imported materials and inputs will be US $ 0.973 million i.e. 83 percent. The plant, therefore, will depend heavily on imported materials and inputs. A small saving is achieved through the use of local iron scrap.

The relative share of materials and inputs in the cost of production at full capacity is shown in the table below which reveals that the share of raw metal predominates, being 78,3 percent of the total.

ESTIMATE OF PRODUCTION COSTS; MATERIALS AND INPUTS
AT FULL CAPACITY
(in US $ '000)

Iron and Steel	%	Auxiliary Materials	%	Utilities	%	Others	%	Total
915,58	78,3	133,60	11,4	76,33	6,5	44,53	3,8	1170,04

Source: Schedule 4-1 in Chapter IV.

1.4 LOCATION AND SITE:

The proposed project will be established as an extension of the existing FMW, whose location and site may be considered excellent. Power, water, communication, etc. are readily available at site and there will be no problem for waste disposal. The plant may face the problem of recruiting an adequate number of technicians and skilled workers, notwithstanding the fact that Mogadishu is a labour surplus area. Therefore, technicians may be recruited in advance and given adequate training, when the decision for implementation of the project is taken. The cost of site preparation and development is estimated at US $ 72,500.

1.5 PROJECT ENGINEERING:

1.5.1 TECHNOLOGY AND EQUIPMENT;

In order to manufacture the numerous products, a total of 143 different types of machinery/equipment will be required, of which 56 types i.e. 39 percent of the machinery and equipment are already available at the FMW in varying conditions. The balance, 87 types will have to be procured from abroad. As there will be frequent changes of product batches due to the varied product-mix, Universal Machine Tools and General Purpose Technologies are recommended.

The flow-chart in Chapter VI shows the different production shops and laboratories to cover the different stages of the production processes. The total cost of new equipment will be US $ 1.1 million and the cost of technology acquisition is US $ 80,000 only. Details of the equipment are presented at Schedule 6-2 page 93. Summary of the equipment and technology costs are shown below.

SUMMARY OF TOTAL EQUIPMENT AND TECHNOLOGY COST

Sl.No.	D e s c r i p t i o n	Cost in US $
1.	Foundry shop	36,100
2.	Forging and heat treatment shop	115,000
3.	Punching and welding shop	35,000
4.	Machining shop	152,400
5.	Assembly shop	30,000
6.	Tooling and maintenance shop	256,200
7.	Pump and Agriculture machinery Maintenance shop	--
8.	Others	466,700
9.	Unforeseen cost	8,600
	Sub-Total :	1,100,000
10.	Technology aquisition	80,000
	T O T A L :	1,180,000

1.5.2 CIVIL ENGINEERING;

The layout of the plant has been designed keeping in view the existing FMW. Detailed layout of the proposed plant within the frame work of the FMW is shown at figure 6-2 on page 87. The total cost of the civil engineering works, is estimated at US $ 1.45 million out of which the foreign cost component is estimated at US $ 1.241 million i.e. 85.6 percent. Details of civil engineering costs are shown at schedules 6-4 and 6-5 on pages 98-99. For various types of civil maintenance and repair works US $ 21,750 will be required annually.

It may be noted that, by integrating the new plant with that of the existing FMW at least 35 percent of investment costs in machinery and civil works will be saved.

1.6 PLANT ORGANIZATION AND OVERHEAD COSTS:

The organizational structure suggested for the proposed plant will have two departments. The production department and the department of administration. A detailed organogram of the proposed plant has been presented at figure 7-1 on page 104 in Chapter VII. Here a brief description of the functions and responsibilities of each unit is given. It is recommended that the new plant will be an extension of the FMW. Hence, both the FMW and the proposed plant will have a common management.

1.7 MANPOWER:

The plant will employ a total of 320 workers and staff of whom 55 will be administrators, 35 engineers and 230 workers of various skills involved in the production process. The total cost of manpower will be US $ 86,382 annually. It was assumed that the plant will operate for 303 days per year and for 8 hours per day in one shift. It is important to recruit qualified and experienced managerial staff and engineers in order to achieve the planned level of output and efficiency. It is also necessary to organize training programs regularly for the workers. Schedules 8-1 to 8-5 pages 108-111 give information on the manpower requirements and the corresponding costs.

1.8 IMPLEMENTATION SCHEDULING:

As indicated in the project implementation Schedule presented in figure 9-1 on page 114, approximately 24 months will be required to implement the project, i.e. reach the stage of production. To ensure the proper planning and execution of the construction phase, a project management team should be set up which will include senior managers and engineers of the future plant. US $ 225,000 will be incurred during the implementation phase to cover the cost of various activities as shown in Schedule 9-1 page 115.

1.9 FINANCIAL EVALUATION:

As indicated in table 10-1 page 117the total initial investment costs will be US $ 3,249,197. It is assumed that the initial investment cost will be financed partly in the form of equity and partly in long term loans, and that the ratio of equity to loans will be 40 : 60. Furthermore it is assumed that the interest rate will be 20 percent and the amortization period will be 10 years with one year of grace during which only the interest will be paid.

Sales revenues at full capacity will amount to US $ 1,944,530. Total production costs in the first year of full capacity will amount to US $ 1,834,200.

The financial analysis have been made using the Computer Model for Feasibility Analysis and Reporting (COMFAR) developed by UNIDO. A full set of COMFAR Schedules are attended at Annex 5.

The cash-flow table computed by COMFAR shows a positive net cash-flow, during the construction period, whereas during the first eight years of the operation period, it shows a negative calculated cash-flow of significant proportions. This is partly due to the relatively long period required for the project to attain full capacity of production. Thus, in the sensitively analysis where it was assumed that full production capacity is reached in the fourth year instead of the fifth year of operation, the period of negative cummulated cash-flow is reduced from eight to six years which still does not solve the problem. Another reason for the huge deficit in the cummulated cash-flow is the debt burden. The repayment of principal and the payment of interest must be covered from the cash balance.

The COMFAR cash-flow table in Annex 5, pages 175-178, shows a negative balance of US $ 294,270 in the first year of operation in 1991, peaking at US $ 921,830 in 1994 and then faling to a negative balance of US $ 74,650 in 1998 and showing a positive balance of US $ 243,766 in 1999.

In real life, this situation can not exist, as financial planning would have identified the need for additional funds and arrangements would have been made with a bank to fully cover these requirements through short-term borrowing or overdraft. Otherwise the operation of the plant will either be disrupted or considerably curtailed. It may be observed that the estimated short term funds requirements as shown in the cash-flow table are larger than the net working capital requirements during each of the initial six years of operation. Such a financial structure, where the working capital is entirely dependent on short-term loans is not sound, and suggests that long-term funds (equity capital and long-term loans) need to be increased to cover part of these financial requirements.

From the point of view of the investor, profitability will be measured by calculating the return on equity, Howeve, as the project will be financed by equity and loan capital, it is advisable to calculate the return on total investment (equity and loans), using discounting methods.

There are two useful measures of profitability using discounting methods: the Internal Rate of Return (IRR) and the Net Present Value (NPV). The IRR for this project, as computed by COMFAR, is 11.59 percent which is significantly lower than the interest rate of 20 percent paid on the long term loan. On this basis the project proposal is not acceptable from a commercial point of view.

The NPV has been calculated using a discount rate equal to the nominal rate on the long term loan, namely 20 percent, which has given a negative NPV of - 1188,6 indicating that the project proposal is not acceptable. One may argue about the wisdom of using 20 percent as the discount rate. On the other hand the IRR of 11.59 percent is too low to be used as the discount rate.

On the basis of the financial analysis as shown in Chapter X page 117 - 126 the project should not be accepted from a commercial point of view. However, the management of the FMW may wish to examine the accuracy of the assumed selling prices and the assumed costs of production. If discrepancies are found, the revised estimates may be sent to UNIDO for another analysis using COMFAR.

1.10. ECONOMIC EVALUATION:

1.10.1 ECONOMIC RATE OF RETURN:

Based on assumptions, mentioned in Chapter X page 127, the project shows an EIRR of 16.5 percent after both the preliminary adjusted prices and the foreign exchange rate adjustment. The EIRR is thus barely above the cut-off rate of 16 percent. Therefore this investment project could be acceptable from an economic point of view.

1.10.2 ADDITIONAL SOCIAL EFFECTS:

a) The project will provide direct employment to 320 persons, the majority of whom will be unskilled or semi-skilled workers who may not otherwise be employed. In addition, the project's spill-over effect is expected to provide employment for an additional 100 workers.

b) The output of this project will replace imports and result in significant value added effect.

c) The project will be beneficial to the country in that it will lay the foundation for an engineering industry. The resultant transfer of technology could beneficial to other industrial enterprises.

d) The project will have a training component. By the skills of Somalian workers, they would not only improve their living standards, but also become more useful members of the society in rendering high quality services.

e) As the proposed project will be merged with the FMW, it is expected that this will be the moment to restructure the FMW along the lines recommended by other studies and, hence, bring about an improvement in profitability. This will save the Government sizable subsidies which it is providing the FMW every now and then.

1.11 CONCLUSION AND RECOMMENDATIONS:

The project appears not to be acceptable from a commercial point of view, however from the national point of view the project appears to be beneficial to the economy. It might, therefore, be worth while to re-examine the product mix with a view to maximizing profitability to make it more appealing to investors and less costly to the Government which may have to offer incentives. The follow-up study should, verify the costs and prices assumed in this study and provide missing data such as international prices of products, projection of demand analysis, and technical and financial evaluation of the project under two shifts operation.

CHAPTER - II

PROJECT BACKGROUND AND HISTORY

2.1 PURPOSE OF THE PROJECT:

The purpose of this project is to carry out a pre-feasibility study for the manufacturing of agricultural tools, animal-drawn implements and manually-operated equipment with a view to ascertaining the marketing, technical, commercial and economic viability of establishing such a plant in Somalia. The pre-feasibility study will also examine the status of the existing Foundry and Mechanical Workshop (FMW) and determine whether the proposed manufacturing facility will be an extension of the FMW or a new independent enterprise.

2.2 PROJECT ORIGIN AND IDEA:

Policy makers in Somalia realized that more food crop production may be achieved by utilizing the available unused vast land which would in turn pave the way for Somalian economic emancipation. In order to achieve this objective, the Government has given high national priority to increase agricultural production and productivity. Adoption of modern techniques and agricultural mechanization are the answers to higher production and productivity in the agricultural sector.

With a view to promote South to South Industrial Cooperation, UNIDO has organized a meeting in November 1986, in the Indian capital of New Delhi between African and Asian Countries. At that meeting, an agreement was signed by the Chinese delegates and the Somalian delegates, by which the Chinese Government agreed to provide two experts who will assist in the preparation of a study on the possibility of manufacturing agricultural hand tools, simple equipment and implements in Somalia. Through UNIDO's coordination and financial assistance in the travel costs, the two chinese experts were sent to Somalia in August 1988. Subsequently UNIDO also recruited a Financial Analyst who also participated in the preparation of the pre-feasibility study. Therefore, this study is a joint effort of all three experts concerned.

2.3 ECONOMICS OF SOMALIAN AGRICULTURAL AND INDUSTRIAL SECTORS:

a) BACKGROUND:

Somalia is located in the northeastern corner of Africa, bordered by Ethiopia and Kenya to the west and south and the Gulf of Aden and the Indian Ocean to the north and east. The length of the coastline is about 3,000 kilometers, and the area is 63 million hectares or 638,000 square kilometers. The topography is varied and includes hot and arid coastal plains, rugged mountains and plateaus, and lowlands of varying fertility and rainfall.

Approximately, 13 percent i.e. 8.2 million hectares of the land is estimated as potentially suitable for crop production, but with water the limiting constraint. At present, roughly 1 million hectares are under cultivation of which 835,000 hectares are under dry farming, 100,000 hectares are under flood irrigation agriculture and 65,000 hectares are under controlled irrigation system (ref. Schedule 2-2, page 41).

Somalia is amongst the poorest countries in the world and is classified by the United Nations as a least developed country. Per capita income was estimated at US $ 280 in 1988. The general lack of infrastructure -- physical and institutional -- and the hostile physical environment, poor communications, lack of modern transportation system and scattered population centres, have created serious obstacles to development of the country.

The population was estimated at 8.5 million<1> in 1986. About 42 percent of the population are nomads and semi-nomads who depend on livestock for their subsistence; about 31 percent are farmers cultivating land along the Juba and Sheballi rivers and in the higher rainfall Bay and north-west regions; and the rest are urban and semi-urban dwellers. The economy is dominated by the livestock sector, principal foreign exchange earning source which provides a living to the large nomadic population and generated about 46 percent of GDP at 1977 constant prices (ref. Table 2-1) and 39 percent of GDP at 1989 current prices (ref. Table 2-2).

Crop production generates about 16 percent of GDP at 1977 constant prices and 19 percent of GDP at 1989 current prices. Rainfed crop production is based primarily upon maize and sorghum. Crop production under controlled irrigation is centered on bananas (the principal cash crop and the second largest export commodity), sugarcane, rice and maize; production under flood irrigation comprises mainly maize and sesame (ref. Schedule 2-1, 2-3, pages 40-42).

"1987 marked the first year of 1987-1991 Five Year Plan. In accordance with the programme, the Public Investment Programme focuses on projects that restore productive capacity, with short gestation periods and which have proven acceptable economic rate of return"<2>. In line with the stated programme of the government the scenario of manufacturing sector has been reviewed and presented in the following paragraphs.

The manufacturing sector's contribution in 1988 was around 3.7 percent of GDP at 1977 constant prices and expected to increase to 4.0 percent in 1989. At 1988 current prices, manufacturing sector's contribution was 4.5 percent of GDP and it is expected to increase to 4.8 percent in 1989.

<1> "The Five-Year National Development Plan 1987-1991", Directorate of Planning, Ministry of National Planning, Mogadishu, September 1987, p.70.

<2> "Performance of the Somalian Economy in 1987", Ministry of National Planning, Government of Somalia, Mogadishu, 1988, p.19.

TABLE 2-1

GROSS DOMESTIC PRODUCT BY SELECTED KIND OF ACTIVITY
AT 1977 CONSTANT PRICES

(Millions of So.Sh.)

YEARS / SELECTED ECONOMIC ACTIVITY	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989 (planned)
1. AGRICULTURE (TOTAL)	3850	4046	3594	3844	4418	4495	3699	4220	4753	4426	5087	5212	5238
In % of G.D.P	61.03	63.82	59.29	58.56	63.91	62.82	59.33	62.35	64.28	61.96	63.99	67.36	64.45
a) Live-stock	2995	3212	2742	2960	3394	3409	2710	3076	3522	3142	3760	3762	3708
In % of G.D.P	47.48	50.66	45.23	45.09	49.09	47.65	43.46	45.45	47.63	43.99	46.68	48.62	45.66
b) Crop Production	689	678	683	698	843	902	795	928	1015	1060	1093	1207	1279
In % of G.D.P	10.92	10.69	11.27	10.63	12.19	12.61	12.75	13.71	13.73	14.84	13.75	15.60	15.74
c) Forestry	145	148	152	156	161	166	170	175	181	186	192	198	204
In % of G.D.P	2.30	2.33	2.51	2.38	2.33	2.32	2.73	2.59	2.45	2.60	2.42	2.59	2.51
d) Fisheries	21	8	17	30	20	18	24	41	35	38	42	45	47
In % of G.D.P	0.33	0.13	0.28	0.46	0.29	0.25	0.38	0.61	0.47	0.53	0.53	0.58	0.64
2. PRODUCTIVE SECTOR													
a) Manufacturing	323	273	327	357	297	370	300	278	299	331	344	292	327
In % of G.D.P	5.12	4.31	5.39	5.44	4.30	5.17	4.81	4.11	4.04	4.63	4.23	3.77	4.02
b) Electricity and Water	30	29	43	43	43	40	40	46	47	55	45	45	47
In % of G.D.P	0.48	0.46	0.71	0.66	0.62	0.56	0.64	0.68	0.64	0.77	0.56	0.58	0.57
3. TOTAL GDP AT FACTORY COST	6308	6340	6062	6564	6913	7155	6235	6768	7394	7143	7947	7737	8122
In Percentage	100	100	100	100	100	100	100	100	100	100	100	100	100
4. Change from previous year in percentage	-	0.5	-4.4	8.28	5.32	3.50	-12.86	8.55	9.25	-3.39	11.26	-2.64	4.98

SOURCE: a) Figures from 1977 to 1986 are from "National Accounts Aggregates 1977-87", Ministry of National Planning and Jubba Valley Development: Central Statistical Department, Mogadishu, 1988, pp.14.

b) Figures from 1987 to 1989 are from "Annual Development Plan, 1989, Mogadishu, January 1989. pp.2.

TABLE 2-2

GDP BY SELECTED KIND OF ACTIVITY AT CURRENT 1989 PRICES

(Millions of So.Sh.)

YEARS / SELECTED ECONOMIC ACTIVITY	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989 (Planned)
1. AGRICULTURE [TOTAL]	3850	4496	4588	11162	13855	18546	21407	40561	55542	70413	105568	192021	278964
% of G.D.P	61.03	62.96	58.55	68.43	68.33	67.79	66.52	67.93	66.76	63.10	64.77	68.13	65.38
a) Live-stock	2995	3491	3129	7591	9365	12775	14812	21180	30908	41159	64552	116680	165008
% of G.D.P	47.46	48.89	40.01	46.54	46.19	47.20	46.03	35.47	37.15	36 88	39.61	41.40	38.67
b) Crop Production	689	812	1185	3150	3761	4308	4791	16112	19065	20338	28838	52598	80008
% of G.D.P	10.92	11.37	15.15	19.31	18.55	15.92	14.89	26.98	22.92	18.23	17.69	18.66	18.75
c) Forestry	145	184	250	369	664	1173	1672	2903	5060	8346	11190	20814	30765
% of G.D.P	2.30	2.58	3.20	2.26	3.27	4.33	5.20	4.86	6.08	7.48	6.87	7.38	7.21
d) Fisheries	21	9	24	52	65	90	132	366	509	570	989	1928	3183
% of G.D.P	0.33	0.13	0.31	0.32	0.32	0.33	0.41	0.61	0.61	0.51	0.61	0.68	0.75
2. PRODUCTIVE SECTOR													
a) Manufacturing	323	301	446	773	932	1423	1572	2805	4145	6240	8303	12746	20486
% of G.D.P	5.12	4.22	5.70	4.74	4.60	5.26	4.89	4.70	4.98	5.59	5.09	4.52	4.80
b) Electricity & Water	30	29	34	27	40	59	65	96	71	262	557	1007	1517
% of G.D.P	0.48	0.41	0.43	0.17	0.20	0.22	0.20	0.16	0.09	0.23	0.34	0.36	0.36
3. TOTAL GDP AT FACTORY COST	6308	7141	7821	16311	20276	27063	32180	59713	83191	111589	162988	281842	426705
In Percentage	100	100	100	100	100	100	100	100	100	100	100	100	100
4. Change from previous year in Percentage	-	13.2	9.52	108.55	24.31	33.47	18.91	85.56	39.92	34.14	46.06	72.92	51.40

SOURCE: a) Figures from 1977 to 1986 are from "National Accounts Aggregates 1977-87", Ministry of Planning and Jubba Valley Development: Central Statistical Department, Mogadishu, 1988, pp.15.

b) Figures from 1987 to 1989 from "Annual Development Plan, 1989", Ministry of National Planning and Jubba Valley Development: Planning Department, Mogadishu, January 1989, pp.6.

"The manufacturing sector, which was originally based on the processing of agricultural products such as fruits, vegetables, sugar, cotton, meat and leather, underwent structural transformation in the early 1980s when some capital-intensive projects came on stream. Around 80 percent of the manufacturing enterprises is State-owned, but shift in priority towards privatization is currently under way"<3>.

"There is a definite shift in Governments strategy from a state-controlled economy to market-oriented economy and full realization of the flexibility of the private sector to the changing industrial realities. Policies are being pursued to attract foreign private investment in the exploitation of Somalia's resource endowment towards economic diversification and transformation"<4>.

"The natural resources of Somalia are rich enough to provide the potential for resource-based pattern of industrialization. One of the reasons for industrial stagnation in Somalia is inefficient management of enterprises"<5>.

In order to overcome the deteriorated industrial growth and sluggish industrialization process, a new set of broad objectives have been framed out by the Somali Government. The objectives as appeared in the Five-Year Plan,1987-1991 are:

-to accelerate the pace of industrial development and maximize production;

-to replace imports of manufactured goods by local manufacture, wherever economically feasible;

-to promote the export of manufactured goods and maximize value added by local processing;

-to encourage the involvement of the private sector; and

-to establish labour-intensive and cottage industries.

b) ECONOMIC CHARACTERISTICS:

Somalia's economy is characterized by a number of structural problems which policy makers have been grappling with over the past decade. As has been stated earlier, the economy is heavily dependent on agriculture for nearly 67 percent of GDP and over 80 percent of exports, and over 75 percent of employment. But, livestock and food grain production remain vulnerable to climatic vagaries. With the commissioning of the proposed Bardhere Dam, substantial improvement is expected in the total agricultural sector and power sector which in turn will help to improve the balance of payment situation.

<3> "Somalia, Industrial Revitalization Through Privatization", Industrial Development Review Series, UNIDO, PPD 91, October 1988, p.xi.
<4> Ibid.p.xii.
<5> Ibid.p.xii.

Somalian labour force is largely unskilled and lacks the education, health and nutrition necessary for transition to more rapid industrial and export growth. Human resource development is low. "Economically active population, constitutes approximately 30-35 percent of the total population whereas the economy is not able to generate enough employment to absorb the increase in the labour force and the existing pool of unemployment"<6>.

The economy is also characterized by very low savings, which in part reflects the low level of incomes, and by a large structural external payments gap. National savings is not capable enough to finance less than half of total investment. The capacity to finance imports can be severely affected by external factors largely beyond the Government's control. Consequently, external assistance has continued to play an important role in providing budgetary and balance of payment support. Nevertheless, inadequate growth in domestic resources continues to seriously constrain the financing of key public investments as well as the operation and maintenance of existing assets.

The problems of balance of payment management, inherently difficult in Somalia on account of its structural trade deficit, and heavy dependence on external aid. Overall balance of payment situation will continue to maintain a dismal trend. "The overall deficit in the balance of payments in 1988 is estimated to be more than double, that of 1987 amounting to US $ 76.4 million (ref. Schedule 2-5, page 43). The main reason for this huge increase in the overall balance of payments deficit is the sharp decline in exports due to the unexpected events that prevented exports of live animals in the second half of 1988"<7>.

The adverse trend of balance of payments situation coupled with sluggish growth of GDP and withdrawal of exchange auction system caused rampant inflation and the shilling to fall further in relation to dollar. "The rate of inflation climbed to 70-80 percent in 1987 and in 1989 it was around 60 percent. This calculation was based on assumption that there will be no additional balance of payment relief/exemptions"<8>. Schedule 2-6 shows, the trends of exchange rate of So.Sh. to dollar and inflation rate in Somalia.

c) SPECIAL OBSERVATION ON THE CHARACTERISTICS OF POPULATION IN RELATION TO GROWTH AND DEVELOPMENT OF AGRICULTURAL SECTOR:

The implementation rate of Agriculture Sector was 72.8 percent in 1987. This shows a major improvement upon implementation rate of 41.9 percent registered in 1986. Despite the success of implementation and large contribution of the agricultural sector to GDP, Somalia will have to import on an average 47 million dollars worth of food per annum for some more

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<6> "Annual Development Plan, 1989", Ministry of National Planning, Mogadishu, 1989. p.145.
<7> Ibid.p.21.
<8> Ibid.p.109.

years; (ref. Schedule 2-4, page 42); primarily to meet up the demand of the increasing population which is growing at the rate of 3.21 per cent <9> per annum. Hard earned foreign exchange is drained out to import food when major percentage of vast cultivable land remained unused/underutilized. One of the main reasons for the above is that a major portion of the population are nomads who are basically by tradition --- non-agriculturist and their economy is primarily comprised of rearing livestock and trading in livestock. It is interesting to note that the nomadic population are gradually decreasing whereas the population of settled farmers and urban dwellers are increasing. Table 2-3 presented below shows, the distribution of population by economic activity in Somalia.

TABLE 2-3

POPULATION DISTRIBUTION BY ECONOMIC ACTIVITY

(Population in millions)

Years	Sources of Information	Total Population	Percentage Distribution of Population		
			Nomads	Settled Farmers	Urban, Semi-urban Dwellers and Others
1986	Five Year Plan of Somalia & UNIDO	8.5	42%	31.3%	26.7%
1983	World Bank Report	5.3	50%	24%	26%
1982	- do -	4.6	56%	20%	24%
1981	- do -	4.5	60%	20%	20%
1976	- do -	3.8	65%	18%	17%

NOTE : As per Five-Year Plan of Somalia, Nomads population will further reduce to 40% in the terminal year of the plan i.e. in 1991.

The Gradual increase of settled farmers is encouraging from the Somalian Economic point of view because this will help in utilization of more and more cultivable land which otherwise remained unused. In addition, increasing crop production will benefit the economy in reducing food import and saving foreign exchange at a time of continuous adverse balance of payment situation.

<9> "The Five-Year National Development Plan 1987-1991". Ministry of National Planning, Government of Somalia, Mogadishu, 1987, p.70.

This transition stage * of the nomadic life style is important from the view of agriculture sector. To get better economic return from agricultural land, modern tools, implements, techniques and methods i.e. agricultural mechanization should be introduced. The proposed project will help in the proper utilization of cultivable land of Somalia through greater use of agricultural implements.

2.4 HISTORICAL BACKGROUND OF AGRICULTURAL MACHINERY INDUSTRY IN SOMALIA:

The metal products sub-sector has contributed between 7 to 14 percent of manufacturing output. The Government owned Foundry and Mechanical workshop (FMW), Mogadishu and the aluminum Utensils, in Mogadishu are the two recognized metal product factories in Somalia besides some small units manufacturing wire netting, nuts, bolts, nails etc. in the private sector. FMW is the only enterprise of its kind in Somalia and has some capacity to manufacture agricultural tools and implements. Therefore, review of the performance of FMW is important from the point of view of the present study.

a) BRIEF REVIEW AND OBSERVATION ON THE PERFORMANCE OF FMW BY UNIDO AND ISTI, Inc. WASHINGTON, D.C.:<10>

The Foundry and Mechanical Workshop was founded in 1975 with extensive assistance from UNIDO. Subsequently, this assistance has continued in the form of technical and managerial inputs. The objective was to create a nucleus for the development of metallurgical and engineering industries and to develop a centre for the training of Somalian technicians.

The FMW was designed to produce castings, machinery parts, steel structures and oil tanks. Progressively, it was to take up the task of complex items to substitute for imports, and ultimately, to become a supplier of indigenous machinery. Initially, equipment was installed with annual capacity of 450 tons on a one shift basis. An annual output of 1,500 tons with a two shift operation was anticipated, but this goal has not been realized.

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*Shifts of the nomads population towards agriculture farming will reduce the overall number of livestock population which is at present the number one foreign exchange earning source for Somalia. Therefore, future foreign exchange earnings from livestock is expected to decrease. On the other hand, utilizing more of the cultivable land for production of food crops will help the economy in reducing the import bill on account of food to a substantial level. A detailed cost-benefit analysis, keeping in view the ethnic characteristics of Somalis may perhaps draw a better conclusion in this regard.

<10>"Somalia: Industrial Revitalization Through Privatization", Industrial Development Review Series, PPD 91 UNIDO, October, 1988, pp.45-46.

At present, the FMW has a small foundry, with an oil fired cupola furnace of one ton per hour capacity. It has also a medium-sized well-equipped machine shop for castings and production of other metal parts by cutting, forging, milling and welding.

The factory processed 84 tons of metal in each of the years 1985 and 1986. There has been a falling trend in capacity utilization since 1982 when it was 33 per cent. Present capacity utilization rate is estimated at 18 percent. Sales in 1986 were So.Sh. 13.4 million, with a profit of So.Sh. 0.7 million.

During the first 13 years of its lifespan production levels have been low. However, it has fulfilled its initial objective of serving as a mechanical training centre. Trainees later found employment in the private sector and in the Middle East countries.

Although the financial accounts have been indicating profits over the years, the figures have been constantly challenged by analysts from bilateral donors. The FMW has not generated any real profit due to operating at low capacity level for the past 5 years. It is going through a process of decapitalization because of the equipment not being improved constantly.

Due to the low salaries offered, turnover is very high, especially among skilled workers. Unskilled workers are recruited as trainee operators, welders, millwrights, etc. However, after receiving some training, they leave for higher wages in the private sector. Although the work of the factory suffers, this aspect scores a positive point since the plant serves its initial purpose of being a training centre for mechanical skills.

There are diesel fuel shortages and interruptions in the power supply. Imports of raw materials such as metal, spare parts and coke are constrained by the foreign exchange shortage. Since the company itself is unable to earn foreign exchange, allocations are needed from the government. This has not been forthcoming because of the overall foreign exchange difficulties in the country. Marketing efforts by the company seem to be inadequate. There is a need to produce items where there is a good market demand.

It is apparent that private sector involvement in this venture could produce positive results. With this objective in mind, a number of studies have been carried out, the last one being done by the International Science and Technology Institute, Inc., Washington, D.C., sponsored by USAID. They recommended leasing out the venture to private entrepreneurs for a limited period. Their recommendations are as follows:

a) The plant may become a viable, profit-making enterprise provided its management is completely restructured and its policies overhauled.

b) Under its current budgetary and political constraints, the government is unable to support the management restructuring process.

c) The private sector is best equipped to supply the necessary profit-making incentives and management expertise.

d) As an interim solution, it is suggested that the plant and equipment be leased to a private entrepreneur with an option of ownership transfer to be exercised at a future date. Meanwhile, the entrepreneur will be guaranteed complete freedom of action, thereby completely separating management of the firm from its ownership.

Mechanical workshops are an extremely important factor in the development of industry and technologies. They serve as a basis for technological development and can even be subsidized as part of the needed infrastructure. In spite of the relatively poor performance, the programme for rehabilitation and improvements has to be taken as a matter of high priority.

As training is a very important ingredient, additional training facilities have to be provided for both management and skilled workers. In fact, management should be exposed to training in successful private sector mechanical workshops in countries with medium-level technology.

b) ANALYSIS OF THE PERFORMANCE OF FOUNDRY AND MECHANICAL WORKSHOP, MOGADISHU

i) PRODUCTION MANAGEMENT:

All products of FMW could be classified into 4 major groups. These are:

1) Gray iron and non-ferrous metal castings,
2) Steel structures,
3) Agriculture implements,
4) Other products (machined parts etc.)

It has been observed that the "majority of products have been manufactured in very small batches or as a unique item, once or twice in last five years"<11>. Production trend of selected products for last five years are presented below in Table 2-4.

"From the four groups of products, the biggest share belongs to castings (by quantity) and to steel structures (by value). These are the only groups of products which were manufactured and marketed in larger quantities"<12>.

"It may be noticed that there was a high fluctuation of production from year to year. However, there is a general trend of production volume decline. Simple products, such as spades, forks, hoes or water pipes, which do not significantly contribute to income generation, are increasing their share in total production"<13>.

<11> "Report on the In-depth Survey of the Foundry and Mechanical Workshop", UNIDO Project No. DP/SOM/86/034, Mogadishu, April 1988, p.38. Also referred to as the Industrial Consultancy Unit (ICU) report.
<12> Ibid. p.39
<13> Ibid. p.39.

TABLE 2-4

PRODUCTION TREND OF SELECTED PRODUCTS OF FMW

Product	Unit of measure	1983	1984	1985	1986	1987
a) Castings						
Kitchen stove	set	170	88	173	273	1,026
Cone	piece	54	454	37	166	191
Crushing wheel	"	-	87	169	74	144
Saddle	"	-	-	70	-	185
Iron ingot	kgs	1,693	697	2,008	850	365
Cu alloys ingot	"	2,351	52	20	-	15
Al alloys ingot	"	382	2,169	27	-	-
b) Steel structures						
Tank 20 m3	piece	-	6	3	6	1
Tank, oval 8 m3	"	-	6	-	8	-
Tank, oval 6 m3	"	-	8	-	6	-
c) Agricultural implements						
Spade	piece	-	-	-	50	234
Hoe	"	-	-	-	-	60
Fork	"	-	-	-	-	23
Weeder	"	-	-	-	1	5
Maize sheller	"	-	-	14	-	3
Maize grinder	"	-	-	2	-	-
Leveller	"	-	-	9	11	-
Juice extractor	"	-	-	-	3	16
Water pipe	meter	-	-	22	16	42
Flange	piece	-	13	15	5	-
d) Other products						
Hand pump (steel)	piece	-	-	10	-	-
Hand pump (cast)	"	-	-	-	1	1
Centrifugal pump	"	-	2	3	-	-
Wind mill	"	-	-	-	-	3

SOURCE: "Report on the the In-Depth Survey of the Foundry and Mechanical Workshop" UNIDO Project No. DP/SOM/86/034, Mogadishu, April 1988.

TECHNOLOGY: The FMW is a well designed plant and its layout is good. The technology adopted by the plant is divided into three major groups, as follows:

- Casting unit (applied processes are: melting, molding, casting and casting dressing),
- Welding unit (applied processes are: shearing, cutting, milling, bending, arc and gas welding, surface coating etc.)
- Mechanical Workshop Unit (applied processes are: shaping, milling, drilling, sawing, grinding, pressing, thread cutting etc.)

The above units of FMW are facing some major problems resulting from:

- utilization of inexperienced and untrained work force, as a result the rejection rate is high.

- non adherence to the technological requirements of various processes resulted in the poor quality of finished products,

- poor maintenance of machines, equipment and tools resulted in an increasing number of non-working machines, equipment and tools,

- lack of spare parts resulted in an increasing number of non-operating machines and equipment.

In order to overcome the problems, FMW should rehabilitate its machinery and equipment, train its workers and strictly adhere to the technological requirements of the production processes. List of machinery and equipment along with their present status and layout position has been exhibited at Annex-1.

PRODUCTION DEPARTMENT: Production Department is headed by a manager and under him there are three major sections. The sections are:

- Foundry

- Steel structure and Maintenance; and,

- Machine shop and Agricultural Implements.

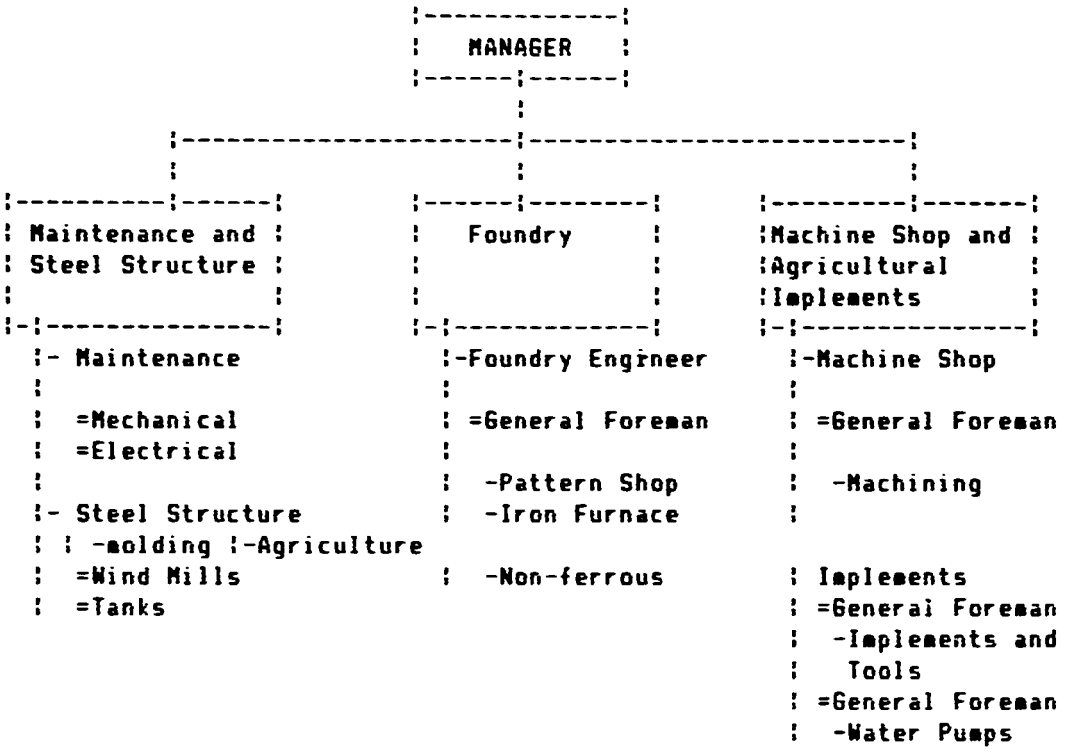
PRODUCTION PLANNING AND CONTROL: Annual production plans for each department/section are prepared by the planner and then subsequently split into monthly production plans. FMW's production planning has no basis to depend on; because past performance, sales forecast, inventory status and availability of resources are not considered in the preparation annual production plans. Production reports are not used for controlling and subsequent adjustments of production targets. In fact there is no set standards of time of production, work orders, quality control, inventory control etc.; as such, it appeared that every organ of this department is operating independently without coordination and control system.

The organogram of the Production Department is presented at Figure 2-1 on the next page.

Review of the prevailing production efficiency and practices of FMW reveals a dismal picture; notwithstanding the fact that, existing production facilities could, if fully utilized earn reasonable profits. On an average FMW is utilizing only 14 to 17 percent of its installed capacity (ref.Schedule 2-8 page 46). Therefore the introduction of proper management and control systems, accountability, delegation of responsibility and authority, appropriate production planning and control etc. are however, the basic preconditions for profit earning.

FIGURE 2-1

ORGANIZATION OF PRODUCTION DEPARTMENT OF THE FMW



ii) MARKETING MANAGEMENT:

Marketing activities of any organization is considered as the nerve centre. Because, it is the marketing efforts and techniques that help the organization to place its product and services at the disposal of the customers and thereby to earn revenue for survival and growth. It is surprising to note that at present there is no formal marketing management department/section in the organogram of the FMW. The fact is that all previous studies conducted on FMW strongly suggested such type of department in the main organogram.

At present marketing activities are performed under the control of administration and finance department. But, there is no qualified personnel available for doing the marketing activities.

Due to the non-existence of the formal marketing organ in the organization of the FMW, the following activities are not performed at present, although their importance could hardly be overemphasized.

- Collection and analysis of yearly data from internal sources on:
- Production, sales, closing inventory etc. for variance analysis.
- Determination of marginal contribution of each individual product necessary for price adjustment and production

planning decisions.

- Assessment of market potential for existing products as well as for new products.

- Assessment of demand and supply and subsequent projection of demand and supply of each product.

- Product-wise segmentation of customers.

- Collection of necessary information for formulation of short-term and long term market strategy and policy decisions.

- Analysis of the efficiency and cost effectiveness of various channels of distribution.

SALES: FMW's total sales during 1988 period, was So.Sh. 12,257 thousand worth of goods and services; amongst which steel structure, iron casting and services comprised approximately 90 percent of total sales. Detailed break-down of the 1988 sales figures were not available. As such analysis of sales has been limited to previous years. Total sales of products and services at current prices for the past five years (i.e. from 1983 to 1987) have been presented at Schedule 2-7, page 45. It appeared from the schedule that FMW's sales have increased from 5,224 thousand So.Sh. in 1983 to 12,163 thousand So.Sh. in 1987. Apparently, the figures reveal an excellent performance of the FMW. However, at 1983 constant prices, value of 1987 sales will be equivalent to 2,730 thousand So.Sh., and, therefore, reflect a negative performance.

SALES PLANNING is primarily done on hunch and imaginative approach. As such, it is difficult to find a relationship between the projected sales and actual sales. A typical example would, justify the above statement.

I t e m s	Forecasted Sales for 1986 and 1987 (in units)	Actual Sales During 1986 and 1987 (in units)
Kitchen Stoves (set of 3)	7,000	1,600
Animal Drawn Implements	1,950	18
Maize Grinders	4,500	7
Hoes, Spades or Rakes	65,000	483

SOURCE: "Report on the In-Depth Survey of the Foundry and Mechanical Workshop, UNIDO, Project NO. DP/SOM/86/034, Mogadishu, April 1988, p.33.

"So large discrepancies between the forecasts and actual figures point to an over-optimistic estimate of sales potential in case of all items. However, low figures on the implementation side may have resulted from the weaknesses in the marketing effort to sufficiently expand sales and exploit the untapped potentials of demand for various items"<14>.

<14> Ibid. p.33.

PRICING OF THE PRODUCTS AND SERVICES: Pricing of the products and services are unilaterally decided by the FMW management. In fact no basis or standard is followed by the FMW in determining the prices of its products and services. As a result sometimes the products are priced so high that customers are demotivated to buy them; rather they prefer to buy similar type of imported products from the market at much lower price. Pricing is considered as one of the most important demand determinants. FMW failed to stimulate demand through pricing techniques. The existing costing system is not properly organized to provide information on the cost elements in the price structure of the products; as such, assessment of the individual products contribution to fixed cost and profit was not possible. Factory management is less concerned about the break-even volume and sales of the individual products. Due to this fact FMW management is unable to decide which product lines should be given more preferences over others. Due to the lack of appropriate pricing policy and strategy, production planning is also suffering which in turn resulted in blocking of working capital due to inventory pile-up.

PHYSICAL DISTRIBUTION: Most of the products of the FMW are directly sold to the customers from the factory premises. FMW has no established channel of distribution to place its products at the door steps of the customers. Due to the lack of appropriate channel, majority of the prospective customers (specially for low priced conventional items) do not bother to go down to the FMW premises to buy the products. All the expensive items are manufactured on order basis.

iii) FINANCIAL MANAGEMENT:

Finance and Administration Department of FMW is headed by a manager. At present Chief Accountant is holding the charge of the manager. This department has in all 9 sections. These sections are:

- Planning, Accounting, Payroll, Stores, Sales, Purchase, Personnel, Secretariat and Archives.

Because the FMW is a medium size public enterprise, as such, accounts, sales, purchase, personnel etc. sections should not be placed under the control of one manager.

WORKING CAPITAL MANAGEMENT:<15> There are no written directives for calculating the working capital requirements and its management. Due to relatively high proportion of cash sales, the factory was able to maintain the liquidity and meet its obligations without specific problems. However, huge amount of inventories of finished products and work-in-process, as well as the unsatisfactory collection of debts, leading to write off of some balances, brought about the shortage of working capital in 1987. Consequently, during that year, the Ministry of Finance contributed an amount of So.Sh. 6 million for purchasing of raw materials in order to increase the production.

<15> Ibid.p.51.

All the important financial statements for 1988 were at the provisional stage and not finalized; as such, financial analysis was not possible. Due to the non-availability of required financial statements, a thorough review of the study conducted by the ICU was made and used for this purpose. Presented below are the relevant extracts from the In-depth study by the Industrial Consultancy Unit (ICU). <16>

BUDGETARY AND PLANNING PROCEDURES:<16> The Financial Plan represents the only planning document, prepared to meet the reporting requirements set up by the Law. No other plans or budgets are prepared for internal use. The forms on which the Financial Plan is presented, are set up by the Ministry of Finance. It is submitted to that Ministry and to the Ministry of Industry and Commerce once a year. However, there is no evidence that the Financial Plan is used for any control purposes within the factory. Planned and actual amounts are not compared and no analysis of variances from the Financial Plan is made.

ACCOUNTING: Accounting records are maintained in the General Ledger and three subsidiary ledgers - accounts receivable, accounts payable and inventories. Inventory ledger (bin cards) comprises the quantities and values of inventories.

The records in inventory ledger are not regularly updated and there are no procedures which ensure the completeness and accuracy of data. Therefore, these records are not reliable and could not be used for management purposes.

General ledger records do not provide sufficient details in order to produce the analysis of costs of individual products. For instance, raw materials are recorded in the general ledger on only 10 separate accounts, comprising groups of materials, irrespective of their different unit prices. All material inputs are recorded on production requirements account, except for administration expenses which are recorded on separate accounts. There are no controls which enable completeness and accuracy of recorded data. For that reason, more than three months are required in order to prepare annual financial statements, although the number of transactions are relatively low.

Several accounting practices, applied by the factory, are not appropriate and, as a result, the financial statements are misleading.

The flowchart of main documents relating to key functional areas is shown in Annex-2. It should be mentioned, however, that this flow of documents is not consistently followed.

FINANCIAL REPORTING<17>

Financial statements, comprising balance sheet and profit and loss account are prepared at the year end, with more than three months delay. In addition to the financial statements, monthly reports are prepared showing the amount of sales and total expenses incurred.

<16> Ibid.p.52-53
<17> Ibid.p.53-54

The reclassified financial statements for the period of five years (1983-1987), together with balance sheet and profit and loss account structures, as well as the selected additional information related to inventories and account receivable, are given in Annex-2.

ANALYSIS OF FINANCIAL DATA <18>

As it can be seen from the balance sheets, see Annex-2, an important source of financing represents the accumulated profit of the factory. However, the accumulated profit constitute basically work in progress and finished products inventory increases, which were not sold. That means that both value of inventories and accumulated profit figures are overstated. Therefore, if the fair value of inventories of work-in-progress and of finished products are taken into consideration, the accumulated profit would be just sufficient to cover losses on their disposal.

Since the depreciation is based on historical cost of fixed assets, the amount of yearly depreciation charged are not realistic; i.e. are very low and do not allow for any replacement of existing fixed assets.

A sizable quantity of products are sold for cash. Cash sales accounted for 47.4 percent and 62.6 percent in 1986 and 1987 respectively. In other words, basically a part of steel structures (tanks and agricultural implements) were sold on credit, where number of customers in 1986 and 1987 were only 7 and 6 respectively. The collection of receivables from customers is rather slow. There is a number of customers with long outstanding balances and major part of such balances could be considered as uncollectible. Some balances, relating basically to stamp duty charges, were written off in 1987. However, this write off was not disclosed as a specific charge to the profit and loss account, so that it is not clear under which item it was included. More details on sales and accounts receivable are shown in Annex-2.

The enterprise pays its creditors within a reasonable time, without borrowing money from banks. Throughout the 5 years period analyzed, the balances of accounts receivable were constantly much higher than the balance of accounts payable, as the latter was insignificant. The number of creditors is rather small: 25 and 22 in 1986 and 1987 respectively.

A more detailed insight into financial position and results of operations may be reflected from the analysis of selected ratios presented in the table 2-5 below, which were calculated on the basis of information disclosed in the financial statements.

As can be seen from the ratios presented, the rate of growth of return on assets is negative, with continuous sharp declines from year to year, reaching a decline of 46.6 percent in 1987.

<18> Ibid.p.54-56

Cost of goods sold ratio is relatively stable, while the administrative expenses share was continuo · increasing, contributing to poor financial performance.

Assets turnover varies from year to year. In general, it is very low for such type of enterprise as FMW. Especially low is the turnover of inventories, where a substantial part of working capital is frozen. A decrease in the accounts receivable turnover is the result of increasing difficulties in collection of these accounts.

TABLE 2-5

SELECTED RATIOS

I T E M S	1983	1984	1985	1986	1987
Net profit to net sales	0.30	0.11	0.10	0.06	0.04
x					
Total assets turnover	0.21	0.34	0.38	0.39	0.27
=					
Return on assets	0.06	0.04	0.04	0.02	0.01
Growth rate	-	-38.1%	-0.5%	-41.7%	-46.6%
Other ratios:					
Cost of goods sold ratio	0.56	0.78	0.77	0.76	0.76
Administrative expense to sales	0.14	0.11	0.13	0.18	0.20
Accounts receivable turnover	2.24	2.64	1.57	1.57	1.75
Inventory turnover	0.36	0.60	0.73	0.88	0.53
Fixed assets (cost)turnover	0.46	0.77	0.91	0.81	0.57
Fixed assets(NBV) turnover	0.87	1.65	2.25	1.82	1.09
Current ratio	8.08	7.06	6.75	17.04	21.95
Quick ratio	2.08	1.98	2.46	7.43	6.88

Current ratio is constantly very high, being the result of abnormal level of inventories of finished products and work- in-progress. As the majority of these items could be sold at scrap value, this means that a high amount of loss is hidden in the valuation of inventories. As the accumulated profit represents the profit from increased inventories, as mentioned earlier, these items are overstated and would be probably offset if the net realizable value of inventories are applied.

For the reasons mentioned, the current ratio could not be used as an analytical tool. However, the quick ratio might represent a measure of the FMW's liquidity, provided the accounts receivable are ultimately collected.

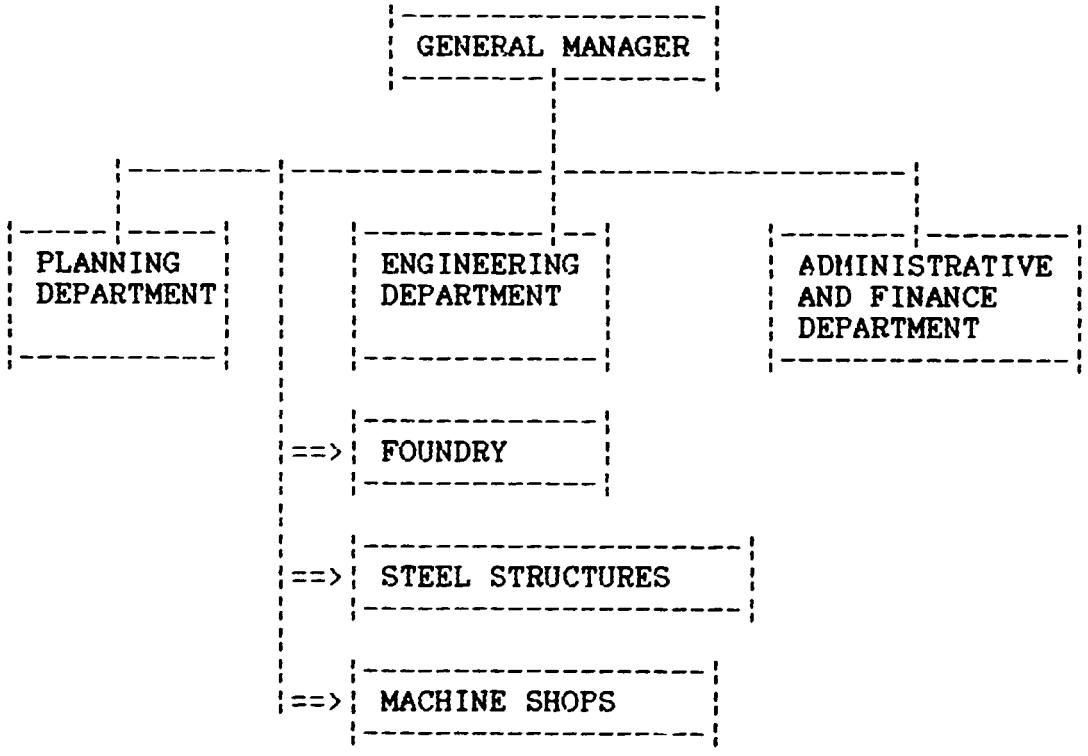
iv) GENERAL MANAGEMENT:

In FMW, there does not exists any formal organization structure, a situation contributing to the major problems discussed in the previous sections. Many of the problems will be eliminated, once FMW is operated through a well designed organization structure.

On the basis of the observations and discussions with the FMW management, the following informal organizational structure is suggested at Figure 2-2.

FIGURE 2-2

INFORMAL ORGANIZATIONAL STRUCTURE OF THE FMW



The organograms suggested in other studies are presented at Annex-3.

v) PERSONNEL MANAGEMENT:

At present 74 officers, staff and workers are working at FMW. Most of the managers are relatively young and a high percentage have a university degree. In this regard, FMW is in an advantageous position. From the distribution of manpower, it is revealed that overhead manpower comprised 57 percent of total strength. Obviously, this is not desirable in the context of the FMW. Table 2-6, presented below shows, the distribution of total manpower.

TABLE 2-6

MANPOWER DISTRIBUTION OF THE FMW

Department	Direct Labour	Overhead		Total
		Administration	Production	
1. Foundry	14	-	2	16
2. Machining Shop - Pumps and Agricultural Implements	9	-	3	12
3. Steel Structures - Maintenance	9	-	7	16
4. Engineering	-	-	3	3
5. Planning	-	1	-	1
6. Finance	-	7	-	7
7. Commercial	-	2	-	2
8. Personnel	-	16	-	16
9. General Manager	-	1	-	1
T o t a l :	32	27	15	74

SOURCE: "Report on the In-depth Survey of the Foundry and Mechanical Workshop", Mogadishu, April 1988, UNIDO Project No. DP/SOM/86/034.

Observations and discussions revealed the following problems in the personnel management area of the FMW.

- Lack of skilled personnel for quality control and due to this there is a higher rate of defective products which in turn reduces the profitability.
- Around 57 percent of the total strength are overhead employees as such due to higher overhead cost, profitability is affected significantly.
- Inadequate salary / wages and incentives resulted in lower productivity and low level of motivation.
- There is no systematic arrangement for training of the officers, staff and workers as a result productivity is hampered due to low efficiency and knowledge.

PERSONNEL INCOME AND INCENTIVE SYSTEM <19>:

Personal income of employees is one of the most important factors which could motivate or demotivate managers and workers to perform better. Personal income is composed of 4 major items:

(a) Basic salary;
(b) Allowance;
(c) Supplement;
(d) Incentive (bonus)

The minimum amount of basic salary is determined by the Collective Labour Agreement (CLA). However, public sector enterprises are authorized, subject to the approval by the Ministry of Industry and Commerce, to pay higher basic salary than determined by the CLA. At present, the levels of remuneration at FMW are slightly higher than those prescribed by the CLA.

At Present the total personal income (excluding bonus) for typical positions, as well as the ratio between the highest and lowest remuneration is summarized below:

Position	Basic salary	Allow-ance	Supple-ment	Total	Ratio to lowest
Department manager	6,000	2,000	1,550	9,550	2.27
Head of Section	4,500	1,500	1,250	7,250	1.73
Head of Unit	4,000	1,000	1,250	6,250	1.49
Direct Labour	3,500	300	1,250	5,050	1.20
Clerk	3,000	-	1,200	4,200	1.00

Some forms of personal income, such as overtime, rewards etc. are not included. However, these forms of payments represent less than 10 percent of total personal income.

<19> "Report on the In-depth Survey of the Foundry and Mechanical Workshop," UNIDO Project No. DP/SOM/86/034, Mogadishu, April 1988, pp. 23-25.

SCHEDULE 2-1

GRAINS, BEANS AND OILSEEDS PRODUCTION/YIELD, 1975-1987

A) A r e a (1000 ha)

Year	Sorghum	Maize	Rice (milled)	Beans	Sesame	Ground-nuts	Cotton
1975	400.0	106.0	1.6	18.8	57,0	3.3	12.0
1976	490.0	119.0	1.8	19.7	45.0	3.2	12.0
1977	458.3	150.6	4.4	18.8	75.0	2.5	12.0
1978	420.1	148.7	9.8	21.8	75.0	1.9	12.0
1979	460.8	147.5	4.8	16.6	80.0	2.4	12.0
1980	456.8	109.0	5.9	18.5	83.0	2.5	12.0
1981	517.0	197.0	5.7	25.9	90.0	2.6	12.0
1982	540.0	209.0	6.0	27.0	90.0	3.0	12.0
1983	335.5	218.6	1.0	27.0	98.4	3.0	12.0
1984	544.7	220.0	1.3	38.1	92.0	4.7	12.0
1985	447.0	234.3	2.6	46.8	109.2	5.2	12.0
1986	385.0	245.1	3.2	28.9	81.0	2.9	12.0
1987	516.2	259.5	3.6	48.3	104.7	4.2	15.7

B) P r o d u c t i o n (1000 ton)

Year	Sorghum	Maize	Rice (milled)	Beans	Sesame	Ground-nuts	Cotton
1975	134.7	103.8	3.3	9.4	37.3	2.6	2.0
1976	139.9	107.6	3.6	9.8	38.8	2.7	2.1
1977	145.1	111.3	5.6	10.2	40.6	2.8	2.2
1978	141.1	107.7	8.0	10.1	40.0	2.8	2.2
1979	140.0	108.2	8.7	8.2	40.6	2.8	2.7
1980	140.0	110.0	11.3	9.3	38.4	3.0	2.7
1981	222.1	142.0	12.7	12.6	53.0	4.0	2.0
1982	235.1	149.9	13.3	15.0	57.1	3.2	3.3
1983	120.7	235.7	2.0	13.0	35.6	3.0	2.7
1984	221.0	270.1	2.8	15.7	39.7	4.7	2.7
1985	221.6	280.0	7.0	24.0	56.7	5.0	2.7
1986	136.7	336.2	8.3	12.7	44.5	2.5	2.7
1987	243.6	286.2	8.4	15.6	45.3	3.1	4.2

C) Y i e l d (qty/ha)

Year	Sorghum	Maize	Rice (milled)	Beans	Sesame	Ground-nuts	Cotton
1975	3.37	9.79	20.63	5.00	6.54	7.88	1.67
1976	2.86	9.04	20.00	4.97	8.62	8.44	1.75
1977	3.17	7.39	12.73	5.43	5.41	11.20	1.83
1978	3.36	7.24	8.16	4.63	5.33	14.74	1.33
1979	3.34	7.34	18.13	4.94	5.08	11.67	2.25
1980	3.96	10.09	19.15	5.03	4.63	12.00	2.25
1981	4.30	7.21	22.28	4.86	5.39	15.38	1.67
1982	4.35	7.17	22.17	5.56	6.34	10.67	2.75
1983	3.60	10.78	20.00	4.81	3.62	10.00	2.25
1984	4.46	12.28	21.54	4.12	4.32	10.00	2.25
1985	4.36	11.95	26.92	5.13	5.19	8.62	2.25
1986	5.15	13.72	25.94	4.39	5.49	8.62	2.25
1987	4.72	11.03	23.33	3.23	4.33	7.38	2.68

Source: Ministry of Agriculture, Department of Planning and Statistics, Mogadishu, 1988.

SCHEDULE 2-2

POTENTIAL AND ACTUAL LAND USE

Items	Potential Land Use		Actual Land Use (crop production)	
	Thousand ha	Per cent*	Thousand ha	Per cent*
Total Land Area	63,765	100	-	-
Non-Agricultural Land	26,765	42	-	-
Range Land	28,850	45	-	-
Land for Crop Production	8,150	13.1	750	9
Total Controlled Irrigation	250	0.1	50	20
- Shebelle River	86	-	35	41
- Juba River	160	-	14	9
- North-West Region	4	-	1	7
Flood Irrigation	-	-	110	-
Rainfed	7,900	12.6	540	7

Source: "The Five year National Development Plan, 1987-1991", Directorate of Planning, Ministry of National Planning, Mogadishu, September 1987, p.163.

* Per cent of Potential Land.

SCHEDULE 2-3

PRESENT AND POTENTIAL YIELDS PER HECTARE

(In Quintals)

Items	Present	Potential	Per cent Present/Potential
Sorghum	4	8	50
Maize	8	25	32
Rice	20	30	67
Sesame	3	10	30
Groundnut	8	25	32
Cotton	7	25	28
Sugar Cane	450	750	60
Bananas	150	300	50

SOURCE: Ministry of Agriculture, Mogadishu, 1988.

SCHEDULE 2-4

FOOD AND FARM MACHINERY IMPORT
CURRENT AND PROJECTED

(in US$ Million)

Items	1985	1986	1987	1988	1989	1990	1991
Food	68	54	52	50	48	46	44
Farm Machinery	5	8	13	13	13	13	12

SOURCE: "Somalia: Industrial Revitalization Through Privatization", UNIDO, Industrial Development Review Series, PPD 91 October 1988, Table A-6, p.85.

SCHEDULE 2-5

BALANCE OF PAYMENTS 1987 - 1989
(in millions of US $ at current prices)

DESCRIPTION	ACTUAL 1987	ESTIMATE 1988	PLANNED 1989
Goods and Services (Net)	-642.2	-454.4	-367.9
Exports F.O.B.	90.7	64.3	78.1
Banana	20.5	21.3	21.1
Live Animals	60.7	28.0	41.2
Others	9.5	15.0	15.0
Imports C.I.F.	-487.8	-457.7	-389.0
Exchange Figures	-115.7	-68.0	-85.0
Grants-in-kind	-299.2	-311.4	-203.0
Loan-in-kind	-72.9	-78.3	-101.0
Trade Balance	-397.1	-393.4	-310.9
Services Net	-65.1	-63.0	-57.0
Interests	-52.0	-59.0	-54.0
Others	-13.1	-4.0	-3.0
Transfers Net	350.5	346.4	244.5
Private	34.5	30.0	31.5
Official	316.0	316.0	213.0
Current Account Balance	-111.7	-110.0	-123.4
Capital Account Net	74.3	33.6	60.7
Private	-10.0	0.0	0.0
Official	84.0	33.0	60.7
Inflows	95.0	96.2	121.8
Outflows	-10.7	-62.6	-61.6
Overall Balance	-37.4	-76.2	-62.7

SOURCE : "Annual Development Plan, 1989", Ministry of National Planning, Government of Somalia, Mogadishu, 1989,p.22.

SCHEDULE 2-6

OVERALL BUDGET DEFICIT, INFLATION AND EXCHANGE RATE PROJECTIONS ASSUMING NO ADDITIONAL BALANCE OF PAYMENTS ASSISTANCE/DEBT RELIEF

Overall Budget Deficit	1985	1986	1987	1988	1989	1990	1991
(So.Sh. billion) current prices	-1.04	-2.3	-10	-12.5	-23	-26	-19
Inflation (%)	38	30	75	55	60	40	23
Exchange rate (So.Sh./US $)	40	70	119	179	278*	382	450
Nominal GDP	91	123	223	355	586	845	1070
Budget deficit as % of GDP	1.1	1.9	4.5	3.5	3.9	3.1	1.8

SOURCE : "The Five Year National Developeent Plan, 1987", Ministry of National Planning, Mogadishu, 1987,p.109.

* March 1989, official exchange rate was 336.00 So.Sh. to 1 US $ as against parallel market rate of So.Sh. 450 - 480 per 1 US $.

SCHEDULE 2-7

TOTAL SALES OF PRODUCTS AND SERVICES OF FMW DURING 1983 - 1987

[in thousands of So.Sh.]

Product	1983		1984		1985		1986		1987	
	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%
Steel Structure	4045	77.5	6662	75.3	9194	87.4	9355	75.5	7757	63.8
Agricultural Implements	6	0.1	18	0.2	15	0.1	25	0.2	613	5.0
Iron Castings	64	1.2	861	9.7	607	5.8	922	7.4	2188	18.0
Non-ferrous Metal Castings	82	1.6	863	9.8	80	0.7	27	0.2	285	2.4
Miscell-aneous	1027	19.6	117	2.0	156	1.5	359	2.9	235	1.9
Services	-	-	262	3.0	477	4.5	1707	13.8	1085	8.9
TOTAL:	5224	100	8843	100	10529	100	12395	100	12163	100

SOURCE: "Report on In-depth Survey of the Foundry and Mechanical Workshop," UNIDO Project No. DP/SOM/86/034, Mogadishu, April 28,1988.

NOTE: The data on sales in current prices do not provide the realistic picture of total marketing efforts of the factory due to high inflation that characterized this period.

SCHEDULE 2-8

UTILIZATION OF INSTALLED CAPACITY IN SELECTED INDUSTRIAL ENTERPRISES, 1982-1986

(in percentage)

Enterprises	1982	1983	1984	1985	1986
Juba Sugar Complex	35.0	40.1	38.4	55.9	38.6
SNAI Sugar Complex, Jowhar	29.8	6.9	1.7	6.8	8.3
Edible Oil Mill, Mogadishu	1.7	1.1	0	0	0
Wheat,Flour & Pasta Factory,Mogadishu	12.9	54.1	77.4	56.3	61.4
Meat Factory, Kismayo	6.2	0	0	0	19.5
ITOP Agfoi (Fruit Canning)	3.0	4.3	2.1	9.1	12.5
Milk Factory, Mogadishu	18.3	6.7	0	0	0
National Bottling Co.(private)	66.0	55.0	45.0	16.0	7.8
Cigarette and Match Factory	55.1	35.2	27.0	25.9	31.0
Somaltex, Blade	47.6	30.2	23.1	15.6	27.5
Tannery Km 7 Mogadishu (hides only)	0	8.5	45.0	48.0	63.0
Incas Packing	16.7	18.3	21.1	24.0	33.0
Somali Chemical Industry (private)	21.2	12.9	15.3	4.8	4.6
Urea Plant, Mogadishu	-	-	-	4.2	2.0
Petroleum Refinery, Mogadishu	47.8	43.9	31.1	36.5	27.0
Foundry & Mechanical Workshop (FMW)	33.3	21.8	17.2	14.0	14.0
Aluminum Utensils	45.0	24.8	34.2	15.0	12.5
Somali Marine Products	-	-	15.0	2.0	20.0
Weighted average for the Manufacturing Sector	39.0	33.0	26.0	28.0	26.0

Source: "Somalia, Industrial Revitalization Through Privatization," Industrial Development Review Series, UNIDO, PPD 91 October 1988, Vienna.

CHAPTER - III

MARKET AND PLANT CAPACITY

3.1 INTRODUCTION:

In order to become self-sufficient in food and to cover the food deficit worth $ 47 million per year, Government of Somalia has given high national priority to increase agricultural production and productivity. Proper supply of agricultural inputs, agricultural mecanization, intensive agricultural extension services and promotional efforts are, therefore, the basic premises where close attention is needed to realize the cherished objective of the Government. But,the agricultural mechanization of Somalia is still in a nascent stage. There is no organized network at present for promoting and marketing of agricultural tools,implements and machinery; though, on an average 12.5 million dollar worth of farm machinery are imported per annum.

Studies undertaken in the past by various agencies on the marketing of agricultural implements and its potential are inadequate in furnishing relevant data and basic approaches for demand analysis. In addition, published statistics on this subject are not available to supplement the data and information requirements of this study. Keeping these limitations in mind, this study attempts to assess the existing demand and supply of agricultural tools and implements and their future potentials.

3.2 ADOPTED METHODOLOGY:

As has been stated earlier, non-availability and reliability of relevant data and information has seriously affected the quality of the market study. An indirect approach has been made to assess demand and supply situation rather then direct approach (i.e.indepth stratified random sample survey in all agricultural regions).

a) Secondary Data:

Secondary data were collected from different agencies, publications, books, journals, reports etc. From the above secondary source, the following data have been collected:

i) Yield of different crop from 1975 to 1987,
ii) Land use for crop cultivation from 1975 to 1987,
iii) Per hectare yield in quantity of different crops,
iv) Potential and actual land use,
v) Present and potential yields per hectare,
vi) Food and farm machinery import trend from 1985 to 1991,
vii) Sizes of area and number of farms by region as of 1987 statistics,
viii) Economic condition and purchasing power of the agricultural farmers etc.
ix) Demand assessment by different studies for selected products.

From the above list of collected data, items (i) to (vi) were discussed in Chapter II while items (vii) to (ix) are discussed in this Chapter.

b) Primary Data:

A random sample survey was conducted in Middle Shebelle, Lower Shebelle, Lower Juba and Bay Regions; considered to be the main farming regions of Somalia. Some local and international organizations related to agricultural machinery near by Mogadishu have also been visited.

Because of the time limitations and scope of work, the random sample survey in the above regions covered a few respondents. The objective of the survey was to obtain information on:

-attitude and traditional taboos of the farmers towards the usage of modern but simple agricultural tools and implements,

-price sensitiveness of the farmers towards modern implements and tools,

-how often they replace old tools and implements by new ones,

-climatic effect on cultivation and retrospective effect on consumption and uses of agricultural tools and implements,

-quality sensitiveness of the farmers regarding the products they are using,

-from where they procure the tools and implements,

-do they get any government support/assistance for crop production,

-farmers attitude towards the agricultural promotion and extension agents/workers,

-reaction of the farmers when they see the usage of modern implements and machinery in the demonstration farms,

-attitude of the farmers towards introduction of animal drawn implements etc.

3.3 ANALYSIS OF THE SECONDARY DATA:

a) Agricultural Segments and their Characteristics:

There is a close relationship between the segments of agricultural mechanization and the segments of agriculture. Cultivable territory of Somalia has been divided into 18 major regions. Schedule 3-1, page 63 shows, by area and size the number of farms and distribution of major crops. Figures 3-1 and 3-2 also show, the concentration of major farms by crops.

This information is important and relevant, because the number of farms or farm holdings and their geographical concentration are the basic demand determinants to assess demand for agricultural tools and implements.

In the backdrop of the above, all information along with the statistics presented at Schedule 3-1 are analyzed and summarized as follows:

Schedule 3-1, reveals that 742 thousand hectares i.e. 80 percent out of a total 932.9 thousand hectares of cultivable land are available in 7 regions. These regions are Hiipan, Mid Shabelle, Lower Shabelle, Lower Juba, Mid Juba, Gedo and Bay Region. The Majority of these regions are scattered around Mogadishu and located on the banks of Shabelle and Juba the two major rivers of Somalia. These regions cover 91 percent of irrigated area and 77 percent of rainfed land. Approximately 80 percent i.e. 215,410 farm holdings out of a total number of 268,421 farm holding are in the above 7 regions. Therefore, the farm holdings of these 7 regions are the major market for agricultural tools and implements.

Product design and production program of the proposed factory will be based on the different and varied characteristics of these regions.

b) Analysis of Farming Systems:

Taking into consideration the existing conditions of Somalia, the farming systems could be divided into 5 patterns. Every pattern is linked to physical conditions (climate, soil condition, water sources etc.), traditional cultivating techniques and practices.

i) Single crop Hoe Cultivation System is Based on Traditional Style

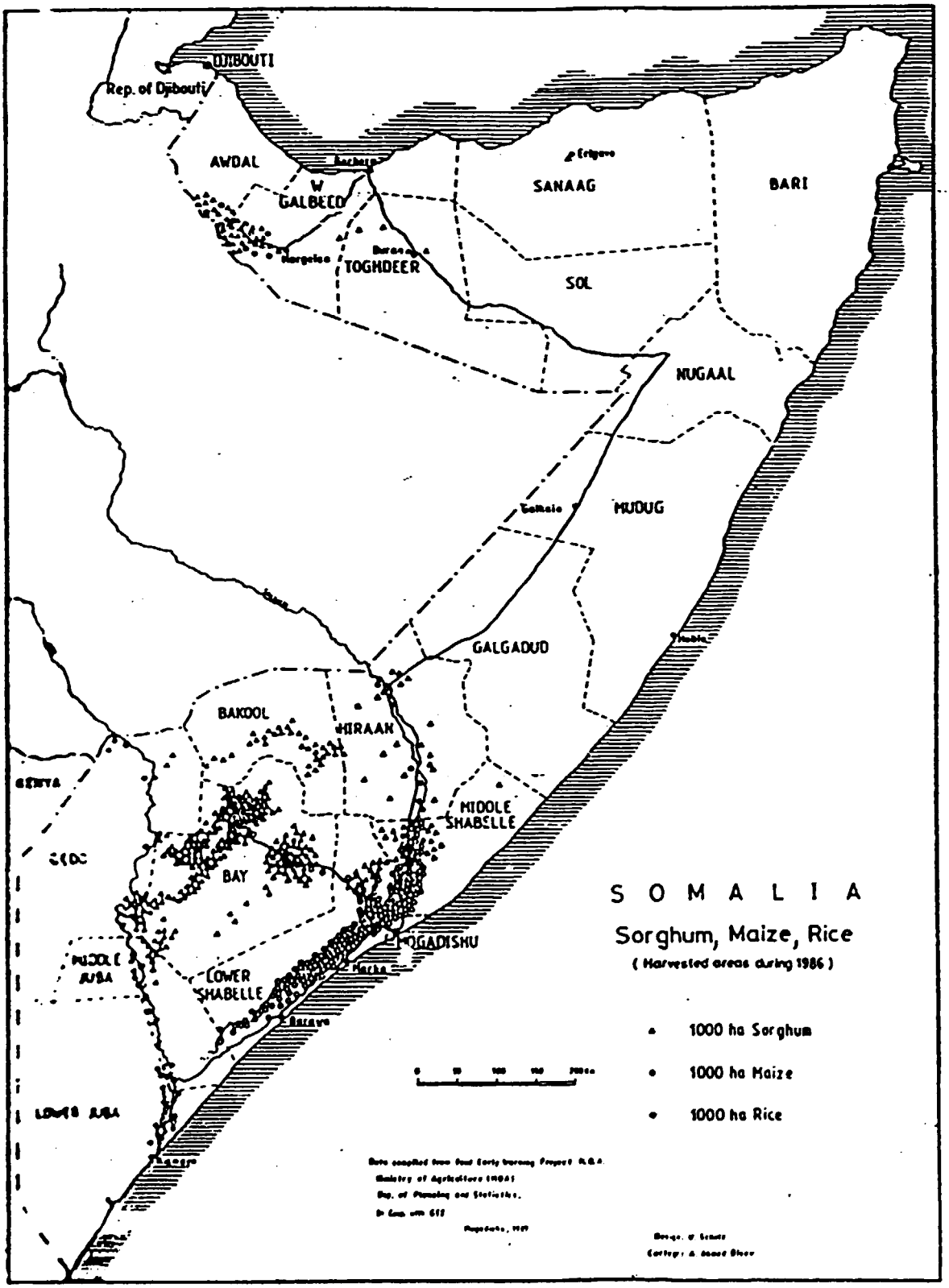
This is one of the major traditional methods of cultivation and is practiced in most of the regions, such as, North-West Regions, Bay Region and border regions. The features of this system is predominantly single crop (sorghum or maize) and extensive cultivation. Simple hand tool hoe, is used for cultivation.

ii) Mixed Crop Hoe Cultivation System of Rainfed Area:

This method is applied in the Mid Shabelle, Lower Shabelle, Lower Juba and a part of Bay Region. Mixed crop production consists mainly of maize, beans and sesame, intercultivated with other crops in different combinations.

FIGURE 3-1

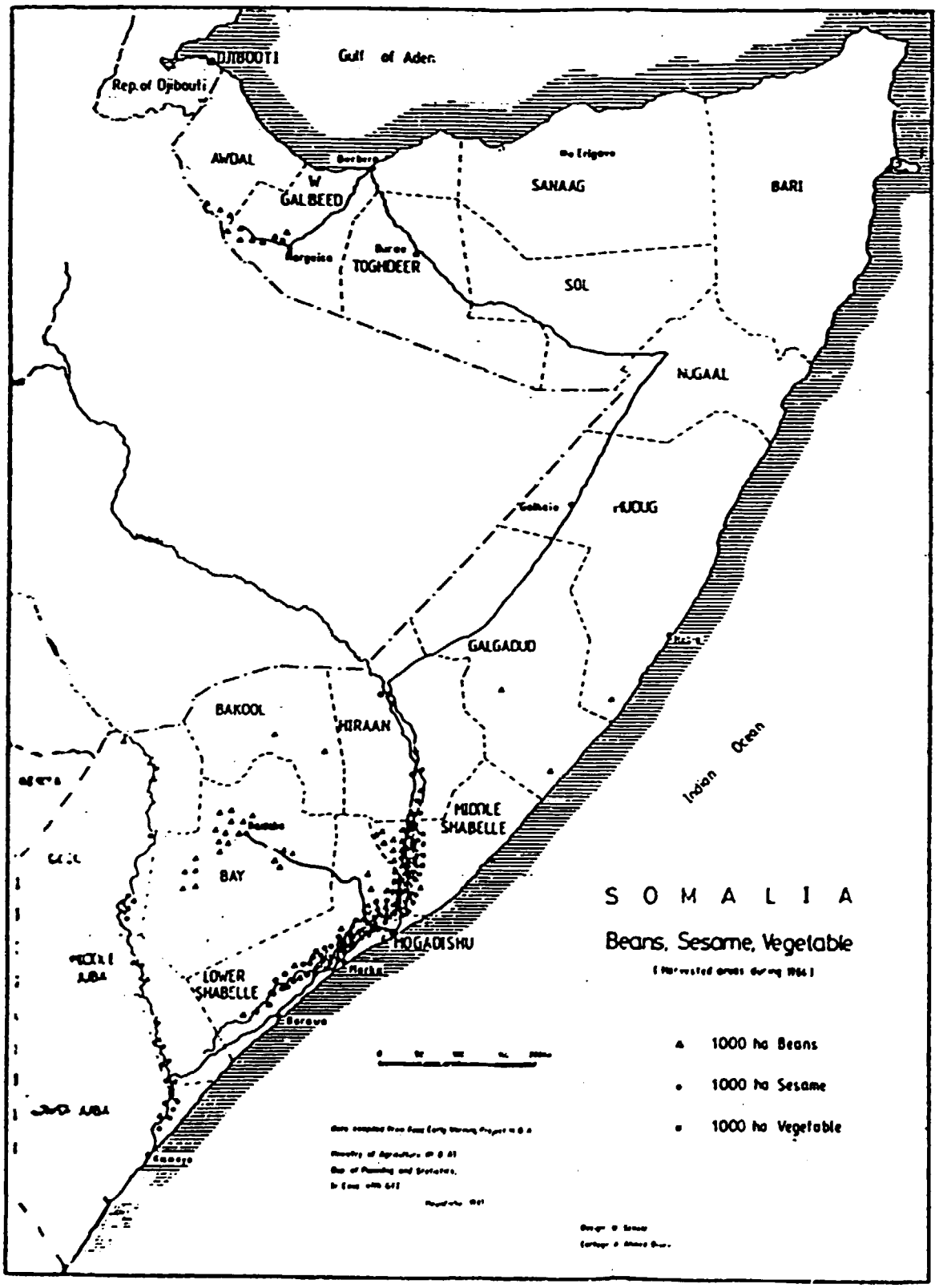
MAP SHOWING DISTRIBUTION OF SORGHUM, MAIZE AND RICE



SOURCE: Annual Report of Ministry of Agriculture, Government of Somalia.

FIGURE 3-2

MAP SHOWING DISTRIBUTION OF BEANS, SESAME AND VEGETABLE



SOURCE: Annual Report of Ministry of Agriculture, Government of Somalia.

It has been estimated that only 20 percent of total farms are engaged in this mix crop hoe cultivation system, but comprising some 80 percent of the total cultivated area in Mid Shabelle and Lower Shabelle Regions.

iii) Mixed Crop Cultivation System in Irrigated Areas:

This method is practiced around the regions of the two rivers, Shabelle and Juba. The main crops are maize, bean, sesame, sunflower, rice and vegetables. Due to heavy adhesive soil of the terrain, ploughing of land can be done only by use of tractors. All other operations are still performed manually.

iv) Animal Drawn Cultivation System:

Somalia is rich in livestocks (oxen, donkeys, camels) but a few animal drawn implements are in use in the northern Galbeed Region and Bay Region. Animal drawn implements are not used in other areas of the country.

v) Mixed Crop Cultivating System of Mechanization:

This method is practiced by some commercial farms. Ploughing is operated by tractors; some processes are accomplished by power operated implements and equipment.

c) Size of Agricultural Farm Holdings:

One of the surveys conducted by Ministry of Agriculture indicated that the farm holdings 0-5 ha amounted to total 54 percent and farm holdings 5-10 ha amounted to 33 percent of total holdings. Thus, most of the farms are small and medium size, which may explain why hand tools and simple equipment are still predominant.

d) Approach to Agricultural Mechanization and Development:

The approach to develop agricultural mechanization is still a controversial issue in Somalia and it is different from the conditions of other developing countries or neighbouring African countries. The distinctive feature is that experimentation of using animal drawn implements are successful in other countries, but are not widely used in Somalia. This situation has been reflected by many studies.

Study conducted by ICU indicated that "the most interesting characteristics of the farming systems in Somalia is a rather unique structure of production technologies practiced. At one end of the technology spectrum, there exists a traditional, low productive and high labour intensive hoe cultivation technology, at the other end, mechanized tilling of land by tractor drawn implements is widely applied on small and medium size farms.

Technology of animal drawn implements, which represents an intermediate phase of transition from a low traditional hand tool technology to advanced mechanized agricultural operations, is not known".

The Agricultural Inputs and Service Study also indicated some important issues, which are presented in the following paragraphs:

> "Although the Hargeisa area has some degree of tradition, the concept of animal traction is by and large non-existent in Somalia; the system has been introduced successfully in several African countries with similar farming traditions and environmental conditions".
>
> "The effect of the introduction of animal traction on the individual farms is expected to increase in the area which can be cultivated by the farmer family e.g. from 2.5 ha, if the present cultivated area caters for family subsistence only, the expanded area would generate produce for marketing i.e. become a source of cash income".
>
> The "Potential for resource based industrial development in the least developed countries, NO. 6 Somalia", UNIDO, IS.426, 1983 put forward the same proposal. "The potential of these activities could be used in a development strategy which would continue to put emphasis on the use of animal power operated agricultural implements, especially because of the abundance of cattle. Some of the animal drawn agricultural implements which are suitable for the country are, ploughs, sweeps, drills, weeders, diggers, harvesters, threshers, winnowers, etc."

Some studies have emphasized the orientation on tractor mechanization for the specific conditions of the local soil and climate.

From the point of view of technological advancement, it seems to be more attractive to transit directly from the traditional hoe cultivating system to the cultivating technique with tractor drawn implements, but the orientation of animal drawn implements and simple hand tools are more realistic in the present context because:

- Somalia is rich in animals (cattle's, donkeys and camels),
- More foreign exchange will be required to import expensive implements and fuels needed for operating the tractors.
- It is necessary to accumulate experiences, knowledge and practices to transit from using hand tools to tractor operated implements.
- The animal drawn implements has been successfully implemented in neighboring African countries similar to Somalia.

Major problems of animal drawn implements identified in Somalia are: lack of forage from rainy season to dry season, shortage of water from dry season to rainy reason for animal feeding as well as animal diseases. As a result, animals become

weak just before the cultivating time. In order to improve this condition, it is necessary to apply scientific methods for feeding the animals used for pulling implements. Furthermore, there is the necessity to strengthen the training of both the farmers and the animals. It is also necessary to establish some fields for testing prototype implements and for demonstration to show their advantages; and for farmers to select suitable implements.

e) Purchasing Power of Farmers:

It is estimated that most of the farmers are capable to buy traditional hand tools, such as hoe, axe and leveller etc. Only 10-15 percent of farmers can buy some simple manual equipment, like small maize shellers and grinding mills, less than 10 percent of farmers have the capacity to purchase animal drawn implements, such as ploughs, 3-tine cultivators etc. No individual farmer has the purchasing power to buy tractor operated implements except for few big farms. Development of cooperative farming system could boost consumption of tractor drawn implements.

The Government should promulgate a policy to support farmers for purchasing implements by increasing the availability of credit and loans at low interest rate for small and medium size farms, and should provide fuel, agriculture inputs at a lower price etc. Based on the above findings, the following conclusions may be drawn:

1) Hand tools, especially traditional tools are still in use and this trend will continue for a long time. The quantity of demand are dominant for hand tools.

2) At present, only few of the animal drawn implements have been adopted. It is assumed that these implements will have rapid application in the fields through active extension and demonstration.
Potential demand, therefore, exist, because, the animal drawn implements are suitable for farming, cultivation system, natural physical conditions and within the purchasing power of Somalian farmers.

3) Heavy and medium sized implements, drawn by tractors are available in the commercial farms and the Farm Machinery and Agricultureal Service Agency (ONAT). ONAT provides services for the small and middle sized farms and runs a fleet of approximately 1000 tractors and implements, thus, there is a possibility to develop limited mechanization in selected regions.

4) While choosing the products to meet the market demand, characteristics of farming cultivation systems and land holding size have been considered. The implements used for the existing cultivation methods are assumed to be laborious. Therefore, to reduce the drudgery of land cultvation and farm operations, modern tools and implements should be introduced.

5) Some simple implements like maize shellers, hand grinding mills, hand pumps are considered to be critical for proces-

sing and cultivation. As these are widely used in regions of Somalia, the improved prospects of marketing them will be sustained over a longer period if the quality and services of these products are found reliable and price competitive.

6) Introduction of animal drawn implements needs a certain period for selecting, testing and demonstration. As a first step some appropriate implements should be chosen and imported from other countries. The second step is to improve them in accordance with real conditions of Somalia. The production program of the proposed factory should be designed in accordance with the above to cater for the needs of local market conditions.

3.4 ANALYSIS OF PRIMARY INFORMATION:

In response to the enquiries made in conjunction with the market survey covering the regions of Mid Shabelle, Lower Shabelle, Lower Juba and Bay, the following information was obtained based on the 10 questions asked to a limited number of farmers.

1) The attitude of all the farmers was positive towards using modern agricultural tools, equipment and implements, however, over 90 percent replied that modern implements are beyond their purchasing capacity.

2) They are using traditional tools because these were within their budget. They are supplied by the local blacksmith shops as well as other local suppliers.

3) If identical products are available at competitive prices, all the farmers replied that they will not hesitate to procure them for their use.

4) Imported tools and implements are costly, but over 50 percent replied that some times they have no option but to procure imported products because the local blacksmith shops are not capable to manufacture them.

5) On the average, they could efficiently use their hand tools and implements for a period of 4-6 years.

6) Over 80 percent of the farmers responded that they are influenced by the activities of the demonstration farms. Because, most of them are marginal farmers, as such they are not in a position to practice the techniques and use the implements of the demonstration farm. If they get Government support, subsidies and assistance, they will adopt the same methods, observed in the demonstration farm. They further revealed that, if cooperatives are formed and extension services are provided, they will gladly accept them.

7) Often the farm regions are affected by the vagaries of nature primarily climatic. The economic condition of the farmers deteriorate during adverse climatic years. And, it takes long time for the farmers to recover their economic status.

8) Over 85 percent of the farmers feel that if they use animals for agriculture farming they will be able to get relief from the drudgery of farm operations. However, they further revealed that it is not possible to utilize their animals because most of them become sick and weak during the cultivation season.

3.5 ASSUMPTIONS UNDERTAKEN TO ASSESS THE DEMAND OF AGRICULTURAL TOOLS, EQUIPMENT AND IMPLEMENTS IN SOMALIA

In order to assess the demand of the agriculture tools, equipment and implements, the following assumptions have been made.

-replacement demand based on average 5-year cycle of amortization of tools and implements in operations,

-number of tools and implements vary directly with the number of farm holdings/farmers,

-cycle of replacement also vary directly with the number of farm holdings/farmers,

-usage of various coefficients like farm holdings, crop varieties, region etc,

-growth rate of agriculture farming and farm land.

-for lack of data estimates of projected new demand have not been attempted.

Based on the above information and that gathered during market survey, demand for different tools and implements were assessed and presented at Table 3-1 on the next page. For comparison the table also shows the demand estimates made by the Industrial Consultancy Unit and by the USAID.

3.6 SUPPLY ANALYSIS:

At Present the following are the sources of supply:

- local blacksmith shops,
- imports from foreign country,
- equipment component of the development projects funded by the donor agencies,
- unauthorized entry of implements and tools from neighboring African Countries etc.

As has been stated earlier, it was not possible to obtain information and statistics on the supply of tools and machinery. However, it was found from Government sources that Somalia on the average imports US $ 12.5 million worth of farm machinery per annum.

TABLE 3-1

ESTIMATION OF POTENTIAL DEMAND OF INDIVIDUAL PRODUCTS
(in units)

Sl. No.	Name of the Products	Estimate of present study	Demand Estimates different agencies		Production Capacity of proposed Factory
			ICU	USAID	
1.	Hoe	55,000	30,000	23,500	40,000
2.	Axe	35,000	15,000	-	15,000
3.	Machete/Sickle	35,000	17,000	-	15,000
4.	Spade/Shovel	60,000	1,000	23,500	20,000
5.	Fork/Rake	45,000	500	23,500	20,000
6.	Wheel Hoe	3,000	-	-	2,000
7.	Leveller	15,000	10,000	-	5,000
8.	Maize Sheller	7,000	5,000	-	2,000
9.	Hand Pump	5,000	-	-	2,000
10.	Sugar Cane Crusher	2,000	-	-	200
11.	Hand Grinding Mill	3,000	-	-	1,000
12.	Hand Rice Huller	3,000	-	-	1,000
13.	Hand Sprayer	3,000	-	-	1,000
14.	Simple Thresher	1,000	163	-	500
15.	Animal Drawn Plough	4,000	1,490	-	2,000
16.	3-Tine Cultivator	2,500	-	-	1,000
17.	Ridger	2,000	700	-	500
18.	1-3 Row Seed Drill	1,000	565	-	500
19.	Cart	1,000	-	-	500
20.	Power Pump	500	-	-	200
21.	Power Grinding Mill	500	-	-	200
22.	Powered Sugar Cane Crusher	500	-	-	200
23.	Powered Oil Seed Crusher	100	-	-	25
24.	Plough (Mechanical)	100	200	-	25
25.	Disk Harrow	100	1,000	-	25
26.	Tractor Drawn Cultivator	200	-	-	100
27.	Plough matched with Walking Tractor	200	-	-	100
28.	Transport Trailer 1 Ton	500		-	100
29.	,, ,, 4 Ton	100	1,140	-	25
30.	,, ,, 6 Ton	100		-	25

NOTE: a) Production programme of the factory has been designed primarily on one shift basis. On the basis of future demand elasticities, production volume may also be enhanced with the introduction of more shifts.

b) Estimates of the present study are based on differential co-efficients of farm holdings, crops, area, growth rate of agriculture farming and farm land, land conditions etc.

3.6 PLANT CAPACITY:

According to the market analysis, in total 32 different types of products (including spare parts), will be manufactured by the proposed factory in different phases. The quantities to be

produced of each type is shown in table 3-1 on the previous page. Also schedule 3-2 page 64 shows, the yearly capacity utilization, volume of production of each product and the unit price. All the products are classified under six major groups as follows:

Groups		Type	Number of Products
A	-	Hand Tools	5
B	-	Manually Operated Implements	9
C	-	Animal Drawn Implements	5
D	-	Powered Equipment	4
E	-	Tractor Drawn Implements	7
F	-	Others (other implements and equipment and spare parts)	2
		TOTAL:	32

Description of each product along with an illustrated drawing is presented at Annex-4.

TABLE 3-2

ESTIMATE OF SALES REVENUE
(in US $ '000)

SL. NO.	PRODUCT GROUPS	YEAR-1	YEAR-2	YEAR-3	YEAR-4	YEAR-5 & ONWARD
1.	GROUP - A	202.13	202.13	281.63	367.50	367.50
2.	GROUP - B	102.69	149.42	213.46	286.83	320.20
3.	GROUP - C	105.33	126.33	176.63	236.50	251.50
4.	GROUP - D	49.50	74.50	106.25	142.50	158.75
5.	GROUP - E	-	112.50	170.70	228.90	291.00
6.	GROUP - F	183.86	265.92	379.47	504.89	555.58
TOTAL ALL GROUPS:		643.51	930.80	1,328.14	1,767.12	1,944.53

NOTE: GROUP-A = HAND TOOLS : Hoe, Axe, Machete / Sickle, Spade and Fork / Rake.

GROUP-B = MANUALLY OPERATED IMPLEMENTS: Wheel Hoe, Maize Sheller, Hand Pump, Sugar cane Crusher, Hand Gringing, Mill, Hand Rice Huller, Hand Sprayer and Simple Thresher.

GROUP-C = ANIMAL DRAWN IMPLEMENTS : Plough, 3-Tine Cultivator, Ridger, 1-3 Row Seed Drill and Cart.

GROUP-D = POWER DRAWN IMPLEMENTS : Pump, Grinding Mill, Sugar cane Crusher and Seed Crusher.

GROUP-E = TRACTOR DRAWN IMPLEMENTS : Plough (3 mould broad type or 3 Disk type), Disk Harrow, Cultivator for Walking Tractor, 2 Mould Broad Plough for Walking Tractor, Transport Trailers 1 ton, 4 ton and 6 ton.

GROUP-F = OTHERS : Other Implements and Spare Parts.

3.8 SALES ESTIMATES AN DISTRIBUTION COSTS:

On the basis of the proposed unit prices and production programme, sales revenues of products have been estimated. In estimating the unit prices, cognizance of the present price structure of the products in the local market has been considered. Table 3-2 above shows the summary of the yearly sales revenues by groups of products and schedule 3-2 page 64 shows sales revenues by individual product.

At full capacity, the factory will produce tools, equipment and implements worth US $ 1.94 million at present market price. The factory will need to establish its own sales and distribution network. To dispose of the products in the market through different channels, estimated sales and distribution costs will be US $ 36,000 of which sales costs will be US $ 24,000 and distribution costs will be US $ 12,000. In the initial years, sales and distribution costs will be higher, however, with the passage of time it will diminish and stabilize during 5th year of production. Table 3-3 presented below, shows the summarized position of sales and distribution costs as a percentage of total sales. Detailed estimates of sales and distribution costs may be seen at Schedule 3-3, page 65.

TABLE 3-3

SALES AND DISTRIBUTION COSTS AS A PERCENTAGE OF TOTAL SALES

(Sales Revenue in 1000 $)

ITEMS	YEAR-1	YEAR-2	YEAR 3	YEAR-4	YEAR-5
Sales Revenues	643.5	930.8	1,328.1	1,767.1	1,944.5
Sales & Distribution cost as % of Sales Revenue	4.4%	3.2%	2.4%	2.0%	1.9%
Sales and Distribution costs	28.0	29.8	32.2	34.8	36.0

3.9 MARKETING STRATEGY:

a) Product Pricing:

Product pricing has been done taking into consideration the purchasing capacity of the farmers. Profit margins have been kept at a possible lowest level in the initial years in order to penetrate into the market and increase its market share by attracting the farmers, retailers, wholesalers, etc. In addition to the purchasing capacity of the farmers information from the following parameters were also considered for estimation of per unit sales price:

- estimation by FMW,
- from market surveys,
- collecting from wholesalers and retailers in Mogadishu,
- refer to similar products produced by other developing countries.

b) Organizational Set-up of Distribution and Sales:

It is necessary to incorporate a sales and marketing department in the organogram of the factory. In addition to its overall role of marketing functions, this department will be

specifically responsible for sales promotion, market intelligence, market research, data collection, demand and supply analysis, price and quality investigation etc. Several trained and experienced market specialist may be recruited for this purpose.

Apart from the existing wholesalers and retailers, the proposed factory should establish close liaison with such organizations as the Agricultural Extension and Farm Management Training Project (AFMET), Agricultural Service Agency (ONAT), and Central Agricultural Research Station (CARS). These organizations have very close cooperation and connection with the farms. AFMET has an extensive program to train animals for pulling implements and to test some original models imported from abroad.

ONAT runs a fleet of about 1000 tractors and implements covering the rainfed and irrigated agricultural areas. In addition, tractors and implements maintenance works are performed at its own workshop. CARS is primarily involved in agricultural research and may provide facilities and opportunities for testing of agricultural tools and implements. Because of their unique positions, they would play an important role in promoting sales and after sales services. Cooperation with these units will help the proposed factory in various ways for identifying new products and for improving qualities and after sales services.

c) Government's Support:

In view of the importance of the agricultural sector in the economy, the government must provide support to farm activities. Policies for availability of credit and agricultural inputs to the farmers and farms should be adopted, especially, to provide credit at lower interest rates to small and medium scale farms under acceptable conditions.

3.10 PLANT CAPACITY AND PRODUCTION PROGRAMME:

On the basis of the market study, the production capacity was determined. Thus Table 3.1 above shows the number of units of each product that can be produced annually in one shift. The plant capacity figure is subject to adjustments in responce to changes in the product-mix. At this capacity the plant's consumption of metal material will be 1443.44 tons annually, which corresponds to the consumption in the fifth year and each year thereafter. In planning the production programme, the following factors and assumptions were recognized:

a) The product-mix covers a wide range from the simple hand tools to the complex tractor drawn implements, and includes various usage patterns from tillaging to processing.

b) Multipurpose "Universal" Machines will be suitable for organizing production programmes in different batches.

c) Even though the factory will use Universal Multipurpose Machines, the products should be limited to a certain range. The reason is that the capacity of production is constrained by many factors, such as capacity of equipment, minimum economic size, material inputs, energy consumption, plant organization etc. The orientation of production and product-mix should be adjusted according to the market demand in a given period. Moreover after 5 years, and based on the market information and level of agricultural mechanization in the country, production of implements like combination processing implements, equipment using natural energy, medium powered implements, may be considered for manufacturing with complex technology.

d) The principle of the production programme must follow "from simple to complex, from less to more". Each product should reach the planned production target within 4 years. Accordingly, the selected tools and implements were divided into two groups or batches. The first batch representing simpler and more popular products will be produced from the first year of production. The production of the second batch of products will begin in the second year. The production capacity for each batch as well as the weighted average production capacity is shown in schedule 4-1-3 in chapter IV, page 72. On the other hand the production capacity for each product and the number of units produced is shown in schedule 3-4 page 65. Full production capacity for all products is attained in the fifth year.

e) The spare parts amount to 25 percent of total metal consumption.

f) Considering the possibility of a change in demand 15 percent margin of total metal consumption has been considered for developing new products.

SCHEDULE 3-1

SIZE OF AREA AND NUMBER OF FARMS BY REGION, 1987

Sl. No.	Region	Total Area in (1000 ha)	% of Total Area	CULTIVATED AREA IN 1000 ha				FARMS	
				Irrigated	Rainfed	Total	% of Total cultivated	Number	% of Total Farms
1.	Awdal	1,680	3	0.2	8.8	9.0	1.0	1,507	1
2.	W/Galbeed	2,800	4	1.5	79.5	81.0	8.7	12,941	5
3.	Togdheer	3,270	5	0.5	24.5	25.0	2.7	9,470	3
4.	Sanaag	5,170	8	0	13.0	13.0	1.4	4,057	1
5.	Bari	6,170	10	0	4.0	4.0	0.4	5,320	2
6.	Nugaal	2,900	5	0	2.0	2.0	0.2	1,888	1
7.	Sool	3,830	6	0	0	0	0	2,274	1
8.	Mudug	6,310	10	0.1	13.4	13.5	1.5	4,162	2
9.	Galgudud	4,970	8	0	18.0	18.0	1.9	6,216	2
10.	Hiipan	3,400	5	2.0	42.2	44.2	4.7	11,645	4
11.	Mid/Shabelle	2,080	3	17.9	95.8	113.7	12.2	23,225	9
12.	Banadir	80	1	0	0	0	0	-	-
13.	L.Shabelle	2,770	4	41.8	165.5	207.3	22.21	67,808	25
14.	Lower Juba	4,900	8	18.1	5.1	23.2	2.5	21,384	8
15.	Mid/Juba	1,870	3	21.6	35.7	57.7	6.1	14,179	5
16.	Gedo	4,540	7	7.1	52.5	59.6	6.4	18,571	7
17.	Bay	4,250	6	0.8	236.3	237.1	25.4	58,598	22
18.	Bakool	2,630	4	0	25.0	25.0	2.7	5,176	2
TOTAL SOMALIA		63,620	100	111.6	821.3	932.9	100	268,421	100

SOURCE: Ministry of Agriculture Yearbook, 1987-88, Mogadishu, 1988.

SCHEDULE 3-2

ESTIMATE OF SALES REVENUES

($ in thousand)

Sl. No.	PRODUCTS	UNIT PRICE IN US $	YEAR - 1		YEAR - 2		YEAR - 3		YEAR - 4		YEAR - 5	
			Quantity	Sales	Quantity	Sales	Quantity	Sales	Quantity	Sales	Quantity	Sales
1.	Hoe	3	22,000	66.00	22,000	66.00	30,000	90.00	40,000	120.00	40,000	120.00
2.	Axe	3	8,250	24.75	8,250	24.75	11,250	33.75	15,000	45.00	15,000	45.00
3.	Machete/Sickle	3.5	8,250	28.88	8,250	28.88	11,250	39.38	15,000	52.50	15,000	52.50
4.	Spade	3.5	11,000	38.50	11,000	38.50	15,000	52.50	20,000	70.00	20,000	70.00
5.	Fork/Rake	4	11,000	44.00	11,000	44.00	15,000	66.00	20,000	80.00	20,000	80.00
6.	Wheel Hoe	30	1,100	33.00	1,100	33.00	1,500	45.00	2,000	60.00	2,000	60.00
7.	Leveller	5.5	2,750	15.13	2,750	15.13	3,750	20.63	5,000	27.50	5,000	27.50
8.	Maize Sheller	18	1,100	19.80	1,100	19.80	1,500	27.00	2,000	36.00	2,000	36.00
9.	Hand Pump	27	1,100	29.70	1,100	29.70	1,500	40.50	2,000	54.00	2,000	54.00
10.	Sugar Cane Crusher	46	110	5.06	110	5.06	150	6.90	200	9.20	200	9.20
11.	Hand Grinding Mill	27	-	-	350	9.45	550	14.85	750	20.25	1,000	27.00
12.	Hand Rice Huller	42	-	-	350	14.70	550	23.10	750	31.50	1,000	42.00
13.	Hand Sprayer	22	-	-	350	7.70	550	12.10	750	16.50	1,000	22.00
14.	Simple Thresher	85	-	-	175	14.88	275	23.38	375	31.88	500	42.50
15.	Animal Drawn Plough	47	1,100	51.70	1,100	51.70	1,500	70.50	2,000	94.00	2,000	94.00
16.	3 Tine Cultivator	40	550	22.00	550	22.00	750	30.00	1,000	40.00	1,000	40.00
17.	Ridger	47	275	12.93	275	12.93	375	17.63	500	23.50	500	23.50
18.	1-3 Row Seed Drill	68	275	18.70	275	18.70	375	25.50	500	34.00	500	34.00
19.	Cart	129	-	-	175	21.00	275	33.00	375	45.00	500	60.00
20.	Pump	130	-	-	70	9.10	110	14.30	150	19.50	200	26.00
21.	Grinding Mill	120	-	-	70	8.40	110	13.20	150	18.00	200	24.00
22.	Sugar Cane Crusher	450	110	49.50	110	49.50	150	67.50	200	90.00	200	90.00
23.	Oil Seed Crusher	750	-	-	10	7.50	15	11.25	20	15.00	25	18.75
24.	Plough	550	-	-	10	5.50	15	8.25	20	11.00	25	13.75
25.	Disk Harrow	570	-	-	10	5.70	15	8.55	20	11.40	25	14.25
26.	Cultivator (Matched Walking Tractor)	230	-	-	35	8.05	55	12.65	75	17.25	100	23.00
27.	Plough (Matched Walking Tractor)	100	-	-	35	3.50	55	5.50	75	7.50	100	10.00
28.	Trasnport Trailer 1 Ton	450	-	-	35	15.75	55	24.75	75	33.75	100	45.00
29.	" " 4 Ton	3,200	-	-	10	32.00	15	48.00	20	64.00	25	80.00
30.	" " 6 Ton	4,200	-	-	10	42.00	15	63.00	20	84.00	25	105.00
	SUB-TOTAL :	-	-	459.65	-	664.88	-	948.67	-	1,262.23	-	1,388.95
31.	Other Implements	-	-	68.95	-	99.70	-	142.30	-	189.33	-	208.34
32.	Spare Parts	-	-	114.91	-	166.22	-	237.17	-	315.56	-	347.24
	T O T A L :	-	-	643.51	-	930.80	-	1,328.14	-	1,767.12	-	1,944.53
	CAPACITY UTILIZATION:			35%		45%		65%		90%		100%

Note: a) Other Implements are assumed to be 15% of Sub-total.
b) Spare Parts are assumed to be 25% of Sub-total.

SCHEDULE 3-3

ESTIMATE OF PRODUCTION COST: SALES AND DISTRIBUTION COST.

Item Description		YEARLY COSTS in thousand So Sh and Corresponding Equivalent in thousand US $				
		YEAR-1	YEAR-2	YEAR-3	YEAR-4	YEAR-5
		Local	Local	Local	Local	Local
SALES COST	So.Sh.	6,120	6,120	6,120	6,120	6,120
	US $	24	24	24	24	24
DISTRI-BUTION COST	So.Sh.	1,010	1,469	2,081	2,754	3,060
	US $	3.96	5.76	8.16	10.80	12.00
TOTAL	So.Sh.	7,130	7,589	8,201	8,874	9,180
	US $	27.96	29.76	32.16	34.80	36.00

NOTE: US $ 1 = So.Sh. 255.

SCHEDULE 3-4
PRODUCTION PROGRAMME

Sl. No.	PRODUCTS	UNITS AT 100% CAPACITY	YEAR-1 Cap %	YEAR-1 Units	YEAR -2 Cap. %	YEAR -2 Units	YEAR -3 Cap %	YEAR -3 Units	YEAR -4 Cap. %	YEAR -4 Units	YEARS-5 Cap. %	YEARS-5 Unit
A.	HAND TOOLS:											
1.	Hoe	40,000	55	22,000	55	22,000	75	30,000	100	40,000	100	40,000
2.	Axe	15,000	55	8,250	55	8,250	75	11,250	100	15,000	100	15,000
3.	Machete/Sickle	15,000	55	8,250	55	8,250	75	11,250	100	15,000	100	15,000
4.	Spade	20,000	55	11,000	55	11,000	75	15,000	100	20,000	100	20,000
5.	Fork/Rake	20,000	55	11,000	55	11,000	75	15,000	100	20,000	100	20,000
B.	MANUALLY OPERATED IMPLEMENTS:											
6.	Wheel Hoe	2,000	55	1,100	55	1,100	75	1,500	100	2,000	100	2,000
7.	Leveller	5,000	55	2,750	55	2,750	75	3,750	100	5,000	100	5,000
8.	Maize Sheller	2,000	55	1,100	55	1,100	75	1,500	100	2,000	100	2,000
9.	Hand Pump	2,000	55	1,100	55	1,100	75	1,500	100	2,000	100	2,000
10.	Sugar C.Crusher	200	35	70	55	110	75	150	100	200	100	200
11.	Hand Grinding Mill	1,000	-	-	35	350	55	550	75	750	100	1,000
12.	Hand Rice Huller	1,000	-	-	35	350	55	550	75	750	100	1,000
13.	Hand Sprayer	1,000	-	-	35	350	55	550	75	750	100	1,000
14.	Simple Thresher	500	-	-	35	175	55	275	75	375	100	500
C.	ANIMAL DRAWN IMPLEMENTS:											
15.	Plough	2,000	55	1,100	55	1,100	75	1,500	100	2,000	100	2,000
16.	3-Tine Cultiva.	1,000	55	550	55	550	75	750	100	1,000	100	1,000
17.	Ridger	500	55	275	55	275	75	375	100	500	100	500
18.	1-3 Row S.Drill	500	55	275	55	275	75	375	100	500	100	500
19.	Cart	500	-	-	35	175	55	275	75	375	100	500
D.	POWERED EQUIPMENTS:											
20.	Pump	200	-	-	35	70	55	110	75	150	100	200
21.	Grinding Mill	200	-	-	35	70	55	110	75	150	100	200
22.	Sugar C.Crusher	200	55	110	55	110	75	150	100	200	100	200
23.	Seed Crusher	25	-	-	40	10	60	15	80	20	100	25
E.	TRACTOR DRAWN IMPLEMENTS:											
24.	Plough (3 mould broad type or 3 Disk Type)	25	-	-	40	10	60	15	80	20	100	25
25.	Disk Harrow	25	-	-	40	10	60	15	80	20	100	25
26.	Cultivator (for Walking Tractor)	100	-	-	35	35	55	55	75	75	100	100
27.	2 Mould Board Plough (for Walking Tractor)	100	-	-	35	35	55	55	75	75	100	100
28.	T.Trailers 1 Ton	100	-	-	35	35	55	55	75	75	100	100
29.	" " 4 Ton	25	-	-	40	10	60	15	80	20	100	25
30.	" " 6 Ton	25	-	-	40	10	60	15	80	20	100	25
F.	OTHERS:											
31.	Other Implements:	Approximately 15% of Total Value of Products.										
32.	Spare Parts :	Approximately 25% of Total Value of Products.										

CHAPTER - IV

MATERIALS AND INPUTS

4.1 INTRODUCTION:

As shown in Table 4-1 below the proposed factory will utilize 17 percent of locally available materials and inputs in terms of value and the remaining 83 percent will be imported. An important issue to be addressed by the authorities concerns the large proportion of the raw materials required, which will have to be imported.

TABLE 4-1

YEARLY UTILIZATION OF IMPORTED AND LOCAL MATERIALS AND INPUTS BY THE PROPOSED FACTORY

(Value in 1000 US $)

PRODUCTION YEAR	IMPORTED	%	LOCAL	%	TOTAL	%
Year - 1	291.97	83	59.03	17	351.00	100
Year - 2	448.96	83	90.81	17	539.77	100
Year - 3	643.61	83	130.18	17	773.79	100
Year - 4	865.36	83	175.15	17	1,040.51	100
Year - 5 & onwards	973.24	83	196.80	17	1,170.04	100

In view of the heavy dependence on imports of raw materials and inputs, the Government should give special consideration to allocating the required foreign exchange if a decision is taken to implement the proposed factory.

Although, deposits of Iron Ore have been discovered recently, it will take a long time before the iron ore mine becomes productive and the ferrous metals usable in industry. However, scrap iron is available locally and can be used with cast iron. This will reduce the imported requirement of cast iron by 5.7 percent by value, as reflected in Schedule 4-1-1 page 71.

4.2 ESTIMATE OF METAL CONSUMPTION;

The metal raw materials have been classified into three main groups:

- Cast Iron
- Sections
- Sheet Metal.

Based on the collected information and data in Somalia and as per reference of similar type of products; the weight of each unit of product has been estimated as well as the weight of each of the three types of metals used in its production. From this data the total weight of metal consumption was computed as well as the corresponding costs as shown in Schedule 4-2 page 75. The ratio of metal consumption varies from product to product. Therefore, it is essential to estimate the usage co-efficient of each metal in every product. The co-efficient for casting is 0.60 and that for other metal processes are 0.75. The formulas used for estimating consumption of ferrous metals are:

HDFE = {HTC + SPC + (IC + EC) 5% }/0.85
FFC = {(IC + EC) 10%}/0.88
CPC = {(IC + EC) 85%}/0.95

Where,

HDFC = Heating die forging consumption
FFC = Free forging consumption
CPC = Cold process consumption
HTC = Hand tool consumption
SPC = Spare parts consumption
IC = Implements consumption for both manually operated and animal drawn implements.
EC = Powered equipment consumption.

The total metal consumption by each of the two batches at full capacity utilization are calculated with the help of the above formulas and the results are presented at Schedule 4-1-2 page 71. The total consumption of metal is estimated at 1443.44 tons per year at full capacity utilization. On the other hand, the share in total consumption of the above metal materials by each specific product at full capacity has been calculated and presented at Schedule 4-2 page 75.

4.3 MATERIALS AND INPUTS SUPPLY PROGRAM:

a) Estimates for Raw-materials:

The total annual consumption of ferrous metals along with auxiliary materials, utilities etc. are exhibited at schedule 4-1 page 70. According to this schedule, during the fifth year of production (i.e. the year when the factory will be able to utilize its full capacity) estimated cost of materials and inputs consumption will be US $ 1,170.04 thousand; out of which local cost will be US $ 196.80 thousand i.e. 17 percent and foreign cost will be US $ 973.24 thousand i.e. 83 percent.

The factory will produce in total 32 different varieties of products of which 30 products are specific in nature (reference Schedule 4-2 page 75) and the remainder represents two groups of ad hoc products. In the production programme it may be observed that during the first year of operation, the factory will produce in the first batch 15 varieties of products which are simple but popular amongst the farmers. However, from the second year of operation a second batch is introduced enabling the factory to produce all varieties of products including spare parts (25

percent in value) and other implements (15 percent in value). Yearly capacity utilization rates are depicted at Schedule 4-1-3 page 72. Detailed estimates of raw materials and inputs are exhibited at Schedule 4-1-1 page 71. The reference prices of materials used in cost estimation have been taken from actual import prices in Somalia and reference of similar enterprises in neighbouring African countries.

b) Estimates for Utilities:

Of the total utilities costs, 75.7 percent will be local and 24.3 percent will be foreign costs. Yearly foreign and local costs along with their percentage share are shown in the following table 4-2.

TABLE 4-2

YEARLY FOREIGN AND LOCAL COST OF UTILITIES

(in thousand $)

PRODUCTION YEARS	FOREIGN COST	%	LOCAL COST	%	TOTAL COST	%
YEAR - 1	5.57	24.3	17.34	75.7	22.91	100
YEAR - 2	8.54	24.3	26.57	75.7	35.11	100
YEAR - 3	12.25	24.3	38.13	75.7	50.38	100
YEAR - 4	16.52	24.3	51.41	75.7	67.93	100
YEAR - 5 AND ONWARD	18.55	24.3	57.77	75.7	76.32	100

SOURCE: Schedule 4-1-5 presented at the end of the chapter.

Major items of the utilities are available from local sources; only coke will have to be entirely imported which alone constitutes 24.3 percent of total utilities costs. Schedule 4-1-4 page 73 shows, the estimates for different items of utilities in quantity and price. Whereas, Schedule 4-1-5 page 74 shows the yearly consumption of different items of utilities in terms of value. Unfortunately, it was not possible at this stage to calculate the costs of utilities per product or even per groups of products. Therefore, it is not possible to determine the relative rates of return of each major group of products.

4.4 QUALITATIVE PROPERTIES OF CHOSEN MATERIALS:

Quality and durability of agricultural tools, equipment and implements depends on the quality of basic raw materials that are used to manufacture them. Different components of agricultural tools, equipment and implements are made of steel and require different proportions of carbon and manganese in the steel. For example, the frames of implements are always made of low carbon steel whereas the hand tools and tillage parts or soil wearing

parts are made of high carbon steel or alloy and subjected to heat treatment. The composition of metal with SAE numbers (Material standard of USA) for producing various parts of tools and implements is presented at Schedule 4-3 page 76.

4.5 AUXILIARY MATERIALS:

These are factory supplies and consist of the various chemicals and additives required in production, maintenance materials like grease and oils, paints and packaging materials as well as components procured from outside suppliers for use in the assembly of certain products. Their estimated costs in the fifth year of production is US $ 133,600.

SCHEDULE 4-1

ESTIMATE OF PRODUCTION COST: MATERIALS AND INPUTS

ITEM DESCRI-TION	COST FOR YEAR-1			COST FOR YEAR-2			COST FOR YEAR-3			COST FOR YEAR-4			COST FOR YEAR-5		
	Foreign US $	Local So.Sh.	Total US $	Foreign US $	Local So.Sh.	Total US $	Foreign US $	Local So.Sh.	Total US $	Foreign US $	Local So.Sh.	Total US $	Foreign US $	Local So.Sh.	Total US $
Iron and Steel	266.36	2117 (8.3)	274.66	409.6	3282.72 (12.9)	422.5	587.18	4694.03 (18.4)	605.58	789.45	6308.73 (24.74)	814.19	687.88	7057.03 (27.7)	915.58
Auxiliary Materials	20.04	5110 (20.04)	40.08	30.82	7858 (30.82)	61.63	44.18	11265 (44.18)	88.36	59.39	15145 (59.39)	118.78	66.8	17034 (66.80)	133.60
Utilities	5.57	4419 (17.33)	22.90	8.54	6776 (26.57)	35.10	12.25	9722 (38.13)	50.38	16.52	13111 (51.42)	67.94	18.56	14731 (57.77)	76.33
Others	-	3407 (13.36)	13.36	-	5239 (20.54)	20.54	-	7515 (29.47)	29.47	-	10097 (39.60)	39.60	-	11356 (44.53)	44.53
Total	291.97	15053 (59.03)	351	448.96	23156 (90.81)	539.77	643.61	33196 (130.18)	773.79	865.36	44662 (175.15)	1040.51	973.24	50178.03 (196.80)	1170.04

NOTE: a) All sorts of chemicals, additives, packaging materials, paints, factory supplies and all types of spare parts etc. costs are included in the Auxiliary Materials.
b) Others include emission and waste disposal cost and all other factory overheads.
c) Foreign and local costs for civil maintenance are not included in this Schedule.
d) This schedule does not include wages and salaries costs which are separately shown at Schedule - 6.
e) US $ in thousand,
f) Figures in Parantheses are in thousand US $
g) So.Sh. in thousand,
h) Total in thousand US $
i) US $ 1 = So.Sh. 255.

SCHEDULE 4-1-1

ESTIMATE OF PRODUCTION COSTS:
METAL RAW MATERIAL INPUTS

(US $ in thousand)
(So.Sh. in thousand)

ITEM DESCRIPTION	YEAT - 1			YEAR - 2			YEAR - 3			YEAR - 4			YEAR - 5		
	Quantity	Cost		Quantity	Cost		Quantity	Cost		Quantity	Cost		Quantity	Cost	
	(Ton)	Foreign US $	Local So.Sh.	(Ton)	Foreign US $	Local So.Sh	(T	Foreign US $	Local So.Sh	(Ton)	Foreign US $	Local So.Sh	(Ton)	Foreign US $	Local So.Sh
Gray Cast Iron*	131.78	38.74	2117 (8.30)	204.34	60.08	3282.72 (12.87)	292.19	85.9	4694.03 (18.40)	392.7	115.45	6308.73 (24.70)	439.28	129.15	7057.03 (27.70)
Sections	234.83	178.47	-	357.67	271.83	-	514.22	390.81	-	691.69	525.68	-	782.75	594.89	-
Sheet Metal	66.42	49.15	-	104.99	77.69	-	149.28	110.47	-	200.43	148.32	-	221.41	163.84	-
TOTAL:	433.03	266.36	2117 (8.30)	667.00	409.60	3282.72 (12.87)	955.69	587.18	4694.03 (18.40)	1284.82	789.45	6308.73 (24.70)	1443.44	887.88	7057.03 (27.70)

* Local cost is for local iron scrap which is about 5.7 percent of total.

Note: a) Figures in Paranthesis are Equivalent of So.Sh. in thousand US $
b) US $ 1 = So.Sh. 255

SCHEDULE 4-1-2

ESTIMATE OF PRODUCTION COSTS:
METAL CONSUMPTION AT FULL CAPACITY
(BY BATCH)

CATEGORY OF MATERIALS	GRAY CAST IRON				SECTIONS				SHEET METAL				TOTAL
Description	Specified Products (Ton)	Other Imple-ments (Ton)	Spare Parts (Ton)	Sub-Total (Ton)	Specified Products (Ton)	Other Imple-ments (Ton)	Spare Parts (Ton)	Sub-Total (Ton)	Specified Products (Ton)	Other Imple-ments (Ton)	Spare Parts (Ton)	Sub-Total (Ton)	(Ton)
FIRST BATCH	180.67	27.10	45.17	252.94	298.93	44.85	74.74	418.52	98. 22	14.73	24.55	137.50	808.96
SECOND BATCH	133.10	19.97	33.27	186.34	260.17	39.02	65.04	364.23	59.93	8.99	14.99	83.91	634.48
T O T A L :	313.77	47.07	78.44	439.28	559.10	83.87	139.78	782.75	158.15	23.72	39.54	221.41	1443.44

Note: The first batch refers to products whose production will start in the first year of production; the second batch are those whose production will start in the second year.

SCHEDULE 4-1-3

YEARLY ESTIMATED RATE OF CAPACITY UTILIZATION

Y E A R S	YEAR 1	YEAR-2	YEAR-3	YEAR 4	YEAR-5
PRODUCTION PROGRAM	Capacity (%)	Capacity (%)	Capacity (%)	Capacity (%)	Capacity (%)
CAPACITY UTILIZATION FOR BATCH ONE	55	55	75	100	100
CAPACITY UTILIZATION FOR BATCH TWO	-	35	55	75	100
WEIGHTED AVERAGE OF CAPACITY RATE	35	45	65	90	100

SCHEDULE 4-1-4

ESTIMATE OF PRODUCTION COSTS: UTILITIES INPUTS
(At Full Capacity)

Sl. No.	ITEMS	UNIT	UNIT PRICE (So.Sh.)	Quantity	COST Foreign ($ 1000)	COST Local (So.Sh. 1000)	COST TOTAL IN ($ 1000)
1.	Electricity	Kwh	13.16	590,850	-	7,775.586	30.49
2.	Water	M3	48	48,480	-	2,327.04	9.13
3.	Gasoline	Litre	67	31,900	-	2,137.30	8.38
4.	Diesel Oil	Litre	53	31,900	-	1,690.70	6.63
5.	Coke	Ton	56,100 ($ 220)	84.34	4,731.47 (18.55)	-	18.55
6.	Charcoal	Ton	20,000	40	-	800.00	3.14
	TOTAL :	-	-	-	4,731.47 (18.55)	14,730.63 (57.77)	76.32

NOTE: 1) Electricity: 975 KW x 2,424 h x 25% x 13.16 So.Sh/KWH
= 7,775.59 thousand So.Sh.

2) Water : 160 M3/Shift x 303 Shift x 48 So.Sh/M3
= 2,327.04 thousand So.Sh.

3) Gasoline : 31,900 Litre x 67 So.Sh./Litre
= 2,137.30 thousand So.Sh.
2x13.3 + 2x27.3 + 2x40 = 161.2 Litre/100 Km.
160x303 = 48,480 Litre/Year.
200KWx8Hx303x5% = 24,240 KWH = 32,493 Hp.H.
32,493 Hp.H x 220 g = 71,48,460 g/Year
= 7,148.46 Kg./Year
= 9,531 Litre/Year
TOTAL [48,480 + 9,531 +(48,480 + 9,531)10%]
= 63,812 = 63,800 Litre/Year

4) Diesel Oil: 31,900 Litre x 53 So.Sh/Litre
= 1,690.7 thousand So.Sh.

5) Coke : (439.28 x 16% + 70.28 x 20%) x 220 = 18.55
thousand $ or 278.35 Kg/day consumption.

6) Charcoal : 40 Ton x 20,000 So.Sh./Ton = 800 thousand So.Sh.
(or 132 Kg/day consumption)

7) US $ = So.Sh 255

SCHEDULE 4-1-5

ESTIMATE OF PRODUCTION COSTS: UTILITIES INPUTS (PER YEAR)

Foreign Cost in Thousand US $
Local Cost in Thousand So.Sh.
Total Cost in Thousand US $

Sl. No.	ITEM DESCRIPTION	YEAR -1			YEAR - 2			YEAR - 3			YEAR - 4			YEAR -5		
		COST			COST			COST			COST			COST		
		Foreign	Local	Total	Foreign	Local	Total	Foreign	Local	Total	Foreign	Local	Total	Foreign	Local	Total
1.	Electricity	-	2,333	9.15	-	3,577	14.03	-	5,132	20.13	-	6,921	27.14	-	7,776	30.49
2.	Water	-	698	2.74	-	1,070	4.20	-	1,536	6.02	-	2,071	8.12	-	2,327	9.13
3.	Diesel Oil	-	507	2.00	-	778	3.05	-	1,116	4.38	-	1,505	5.90	-	1,691	6.63
4.	Gasoline	-	641	2.51	-	983	3.85	-	1,410	5.53	-	1,902	7.46	-	2,137.3	8.38
5.	Coke	5.57	-	5.57	8.54	-	8.54	12.25	-	12.25	16.52	-	16.52	18.55	-	18.55
6.	Charcoal	-	240	0.94	-	368	1.44	-	528	2.07	-	712	2.79	-	800	3.14
9	TOTAL :	5.57	4,419	22.91	8.54	6,776	35.11	12.25	9,722	50.38	16.52	13,111	67.93	18.55	14,731.3	76.32

NOTE: US $ 1 = So.Sh. 255

SCHEDULE 4-2

ESTIMATE OF PRODUCTION COSTS:
METAL MATERIALS INPUTS
(By product - at full capacity)

SL. NO.	PRODUCTS DESCRIPTION	NET UNIT WEIGHT (Kg.)	UNIT CONSUMPTION Cast Iron (Kg.)	Section (Kg.)	Sheet Metal (Kg.)	TOTAL UNIT COST ($)	PRODUCTION PROGRAMME (Pcs/Year)	TOTAL CONSUMPTION Cast Iron (Ton)	Section (Ton)	Sheet Metal (Ton)	TOTAL COST IN THOUSAND DOLLAR
1.	Hoe	1.0	-	1.33	-	1.01	40,000	-	53.20	-	40.432
2.	Axe	1.2	-	1.60	-	1.22	15.000	-	24.00	-	18.240
3.	Machete/Sickle	1.0	-	-	1.33	0.98	15,000	-	-	19.95	14.763
4.	Spade	1.5	-	-	2.00	1.48	20,000	-	-	40.00	29.600
5.	Fork/Rake	2.0	-	2.66	-	2.02	20,000	-	53.20	-	40.432
6.	Wheel Hoe	12.0	3.00	11.20	2.40	11.36	2,000	6.00	22.40	4.80	22.718
7.	Leveller	3.5	-	4.67	-	3.55	5,000	-	23.33	-	17.731
8.	Maize Sheller	7.0	10.50	0.93	-	4.46	2,000	21.00	1.86	-	8.710
9.	Hand Pump	25.0	35.42	5.00	-	16.44	2,000	70.84	10.00	-	32.890
10.	Sugar Cane Crusher	40.0	53.33	5.33	5.33	27.07	200	10.67	1.07	1.07	5.414
11.	Hand Grinding Mill	23.0	34.50	3.07	-	14.65	1,000	34.50	3.07	-	14.650
12.	Hand Rice Huller	15.0	21.25	3.00	-	9.87	1,000	21.25	3.00	-	9.866
13.	Hand Sprayer	5.0	-	0.67	6.00	4.95	1,000	-	0.67	6.00	4.949
14.	Simple Thresher	45.0	30.00	24.00	12.00	37.83	500	15.00	12.00	6.00	18.915
15.	Animal Drawn Plough	33.0	5.08	30.80	8.80	31.73	2,000	10.16	61.60	17.60	63.467
16.	3 Tine Cultivator	17.0	2.83	19.27	1.13	16.49	1,000	2.83	19.27	1.13	16.492
17.	Ridger	25.0	4.17	23.33	6.67	24.17	500	2.09	11.67	3.34	12.087
18.	1-3 Row Seed Drill	30.0	7.50	24.00	10.00	28.32	500	3.75	12.00	5.00	14.159
19.	Cart	150.0	-	200.00	-	152.00	500	-	100.00	-	76.000
20.	Pump	37.0	49.33	9.87	-	25.10	200	9.87	1.97	-	5.020
21.	Grinding Mill	80.0	106.67	21.33	-	54.30	200	21.33	4.27	-	10.860
22.	Sugar Cane Crusher	200.0	266.67	26.67	26.67	135.17	200	53.33	5.33	5.33	27.034
23.	Oil Seed Crusher	210.0	210.00	112.00	-	160.09	25	5.25	2.80	-	4.002
24.	Plough	370.0	92.50	431.67	74.00	415.76	25	2.31	10.79	1.85	10.394
25.	Disk Harrow	400.0	66.67	333.33	213.33	434.85	25	1.67	8.33	5.33	10.871
26.	Cultivator (Matched Walking Tractor)	100.0	16.67	100.00	20.00	96.76	100	1.67	10.00	2.00	8.676
27.	Plough (Matched Walking Tractor)	55.0	13.75	51.33	11.00	51.31	100	1.38	5.13	1.00	5.131
28.	Transport Trailer 1 Ton	345.0	57.50	299.00	115.00	332.87	100	5.75	29.90	11.50	33.287
29.	" 4 Ton	1,150.0	191.67	996.67	383.33	1,109.23	25	4.79	24.91	9.58	27.731
30.	" 6 Ton	2,000.0	333.33	1,733.33	666.67	1,929.62	25	8.33	43.33	16.67	48.240
	SUB-TOTAL :	-	-	-	-	-	-	313.77	559.10	158.15	652.961
31.	Other Implements	15%	-	-	-	-	-	47.07	83.87	23.72	97.944
32.	Spare Parts	25%	-	-	-	-	-	78.44	139.78	39.54	163.240
	TOTAL :	-	-	-	-	-	-	439.28	782.75	221.41	914.145

SCHEDULE 4-3

MATERIALS SPECIFICATION OF AGRICULTURAL IMPLEMENTS

Sl. No.	COMPONENTS	SAE Number	Carbon (%)	Manganese (%)
1.	Hand Tools (Spade, Hoe, Fork, Axe, Sickle, etc.	1078	0.72 - 0.85	0.30 - 0.60
2.	Implement Frame	1006-1008-1010-1015	0.08 - 0.18	0.25 - 0.60
3.	Springs	1065	0.60 - 0.70	0.60 - 0.90
4.	Plough Beam or Tool Bar	1070	0.65 - 0.75	0.60 - 0.90
5.	Rake Teeth	1078	0.72 - 0.85	0.30 - 0.60
6.	Plough Shares	1074	0.70 - 0.80	0.50 - 0.80
7.	Scraper, Blades, Disks	1085	0.80 - 0.93	0.70 - 1.00
8.	Spring Tooth Harrow	-	---	---
9.	Mower and Binder Section Twine	1086	0.82 - 0.95	0.30 - 0.50
10.	Holders, Rotter Disks	1090	0.85 - 0.98	0.60 - 0.90

SOURCE : "Appropriate Industrial Technology for Agricultural Machinery and Implements," United Nations, 1979.

CHAPTER - V

LOCATION AND SITE

5.1 CHOICE OF LOCATION:

The Foundry and Mechanical Workshop (FMW) is located in the industrial area of Mogadishu, well connected by modern roads, approximately 6 km north-west of the centre of the town. Its exact location is shown in the Figure 5-1 page 78. It is concluded in this study that the proposed factory will be an extension of FMW; and, it will be located at the same premises. Existing factory buildings of FMW cover an area of 3,350 sq.meters; the proposed factory buildings will cover an additional area of 3,908 sq.meters. As the proposed factory will be an extension of FMW and will be established within the same premises, it will have access to all the existing facilities available to FMW.

Agricultural farms producing food crops are situated in the cultivated regions which are close to Mogadishu. These agricultural farms are considered to be the major consumers of the agricultural implements. Therefore the existing location of FMW is favourable for product promotion, extension services, technical guidance as well as for after sales-services. Futhermore it will be convenient for transportation of raw materials (most of which will be imported) from the port to site as well as for delivery of finished products. The Bay region is also close to Mogadishu and is approachable by all weather roads; as such, this region may be used by the proposed factory as its testing ground for animal drawn implements.

The proposed factory will use many of the existing production facilities of the FMW, therefore, it will be desirable to plan the layout of the new buildings keeping in view the existing layout of the FMW so that the production programme could be organized in a better and efficient way. Land owned by FMW leaves a wide margin for future expansion as well.

5.1 LOCAL CONDITIONS:

a) Precipitation:

The annual and monthly average rainfall in and around Mogadishu are shown at Table 5-1 below.

TABLE 5-1

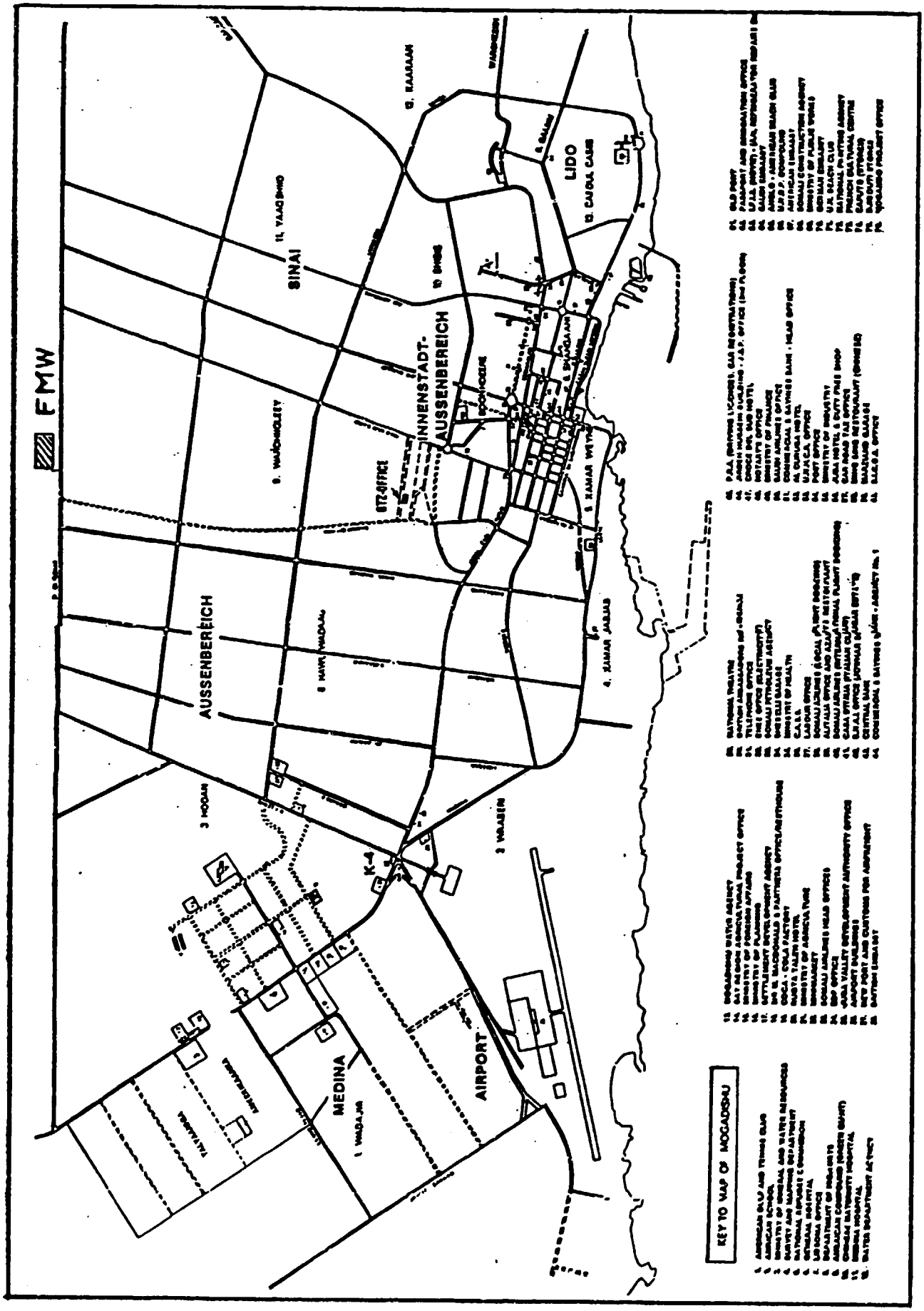
THE PRECIPITATION OF MOGADISHU

MONTHS	RAINFALL IN (MM)	MONTHS	RAINFALL IN (MM)	MONTHS	RAINFALL IN (MM)
January	0	May	62	September	23
February	0	June	88	October	33
March	8	July	84	November	41
April	58	August	23	December	8
				AVERAGE YEARLY :	447

SOURCE: Ministry of Agricultural, Statistics Section, Mogadishu, 1988.

FIGURE 5-1

MAP SHOWING THE EXACT LOCATION OF FMW
AND THE PROPOSED PROJECT



b) Climate:

The climate of Somalia belongs to the tropical and sub-tropical zones. The annual average temperature is approximately 25-30 degrees C. Humidity is higher along the costal belt whereas inside the country the percentage of humidity is much lower.

c) Terrain:

The terrain of the site is flat, as such, site preparation will be easier and less costly as compared to other areas. The costs of site preparation and development is estimated at US $ 72,500 all of which will be in local currency.

d) Transport Facility:

Existing transportation facility is excellent. The site is close to the sea port and the international airport, and is connected by a wide all weather high-way linked with all major roads of the Mogadishu.

e) Water Supply:

At present, water is drawn with the help of a deep tube well pump from underground to an overhead tank. Therefore, there will be no problem of water supply.

f) Electricity Supply:

It was reported that "power for industrial purpose has been in short supply in the past. The major problem has been the interruptions in power due to mechanical breakdowns and shortage of fuel. Most of the existing industries have their own power generators run on petroleum fuel since it could not depend on the city mains". <1>

"The electricity generating capacity has increased at an average rate of 15 percent per annum. Nearly 50 percent of the total capacity in the country is generated in Mogadishu <2>. Power supply through national grid is still insufficient to meet the demand; as such, Mogadishu is experiencing frequent load shading. To minimize the problem, Government has planned to install an additional 15 MW steam turbine generator at the Tesira Power Plant and rehabilitate the three previously closed down diesel generator plants.

<1> "Somalia: Industrial Revitalization Through privatization", Industrial Development Review Series, UNIDO, PPD.91, 1988.
<2> Ibid p.69

The existing power supply capacity is 160 KVA (15000/400 V Transformer). Major breakthrough in hydro-electric supply will emerge when Bardhere Dam is completed and over 105 MW of power capacity is added <3>. Therefore, it is expected that at the time of need, the proposed factory will not face any power supply problem. However, keeping in view of the demand of the proposed factory, it will be necessary to set up a new transformer.

g) Waste Disposal:

Location of the proposed factory will be in the suburb of Mogadishu, therefore, disposal of waste will not be a problem. Moreover, the proposed factory will not generate any toxic waste, to pollute the environment.

h) Manpower:

The population of Mogadishu is 1.2 million. More than 15 percent of the city male dwellers are unemployed. Of the total female dwellers 33 percent are unemployed. Notwithstanding the availability of workers the proposed factory may face the problem of recruiting an adequate number of technicians and skilled workers. Therefore, some technicians should be recruited in advance and trained during the construction period, so they will be ready and able to operate the factory.

<3> Ibid p.69

CHAPTER-VI

PROJECT ENGINEERING

6.1 INTRODUCTION:

The machinery / equipment of the proposed factory listed in Schedule 6-2, at page 93, is exhaustive. A total of 143 different types of machinery / equipment will be required for the factory to perform its ten distinctive production processes, to manufacture 6 different groups of products comprising 32 different kinds of agricultural tools, equipment, implements, spares etc. Out of 143 different types of machinery/equipment, 87 types (61 percent) would be procured. The rest 56 types (39 percent) are already available at the FMW. The existing machinery / equipment need thorough servicing and overhauling before they are rearranged and placed in the production process; otherwise an imbalance in the production process may occur due to differential efficiency of the machinery / equipment. The selected products are generally simple, with a short production cycle, and can be produced in small batches, to meet the local demand in different periods. Therefore, it is expected that there will be frequent changes of production batches due to varied product-mix. Universal machines and general purpose technologies will cope with the production requirements.

The total investment costs of machinery and equipment has been estimated at US $ 1.1 million (Schedule 6-3 page 97).

The appropriate technological processes to be employed and the type of machinery and equipment required in the various workshops are described in the following sections.

6.2 DESCRIPTION OF PROCESSES AND MACHINERY:

a) Casting:

Many parts of farm machinery are made of casting. Most of these parts are made of grey iron, some of these are also made of spheroidal cast iron. A blast furnace with 2 tons/hour capacity will be required. The chamber size of the furnace could be changed to accommodate different amounts of molten iron. For pouring big casting (2-4 tons/piece), a molten iron ladle in front of the furnace may be used. The raw materials are broken mechanically or manually. The large steel scraps could be splitted by gas cutting. Mechanical weighing and material feeding should be adopted. Pouring will be done primarily by hand.

The white casting iron for manufacturing cultivating parts or wear-proof parts could be casted in permanent mould through cooling at high speed. During continuous production process, vibrating moulding machines should be used. The large castings would be moulded directly on the ground. Core is man-made. Ovens are adopted for drying cores. Top shaker and mixer would

be used for sand processing. Top risers and burrs would be removed by chiseling or grinding.

The castings would be put into a tumbling barrel for cleaning and then be placed in open air for natural aging. A crucible furnance with 50 kg. capacity will be used for melting the non-ferrous metal.

b) Forging:

A small quantity of forged parts will be produced by the free forging method. When the quantity of production in one batch exceeds 100 pieces, stamp forging technology would be used. Special forging dies will be designed for production of hand tools.

Electric air hammers of three different sizes: 400 kg, 150 kg and 60 kg. are suggested. The larger blanks, such as gears with diameter over 100 mm, small mouldboards, disks etc. will be produced by a friction press with 300 tons capacity. Coal stove or coke stove will be used for heating the forged blanks.

c) Punching and Pressing:

Most parts of the hand tools and implements are made of steel sheets and sections. Punching and pressing are the main processes used. The mechanical punching and pressing machines are the basic equipment in this workshop. A combined stamping-shearing machine is included for material blanking. Three roller mills are considered for sheet rounding. Tubes and sections can be cut off with hand tube cutters and hand shears. Tube bending will be done by the hand tube bending machine. The burrs and edges of stamping could be removed by chisel, file or portable grinder.

d) Welding:

The proposed welding equipment consist of electric arc welding sets, electric spot welding sets and oxyacetylene welding sets. In cases of production of a small batch, the accuracy of welding structures will be handled with universal tools. When the production quantity increases to a specific level, the special welding jigs and fixtures would be used. The welding section would be separated from other sections. The exhaust blowers would be mounted in the welding section.

e) Heat Treatment:

The soil wearing parts are particularly vulnerable and should be given wear-resistance treatment. Therefore, equipment for heat treatment should be procured. The parts that requires quenching and tempering could be heated in a box-type electric furnance. Carburizing will be conducted in well-type gas

carburizing furnace. Tempering will be treated in well-type electric furnace. The deformation of parts would be rectified by a screw press. The hardness can be inspected with hardometers.

f) Machining:

The recommended universal machine tools are : lathes, capstan lathes with hex-turret, universal milling machine, horizontal boring machine, universal cylindrical grinding machine, radial arm drilling machine, upright drilling machine, table drilling machine, pedestal grinder and shaping machine.

The machining workshop will also be equipped with gear-hobbing machine and gear shaping machine to handle the high speed rotating gears.

In order to extend the usage of machine tools and to process some special parts, such as, the long shafts, the large disks and drums, some technological devices and attachments would be taken into account; special jigs and fixtures would be used.

g) Assembling, Testing and Painting:

Assembling will be completed at the specified shop, medium and small-sized products could be assembled by means of assembly benches and test rigs. If a large quantity of products are to be assembled; it would be necessary to build a simple assembly line. After final assembling, products should be adjusted, inspected and tested.

Painting of tools, equipment and implements will be the final process. The finished components, tools and implements would be painted by means of hand spray painting, brush painting or emulsion painting.

The painting room would be equipped with a paint mixer, movable air compressor and painting gun, and it should be isolated from other rooms.

h) Tooling, Machining for Non Standard Equipment and Maintenance:

This workshop is an important technical basis for the proposed factory. It should be capable of manufacturing tools and equipment, rebuilding components, and repairing the machines and tools of the factory.

The precision of machine tools in this workshop would be higher than that in the machining shop. In addition to the general machine tools suggested, this shop would be equipped with tool milling machines and tool grinding machines. The specification of machine tools of this shop are different from the specifications proposed in the machining shop, as such, coordinated efforts between these two shops are needed for efficient use of the machines.

i) Woodworking:

This workshop will be responsible for pattern making, wood works and repairing of the building and furniture. The equipment used for this shop consist of wood sawing machine, wood turning lathe, wood planning machine, wood joint machine, pedestal grinder and table drilling machine. Some important wooden parts and patterns will be treated by means of boiling and drying to provide resistance to deformation.

j) Measuring, Metallurgical and Chemical Examination, Physical Testing :

According to the technical requirements specified by different standards, the raw materials, semi-finished or finished parts, components and products should be examined to ensure high quality. Although some standard instruments have been considered for this purpose, some special measuring tools will also be required in this shop.

Owing to the limitation of factory capacity, some of the parts and components would be purchased from the market. These components are as follows:

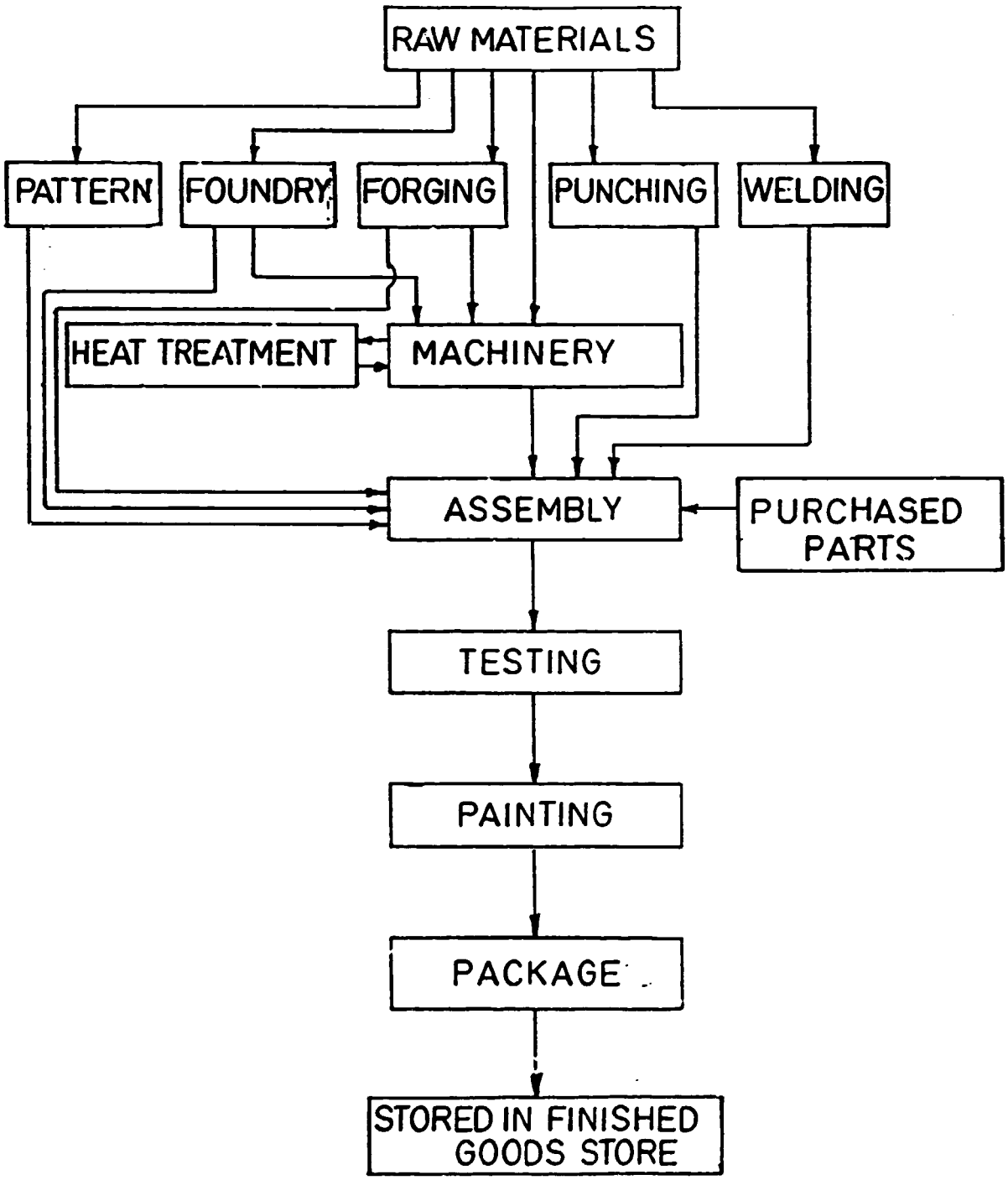
(a) Engines and motors mounted on products,
(b) Bearings,
(c) Standard parts (nuts, bolts, washers and pins),
(d) Non-metalic parts (rubber, plastics, leather and glass etc.),
(e) Standard tools, precision measuring tools,
(f) Steel castings and malleable castings,
(g) Electroplated parts,
(h) Oxygen for gas welding and cutting etc.

The process flow-chart is presented in Figure 6-1 at page 85.

6.3 THE GENERAL REQUIREMENTS OF CIVIL ENGINEERING:

The new buildings of the factory should have mild steel structures, which will consist of beams and pillars of reinforced concrete; asbestos tile roofing, brick walls and windows with steel sashes. Most of the materials (86 percent) for civil engineering will be imported. The bricks with centre hole will be procured from the local market. Auxiliary buildings, such as warehouses will have mild steel structure, brick walls and asbestos tile roofing. Offices and washrooms will consist of frame and floor of rainforced concrete, wooden coiling, concrete tile roofing and windows with steel sashes. Total investment costs for civil engineering works including site preparation has been estimated at US $ 1.45 million (Schedules 6-4 and 6-5 page 98 and page 99).

FIG. 6-1. PROCESS FLOW



All of the civil engineering works will follow a unified standard with a view to reducing the specifications of pre-fabricated parts, and hence reduce costs. The following specifications are recommended.

Span: 12M, 8M
Colum distance : 6M
Height of low beam: 8.4M, 6M

The safety measures against fire have been considered, especially in the heat treatment and the foundry workshops. In all, there will be 12 new workshops and utility buildings for the proposed factory. Figure 6-2 page 87 shows, in detail the layout of the proposed factory including the existing FMW. Brief descriptions of each shop is presented in the following paragraphs.

a) Foundry Workshop:

It will be constructed on the basis of the original foundry workshop. The existing building will be renovated partly to match the new construction. It will be a heat processing workshop. A proper distance should be kept between the foundry workshop and the other buildings. Its area will be 1000 sq.meters. Its location has been shown in figures 6-2 and 6-2(a) at page 87 and page 90.

b) Forging and Heat Treatment Shop:

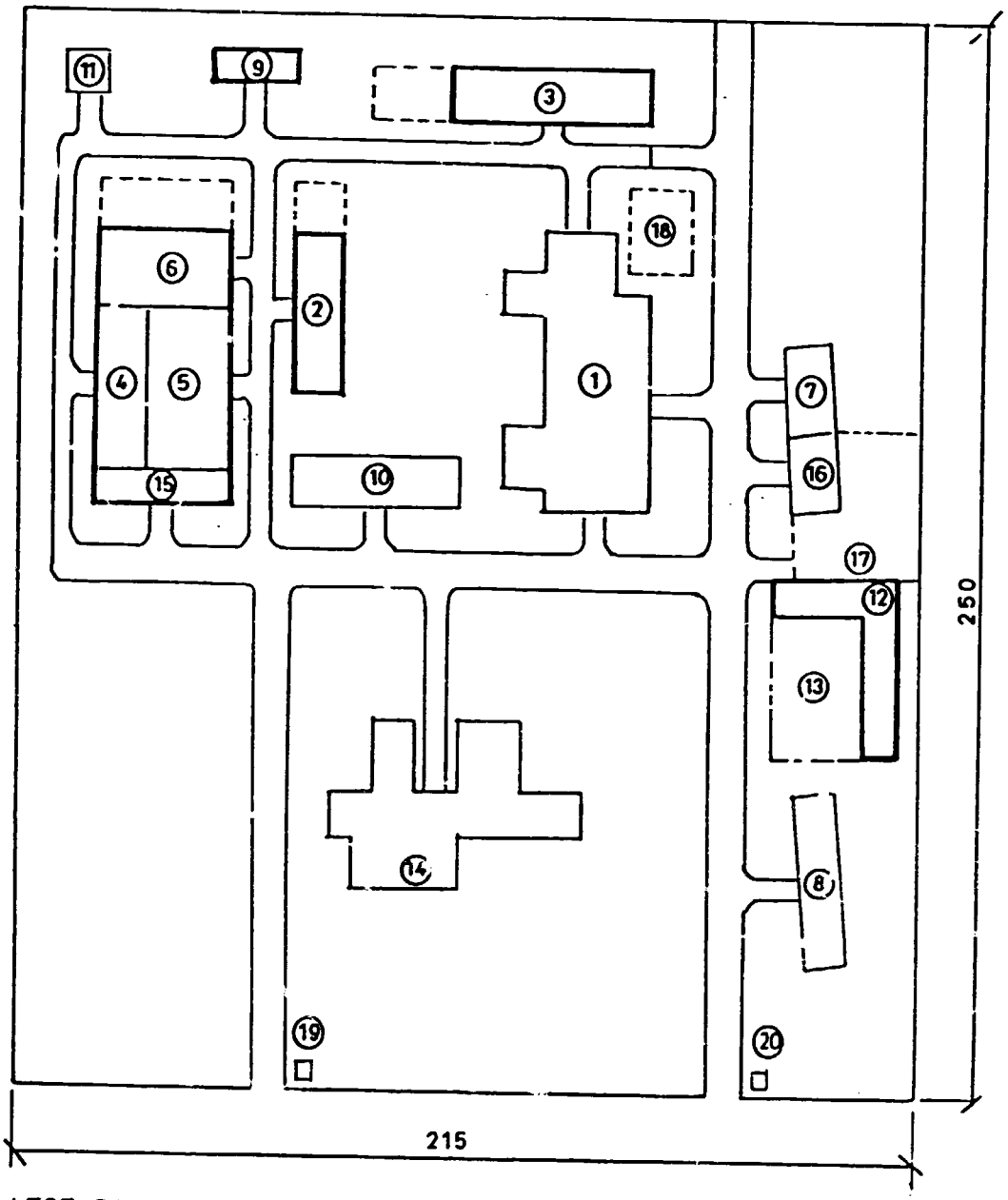
It will also be a heat processing workshop. It will be located in the same region as the foundry workshop. The building should be constructed away from other workshops. The building will have a single span structure: length x width x height: 36 x 12 x 6 meters; building area: 432 sq.meters. Forging section and heat treatment section are separated by an intermediate wall. The foundation of hammer forging machines should be designed to withstand shock generated due to hammering vibration. Its location has been shown in figures 6-2 and 6-2(b) at page 87 and page 89.

c) Punching and Welding Shop:

The building will have a single span structure; length x width x height: 48 x 12 x 6 meters, building area: 576 sq.meters. It will be separated into two sections by an intermediate wall, for punching and welding. The foundations of punching machines and pressing machines should be designed to withstand the shock and vibrations. Partitions and facilities for discharging smoke and dust should be installed at welding section. Its location has been shown in figures 6-2 and 6-2(c) at page 87 and page 89.

FIG. 6-2 PROPOSED PLANT LAY-OUT

1"= 1000



LEGEND:

① FOUNDRY SHOP (EXISTING)
② FORGING & HEAT TREATMENT SHOP
③ PUNCHING & WELDING SHOP
④ MACHING SHOP
⑤ ASSEMBLY SHOP
⑥ TOOLING & MAINTENANCE SHOP
⑦ PATTERN GROUP (EXISTING)
⑧ PUMP & AGR. MACHINERY MAINTENANCE SHOP (EXISTING)
⑨ SUBSTATION & GENERATOR ROOM
⑩ LABORATORY (EXISTING)
⑪ WATER TOWER (EXISTING)
⑫ WARE HOUSE
⑬ WARE HOUSE
⑭ OFFICE (EXISTING)
⑮ OFFICE AND WASHROOM
⑯ PRODUCT STORE (EXISTING)
⑰ PRODUCT STORE
⑱ WARE HOUSE
⑲ GATE HOUSE (EXISTING)
⑳ GATE HOUSE

d) Machining Shop, Assembling Shop, Tooling and Maintenance Shop:

These three shops will be located in one building and are separated by partitions. A bridge crane will be situated in middle span (Load 2 tons) for assembling and maintenance. The assembling and maintenance shops will be connected by a mobile gate. The building will consist of three span structures; building area: 54 x 32 = 1,728 sq.meters. Middle span: 12 meters and side span: 8 meters, height to trusses of middle span: 8.4 meters. Its location and layout has been shown in figure 6-2 and 6-2(d) at page 87 and page 90.

e) Offices and Washrooms:

In front of machining shop, there will be a new two-storeyed building. It will accommodate the offices and washrooms of administrative department, the technical and inspection departments; building area: 32 x 8 = 256 sq.meters. Its location has been shown in figure 6-2, legend-15 at page 87.

f) Pattern Group:

It is a part of foundry shop. It will be located in the original machining shop, occupied half of the total area as shown in figure 6-2, legend-7 at page 87; building area: 200 sq.meters. The fireproof measures should be provided for this shop.

g) Power and Transformer Section:

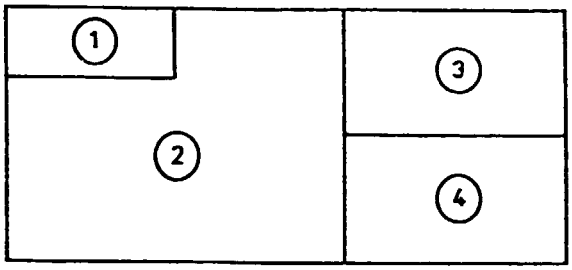
Safety measures will be necessary for this section. The building is separated by partitions, building area: 120 sq meters, length x width x height: 24 x 6 x 4.8 meters. Its location has been shown in figure 6-2, legend-9 at page 87.

h) Laboratories:

The existing semi-finished type building behind the original administrative building should be reconstructed and divided into several rooms for chemical analysis laboratory, physical and mechanical testing laboratory, metallurgical examination laboratory and measuring laboratory. According to the various requirements of these laboratories, it should be made dustproof, humidity proof and temperature proof. Building area will be 200 sq.meters. The location of the laboratories are shown in figure 6-2, legend-10 at page 87.

LAY-OUT OF FOUNDRY SHOP

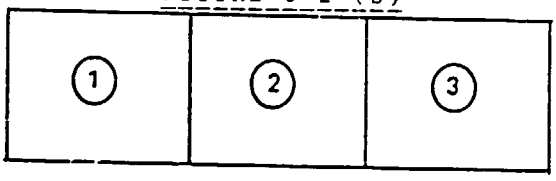
FIGURE 6-2 (a)



1. MELTING ZONE
2. MOULDING ZONE
3. SAND TREATMENT ZONE
4. CLEANING ZONE

LAY-OUT OF HEAT TREATMENT AND FORGING SHOP

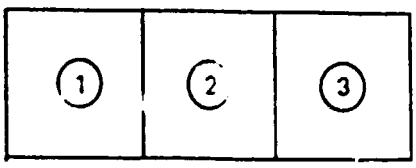
FIGURE 6-2 (b)



1. HEAT TREATMENT ZONE
2. FURNACE ZONE
3. FORGING ZONE

LAY-OUT OF PUNCHING & WELDING SHOP

FIGURE 6-2 (c)



1. PUNCHIN ZONE
2. PREPARE ZONE
3. WELDING ZONE

i) Repair Shop for Water Pump and Agricultural Implements:

As this shop will be in close touch with the enduser, the building should be constructed near the gate. The building area is 400 sq meters. Its location has been shown in figure 6-2, legend-8 at page 87.

j) Warehouses:

The warehouses are divided as follows: steel warehouse, common material and auxiliary material warehouse, tool warehouse, material warehouse for furnance, and finished product warehouse. The material warehouse and finished product warehouse will have open-air structure with walls. The layouts of warehouses are shown in figure 6-2, legend-12 13, 16, 17 and 18 at page 87.

k) Offices:

The administrative building containing the offices of general manager, chief engineer and other staff has been shown in figure 6-2, legend-14 at page 87. Building area will be 130 sq.meters.

l) Water Pump Station:

It will be located in the existing original building as shown in figure 6-2, legend-11 at page 87.

m) Guard House:

It will be a brick made building as shown in figure 6-2, legend-19 and 20 at page 87. Building area will be 40 sq.meters.

n) Roads:

Roads could be divided into main roads and sub-roads. The surface of the road will be made of pitch. Width of the main road will be 8 meters and that of sub-roads will be 5 meters. Length of main roads will be 400 meters and that of the sub-roads will be 300 meters. The layout of the roads are shown in figure 6-2 at page 87.

o) Walls of Factory Area:

Original walls of the existing FMW will serve the purpose. The total length of the walls are 920 meters.

p) Site Preparation and Development:

Before constructing the new buildings, it will be necessary to level the ground. The volume of earth works for site preparation will be approximately 5000 cubic meters. Estimated local cost for site preparation will be US $ 17,500 (reference Schedules 6-4 and 6-5 page 98 and page 99).

q) Maintenance and Repair of Civil Engineering:

It is estimated that maintenance and repair of the civil engineering will be US $ 21,750 per annum. Schedule 6-6 at page 100 shows the break-down of this amount.

6.4 EMISSION DISPOSAL:

The proposed factory will not dispose of any toxic chemicals or materials to pollute the environment. The foundry, however, will emit smoke in the air, which will to some extent pollute the air. For the treatment of emissions and the disposal of dumps and sewage waste an estimated cost of US $ 3,000 per annum will be incurred. Schedule 6-7 at page 100 shows the estimated costs for this purpose.

SCHEDULE 6-1

ESTIMATE OF TECHNOLOGY COSTS
[LUMP - SUM PAYMENTS]

	TECHNOLOGY	COST (US $)
1.	Drawings of Agricultural Machinery	20,000
2.	Design Technology of Agricultural Machinery	30,000
3.	Manufacture Technology of Agricultural Machinery	30,000
	T O T A L :	80,000

Spent in the second year of construction.

SCHEDULE 6-2

ESTIMATE OF INVESTMENT COST : EQUIPMENT

SL. NO.	QTY.	ITEM DESCRIPTION	COST (US $)
I.		**Foundry Shop:**	
1.	1	Cupola furnace (2.0 ton)	28,000
2.	1	Sand mixer	existing
3.	1	Sand screening machine (ZS 750)	3,100
4.	2	Moulding machines	existing
5.	1	Cylinder cleaning machine (Q 116)	5,000
6	1	Grinder	existing
7.	2	Crucible furnaces	"
8.	1	Charging scale (2,000 kg)	"
9.	1	Beam crane	"
10.	1	Band saw	"
11.	1	Band saw	"
12.	1	Disk saw	"
13.	1	Wood planer	"
14.	1	Wood milling machine	"
15	1	Wood lathe	"
16.	1	Wood lathe	"
17.	1	Wood drilling machine	"
18.	1	Wood grinding machine	"
19.	1	Wood grinding machine	"
20	1	Wood grinding machine (vertical)	"
21.	1	Band saw grinding machine	"
22.	1	Band saw welding machine	"
23.	1	Table grinder	"
24.	1	Dust collector	"
25.	1	Work bench	"
II.		**Forging and Heat Treatment Shop**	
26.	1	Air forging hammer (C41-400) (400 kg)	22,200
27.	1	" " " (C41-150) (150 kg)	9,100
28.	1	" " " (65 kg)	existing
29.	1	Frictional press (J53-300) (300 kg)	26,600
30a	2	Forging furnaces	existing
31.	1	Box resistance stove(Rx3-60-9,60KW,950C)	7,000
32.	1	,, ,, ,, (Rx3-90-12,95KW,1200oC)	14,100
33.	1	Well resistance stove(RJ-55-6,55KW,650oC)	10,000
34.	1	Well carbonizing stove(RQ-75-90,75KW,950oC)	12,300
35.	1	Hardness tester (HRB - 150)	7,200
36.	1	Quenching trough (made by factory)	600
37.	1	Hand press (J01-1)	900

SCHEDULE 6-2 (continued)

SL. NO.	QTY	ITEM DESCRIPTION	COST (US $)
III.		**Punching and Welding Shop**	
38.	1	Plate shearing machine	existing
39.	1	Punching and shearing machine	,,
30b.	1	Forging furnace	5,000
40.	1	Plate rolling machine	existing
41.	1	Plate bending machine	,,
42.	1	Pipe bending machine	,,
43.	1	Press (JB21 - 100) (100 ton)	10,000
44.	1	Press (JB23 - 80) (80 ton)	13,300
45.	1	Press (JB23 - 63) (63 ton)	8,900
46.	1	Drilling machine	existing
47.	1	Electric welding machine	600
48.	1	Electric welding machine	existing
49.	1	Spot welding machine (DN - 10)	500
50.	1	Gas generator	existing
51.	1	Hand press	,,
52.	1	Grinder	,,
53.	1	Bracket jib crane (1000 kg)	,,
54.	1	Work bench (steel structure) (2200x800x860)(with two vice)	800
55.	2	Work bench (2480x700) (with one vice)	900
IV.		**Machining Shop**	
56.	2	Lathes (C 616 x 750)	10,000
57.	2	,, (CA 6140 x 1000)	14,700
58.	1	Lathe (CA 6140 x 1500)	7,800
59.	1	,, (400 x 800)	existing
60.	1	,, (500 x 2500)	,,
61.	1	,, --	,,
62.	1	Turret lathe (C3163)	15,600
63	1	Turret lathe (C336 K-1)	6.900
64.	1	Universal milling machine (X61W 250x1000)	11,100
65.	1	,, ,, ,, (X62W,320x1250)	12,100
66.	1	,, ,, ,, ---	existing
67.	1	Vertical milling machine (X52K,320x1250)	13,600
68.	1	Shaping machine (B 650)	5,300
69.	1	,, ,, (B 665)	6,600
70.	1	Vertical drilling machine (Z 5125)	4,600
71.	1	,, ,, ,, (Z 5140)	5,500
72.	1	Table drilling machine (Z 4006)	700
73.	1	,, ,, ,, (Z 4012)	700
74.	1	Gear hobbing machine (Y 38, 0800xM8)	23,200
75.	1	Universal external grinding machine (M1420) (0 200x750)	12,700
76.	2	Table grinders (S3ST-200)	300
77.	2	Grinders (S3SL-300)	600
78.	1	Work bench (1350x700) (with one vice)	400

SCHEDULE 6-2 (continued)

SL. NO.	QTY.	ITEM DESCRIPTION	COST (US $)
		V. Assembly Shop	
79.	1	Universal radial drilling machine (Z3125)	7,500
80.	1	Vertical drilling machine (Z 535)	5,200
81.	2	Table drilling machines (Z 4012)	1,300
82.	1	Electric welding machine	existing
83.	1	Hand hydralic press (Y03-10)	900
84.	1	Hand press (J01-1)	900
85.	1	Grinder (S3 SL - 300)	600
86.	1	Paint equipment	5,500
87.	1	Air compressor	existing
88.	1	Bridge crane (LD, 2 ton, 12M)	5,500
89.	4	Work benches (2480x700mm)(with two vice)	2,200
90.	1	,, ,, (1350x700mm)(with one vice)	400
		VI. Tooling and Maintenance Shop	
91.	1	Precision lathe (C616A x 750)	6,100
92.	1	,, ,, (CM6140 x 1000)	9,600
93.	1	Lathe (C6132A x 1000)	5,600
94.	1	,, (C6140 x 750)	7,400
95.	1	,, (C6140 x 1500)	8,700
96.	1	,, (0 500 x 3000)	existing
97.	1	Universal milling machine (X63WT) (425x2000)	19,300
98.	1	,, ,, ,,	existing
99.	1	Vertical milling machine (X51K)(250x1100)	12,100
100.	1	Universal tool milling machine(X8130,300x750)	17,600
101.	1	Shaping machine (B 665)	6,600
102.	1	,, ,, (B 690)	12,100
103.	1	Radial drilling machine	existing
104.	1	Vertical drilling machine (Z 5125)	4,600
105.	1	,, ,, ,, (Z 535)	5,200
106.	1	Table drilling machine (Z 515)	700
107.	1	Gear shaping machine (Y5132A, 0 320x6)	18,600
108.	1	Horizontal boring machine	37,400
109.	1	Double housing shaping machine (BQ 2010) (1000x3000)	30,600
110.	1	Universal external grinding machine (M131W) (0 315x1000)	16,500
111.	1	Internal grinding machine (M2110A, 0100x150)	11,000
112.	1	Planing grinding machine (M7130, 300x1000)	13,900
113.	1	Universal tool & cutter grinding machine (M6025C)(0250x630)	9,500
114.	2	Grinders (S3 SL - 300)	1,100
115.	2	Table grinders (S3 ST - 200)	500
116.	1	Welding machine	existing
117.	1	Bracket jib crane (1000 kg)	,,
118.	2	Work benches (2480x700)(with two vice)	1,100
119.	1	,, ,, (1350x700)(with one vice)	400

SCHEDULE 6-2 (continued)

SL. NO.	QTY	ITEM DESCRIPTION	COST (US $)
VII.		Pump & Agricultural Machinery Maintenance Shop	
120.	1	Pump testing equipment	existing
121.	1	Lathe	,,
122.	1	Shaping machine	,,
123.	1	Vertical drilling machine	,,
124.	1	Grinder	,,
125.	1	Welding machine	,,
126.	1	Hand press	,,
127.	1	Work benches	,,
VIII.		Others	
128.	1	Hack saw	,,
129.	1	Band saw	,,
130.	1	Disk saw	,,
131.	1	Electric generator with diesel engine (200 GF, 200KW)	16,500
132.	1	Box transformer sub-station (XWB, 630KVA)	17,400
133.	1	Water pump	300
134.	1	,, ,,	1,100
135.	2	Battery driven vehicles (DB 1, 1 ton)	6,800
136.	2	,, ,, ,, (2DB-7071), 2 ton)	8,600
137.	2	Battery driven forklifts (CPD 2, 2 ton)	11,000
138.	2	Trucks (2 ton)	30,000
139.	2	,, (4 ton)	50,000
140.	1	Truck (6 ton)	45,000
141.	-	Equipment & instrument for laboratory	150,000
142.	-	Normal tools (include office equipment)	80,000
143.	-	Attachments	50,000

SCHEDULE 6-3

SUMMARY SHEET-INVESTMENT COSTS :EQUIPMENT

PROJECT COMPONENT		Investment Cost Carried
SL.NO.	D E S C R I P T I O N	Over US $
1.	Foundry shop	36,100
2.	Forging and heat treatment shop	115,000
3.	Punching and welding shop	35,000
4.	Machining shop	152,400
5.	Assembly shop	30,000
6.	Tooling and maintenance shop	256,200
7.	Pump and Agriculture machinery Maintenance shop	--
8.	Others	466,700
9.	Unforeseen cost	58,600
	T O T A L :	1,100,000

The expenditures on equipment is split 50 - 50 between the two construction years. US $ 700,000 worth of machines are assumed to be invested in the 10th year to replace worne out ones.

SCHEDULE 6-4

ESTIMATE OF INVESTMENT COSTS
CIVIL ENGINEERING WORKS

(* US $ per square meter)

SL. NO.	ITEM DESCRIPTION	UNIT COST *	C O S T		
			Foreign (US $)	Local (So.Sh.)	Total (US $)
1.	Foundry shop(1000 Sq.M.)	10	9,000	255,000	10,000
2.	Forging and heat treatment shop (432 Sq.M.)	322	125,193	3,547,050	139,104
3.	Punching and welding shop (576 Sq.M.)	311	161,222	4,567,815	179,136
4.	Machining shop,assembly shop,tooling and maintenance shop (1728 Sq.M.)	327	508,550	14,408,775	565,056
5.	Pattern group (200 Sq.M.)	5	900	25,500	1,000
6.	Substation and generator room (120 Sq.M.)	207	22,356	633,420	24,840
7.	Office and washroom (512 Sq.M.)	270	124,416	3,525,120	138,240
8.	Laboratory (200 Sq.M.)	100	18,000	510,000	20,000
9.	Pump and agricultural machinery maintenance shop (400 Sq.M.)	50	18,000	510,000	20,000
10.	Warehouse (500 Sq.M.)	200	90,000	2,550,000	100,000
11.	Outdoors warehouse (640 Sq.M.)	5	-	816,000	3,200
12.	Gatehouse (40 Sq.M.)	80	-	816,000	3,200
13.	Road,main line(400M)	100	-	10,200,000	40,000
14.	Road,minor line (300M)	50	-	3,825,000	15,000
15.	Site preparation(5000 Cubic Meter)	3.5	-	4,462,500	17,500
16.	Utility supplies	-	90,000	2,550,000	100,000
17.	Others	-	73,724	-	73,724
	T O T A L :		1,241,361	53,202,180	1,449,997

US $ 1 = So.Sh. 255.

SCHEDULE 6-5

SUMMARY SHEET - INVESTMENT COSTS
[CIVIL ENGINEERING WORKS]

PROJECT COMPONENT				
SL. NO.	DESCRIPTION	Foreign (US $)	Local (So.Sh.)	Total (US $)
1.	Process buildings	804,866	22,804,140	894,293
2.	Auxillary buildings	58,356	2,469,420	68,040
3.	Offices	62,208	1,762,560	69,120
4	Washrooms	62,208	1,762,560	69,120
5.	Ware houses	90,000	3,366,000	103,200
6.	Roads	-	14,025,000	55,000
7.	Site preparation	-	4,462,500	17,500
8.	Utility supplies	90,000	2,550,000	100,000
9.	Others	73,724	-	73,724
	Total :	1,241,361	53,202,180	1,449,997
	Total in % :	86 %	14 %	100 %

1 US $ = So.Sh 255.

SCHEDULE 6-6

ESTIMATE OF PRODUCTION COSTS
[CIVIL ENGINEERING WORKS]

MAINTENANCE AND REPAIR WORKS

SL. NO.	ITEM DESCRIPTION	COST		
		Foreign (US $)	Local (So.Sh.)	Total (US $)
1.	Site preparation and development	-	446,250	1,750
2.	Buildings and special civil works	-	2,550,000	10,000
3.	Outdoor works	-	2,550,000	10,000
	T O T A L :			21,750

SCHEDULE 6-7

ESTIMATE OF PRODUCTION COST: EMISSIONS DISPOSAL

Sl. No.	Quantity	Unit	Item Description	COSTS		
				Foreign (US $)	Local (So.Sh.)	Total in US $ Equivalent
1.	Lump Sum	-	Emissions Treatment	Nil	510,000	2,000
2.	Lump Sum	-	Disposal in Dumps and Sewage System	Nil	255,000	1,000
	T O T A L :			Nil	765,000	3,000

NOTE : US $ 1 = So.Sh. 255.

CHAPTER - VII

PLANT ORGANIZATION AND OVERHEAD COSTS

7.1 INTRODUCTION:

The organizational structure of the proposed plant is shown in figure 7-1 page 104. As the proposed plant, will be an extension of the existing FMW, the proposed organogram may be used as a basis for working out a structure for the integrated facility. The layout shown in Chapter 6 was designed with a view to integrate the existing production processes with the new one in order to save on capital investment; and to keep overhead costs as low as possible, as well as to improve the efficiency of the production processes. Moreover, for the new enterprise to succeed, it is necessary to implement the adjustment reforms recommended by other studies which were mentioned in Chapter II.

The organogram (Fig 7-1) of the plant shows the various production units and administrative units, and their structural relationships. It may be observed that the production processes has been divided into related functions or shops, a brief description of each follows.

7.2 PRODUCTION PROCESSES;

a) Foundry Shop:

Melting, moulding, cleaning, non-ferrous casting and pattern grouping will be the major functions of the foundry shop. The shop will be responsible for producing the parts made of grey cast iron, spheroidal cast iron and non-ferrous metals. As the melting process is a continuous one, the jobs in this section should be performed in shifts. Responsibility of the Pattern Group will be to make wooden patterns as well as making wooden parts and repair works for the factory.

b) Forging and Heat Treatment Shop:

This shop has been divided into two groups: forging group and heat treatment group. Forging group will produce forging parts required by different products; blanks for technological equipment and repairing spare parts. Heat treatment group will be responsible to improve the property of materials by heat treatment process. Sometimes, the heat treatment process will take a longer time, therefore, production in this shop would be performed in shifts.

c) Punching and Welding Shop:

There will be two groups in this shop. Punching and pressing group will be responsible for all of the processes from preparing

blanks to forming. Welding group will undertake the production of welding structure, gas cutting etc.

d) Machining Shop:

All of the machining works will be done in this shop. It would be divided into three groups: turning group, milling and shaping group and precision machining group.

e) Assembling Shop:

There will be three groups in the set-up of this shop. The assembling group, testing group and painting and packing group. It would accomplish the final processes for the finished products.

f) Tooling and Maintenance Shop:

There will be two groups in this shop. Tool group will be responsible for undertaking the jobs for special machining of tools, measuring tools, fixtures and jigs, forging dies, punching dies, metal dies for casting etc. Maintenance group will undertake the repairing and maintenance of machinery and equipment, producing spare parts, manufacture non-standard equipment as well as making prototype of new products.

7.3 ADMINISTRATIVE DEPARTMENT:

The administrative department will consist of 9 sections, these are as follows:

a) General Office:

It will be responsible for carrying out the decision making and general management of the factory. In addition, other functions of this office will be to prepare the schedule of daily activities, secretarial services and welfare matters of the factory.

b) Planning Section:

It will be responsible to prepare in detail the production plan for coordination and balancing production and to manage the idle capacity.

c) Supplies and Marketing Section:

This section will be in charge of purchasing of raw

materials, auxiliary materials, fuels, parts and components, produced by other enterprises and in addition it will also be responsible for transportation of materials, storage of materials in warehouses, management of transport facilities, marketing of finished products and after sales services, visiting customers and end-users etc.

d) Technical Section

It will be responsible for the designing of products, research and development for new products, standardization, technologies, technical reform, designing of technological equipment and information etc.

e) Quality Control Section:

This section will be responsible to check-up the products quality, inspection of measuring tools, metallurgical and chemical examination and physical testing of materials and products etc. Chemical analysis, physical and mechanical testing and measuring laboratories will be under the control of this section.

f) Finance and Accounts Section:

This section will be responsible for preparing the budget, and all sorts of financial statements and reports for management information and decision making. A computer would be installed to handle laborious and cumbersome computations. The use of the computer to help management in quick decision making through providing up-to-date information and data.

g) Personnel and Security Section:

This section will be responsible for personnel management and labour welfare of the factory along with the security measures.

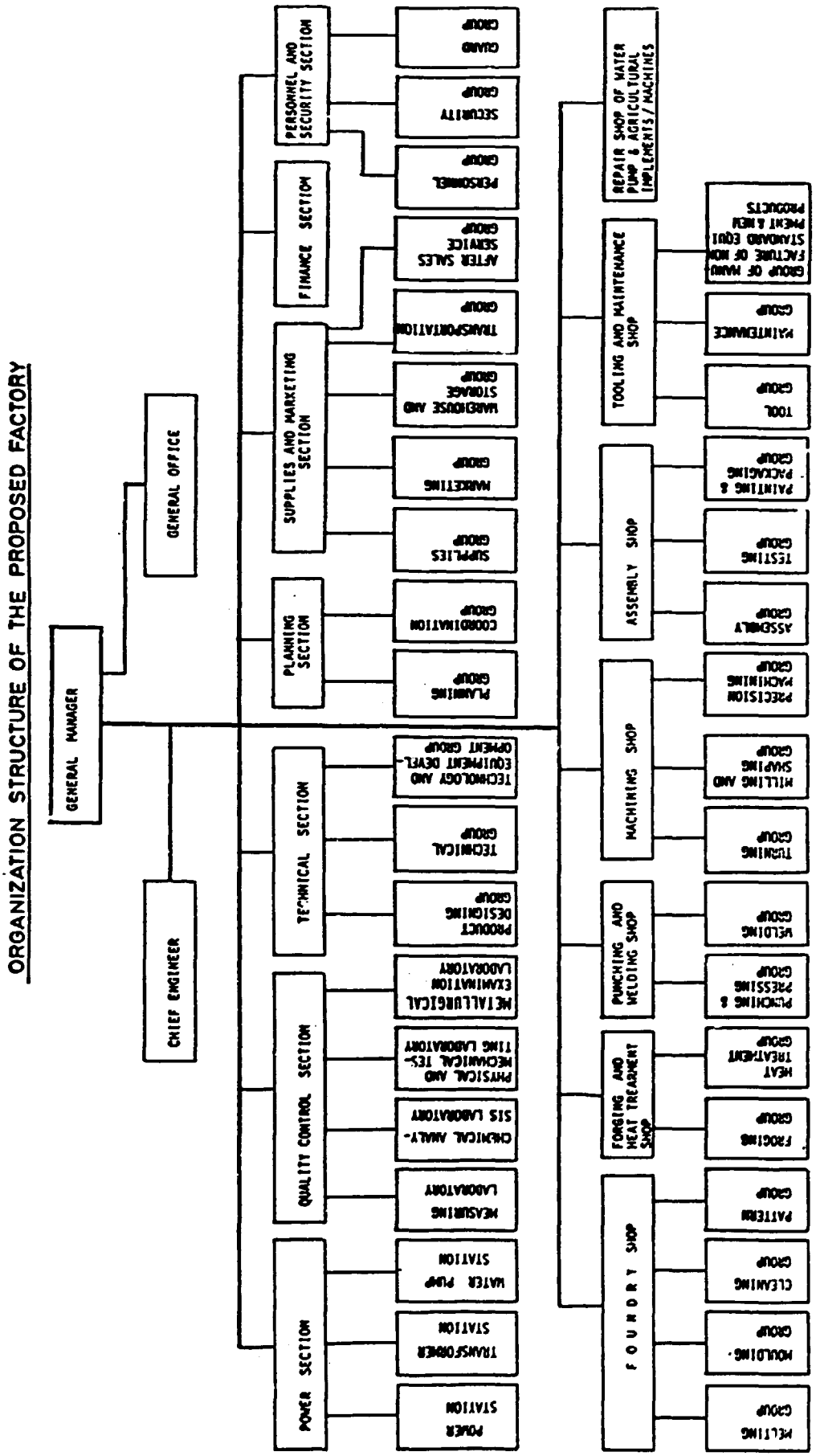
h) Power Section:

It will be responsible for the operations of the power station, transformer station, and water pumps of the factory. Repair and maintenance of the power and pump equipment will also be the responsibility of this section.

i) Repair Shop of Water Pumps and Agricultural Machinery:

It will be necessary to establish an auxiliary section for repairing water pumps and agricultural machinery, which will service customers and will collect information about the quality of products and on market intelligence. This information is essential for future production planning and market strategy formulation.

figure 7-1


ORGANIZATION STRUCTURE OF THE PROPOSED FACTORY
GENERAL MANAGER
GENERAL OFFICE
CHIEF ENGINEER
POWER SECTION
POWER STATION
TRANSFORMER STATION
WATER PUMP STATION
QUALITY CONTROL SECTION
MEASURING LABORATORY
CHEMICAL ANALYSIS LABORATORY
PHYSICAL AND MECHANICAL TESTING LABORATORY
METALLURGICAL EXAMINATION LABORATORY
TECHNICAL SECTION
PRODUCT DESIGNING GROUP
TECHNICAL GROUP
TECHNOLOGY AND EQUIPMENT DEVELOPMENT GROUP
PLANNING SECTION
PLANNING GROUP
COORDINATION GROUP
SUPPLIES AND MARKETING SECTION
SUPPLIES GROUP
MARKETING GROUP
WAREHOUSE AND STORAGE GROUP
TRANSPORTATION GROUP
AFTER SALES SERVICE GROUP
FINANCE SECTION
PERSONNEL GROUP
PERSONNEL AND SECURITY SECTION
SECURITY GROUP
GUARD GROUP
FOUNDRY SHOP
MELTING GROUP
MOULDING GROUP
CLEANING GROUP
PATTERN GROUP
FORGING AND HEAT TREARMENT SHOP
FORGING GROUP
HEAT TREATMENT GROUP
PUNCHING AND WELDING SHOP
PUNCHING & PRESSING GROUP
WELDING GROUP
MACHINING SHOP
TURNING GROUP
MILLING AND SHAPING GROUP
PRECISION MACHINING GROUP
ASSEMBLY SHOP
ASSEMBLY GROUP
TESTING GROUP
PAINTING & PACKAGING GROUP
TOOLING AND MAINTENANCE SHOP
TOOL GROUP
MAINTENANCE GROUP
GROUP OF MANU FACTURE OF NON STANDARD EQUI PMENT & NEW PRODUCTS
REPAIR SHOP OF WATER PUMP & AGRICULTURAL IMPLEMENTS / MACHINES

7.4. OVERHEAD COSTS;

The major overhead costs items may be grouped under two headings, namely factory overheads and administrative overheads:

a) Factory Overheads:

The items falling under this group are shown at Schedule 4-1 of chapter IV consisting of auxiliary materials and other materials, incl. waste disposal, both cost items amounting to US $ 178,130. To this must be added US $ 21,750 for maintenance of civil works, bringing the total of factory overhead costs to US $ 199,880.

Depreciation charges are also considered factory overheads, and are calculated by COMFAR based on the original value of fixed investment according to the straight line method. The COMFAR software has the function of differentiating between charges which are of foreign origin and those of local origin. The depreciation rates and salvage values used are mentioned in table 7-1.

TABLE 7-1

Depreciation Rates and Salvages Value

Type of Asset	Depreciation rate in %	Salvage value in %
Site preparation and Development	10	10
Civil engineering works	5	20
Plant machinery and equipment	10	10
Technology acquisition	20	0
Pre-production costs.	20	0

b) Administration Overheads:

The portion of wages and salaries attributable to administrative overheads are taken from Schedule 8-4 in Chapter VIII (page 110) amounting to US $ 34,758 annually including bonus payments. The financial costs, meaning interest on loans, are dealt with seperately in Chapter X.

CHAPTER - VIII

M A N P O W E R

8.1 LABOUR AND STAFF REQUIREMENTS;

The personnel required has been defined in accordance with the requirements of the selected technological process and the plant production capacity. The training needs at various levels has been taken into consideration.

To estimate the cost of manpower, a manning table was prepared which is shown in Schedule 8-1 page 108. Thus, a total of 230 workers are required in both the semi-skilled and unskilled categorials, at a cost of US $ 51,624 annually including the yearly bonus, see Schedule 8-2 page 108.

The staff requirement is estimated at 90 of whom 35 will be engineers for supervisory functions and 55 for management activities, see Schedule 8-3 and 8-4 page 109 and page 110. Total salary payment per year amounts to US $ 34,753 including the yearly bonus.

In calculating the manpower costs, it was assumed that the factory will operate for 303 days per year and for 8 hours per day in one shift. However, because of technical requirements, the foundry and the heat treatment shops will be operated in two shifts. The wage and salary rates were based on those of the FMW.

8.2 TRAINING;

In a multi-purpose manufacturing plant, workers are required to be specialists in one specific job and be able to handle other jobs when required in accordance with the production program.

A minimum member of engineers and skilled technicians will be required as indicated in Schedule 8-5 page 111. To achieve the required level of productivity and efficiency, it is necessary to carry out not only on the job training for all the workers, but also to organize special training programs regularly each year for the production workers on a rotation basis.

The recruitment of all the key managerial staff and supervisory engineers should be done during the construction phase. In order to associate them with the project it may be necessary to provide training to some of them abroad. The recruitment of qualified experienced managerial staff and engineers is particulary important in this case as these do not seem to be available at FMW at present. A provision of US $ 50,000 was made for this purpose during the pre-production stage, as may be noted from Schedule 9-1 in chapter IX page 115.

SCHEDULE 8-1
MANNING TABLE - LABOUR

MANNING TABLE - LABOUR		
DEPARTMENT		NO. OF WORKERS
SL.NO.	FUNCTION	
1.	Foundry shop	30
2.	Forging and heat treatment shop	20
3.	Punching and welding shop	30
4.	Machining shop	35
5.	Assembly shop	30
6.	Tooling and maintenance shop	40
7.	Power section	6
8.	Pump and Agricultural machinery maintenance shop	18
9.	Quality Control Section	17
10.	Supplies and marketing section	4
	T O T A L :	230

SCHEDULE 8-2
ESTIMATE OF PRODUCTION COSTS : WAGES

ESTIMATE OF PRODUCTION COST - WAGES		
	Total No. of workers	230
	Working hours per day	8
	Working days per year	303
	Hours per year	2,424
	Wages per hour (So.Sh.)	14.85
	Surcharge (40 %) (So.Sh.)	14,398.6
	Wages per year/per person (So.Sh.)	50,395
	WAGES; (So.Sh.)	11,590,850
	WAGES: (US $)	= 45,454.3
	BONUS (US $)	6,170.2
	TOTAL COST - WAGES (US $)	= 51,624.5
	1 US $ = 255 So.Sh.	

SCHEDULE 8-3

MANNING TABLE - STAFF

MANNING TABLE - STAFF		
DEPARTMENT		NO. OF STAFF
SL.NO.	FUNCTION	
1.	Foundry shop	1
2.	Forging and heat treatment shop	1
3.	Punching and welding shop	1
4.	Machining shop	2
5.	Assembly shop	2
6.	Tooling and maintenance shop	4
7.	Power section	1
8.	Pump and agricultural maintenance shop	1
9.	Technical section	27
10.	Production planning section	10
11.	Quality control section	9
12.	Finance section	5
13.	Personnel section	5
14.	Supplies and marketing section	13
15.	Administrative section	5
16.	Chief engineer	2
17.	Director of factory/General Manager	1
	TOTAL STAFF :	90

SCHEDULE 8-4

ESTIMATE OF PRODUCTION COSTS:

SALARIES

ESTIMATE OF PRODUCTION COST - SALARIES	
Total No. of staff	90
Working months per year	12
Man-months per year	1080
Salaries per month (So.Sh)	4500
Surcharge (50%) (So.Sh.)	27,000
Salaries per year per person (So.Sh)	81,000
SALARIES: (So.Sh.)	7,290,000
SALARIES: (US $)	= 28,588.2
BONUS (US $)	6,170.2
TOTAL SALARIES (US $)	= 34,758.4

1 US $ = 255 So.Sh.

SCHEDULE 8-5

MANNING TABLE - LABOUR AND STAFF

SL. NO.	DESCRIPTION	LABOUR AND STAFF					
		LABOUR			ENGINEER	MANAGEMENT STAFF	TOTAL
		PRODUCTION LABOUR	NON-PRODUCTION LABOUR	TOTAL			
1.	Foundry shop	20	10	30	-	1	31
2.	Forging and heat treatment shop	15	5	20	-	1	21
3.	Punching and	25	5	30	-	1	31
4.	Machining shop	30	5	35	-	2	37
5.	Assembly shop	25	5	30	-	2	32
6.	Tooling and maintenance shop	35	5	40	-	4	44
7.	Power section	5	1	6	-	1	7
8.	Pump and agricultural machinery maintenance shop	15	3	18	-	1	19
9.	Technical section	-	-	-	25	2	27
10.	Production planning section	-	-	-	2	8	10
11a.	Quality control management section	9	1	10	2	4	16
11b.	Laboratory	6	1	7	2	1	10
12.	Finance section	-	-	-	-	5	5
13.	Personnel section	-	-	-	-	5	5
14.	Supplies and marketing section	2	2	4	1	12	17
15.	Administrative section	-	-	-	-	5	5
16.	Chief engineer	-	-	-	2	-	2
17.	Director of factory	-	-	-	1	-	1
	T O T A L :	187	43	230	35	55	320
	PERCENTAGE (%)	59%	13%	72%	11%	17%	100%

CHAPTER - IX

IMPLEMENTATION SCHEDULING

As per the implementation schedule presented at Figure 9-1, on page 114, approximately 2 years time will be required to implement the project. Trial operation period of the project is also included in this time frame. A tentative time schedule covering each major activity concerned with implementation is presented in the Figure. To ensure the proper planning and execution of the construction phase, a project management team should be set up which will include senior managers and engineers of the future factory. They will be responsible for executing the implementation plan which will include the crucial decisions concerning the selection of the technology process and equipment suppliers, appointment of contractors for the design and erection of civil works and for the supervision related thereto and to the erection of the plant and its commissioning. The project management team may seek the assistance of UNIDO.

Apart from the financial costs during the construction period, a total of US $ 225,000 will be incurred to implement the project. The breakdown of these costs is show in Schedule 9-1 page 115. All the costs of implementation will be incurred in foreign currency.

PROJECT IMPLEMENTATION SCHEDULE

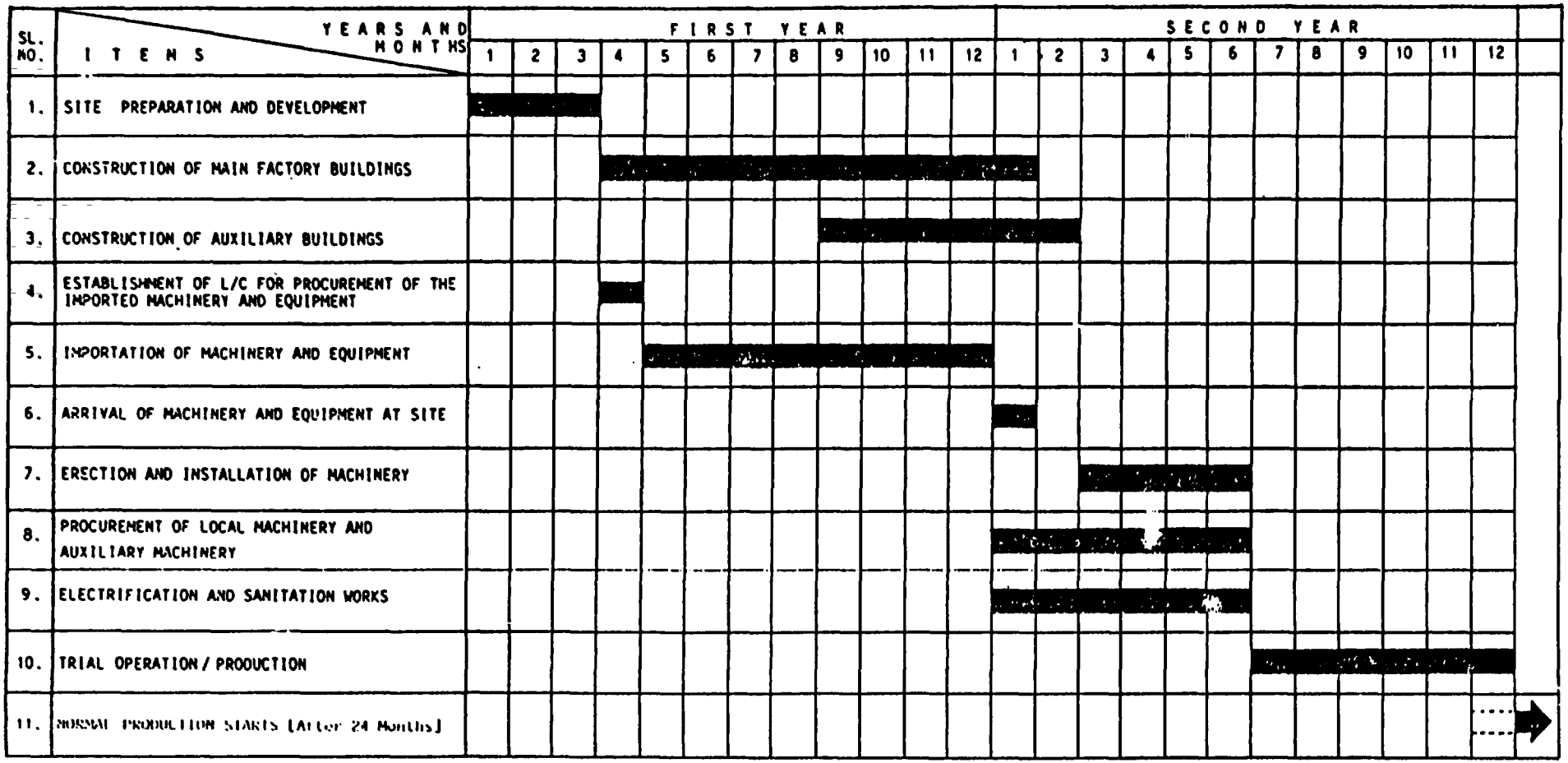


Figure 9-1

SCHEDULE 9-1

ESTIMATE OF INVESTMENT COSTS

PROJECT IMPLEMENTATION

SL.NO.	ITEM DESCRIPTION	COST in US $
1.	Management of project implementation	20,000
2.	Detail engineering, tendering	130,000
3.	Supervision, coordination test-run and take over of civil work, equipment and plant	5,000
4.	Build-up of administration, recruitment and training of staff and labour	50,000
5.	Arrangements for supplies	5,000
6.	Arrangements for marketing	5,000
7.	Build-up of connections	5,000
8.	Preliminary and capital issue expenses	5,000
	T O T A L :	225,000

Split 50 : 50 over 2 years of construction.

CHAPTER - X

FINANCIAL AND ECONOMIC EVALUATION

10.1 TOTAL INVESTMENT COSTS

Total investment costs may be divided into initial investment and investment during production, and these in turn may be split into fixed investment, in land and machinery, pre-production capital expenditures and working capital. Table 10-1 below shows the breakdown of the initial fixed investment costs.

TABLE 10-1

TOTAL INITIAL INVESTMENT COSTS

Component	First Year	Second Year	Total
Land, site preparation, development	72,500	0,000	72,500
Building and civil works	1,101,998	275,499	1,377,497
Incorporated fixed assets	0,000	80,000	80,000
Plant machinery and equipment	550,000	550,000	1,100,000
Total fixed investment costs	1,724,498	905,499	2,629,997
Pre-production capital expenditures	172,100	367,100	539,200
Net working capital	0,000	80,000	80,000
Total initial investment costs	1,896,598	1,352,599	3,249,197
Of it foreign, in %	87.29	79.16	83.91

A brief explanation of the main investment expenditures follows:

a) Land and site preparation

As the proposed factory will be an extension of the FMW, there will be no cost for the land. The cost of site preparation and development is estimated at US $ 72,500 all of which will be in local currency.

b) Buildings and other civil works

The total cost of civil engineering works including auxiliary and service facilities is estimated at US $ 1,377,497.

Of this amount 90 percent will be in foreign currency, because of the technical requirements for the buildings. The relatively high investment cost of this component is due to the fact that not only new building structures will be constructed, but also the existing ones of the FMW will need substantial renovation.

c) Incorporated fixed assets

This component covers the lump sum payments made for the drawings, designs and manufacturing technology, of the tools and implements to be manufactured. The total cost is estimated at US $ 80,000 see Schedule 6-1 page 92 in Chapter VI.

d) Plant Machinery and equipment

A detailed list of the machinery and equipment is given in Schedule 6-2 page 93. The total investment costs of machinery and equipment are estimated at US $ 1.1 million, all of which will be imported. Considerable savings were realized on this component by integrating the proposed plant with the FMW. The cost required for repairing and overhauling the FMW equipment is not included in this estimate.

e) Pre-production capital expenditures

Under this cost component two categories of expenditures are included. The first, amounting to US $ 225,000 covers the costs associated with implementation including the cost of initial training. The breakdown of expenditures is shown in Schedule 9-1 page 115. The second, amounting to US $ 314,200 represent interest payments on the loan during the construction period.

f) Working capital

The working capital requirements for the production phase were computed by the COMFAR software where it is assumed that working capital availability starts with the first year of production. In reality, however, some expenses might occur during the last half year of the construction period to cover the necessary raw material stock including coke. For this reason a provision of US $ 80,000 is made during the second year of construction to cover such need. For the purpose of computing the working capital using the COMFAR software, some assumptions were made concerning the days of minimum coverage for each of the current assets and the current liabilities. As shown in the COMFAR Schedules in Annex 5, page 172.

The net working capital required in the first year of production is US $ 149,700, which will rise with the increase in capacity utilization until it reaches the level of US $ 418,750 at full capacity in the fifth year. The provision for raw materials including coke constitutes 59 percent of net working capital requirement.

With a high percentage of the working capital locked in raw materials means that increasing the minimum days of coverage will significantly increase working capital requirements. Therefore, in view of the high cost of capital in Somalia, it is prudent to maintain as low a stock of raw materials as possible. No provision is made for a stock of spare parts and utilities.

TABLE 10-2

WORKING CAPITAL REQUIRED FOR A FULL CAPACITY YEAR OF OPERATION

ITEM	Amount in US $
1. Current assets. Total	522,356
1.1. Accounts receivable	109,506
1.2. Raw materials (incl.coke)	247,953
1.3. Work-in-progress	34,537
1.4. Finished products	106,506
1.5. Cash-in-hand	23,855
2. Current liabilities. Total	103,610
2.1. Accounts payable	103,610
3. Net working capital	418,747

Note: Refer to COMFAR Schedule in Annex 5 for details.

10.2. INVESTMENT DURING PRODUCTION;

It has been assumed that replacement of major plant machinery and equipment will take place during the tenth year of production, at a cost of US $ 700,000.

10.3. TOTAL PRODUCTION COSTS;

The total production costs as computed by COMFAR will amount to US $ 1,834,200 in 1995. These costs may be broken down into four main categories each of which is briefly described below with an estimate of the corresponding cost. The COMFAR Schedules in Annex 5 (pages 169 - 171) give details of these costs.

10.3.1. Factory costs:

a) Raw materials

The raw materials consist of cast iron, sections and sheet metal, most of which have to be imported. In year 5 (the first year of full capacity), the total cost of iron and sheet metal would be US $ 915,480.

b) Auxiliary materials

These consist of chemicals and additives required in production, maintenance materials like grease and oils, paints and packing materials, as well as components procured from outside suppliers for use in the assembly of certain products. Their estimated costs in the fifth year of production are US $ 133,600.

c) Utilities

The plant will use electricity, water, gasoline, diesel oil, coke and charcoal. The total costs at full capacity is shown in Schedule 4-1-4 page 73 and amounts to US $ 76,320.

d) Direct labour

The plant will employ a total of 320 staff and workers. The annual salary and wage payments will amount to US $ 86,382 including the yearly bonus. However, those that are directly employed in the production programme number 230 workers, costing US $ 51,624 annually including the yearly bonus.

e) Maintenance and repair:

The maintenance and repair work required for the machines and equipment will be carried out internally by the engineers, technicians and workers of the plant. Some spare parts will be imported, others will be manufactured at the plant. Where possible, the costs of products needed for maintenance and repair including such materials as grease and oils were included under auxiliary raw materials. On the other hand, provision of US $ 21,750 annually has been assumed as the costs of repairing the buildings and other civil works.

f) Factory overheads

Most of these costs were included under one of the above mentioned items, namely: auxiliary materials, utilities or maintenance and repair. One cost item not covered refers to the cost of emission and waste disposal and all other factory costs which is estimated at US $ 44,530 annually.

10.3.2. Administrative Overheads, including Marketing Overheads:

These costs cover mainly indirect manpower, that is the administration and management staff, (as explained in Chapter VII) the total costs attributable to the Administrative Overheads were estimated at US $ 34,758 annually, throughout the life of the project; whereas sales and distribution costs are progressively rising in the initial years of operation as production increases

and become constant at full capacity, amounting to US $ 36,000 annually.

10.3.3. Financial Costs:

As explained below, loan financing constitutes 60 percent of total initial capital outlay. The financial charges at 20 percent nominal interest rate are considerable. During the construction period, capitalized interest amounts to US $ 314,200. Thereafter, the financial costs are progressively falling as the principal is being redeemed.

10.3.4. Depreciation:

The COMFAR software calculates the annual amount of depreciation based on the original value of the asset and the selected method which in this case is the straight line method, and the depreciation rates and salvage values. The annual amount of depreciation as calculated by COMFAR is US $ 247,125 annually in the first five years of operation; and falls to US $ 186,125 for the next four years, because some assets have been amortized in the first five years.

10.4. SALES REVENUES:

It was explained in Chapter III that gross sales revenues at full capacity will amount to US $ 1,944,530. All products will be marketed locally.

10.5. FINANCIAL PLAN:

The sources of financing for this project have not been identified. Unfortunately, the FMW with which the proposed plant will be integrated has no financial means of its own to invest in the new venture. In fact as explained in Chapter II, the FMW is financially weak. Therefore, two questions still need to be resolved. The first concerns the source of finance and the second the mode of finance.

In the face of the existing situation, it will not be easy for the proposed enterprise to raise a long-term loan without a government guarantee. On the other hand, to improve the prospect of obtaining a long term loan, the investors, whether public or private, will find it imperative to cover a reasonable portion of the initial capital investment by equity.

For lack of information on the financing possibilities of this project, and whether national or international funds are available, it is assumed that it will be partly in the form of equity and partly in long term loans, and that the ratio of equity to loans will be 40:60.

The initial capital outlay for the proposed project was estimated at US $ 3,249,197 and long term loans US $ 1,950,000. Furthermore, it was assumed that the equity capital will have been entirely paid up and available during the first year of construction, whereas the loan capital will be available at the time of need. Hence, the first installment of the loan needed in the first year of construction will amount to US $ 596,000 and in the second year US $ 1,354,000. In this way the interest liability will be minimized.

The conditions of the long term loan were assumed to be as follows: Interest rate, 20 percent; amortization period, 10 years with one year of grace during which only the interest due will be paid. It will be seen from the COMFAR Schedule of Total Production Costs, that there is a gradual decrease of interest payment until the entire amortization is repaid in the eleventh year of production, whereas the repayment of principal is in equal annual installments of US $ 195,000.

10.6. FINANCIAL EVALUATION:

For the purpose of financial evaluation three financial statements are required, namely a cash-flow table for financial planning and accounting, a projected income statement and a projected balance sheet. All these statements are interrelated.

10.6.1 CASH-FLOW TABLE FOR FINANCIAL PLANNING;

The purpose of this table is to synchronize the timing of inflow of funds with the outflow of expenditures. On the basis of the proposed capital structure, the cash flow table as computed by COMFAR, shows a positive net cash-flow, during the construction period, whereas during the first eight years of the operation period, it shows a negative calculated cash-flow of significant proportions. This is partly due to the relatively long period required for the project to attain full capacity of production. Thus, in the sensitivity analysis where it was assumed that full production capacity is reached in the fourth year instead of the fifth year of operation, the period of negative cummulated cash-flow is reduced from eight to six years which still does not solve the problem. Another reason for the huge deficit in the cumulated cash-flow is the debt burden. The repayment of principal and the payment of interest must be covered from the cash balance.

The COMFAR cash-flow table in Annex 5 (pages 175-178) shows a negative balance of US$ 294.270 in the first year of operation in 1991, peaking at US$ 921,830 in 1994 and then falling to a negative balance of US$ 74,690 in 1998 and showing a positive balance of US $ 243,766 in 1999.

In real life, this situation cannot exist, as financial planning would have identified the need for additional funds and arrangements would have been made with a bank to fully cover these requirements through short-term borrowing or overdraft. Otherwise the operation of the plant will either be disrupted or considerably curtailed. It may be observed that the estimated

short term funds requirements as shown in the cash-flow table are larger than the net working capital requirements during each of the initial six years of operation. Such a financial structure, where the working capital is entirely dependent on short-term loans is not sound, and suggests that long-term funds (equity capital and long-term loans) need to be increased to cover part of these financial requirements.

10.6.2 NET INCOME STATEMENT;

The net income statement page 180 shows a gross loss of US $ 473,497 in the first year of operation (1991), and losses also in 1992 and 1993 of US $ 370,413 and US $ 188,840 respectively. It is assumed that the proposed plant will not be subject to a corporate tax, and hence, the profit shown in the above table may be considered as net profit. The net losses of the first three years are considerable to the extent that the undistributed profits of the next five years are needed to offset the losses. The sensitivity analysis carried out assumes that full capacity utilization is reached within four years instead of five. This has ameliorated the profit situation a little.

10.6.3 PROJECTED BALANCE SHEET;

The balance sheet during construction shows that the capital structure was based on an equity / debt ratio of 40:60. The following observations may be made on the projected balance sheet pages 183 - 185.

Profits are realized from the fourth year of operation (1994). However, these profits and those of subsequent years will be used to offset the losses of the first three years of operation. The first time that profits are retained in reserve is in the tenth year, 2000. The reserves in the last year of project life, 2005, will be 57,5 percent of total liabilities which is not a comfortable ratio. On the other hand, cash surplus begins to accumulate from the ninth year of operation (1999) only. This means that in the first eight years of operation, there will be no funds available for financing. Hence, to provide for the necessary cash an overdraft or short term borrowing is required, over and above the existing long-term loan. The interest liability of such an overdraft has not been considered in this study. In the last year of operation (2005), the cash surplus will be 63,2 percent of total assets.

10.6.4 RATIOS FOR FINANCIAL ANALYSIS:

These ratios are usually used by financing institutions to scrutinize and asses credit worthiness of prospective borrowers and also for setting borrowing limits.

a) Current Ratio and Quick Ratio:

At full capacity utilization, that is year 1995, the Current Ratio will be 4.8 to 1. Although this ratio appears to be satisfactory, it assumes that those assets comprising the current assets can be easily sold for cash which may not be the case. For this reason the Quick Ratio is considered a better measure of liquidity. In this instance, it is equal 1.3 to 1 which is the acceptable minimum assuming that all receivables can be realized.

b) Operational performance:

The operational performance is measured as a percentage of the net profit to total sales. In 1995 the net profit is as low as 5.7 percent of sales. However, the net profit rises as certain costs fall, such as costs of finances. The profit peaks in the year 2002, where it is 25.3 percent of sales, which though acceptable is coming too late in the life of the project.

c) Long-term debt service coverage:

It is understood that an enterprise needs to generate enough cash to service the debt at the agreed yearly installments. For the proposed project the ratio of cash generation to debt service in 1995 is 1.27 to 1 which is not acceptable (see cash flow table on pages 176 - 178). It means that cash generation should not fall by more than 20 percent. Otherwise the project will not be able to meet the debt service obligations. Such a risk exist during the period of under capacity utilization. However, the situation improves thereafter especially as the debt service obligations decrease. Nevertheless the year 2000 will be an exceptionally critical year showing a small negative cash-flow which should be covered by an overdraft. This is the result of heavy capital outlay in machines and equipment which will take place in that year. The inability of the proposed plant to finance from its own resources the replacement of its worn out machinery and equipment is another symptom of its streaky cash-flow position.

10.6.5 PROJECT PROFITABILITY;

From the point of view of the investor, profitability will be measured by calculating the return on equity. However, as the project will be financed by equity and loan capital, it is advisable to calculate the return on total investment (equity and loans), using discounting methods.

There are two useful measures of profitability using discounting methods: the Internal Rate of Return (IRR) and the Net Present Value (NPV). The IRR for this project, as computed by COMFAR, is 11.59 percent which is significantly lower than the interest rate of 20 percent paid on the long term loan. On this basis the project proposal is not acceptable from a commercial point of view.

The NPV has been calculated using a discount rate equal to the nominal rate on the long term loan, namely 20 percent, which has given a negative NPV of -1188,6 indicating that the project proposal is not acceptable. One may argue about the wisdom of using 20 percent as the discount rate. On the other hand the IRR of 11.59 percent is too low to be used as the discount rate.

10.6.6 BREAK-EVEN ANALYSIS:

Break-even analysis is a form of sensitivity analysis which will determine the break-even price and the break-even output. To derive these figures the standard formula was used and the relevant computations carried out by COMFAR. Two assumptions were made. The first is that the analysis refer to the full capacity year 1995 and the second that a single product will be produced and sold at a unit price of 1.

a) Break-even price:

The COMFAR Schedule "Total Production Costs" on page 169 shows the following data (year 5):

Unit Cost of single product	= 0.943
of which variable cost	= 0.641
of which fixed cost	= 0.302

On the bases of an assumed price of 1 for the single product, the break-even price will be 0.943. The difference in percent between the selling price and the cost price of one unit of product is 5.7. percent. It means that should the selling price fall by 5.7 percent no profits will be realized. A fall greater than 5.7 percent will result in losses to the plant. This is a narrow profit margin indeed. To improve the profit margin, the possibility of cost-cutting may be examined and/or price-raising. However, in the context of this study, there is no basis for changing these variables.

b) Break-even output

To obtain the break-even output, the above relative unit costs will be applied to the following formula: $x = \frac{f}{(p - c)}$

Where x is output, p is selling price,
f is fixed costs and c variable costs.

Therefore, output (x) = $\frac{0.302}{(1 - 0.641)}$ = 0.84 or 84 percent.

The break-even output level is, therefore, 84 percent of the full capacity level which again leaves a small safety margin between break-even output and full capacity utilization.

10.6.7 SENSITIVITY ANALYSIS;

There is no need to go into an elaborate sensitivity analysis as the IRR of 11.59 percent is already discouraging enough to lead to the conclusion that the project should be abandoned from a commercial point of view. It would not therefore, be useful to work out another version by assuming a lower selling price or higher cost. On the other hand, it is clear that should it be possible to raise the selling price, by a substantial amount, say 20 percent, then the IRR would be higher, and closer to the interest rate on the long-term loan. But there is no justification to make such an assumption.

On the other hand, one might assume that the full capacity utilization could very well be reached during the fourth year of production instead of the fifth year. It will be recalled that in the base version, the production capacity was assumed to be 35 percent, 45 percent, 65 percent and 90 percent in the first four years of operation respectively. From the fifth year onward, the capacity utilization rate will be 100 percent on a one shift basis. In version II, 100 percent capacity utilization rate was assumed to have been reached in the fourth year, with rates of 40 percent, 60 percent, and 80 percent in the first three years. The resultant COMFAR computations show the IRR to be 12.4 percent, a slight improvement over the IRR of 11.59 percent in the base version. However, this is not sufficient to alter the analysis. The COMFAR Schedules regarding version II are in Annex 5, pages 186 - 199.

10.6.8 CONCLUSION OF THE FINANCIAL EVALUATION:

On the basis of the above financial evaluation the project should not be accepted from a commercial point of view. However, the management of the FMW may wish to examine the accuracy of the assumed selling prices and the assumed costs of production. If discrepancies are found, the revised estimates may be sent to UNIDO for another analysis using COMFAR.

10.7 ECONOMIC EVALUATION:

10.7.1 INTRODUCTION:

The objective of economic evaluation is to reflect more accurately the true economic contribution of the project and to facilitate an optimal investment decision form the national point of view. The financial evaluation carried out above aim at determining the financial viability of the project from the point of view of the individual investor. The results of the financial evaluation have shown that the financial IRR, which is the prime indicator of commercial profitability, is not attractive enough to induce investment. However, it sometimes happens that the economic viability of a project may differ from the financial viability for two reasons. The first, relates to the fact that financial evaluation is based on market prices where as economic evaluation eliminates distortions from the market prices in order

to reflect the true economic value of the product or service. The second relates to the fact that financial evaluation does not include all costs and benefits originating from the project. These are known as indirect effects.

The UNIDO method of economic evaluation is based on the concept of shadow pricing, originating from data given in the financial analysis. The COMFAR module for economic analysis known as ECBA was used for undertaking the computations.

10.7.2 ASSUMPTIONS FOR ECONOMIC ANALYSIS:

As stated above, the financial data need to be adjusted to reflect their true price to the economy. The adjusted figures are known as shadow prices. For the purpose of this study, values which have a major impact on the economic analysis have been adjusted. This simplified approach was necessary due to the lack of reliable data for the purposes of the adjustment. Accordingly the following assumptions were taken into consideration.

1. The Somalian Government levies a 50 percent tariff on all foreign inputs, except for plant machinery and equipment. Therefore, costs of imported materials will be reduced to reflect the border price, i.e. CIF price in this case.

2. Port charges and inland transportation costs on all foreign inputs are estimated at 1.2 percent of CIF price. The value of all inputs are, therefore, reduced by 1.2 percent.

3. The shadow exchange rate is 1.4 times higher than the official exchange rate.

4. The shadow wage rate was not considered as any adjustment will have only an insignificant effect.

5. Similarly, the use of a Standard Conversion Factor has not been considered for the group of non-traded goods for lack of reliable data and for the fact that their costs is a small proportion of total costs of production.

6. The project is 100 percent import substitution, and the sales volume estimated in the study will be maintained.

7. The CIF price of the products of the plant is 20 percent below the domestic market price.

8. For indirect effects, it is assumed that 100 persons will find employment, in secondary occupations as a result of investment in this project. Their net income is calculated on the basis of the per capita annual income of US $ 280. This amounts to US $ 28,000 per year starting from the second year of production onwards.

9. The economic discount rate (EDR) is the shadow interest rate in economic analysis on the basis of which a project may be accepted or rejected. The economic discount rate for Somalia is not available and such a rate can not be calculated from available data. The factors which determine the EDR are the

interest rate at which funds are borrowed both from the domestic market and abroad, the rate of inflation in Somalia and the value of the Somalian Shilling vis-a-vis other international currencies. If the current interest rate of the US $ in the world capital market is taken as a base, which is about 9 percent, and adjust it for the Somalian shadow exchange rate and for risk elements in the project, one arrives at a rate of 16 percent which will be taken as the nominal EDR or the desirable cut-off rate for this project.

10.7.3 COMFAR ECONOMIC COST-BENEFIT ANALYSIS;

For economic analysis COMFAR-ECBA follows three methods, each one of which should in principle lead to the same conclusion.

- The Economic Internal Rate of Return
- Value Added (Absolute Efficiency Test)
- Net Foreign Exchange Effect

The Economic Internal Rate of Return has been selected because it relates easily to the methodology of the financial analysis presented above.

Based on the above assumptions, the project shows an Economic Internal Rate of Return (EIRR) of 16.5 percent after both the preliminary adjusted prices and the foreign exchange rate adjustment. See Annex 5 (pages 200 - 201) for the adjusted cash flow Schedules. The EIRR is thus barely above the cut-off rate of 16 percent. Therefore, this investment project can be accepted from an economic point of view.

10.7.4 ADDITIONAL SOCIAL EFFECTS:

a) The project will provide direct employment to 320 persons, the majority of whom will be unskilled or semi-skilled workers who may not otherwise be employed. In addition, the project's spill-over effect is expected to provide employment for an additional 100 workers.

b) The output of this project will replace imports and result in significant value added effect.

c) The project will be beneficial to the country in that it will lay the foundation for an engineering industry. The resultant transfer of technology could beneficial to other industrial enterprises.

d) The project will have a training component. By the skills of Somalian workers, they would not only improve their living standards, but also become more useful members of the society in rendering high quality services.

e) As the proposed project will be merged with the FMW, it is expected that this will be the moment to restructure the FMW along the lines recommended by other studies and, hence, bring about an improvement in profitability. This will save the Government sizable subsidies which it is providing the FMW every now and then.

10.8 CONCLUSION AND RECOMMENDATIONS:

The project appears not to be acceptable from a commercial point of view, however from the national point of view the project appears to be beneficial to the economy. It might, therefore, be worth while to re-examine the proposal in more details and to modify the product mix with a view to maximizing profitability to make it more appealing to investors and less costly to the Government which may have to offer incentives. The follow-up study should, verify the costs and prices assumed in this study and provide missing data such as international prices of products, projection of demand analysis, and technical and financial evaluation of the project under two shifts operation.

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ANNEXES

ANNEX I:

LIST OF EXISTING MACHINERY AND EQUIPMENT OF FMW ALONG WITH THEIR STATUS

No. in layout	Machine Description	Year of installation	Working condition	Origin	Remarks/Needs
	Machine Shop				
1.	Thread cutting machine	1976	Not working	Not known	Needs repair and tools
1.	Shaping machine	"	Working	Yugo-slavia	Overhauled
2.	Universal milling machine	"	"	"	
3.	Universal drilling machine	"	"	"	
4.	Drilling machine	"	"	Germany	
5.	Annealing furnace	"	Not working	"	Electrical spares
6.	Forging furnace	"	Working	"	
7.	Metal band saw	"	"	Italy	
8.	Mechanical press	1980	Not working	Sweden	Overhauling & electrical spares
9.	Tool grinding machine	1976	Working	Germany	Overhauling
10.	Tool grinding machine	"	"	"	
11.	Centre lathe	1980	"	Sweden	
12.	Drilling machine	1976	Not working	USSR	Old spares
13.	Centre lathe 1100x220 mm (*)	"	Working	"	Overhauling
14.	Centre lathe 800x220	"	Not working	"	Spares
15.	Universal tool grinding machine	"	"	Yugo-slavia	Electrical & mechanical spares
16.	Centre lathe	"	Working	"	
17.	Compressor	"	Not working	Italy	"

No. in layout	Machine Description	Year of installation	Working condition	Origin	Remarks/Needs
18.	Centre lathe 800x400	"	Working	Italy	
19.	Centre lathe 2500x500	1976	Working	Yugo-slavia	
20.	Centre lathe 3000x500	"	"	Italy	
21.	Shaping machine	"	Not working	USSR	Electrical & mechanical spares
22.	Circular hack saw	"	"	Yugo-slavia	"
WB	3 work benches				
	Pump Repair Section				
23.	Table stand				
24.	Table stand				
25.	Drilling machine	1984	Working		
26.	Sand blasting cabin	"	"		
27.	Disc sawing machine	"	"		
28.	Bracket jib crane 1000 kg	"	"		
29.	Cutting machine	"	"		
30.	Hand press	"	"		
31.	Pump testing equipment	"	"		
WB	7 work benches	"	"		
32.	Air compressor	"	"		

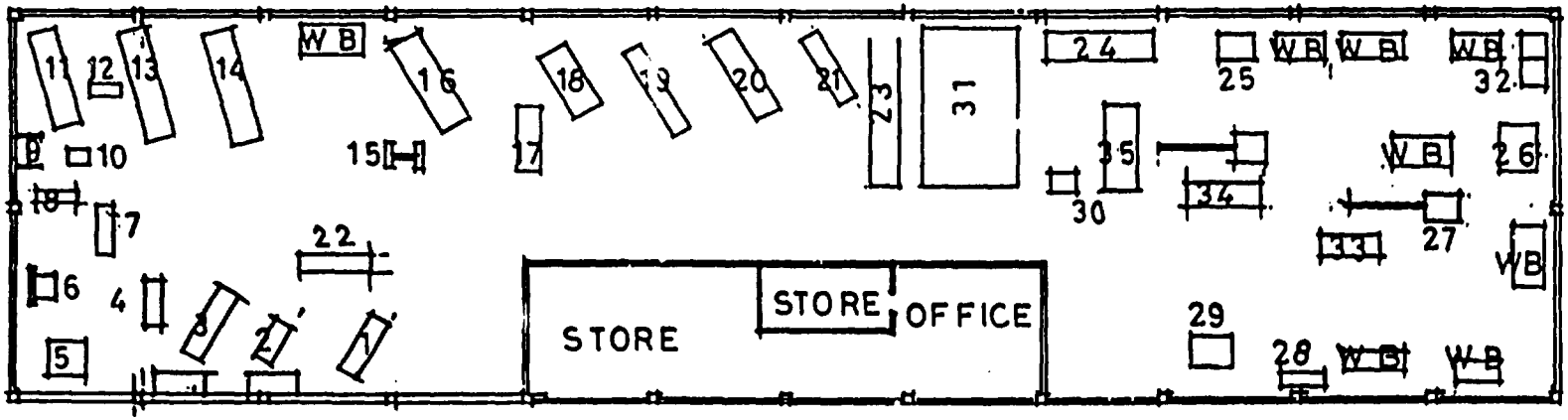
No. in layout	Machine Description	Year of installation	Working condition	Origin	Remarks/Needs
	Steel Structures Section				
33.	Radial drill machine	1976	Working	Yugo-slavia	Electrical spares
34.	Plate shearing machine	"	"	"	Mechanical spares
35.	Plate rolling machine	"	"	"	
36.	Plate shearing machine	"	"	Sweden	
37.	Rod shearing machine	"	"	Italy	
38.	Disc cutting machine	"	"	"	
39.	Plate bending machine	"	"	Sweden	
40.	Milling machine (horizontal)	"	"	Yugo-slavia	
	Pipe bending machine	"	"	U.K.	
	Foundry				
41.	Forging hammer	1976	Not working		Never used
42.	Sand mixer	"	Not used		
43.	Jar-ram moulding machine with magnetic separator	"	Working		
44.	Sand turnover (blaster)	"	"		
45.	Core sand mixer	"	"		
46.	Tool grinder	"	Not working		
47.	Moulding machine	"	Working	U.K.	
48.	Moulding machine	"	"	"	
49.	Band saw	"	"		
50.	Charging scale 2000 kg	"	"		
51.	Core baking oven	"	Not working		Never used

No. in layout	Machine Description	Year of installation	Working condition	Origin	Remarks/Needs
52.	Cupola furnace 1.0 ton	1976	Working	Italy	
53.	Cupola furnace 2.8 tons	"	Not working		Repair
54.	Rotary furnace 1.0 ton	1987	Working	Turkey	Technical Department
55.	Aluminium crucible furnace 50 kg	"	Not working	"	
56.	Aluminium crucible furnace 100-200 kg	1976	Working	"	Without crucible
57.	Crucible furnace for bronze 50 kg	1987	"	"	
58.	Crucible furnace for bronze 300 kg	1976	"	"	
59.	Forging furnace	1987	"		
60.	Grinder for casted products	"	Not working	"	Lacks grinding wheels

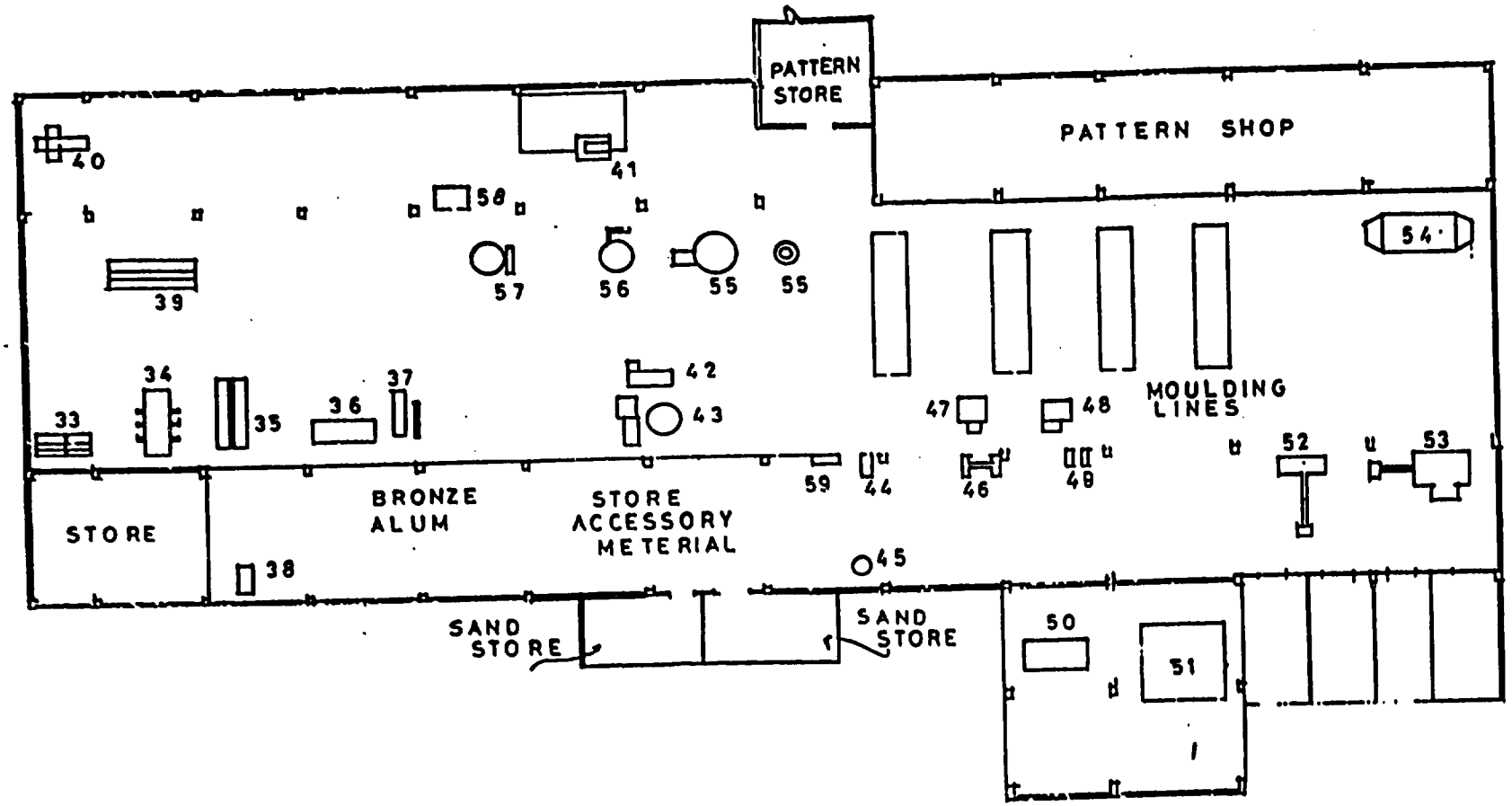
(*) Centre distance x centre head

N.B. Most of the machines have no operating and maintenance manuals

MACHINE SHOP, PUMP REPAIR &
AGRICULTURAL IMPLEMENTS



FMW
FOUNDRY AND METAL WORKS



ANNEX II:

FINANCIAL STATEMENTS OF THE FMW

FOUNDRY AND MECHANICAL WORKSHOP

BALANCE SHEETS

In thousands of So.Sh.

	1983	1984	1985	1986	1987
ASSETS					
Fixed assets					
Buildings	4,416	4,416	4,416	4,416	4,416
Machinery and equipment	5,211	5,211	5,242	8,267	14,356
Motor vehicles	899	945	1,056	1,535	1,550
Furniture and fixtures	346	346	346	527	527
Construction in progress	391	577	577	577	577
Total fixed assets	11,263	11,495	11,638	15,322	21,426
Less: Accumulated depreciation	(5,286)	(6,149)	(6,963)	(8,510)	(10,294)
Net book value of fixed assets	5,977	5,346	4,675	6,812	11,132
Current assets					
Materials and supplies	3,134	3,183	2,855	1,403	7,687
Work in process	3,080	3,326	3,325	3,376	5,097
Finished products	8,123	8,223	8,255	9,246	10,391
Total inventories	14,337	14,732	14,495	14,025	23,175
Accounts receivable	2,331	3,352	6,720	7,905	6,968
Advances	483	224	495	30	24
Cash and bank balances	2,160	2,176	1,106	2,901	3,593
Total cash and receivables	4,974	5,752	8,321	10,836	10,585
Total current assets	19,311	20,484	22,816	24,861	33,760
TOTAL ASSETS	25,288	25,830	27,491	31,673	44,892
LIABILITIES					
Capital					
Initial capital	11,605	11,651	11,794	11,794	19,998
UNIDO contribution	2,472	2,472	2,472	6,156	12,260
Reserve for special fund				1,700	
Accumulated profit	8,822	8,805	9,846	10,564	11,096
Total capital	22,899	22,928	24,112	30,214	43,354
Current liabilities					
Accounts payable	1,892	2,176	2,388	286	132
Accrued charges (provisions)	497	726	991	1,173	1,406
Total current liabilities	2,389	2,902	3,379	1,459	1,538
TOTAL LIABILITIES	25,288	25,830	27,491	31,673	44,892

FOUNDRY AND MECHANICAL WORKSHOP

PROFIT AND LOSS ACCOUNTS

In thousands of So.Sh.

	1983	1984	1985	1986	1987
SALES					
Steel structures	4,051	6,680	9,209	9,380	8,370
Cast iron	64	861	607	922	2,188
Aluminium alloys	6	19	16	3	55
Copper alloys	76	844	64	24	230
Miscellaneous	1,027	177	156	359	235
Services		262	477	1,707	1,085
Total sales	5,224	8,843	10,529	12,395	12,163
COST OF SALES					
Opening stock of WIP and FP	8,315	11,203	11,549	11,640	12,622
Raw materials for production	2,675	2,850	4,014	4,982	4,427
Wages, allowances and supplements	1,975	2,603	2,139	2,691	3,638
Depreciation	845	863	815	1,585	1,784
Other factory overheads	310	911	1,248	1,180	2,273
Closing stock of WIP and FP	(11,203)	(11,549)	(11,640)	(12,622)	(15,488)
Total cost of sales	2,917	6,921	8,125	9,456	9,256
CONTRIBUTION/GROSS MARGIN	2,307	1,922	2,404	2,939	2,907
Administrative expenses					
Salaries, wages and allowances	...	...	598	670	967
Other administrative expenses	753	939	765	1,569	1,408
Total	753	939	1,363	2,239	2,375
NET PROFIT	1,554	983	1,041	700	532

FOUNDRY AND MECHANICAL WORKSHOP

BALANCE SHEETS

Structure in %

	1983	1984	1985	1986	1987
ASSETS					
Fixed assets					
Buildings	17.46	17.10	16.06	13.94	9.84
Machinery and equipment	20.61	20.17	19.07	26.10	31.98
Motor vehicles	3.56	3.66	3.84	4.85	3.45
Furniture and fixtures	1.37	1.34	1.26	1.66	1.17
Construction in progress	1.55	2.23	2.10	1.82	1.29
Total fixed assets	44.54	44.50	42.33	48.38	47.73
Less: Accumulated depreciation	(20.90)	(23.81)	(25.33)	(26.87)	(22.93)
Net book value of fixed assets	23.64	20.70	17.01	21.51	24.80
Current assets					
Materials and supplies	12.39	12.32	10.39	4.43	17.12
Work in process	12.18	12.88	12.31	10.66	11.35
Finished products	32.12	31.84	30.03	29.19	23.15
Total inventories	56.69	57.03	52.73	44.28	51.62
Accounts receivable	9.22	12.98	24.44	24.96	15.52
Advances	1.91	0.87	1.80	0.99	0.05
Cash and bank balances	8.54	8.42	4.02	9.16	8.00
Total cash and receivables	19.67	22.27	30.27	34.21	23.58
Total current assets	76.36	79.30	82.99	78.49	75.20
TOTAL ASSETS	100.00	100.00	100.00	100.00	100.00
LIABILITIES					
Capital					
Initial capital	45.89	45.11	42.90	37.24	44.55
UNIDO contribution	9.78	9.57	8.99	19.44	27.31
Reserve for special fund				5.37	
Accumulated profit	34.89	34.09	35.82	33.35	24.72
Total capital	90.55	88.77	87.71	95.39	96.57
Current liabilities					
Accounts payable	7.48	8.42	8.69	0.90	0.29
Accrued charges (provisions)	1.97	2.81	3.60	3.70	3.13
Total current liabilities	9.45	11.23	12.29	4.61	3.43
TOTAL LIABILITIES	100.00	100.00	100.00	100.00	100.00

FOUNDRY AND MECHANICAL WORKSHOP

IT AND LOSS ACCOUNTS

	Structure in %				
	1983	1984	1985	1986	1987
SALES					
Steel structures	77.55	75.54	87.46	75.68	68.82
Cast iron	1.23	9.74	5.77	7.44	17.99
Aluminium alloys	0.11	0.21	0.15	0.02	0.45
Copper alloys	1.45	9.54	0.61	0.19	1.89
Miscellaneous	19.66	2.00	1.48	2.90	1.93
Services		2.96	4.53	13.77	8.92
Total sales	100.00	100.00	100.00	100.00	100.00
COST OF SALES					
Opening stock of WIP and FP	159.17	126.69	109.69	93.91	103.77
Raw materials for production	51.21	32.62	28.12	40.15	36.40
Wages, allowances and supplements	37.81	29.44	20.32	21.71	29.91
Depreciation	16.16	9.76	7.74	12.79	14.67
Other factory overheads	5.52	10.30	11.85	9.52	18.69
Closing stock of WIP and FP	(214.45)	(130.66)	(116.55)	(101.83)	(127.34)
Total cost of sales	55.34	78.27	77.17	76.29	76.10
CONTRIBUTION/GROSS MARGIN	44.16	21.73	22.83	23.71	23.90
Administrative expenses					
Salaries, wages and allowances			5.68	5.41	7.95
Other administrative expenses	14.41	10.62	7.27	12.66	11.58
Total	14.41	10.62	12.95	18.06	19.53
NET PROFIT	29.75	11.12	9.89	5.65	4.37

ADDITIONAL DATA TO THE FINANCIAL STATEMENTS

In order to get a better insight into some Balance Sheet items, particularly accounts receivable, the collection of which is becoming more and more difficult, and the inventories, which are significantly overstated, the following additional information is set out below:

NUMBER OF CUSTOMERS

	1986	1987
Number of customers with balances	56	53
Number of old customers not buying products during the year	(49)	(20)
Number of customers not buying, but repaying due balances		(3)
Number of customers with balances written off		(24)
Number of customers buying products during the year	7	6

OUTSTANDING ACCOUNTS RECEIVABLE BALANCES

Customer	Opening Balance	In thousands of So.Sh. Sales	Collections	Closing Balance
1986				
1. Somaltex	3	3,400	1,460	1,943
2. ONAT (Government agency for tractors)	15	2,800	464	2,351
3. Bank	30	216	56	190
4-7. Others	46	100	-	146
	94	6,516	1,980	4,630
Cash sales		5,879		
Total sales		12,395		
Other customers	6,626	-	3,351	3,275
Accounts receivable balance at the year end	6,720	6,516	5,331	7,905
1987				
1. Somaltex	1,943	-	-	1,943
2. ONAT (Government agency for tractors)	2,351	-	2,294	
Balance written off			57	0
3. Bank	190	409	418	181
4. Transport agency	6	294	140	160
5. Local government	6	984	-	990
6. Petroleum agency	485	1,625	641	1,469
7-8. Others		1,236	1,236	0
	4,981	4,548	4,729	4,743
Balances written off			57	
Cash sales		7,615		
Total sales		12,163		
Other customers	2,924	-	3	
Balances written off			696	2,225
Accounts receivable balance at the year end	7,905	4,548	4,732	
Balances written off			753	6,698
In that: Items outstanding more than one year				4,168

STRUCTURE OF SALES

	1986			1987		
	Credit	Cash	Total	Credit	Cash	Total
Steel structures	6,158	3,222	9,380	3,383	4,887	8,370
Cast iron	138	783	921	116	2,072	2,188
Aluminium alloys	-	3	3	-	55	55
Copper alloys	-	24	24	-	230	230
Miscellaneous items	-	359	359	-	235	235
Services	220	1,488	1,708	949	136	1,085
Total	6,516	5,879	12,395	4,548	7,615	12,163

PRODUCTION QUANTITIES

In Kilograms

	1982	1983	1984	1985	1986	1987
Cast iron	100,047	34,519	19,173	6,107	18,153	19,042
Aluminium alloys	-	-	3,053	64	-	131
Copper alloys	7,057	8,716	5,431	446	82	255
Steel structures	96,040	90,028	111,329	77,383	65,393	...
Total	203,144	133,263	138,986	84,000	83,828	...

RAW MATERIALS MOVEMENTS

In thousands of So.Sh.

	Opening Balance	Purchases	Consumption	Closing Balance
1986				
Raw materials	1,631	737	1,671	697
Auxiliary materials	645	304	532	417
Charcoal	-	1,133	1,133	-
Fuel and oil	-	53	53	-
Other production requirements	579	1,303	1,593	289
Total	2,855	3,530	4,982	1,403
1987				
Raw materials	697	8,116	1,468	7,345
Auxiliary materials	417	591	962	46
Charcoal	-	748	748	-
Fuel and oil	-	56	56	-
Other production requirements	289	1,200	1,193	296
Total	1,403	10,711	4,427	7,687

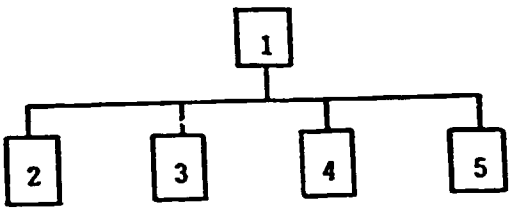
ANNEX III:

ORGANOGRAMS OF THE FMW SUGGESTED BY VARIOUS STUDIES

DEVELOPMENT OF THE ORGANISATIONAL STRUCTURE

In the period between 1976 and 1987 various international expert have been involved in designing the organisation charts to be applied by FMW. However, none of these charts was really implemented. Examples of such charts are given below:

I.



1 - General Manager

2 - Technical Manager

3 - Financial Manager

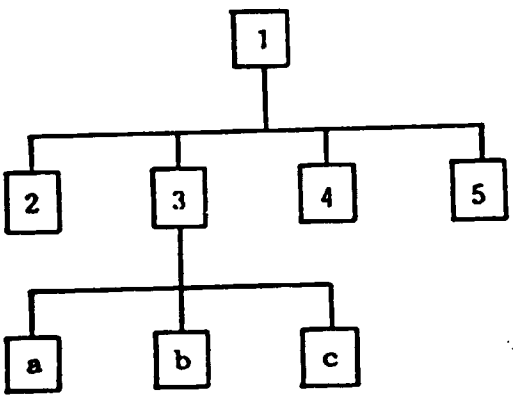
4 - Commercial Manager

5 - Sales Manager

UNIDO Project: DP-SOM/72/007
September 1976

This informal organisation chart was existing at that time.

II.



1 - General Manager

2 - Administration

3 - Technical

(a) Engineering
(b) Foundry
(c) Workshop

4 - Sales and Marketing

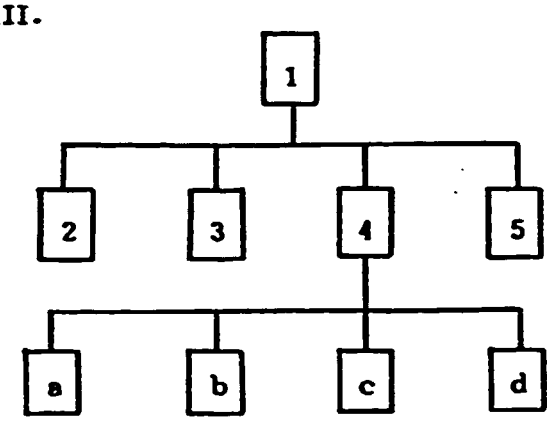
5 - Finance

UNIDO Project: DP-SOM/72/007
September 1976

This organisation chart was proposed by the international expert

NOT IMPLEMENTED

III.



1 - General Manager

2 - Administration

3 - Sales

4 - Technical

(a) Foundry
(b) Engineering
(c) Mechanical Workshop
(d) Sheet Metal

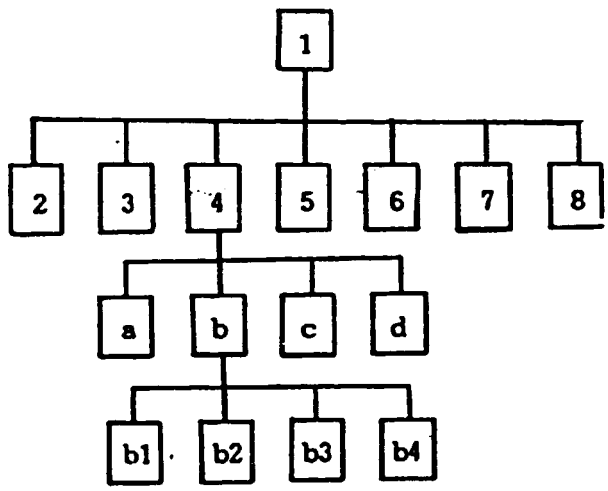
5 - Finance

UNIDO Project: DP-SOM/81/013
August 1984

This organisation chart was proposed by the international expert

NOT IMPLEMENTED

IV.



1 - General Manager

2 - Administration

3 - Sales

4 - Technical

(a) Design, Methods, Planning
(b) Production and Engineering
b1) Pattern Shop
b2) Foundry Shop
b3) Sheet Metal Shop
b4) Mechanical Workshop
(c) Quality Control
(d) Maintenance

5 - Finance

6 - Training

7 - Stores

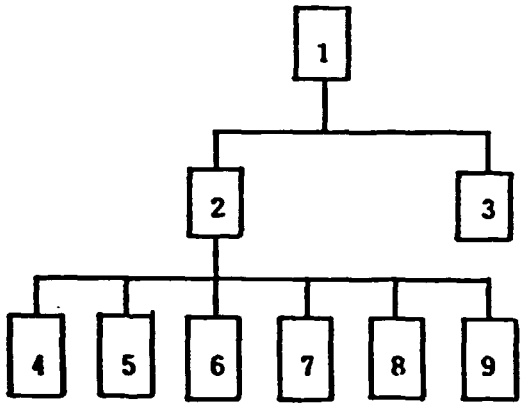
8 - Purchasing

UNIDO Project: DP-SOM/81/013
September 1985

This organisation chart was proposed by the international expert

NOT IMPLEMENTED

V.



This is formal present organisation chart

1 - General Manager

2 - Assistant General Manager - Operations

3 - Assistant General Manager - Administration

4 - Foundry

5 - Steel Structures

6 - Maintenance

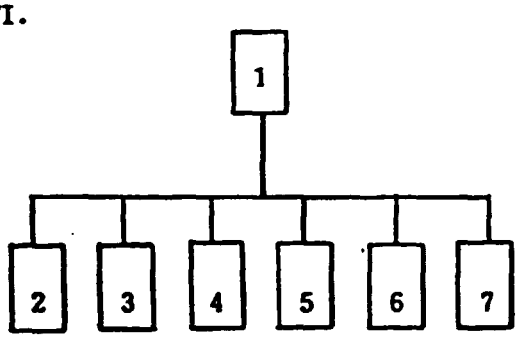
7 - Machine Shop

8 - Engineering

9 - Pump Repair and Agricultural Implements

PARTLY IMPLEMENTED

VI.



This is existing informal organisation chart

1 - General Manager

2 - Planning

3 - Engineering

4 - Administration and Finance

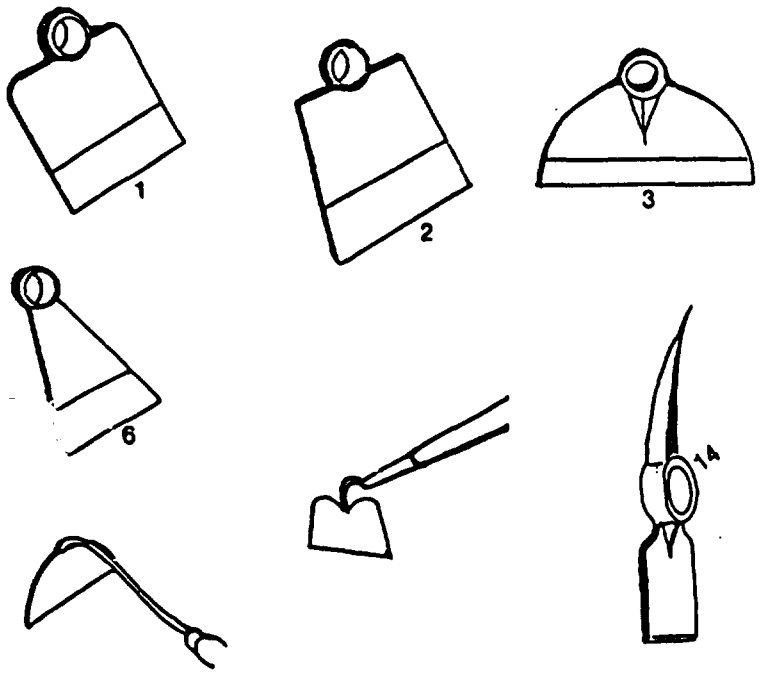
5 - Foundry

6 - Steel Structures

7 - Machining Shop

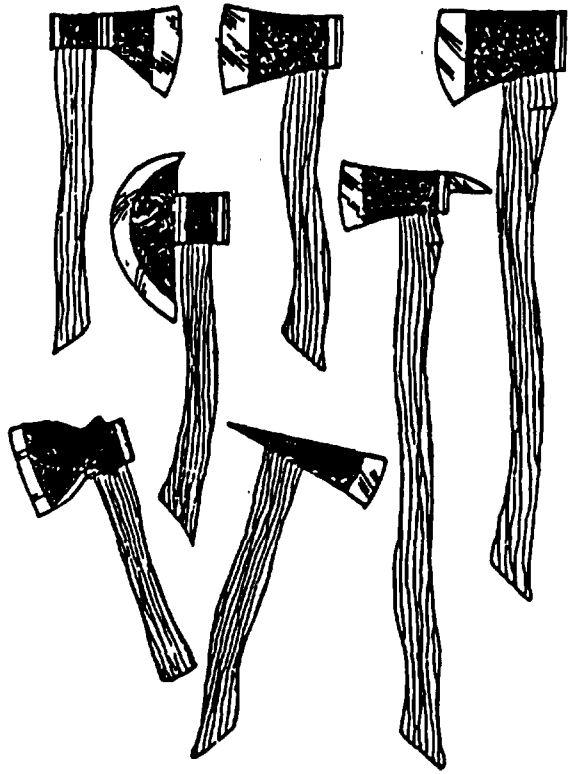
001. HOES

Hoes are the most widely used traditional hand tools in Somalia. They are essentially primary tillage implements. Hoes are used for many purpose, particularly weeding, ridging, bund forming and so on.



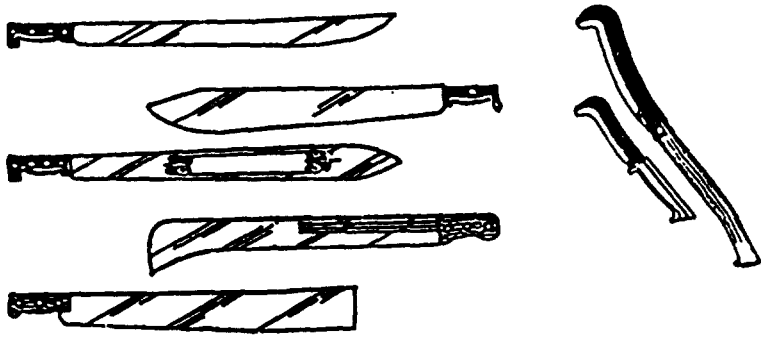
002. AXES

Axes are one of traditional hand tools used for cutting trees, bushes etc. in Somalia.



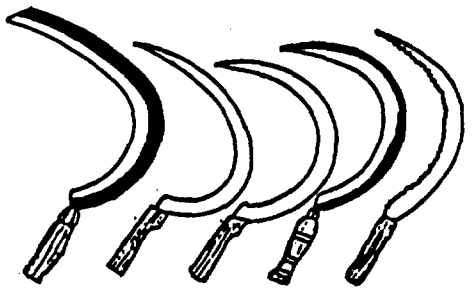
003. MACHETES

Machetes are useful for cutting down small bushes with stems up to about 8 cms in diameter and are used for cleaning land, harvesting, weeding etc.



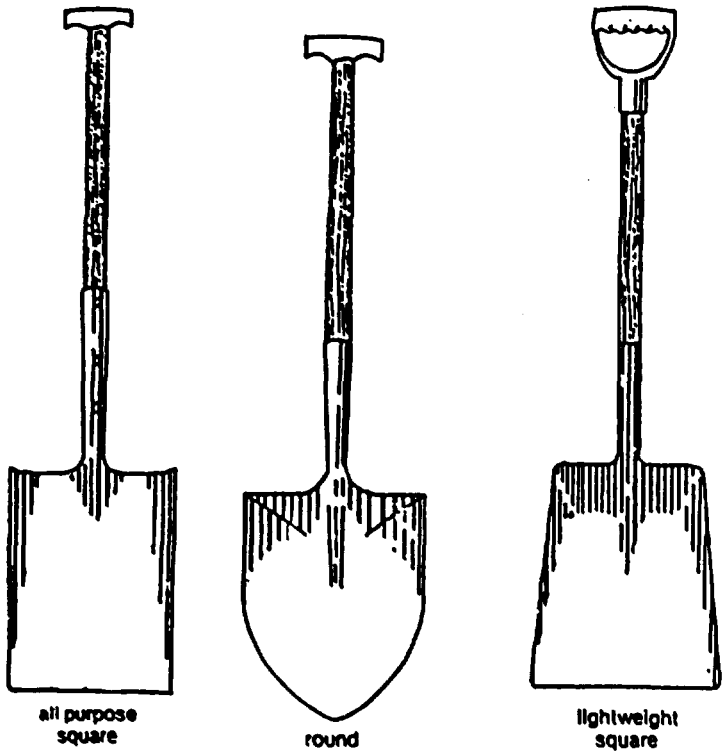
004. SICKLES

Sickles are not a widespread tool used in Somalia, but it is more efficient than machetes for weeding and harvesting purpose.



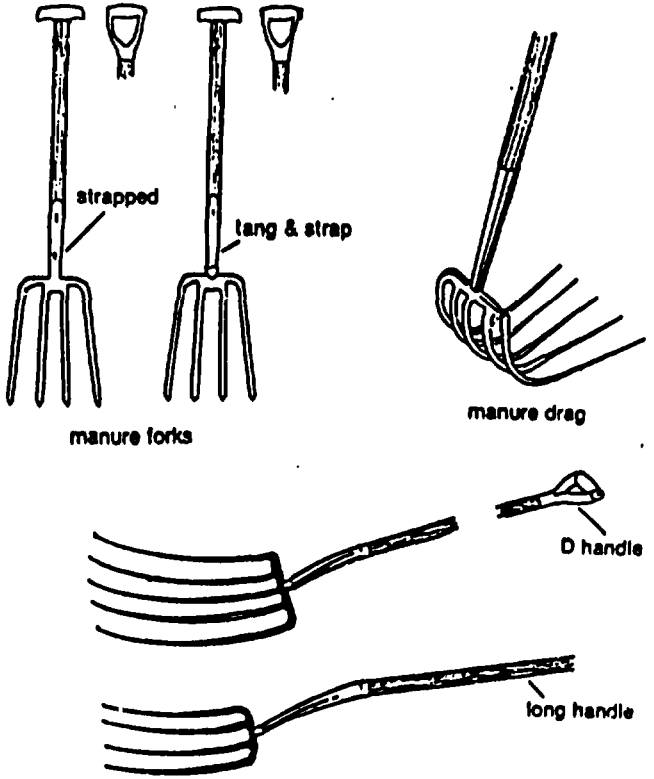
005. SHOVELS

Shovels are useful for both agricultural and construction activities. The earth moving shovel is relatively small, and its face is rounded or pointed. The grain shovel is large and its face is broad, suitable for movement of large quantity at a time.



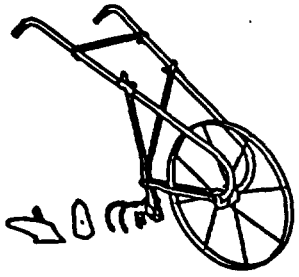
006. FORKS/RAKES

They are used for carrying materials for building compost heaps. The number of times needed for any particular task depends on the volume of the materials to be moved.



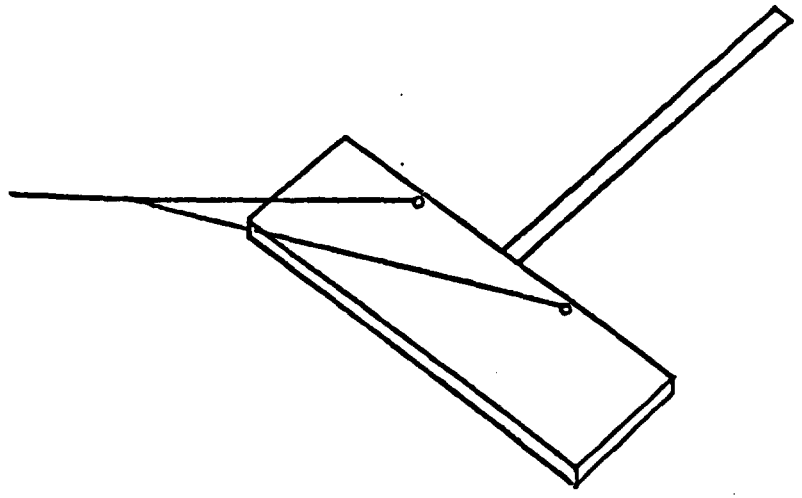
007. WHEEL HOE

It is a very useful agricultural implement for removal of weeds and loosening of soil crusts. The different kinds of shovels and tyres or blades can be fixed on the same frame.



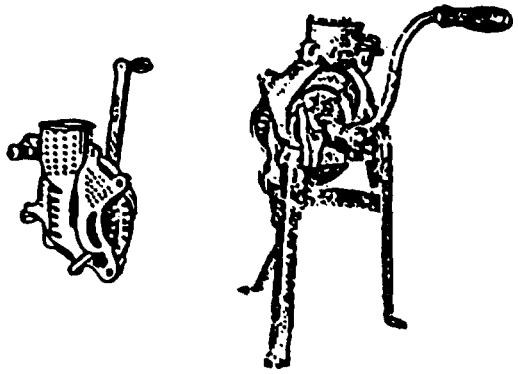
008. LEVELLOR

This is a traditional tool used in Somalia. It performed a land forming function by scraping soil from the field surface for removing weeds and keeping water.



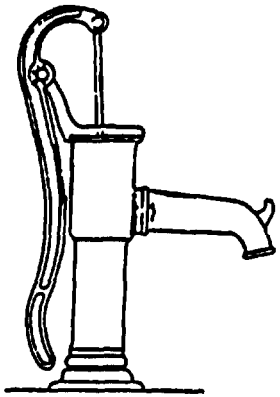
009. MAIZE SHELLER

It is suitable for small farmers, simple and used manually. Output is 100 - 150 kgs per hour. Its weight is 7 kg. Its overall dimension is 284x264x180 [mm].



010. HAND PUMP

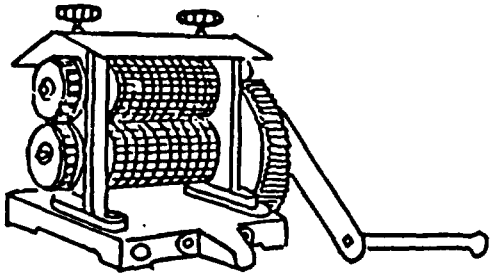
They are suitable for cistern and shallow well applications. It can lift water from depths up to 7 meter. Its capacity is 17-40 litres/min at 45 strokes.



011. SUGAR-CANE CRUSHER

This is a cast-iron crusher consisting of two or three rollers. The rollers with well designed grooves are fitted into the frame with appropriate clearances. A hand operated crusher can be converted for motor driver crusher as well.

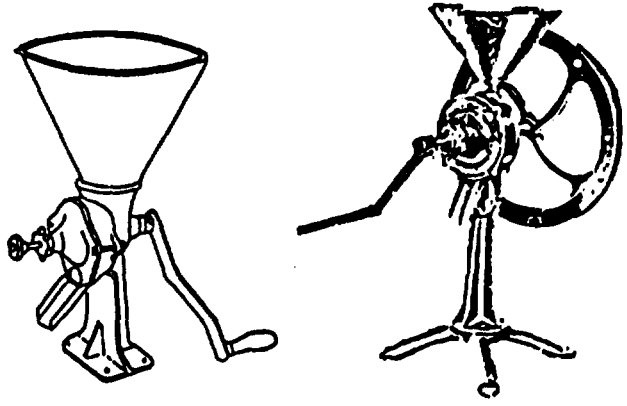
Capacity : 115 kg /hour.



012. HAND GRINDING MILL

Hand powered grinding mill for all kinds of dry grain. It is designed for easy hand operation with a 380 mm diameter flywheel. The flywheel and handle can be removed and be replaced by a 0.5 hp electric motor.

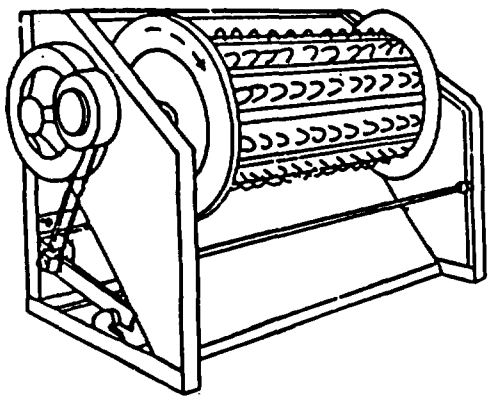
Output : 22-30 kg/hour (hand operated)
30-100 kg/hour (motor operated)



013. PADDY THRESHERS

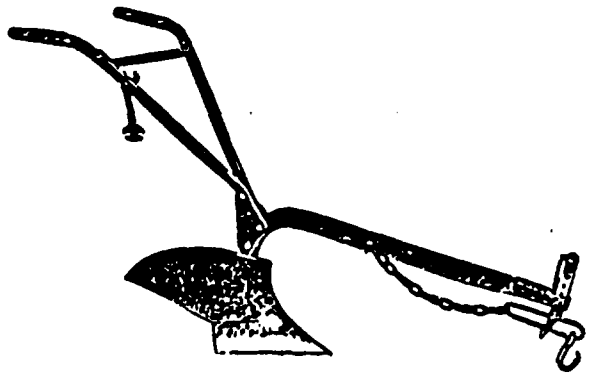
Suitable for many types of grains such as rice, wheat and soyabean. The cylinder is rotated by foot. It can also be coupled to a motor of 0.8 kw.

Capacity : 200 kg /hour by foot
400 kg /hour by motor driven.



014. ANIMAL DRAWN MOULD BOARD PLOUGH - A

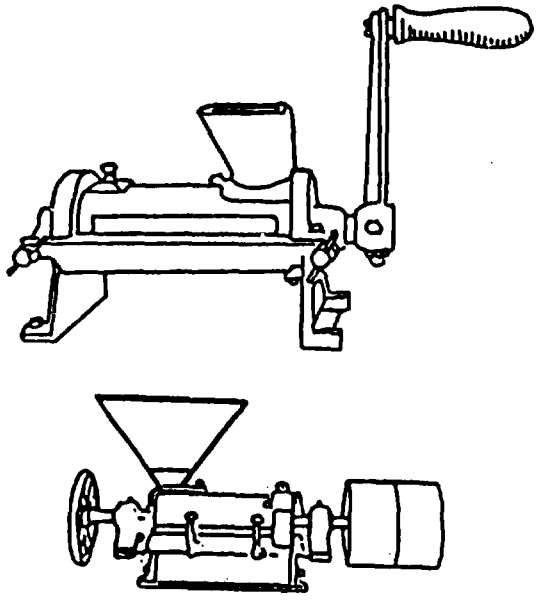
It is suitable for light soils, both water logged and dry. It require a tractive force of 70-110 kg. Furrow width :20-25 cms, plough depth : 15-25 cms, output/10 hour: 0.6-0.8 ha.



015. HAND-POWERED RICE HULLER

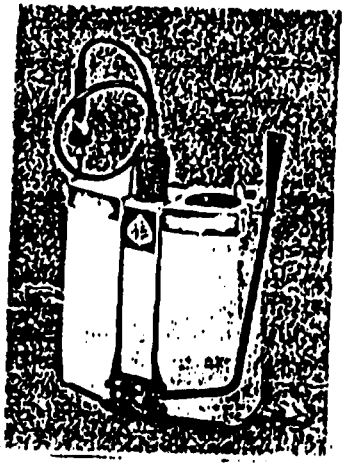
The machine has three adjustments controlling factor such as, the feed, the discharge and the haulling knife. A perforated plate allows dust to escape. It can be opened easily for cleaning purpose.

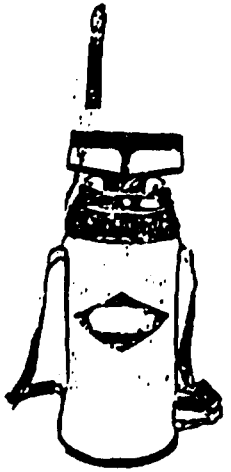
Capacity: 14 kg/hour
Weight : 10.5 kg.



016. HAND COMPRESSION KNAP SACK SPRAYER

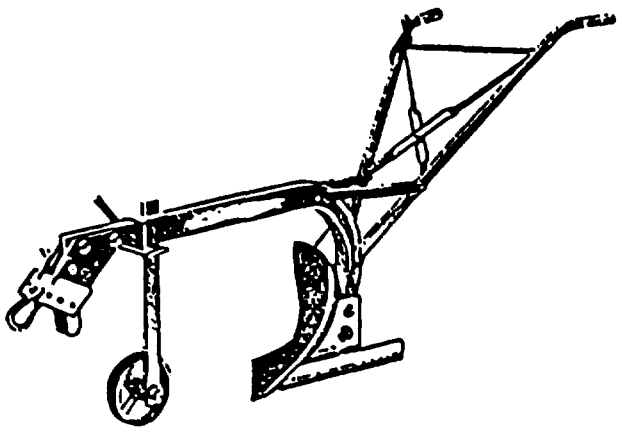
This manually operated type is made in varying sizes from 7 to 16 litres and its weight varies from 4 to 5.05 kgs. Capacity is 0.5 ha. per day.
Working pressure : 4kgf / cm2.
Overall dimension : 310x210x540 (mm).





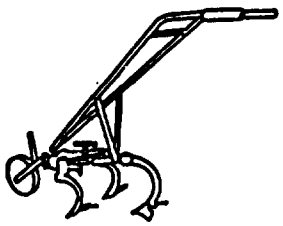
017. ANIMAL DRAWN MOULD PLOUGH-B

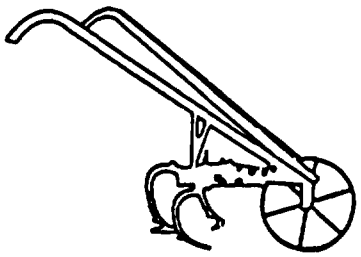
It is called general purpose ploughs. The plough is fabricated from bolted components together with a adjustable land wheel. This simplifies assembly and replacement of worn parts.
Working depth: 15-25 cm.



018. THREE-TYNE CULTIVATOR

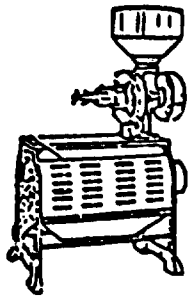
The cultivator is available with various attachments for weeding, hilling, ridging or furrowing. The space between the blades is easily adjusted. Working width:30-70 cm
Capacity: 1.2-1.6 ha per day.





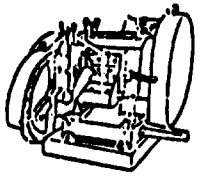
023. GRINDING MILL

This is a multi-purpose mill, powered by 2.8 -4 kw motor or by 5-8 hp diesel engine Capacity: 80-110 kg/hour, Weight: 80 kg.



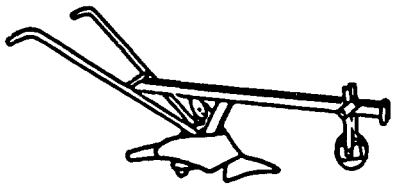
024. POWERED SUGAR-CANE CRUSHER

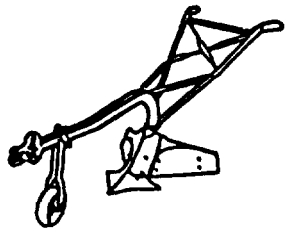
This small crusher produces upto 300 litres per hour. It requires 2hp [electric motor] or 3-4 hp diesel engine.



019. RIDGER

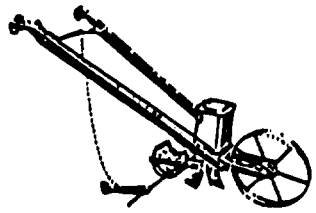
The ridger consists of a share, two wings and a breast plate which are attached to a beam. The soil is formed into well-defined ridge for sugar-cane, groundnuts and cotton. The trough of the ridges can also be used for irrigation.
Capacity: 1.5 ha per day.

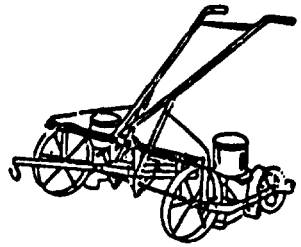




020. 1-3 ROW DRILL

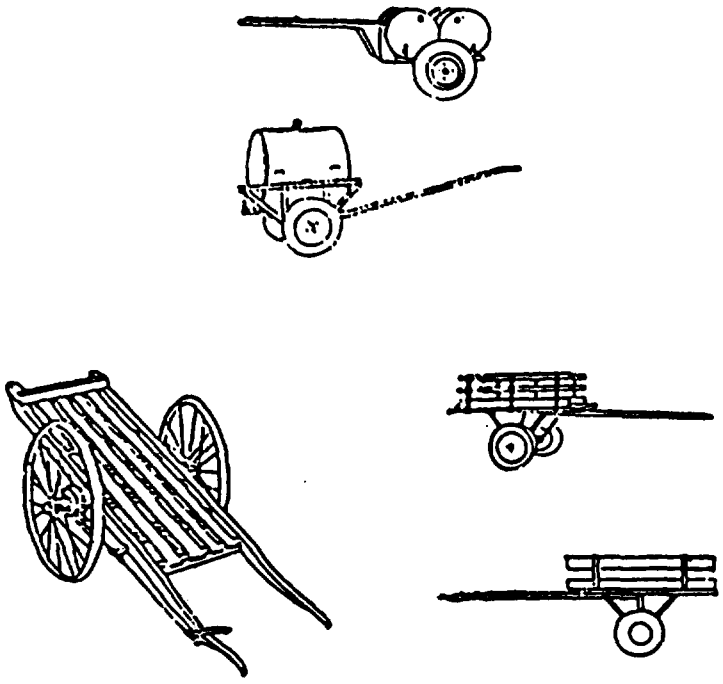
It is suitable for drilling seed and fertilizer simultaneously at a rate adjusted to crop requirements. It is suitable for most varieties of seeds including soya bean, all cereal crops and other small seed varieties.
Capacity: 1.5 ha per day.





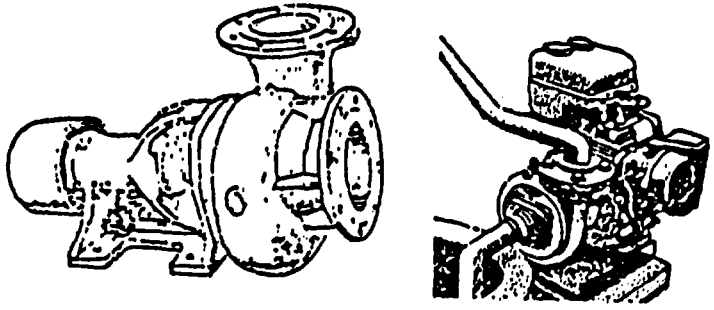
021. ANIMAL DRAWN CARTS

Donkey-cart has a loading platform measuring 1.6x0.95 M and a capacity of 500 kg. The body is supported by an axle, which is fitted with tapered roller bearings and 2 pneumatic-tyred wheels.
Ox-cart is designed for 1000kg payload. The steel chassis and pneumatic tyres support a superstructure.



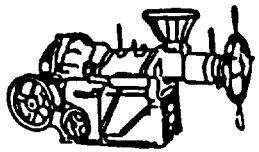
022. AGRICULTURAL PUMPS

The pump body and casing are constructed of close grained cast iron. Impellers of either the closed or open type and also cast iron impellers can be supplied as specified.
Capacity: 11-45 cubic meter per hour, maximum suction lift: 17-30 meter.
Speed: 2900rpm, power: 1.5-4 kw.



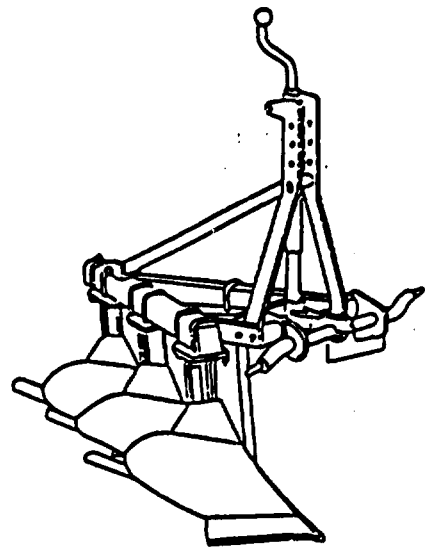
025. OIL EXTRACTORS

The most efficient small-scale press for seeds consists of a machined tapered screw -auger which rotates in a perforated drum or slotted housing. The screw augur can be changed for different seeds, such as sunflower, sesame and cotton seeds.



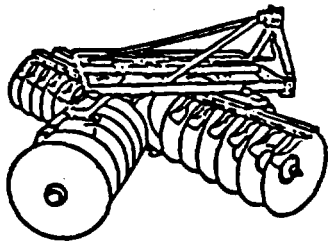
026. MOUNTED 3 MOULD BOARD PLOUGH

The plough can be mounted to the tractor with 40-60 hp. Depth of ploughing: 16-26 cm working width: 90 cm, Capacity: 0.5 ha/hr.



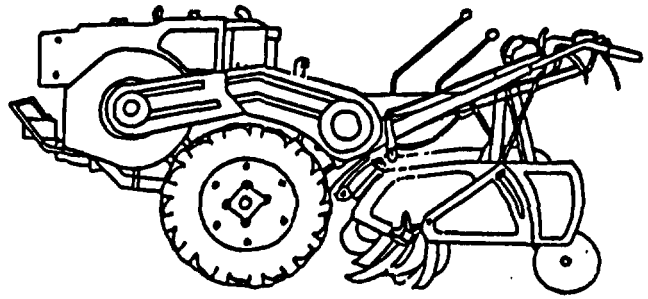
027. DISK HARROW

It is used after ploughing. Both dry land and paddy field can be used for breaking up the soil surface and filling up the furrow.It provides good condition for seeding, sometimes instead of shallow plough. Disk amounts: 16-24, Working Width 160-250 cm, Tilling Depth: 10-20 cm. Capacity: 1-1.5 ha/hour, matched with 50-80 hp tractor.



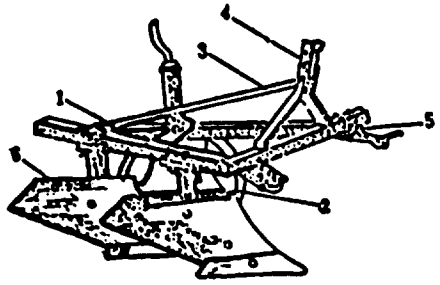
028. CULTIVATOR MATCHED WITH WALKING TRACTOR

The cultivator is suitable for use in both water-logged or dry conditions. It is driven by a 12hp walking tractor. Working width: 60--80 cm, Working depth: 12--18 cm, Capacity: 0.13-0.19 ha/hour.



029. MOUNTED 2 MOULDBOARD PLOUGH FOR WALKING TRACTORS

It is connected to 12hp walking tractor or small 4 wheel tractor with similar power. It is especially suitable for small or middle farmers. Working depth: 12-18 cm. Working width: 40 cm,Capacity: 0.15 ha/hr.

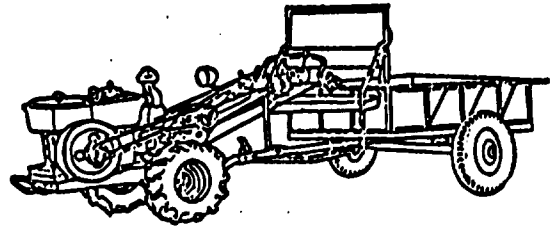


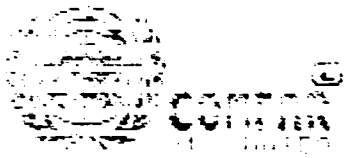
030. AGRICULTURAL TRAILER

They are widely used in agricultural transportation.

A type: light duty matched with 12 hp walking tractor. Payload: 1000 kg.

B type: heavy duty matched with 50hp 4 wheel tractor.
Payload: 4000kg, 6000kg.





ANNEX V:

COMFAR SCHEDULES

COMFAR 2.1 - Feasibility Study Branch, UNIDO, Vienna

BASE-MODEL
agritool/somalia
september 89
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2 year(s) of construction, 15 years of production
currency conversion rates:
foreign currency 1 unit = 1.0000 units accounting currency
local currency 1 unit = 1.0000 units accounting currency
accounting currency: 1000 us

Total initial investment during construction phase

fixed assets:	3169.20	83.583 % foreign
current assets:	80.00	100.000 % foreign
total assets:	3249.20	83.909 % foreign

Source of funds during construction phase

equity & grants:	1301.00	0.000 % foreign
foreign loans :	0.00	
local loans :	1950.00	
total funds :	3251.00	0.000 % foreign

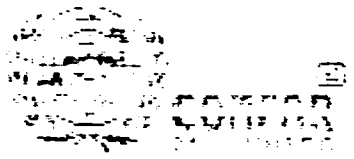
Cashflow from operations

Year:	1	2	5
operating costs:	479.88	664.09	1314.07
depreciation :	247.13	247.13	247.13
interest :	390.00	390.00	273.00
production costs	1117.01	1301.21	1834.20
thereof foreign	49.70 %	53.71 %	65.76 %
total sales :	643.51	930.80	1944.53
gross income :	-473.50	-370.41	110.33
net income :	-473.50	-370.41	110.33
cash balance :	-296.07	-377.70	125.77
net cashflow :	93.93	207.30	593.77

Net Present Value at: 20.00 % = -1188.56
Internal Rate of Return: 11.59 %
Return on equity1: 5.39 %
Return on equity2: 6.28 %

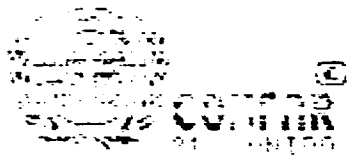
Index of Schedules produced by COMFAR

Total initial investment	Cashflow Tables
Total investment during production	Projected Balance
Total production costs	Net income statement
Working Capital requirements	Source of finance



Total Initial Investment in 1000 us

Year	1989	1990
Fixed investment costs		
Land, site preparation, development	72.500	0.000
Buildings and civil works	1101.998	275.699
Auxiliary and service facilities	0.000	0.000
Incorporated fixed assets	0.000	80.000
Plant machinery and equipment	550.000	550.000
Total fixed investment costs	1724.498	905.699
Pre-production capital expenditures	172.100	367.100
Net working capital	0.000	80.000
Total initial investment costs	1896.598	1352.599
Of it foreign, in %	87.293	79.164



COMFAR 2.1 - Feasibility Study Branch, UNIDO, Vienna

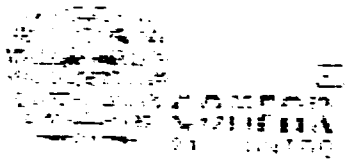
Total Current Investment in 1000 us

Year	1991	1992	1993	1994	1995
Fixed investment costs					
Land, site preparation, development	0.000	0.000	0.000	0.000	0.000
Buildings and civil works	0.000	0.000	0.000	0.000	0.000
Auxiliary and service facilities	0.000	0.000	0.000	0.000	0.000
Incorporated fixed assets	0.000	0.000	0.000	0.000	0.000
Plant, machinery and equipment	0.000	0.000	0.000	0.000	0.000
Total fixed investment costs	0.000	0.000	0.000	0.000	0.000
Preproduction capitals expenditures.	0.000	0.000	0.000	0.000	0.000
Working capital	69.697	59.411	82.170	90.781	36.688
Total current investment costs	69.697	59.411	82.170	90.781	36.688
Of it foreign, %	75.225	84.620	84.620	84.620	84.620

COMFAR 2.1 - Feasibility Study Branch, UNIDO, Vienna

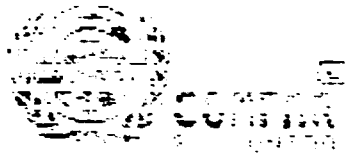
Total Current Investment in 1000 us

Year	1996-99	2000
Fixed investment costs		
Land, site preparation, development	0.000	0.000
Buildings and civil works	0.000	0.000
Auxiliary and service facilities	0.000	0.000
Incorporated fixed assets	0.000	0.000
Plant, machinery and equipment	0.000	700.000
Total fixed investment costs	0.000	700.000
Preproduction capitals expenditures.	0.000	0.000
Working capital	0.000	0.000
Total current investment costs	0.000	700.000
Of it foreign, %	0.000	100.000



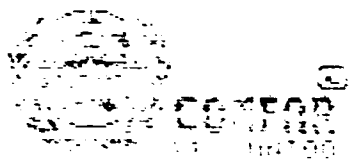
Total Production Costs in 1000 us

Year	1991	1992	1993	1994	1995
% of nom. capacity (single product).	33.093	47.868	68.301	98.876	100.000
Raw material 1	196.869	284.760	406.318	540.615	594.890
Other raw materials	106.094	153.459	218.967	291.341	320.590
Utilities	34.923	44.067	56.712	70.684	76.330
Energy	0.000	0.000	0.000	0.000	0.000
Labour, direct	17.084	24.712	35.261	46.915	51.625
Repair, maintenance	14.474	16.881	20.303	20.758	21.750
Spares	0.000	0.000	0.000	0.000	0.000
Factory overheads	58.949	85.267	121.665	161.878	178.130
Factory costs	428.394	608.344	857.226	1132.190	1243.315
Administrative overheads	34.758	34.758	34.758	34.758	34.758
Indir. costs, sales and distribution	16.731	20.986	26.871	33.372	36.000
Direct costs, sales and distribution	0.000	0.000	0.000	0.000	0.000
Depreciation	247.125	247.125	247.125	247.125	247.125
Financial costs	390.000	390.000	351.000	312.000	273.000
Total production costs	1117.008	1301.213	1516.980	1759.446	1834.198
Costs per unit (single product)	1.736	1.396	1.142	0.996	0.943
Of it foreign, %	49.695	53.710	59.179	63.510	65.762
Of it variable,%	36.939	45.866	56.136	64.398	67.975
Total labour	51.842	59.470	70.019	81.673	86.383



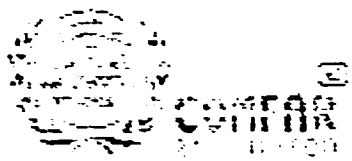
Total Production Costs in 1000 us

Year	1996	1997	1998	1999	2000
% of nom. capacity (single product).	100.000	100.000	100.000	100.000	100.000
Raw material 1	594.890	594.890	594.890	594.890	594.890
Other raw materials	320.590	320.590	320.590	320.590	320.590
Utilities	76.330	76.330	76.330	76.330	76.330
Energy	0.000	0.000	0.000	0.000	0.000
Labour, direct	51.625	51.625	51.625	51.625	51.625
Repair, maintenance	21.750	21.750	21.750	21.750	21.750
Spares	0.000	0.000	0.000	0.000	0.000
Factory overheads	178.130	178.130	178.130	178.130	178.130
Factory costs	1243.315	1243.315	1243.315	1243.315	1243.315
Administrative overheads	34.758	34.758	34.758	34.758	34.758
Indir. costs, sales and distribution	36.000	36.000	36.000	36.000	36.000
Direct costs, sales and distribution	0.000	0.000	0.000	0.000	0.000
Depreciation	186.125	186.125	186.125	186.125	76.125
Financial costs	234.000	195.000	156.000	117.000	78.000
Total production costs	1734.198	1695.198	1656.198	1617.198	1468.198
Costs per unit (single product)	0.892	0.872	0.852	0.832	0.755
Of it foreign, %	66.037	67.556	69.147	70.814	70.509
Of it variable,%	71.895	73.549	75.281	77.096	84.920
Total labour	86.383	86.383	86.383	86.383	86.383



Total Production Costs in 1000 us

Year	2001	2002- 5
% of nom. capacity (single product).	100.000	100.000
Raw material 1	594.890	594.890
Other raw materials	320.590	320.590
Utilities	76.330	76.330
Energy	0.000	0.000
Labour, direct	51.625	51.625
Repair, maintenance	21.750	21.750
Spares	0.000	0.000
Factory overheads	178.130	178.130
Factory costs	1243.315	1243.315
Administrative overheads	34.750	34.750
Indir. costs, sales and distribution	36.000	36.000
Direct costs, sales and distribution	0.000	0.000
Depreciation	138.875	138.875
Financial costs	39.000	0.000
Total production costs	1491.940	1452.940
Costs per unit (single product)	0.767	0.747
Of it foreign, %	76.078	76.067
Of it variable,%	83.568	85.812
Total labour	86.383	86.383



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Net Working Capital in 1000 us

Year			1991	1992	1993	1994	1995
Coverage	ndc	coto					
Current assets &							
Accounts receivable	30	12.0	39.990	55.341	76.571	100.027	109.506
Inventory and materials	90	4.0	84.472	120.571	170.499	225.660	247.953
Energy	0	---	0.000	0.000	0.000	0.000	0.000
Spares	0	---	0.000	0.000	0.000	0.000	0.000
Work in progress	10	36.0	11.900	16.898	23.812	31.450	34.537
Finished products	30	12.0	38.596	53.592	74.332	97.246	106.506
Cash in hand	30	12.0	10.439	13.401	17.499	22.026	23.855
Total current assets			185.396	259.804	362.713	476.408	522.356
Current liabilities and Accounts payable	30	12.0	35.699	50.695	71.436	94.349	103.610
Net working capital			149.697	209.108	291.278	382.059	418.747
Increase in working capital			69.697	59.411	82.170	90.781	36.688
Net working capital, local			37.087	46.225	58.863	72.826	78.469
Net working capital, foreign			112.609	162.883	232.415	309.233	340.278

Note: ndc = minimum days of coverage : coto = coefficient of turnover .

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---------- COMFAR 2.1 - Feasibility Study Branch, UNIDO, Vienna -----

Net Working Capital in 1000 us

Year			1996-2005
Coverage	ndc	coto	
Current assets &			
Accounts receivable	30	12.0	109.506
Inventory and materials	90	4.0	247.953
Energy	0	---	0.000
Spares	0	---	0.000
Work in progress	10	36.0	34.537
Finished products	30	12.0	106.506
Cash in hand	30	12.0	23.855
Total current assets			522.356
Current liabilities and Accounts payable	30	12.0	103.610
Net working capital			418.747
Increase in working capital			0.000
Net working capital, local			78.469
Net working capital, foreign			340.278

Note: ndc = minimum days of coverage : coto = coefficient of turnover .

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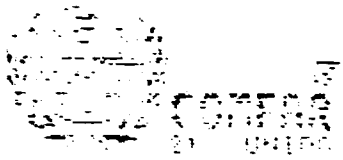
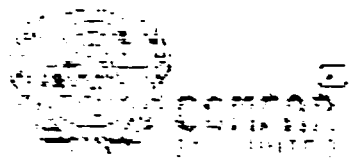


Source of Finance, construction in 1000 us

Year	1989	1990
Equity, ordinary ..	1301.000	0.000
Equity, preference.	0.000	0.000
Subsidies, grants .	0.000	0.000
Loan A, foreign .	0.000	0.000
Loan B, foreign..	0.000	0.000
Loan C, foreign .	0.000	0.000
Loan A, local....	596.000	1354.000
Loan B, local....	0.000	0.000
Loan C, local....	0.000	0.000
Total loan	596.000	1354.000
Current liabilities	0.000	0.000
Bank overdraft	0.000	0.000
Total funds	1897.000	1354.000



COMFAR 2.1 - Feasibility Study Branch, UNIDO, Vienna

Source of Finance, production in 1000 us

Year	1991	1992	1993	1994	1995	1996
Equity, ordinary ..	0.000	0.000	0.000	0.000	0.000	0.000
Equity, preference.	0.000	0.000	0.000	0.000	0.000	0.000
Subsidies, grants .	0.000	0.000	0.000	0.000	0.000	0.000
Loan A, foreign .	0.000	0.000	0.000	0.000	0.000	0.000
Loan B, foreign..	0.000	0.000	0.000	0.000	0.000	0.000
Loan C, foreign .	0.000	0.000	0.000	0.000	0.000	0.000
Loan A, local....	0.000	-195.000	-195.000	-195.000	-195.000	-195.000
Loan B, local....	0.000	0.000	0.000	0.000	0.000	0.000
Loan C, local....	0.000	0.000	0.000	0.000	0.000	0.000
Total loan	0.000	-195.000	-195.000	-195.000	-195.000	-195.000
Current liabilities	35.699	14.996	20.740	22.914	9.260	0.000
Bank overdraft	294.266	377.699	218.884	30.982	-125.769	-201.457
Total funds	329.966	197.695	44.624	-141.105	-311.508	-396.457

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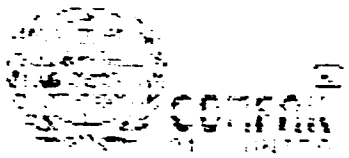
COMFAR 2.1 - Feasibility Study Branch, UNIDO, Vienna

Source of Finance, production in 1000 us

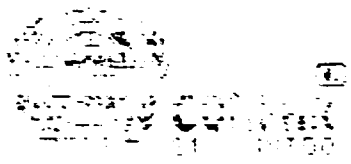
Year	1997	1998	1999	2000	2001
Equity, ordinary ..	0.000	0.000	0.000	0.000	0.000
Equity, preference.	0.000	0.000	0.000	0.000	0.000
Subsidies, grants .	0.000	0.000	0.000	0.000	0.000
Loan A, foreign .	0.000	0.000	0.000	0.000	0.000
Loan B, foreign..	0.000	0.000	0.000	0.000	0.000
Loan C, foreign .	0.000	0.000	0.000	0.000	0.000
Loan A, local....	-195.000	-195.000	-195.000	-195.000	-195.000
Loan B, local....	0.000	0.000	0.000	0.000	0.000
Loan C, local....	0.000	0.000	0.000	0.000	0.000
Total loan	-195.000	-195.000	-195.000	-195.000	-195.000
Current liabilities	0.000	0.000	0.000	0.000	0.000
Bank overdraft	-240.457	-279.457	-74.691	98.777	-98.777
Total funds	-435.457	-474.457	-269.691	-96.223	-293.777

agritool/somalia --- september 89



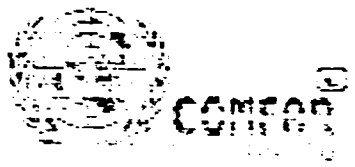
Cashflow Tables, construction in 1000 us

Year	1989	1990
Total cash inflow	1897.000	1354.000
Financial resources	1897.000	1354.000
Sales, net of tax	0.000	0.000
Total cash outflow	1896.598	1352.599
Total assets	1836.998	1097.999
Operating costs	0.000	0.000
Cost of finance	59.600	254.600
Repayment	0.000	0.000
Corporate tax	0.000	0.000
Dividends paid	0.000	0.000
Surplus (deficit)	0.402	1.401
Cumulated cash balance	0.402	1.803
Inflow, local	1897.000	1354.000
Outflow, local	241.009	281.827
Surplus (deficit)	1655.991	1072.173
Inflow, foreign	0.000	0.000
Outflow, foreign	1655.589	1070.772
Surplus (deficit)	-1655.589	-1070.772
Net cashflow	-1836.998	-1097.999
Cumulated net cashflow	-1836.998	-2934.997



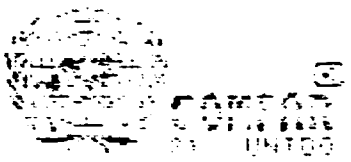
Cashflow tables, production in 1000 us

Year	1991	1992	1993	1994	1995	1996
Total cash inflow	679.209	945.796	1348.880	1790.034	1953.790	1944.530
Financial resources	35.699	14.996	20.740	22.914	9.260	0.000
Sales, net of tax	643.510	930.800	1328.140	1767.120	1944.530	1944.530
Total cash outflow	975.279	1323.095	1567.765	1821.015	1828.021	1743.073
Total assets	105.396	74.407	102.910	113.694	45.949	0.000
Operating costs	479.883	664.888	918.855	1286.321	1314.073	1314.073
Cost of finance	390.000	390.000	351.000	312.000	273.000	234.000
Repayment	0.000	195.000	195.000	195.000	195.000	195.000
Corporate tax	0.000	0.000	0.000	0.000	0.000	0.000
Dividends paid	0.000	0.000	0.000	0.000	0.000	0.000
Surplus (deficit)	-296.069	-377.699	-218.885	-30.982	125.769	201.457
Cumulated cash balance	-296.266	-671.966	-890.850	-921.832	-796.063	-594.606
Inflow, local	652.372	933.815	1332.309	1771.726	1946.392	1944.530
Outflow, local	593.788	795.421	816.995	841.535	816.437	769.933
Surplus (deficit)	58.585	138.393	515.315	930.192	1129.954	1174.597
Inflow, foreign	26.837	11.981	16.571	18.307	7.399	0.000
Outflow, foreign	381.491	528.674	750.770	979.481	1011.584	973.140
Surplus (deficit)	-354.654	-516.692	-734.199	-961.173	-1004.185	-973.140
Net cashflow	93.931	207.301	327.115	476.018	593.769	630.457
Cumulated net cashflow	-2841.066	-2633.765	-2306.650	-1830.632	-1236.863	-606.406



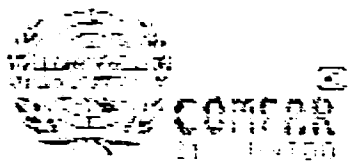
Cashflow tables, production in 1000 us

Year	1997	1998	1999	2000	2001	2002
Total cash inflow	1944.530	1944.530	1944.530	1944.530	1944.530	1944.530
Financial resources	0.000	0.000	0.000	0.000	0.000	0.000
Sales, net of tax	1944.530	1944.530	1944.530	1944.530	1944.530	1944.530
Total cash outflow	1704.073	1665.073	1626.073	2287.073	1548.073	1314.073
Total assets	0.000	0.000	0.000	700.000	0.000	0.000
Operating costs	1314.073	1314.073	1314.073	1314.073	1314.073	1314.073
Cost of finance	195.000	156.000	117.000	78.000	39.000	0.000
Repayment	195.000	195.000	195.000	195.000	195.000	0.000
Corporate tax	0.000	0.000	0.000	0.000	0.000	0.000
Dividends paid	0.000	0.000	0.000	0.000	0.000	0.000
Surplus (deficit)	240.457	279.457	318.457	-342.543	396.457	630.457
Cumulated cash balance	-354.149	-74.691	243.766	-98.777	297.680	928.137
Inflow, local	1944.530	1944.530	1944.530	1944.530	1944.530	1944.530
Outflow, local	730.933	691.933	652.933	613.933	574.933	340.933
Surplus (deficit)	1213.597	1252.597	1291.597	1330.597	1369.597	1603.597
Inflow, foreign	0.000	0.000	0.000	0.000	0.000	0.000
Outflow, foreign	973.140	973.140	973.140	1673.140	973.140	973.140
Surplus (deficit)	-973.140	-973.140	-973.140	-1673.140	-973.140	-973.140
Net cashflow	630.457	630.457	630.457	-69.543	630.457	630.457
Cumulated net cashflow	24.051	654.508	1284.966	1215.423	1845.880	2476.337



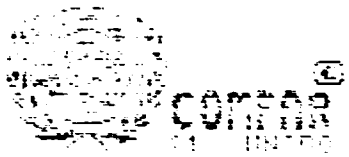
Cashflow tables, production in 1000 us

Year	2003	2004	2005
Total cash inflow	1944.530	1944.530	1944.530
Financial resources	0.000	0.000	0.000
Sales, net of tax	1944.530	1944.530	1944.530
Total cash outflow	1314.073	1314.073	1314.073
Total assets	0.000	0.000	0.000
Operating costs	1314.073	1314.073	1314.073
Cost of finance	0.000	0.000	0.000
Repayment	0.000	0.000	0.000
Corporate tax	0.000	0.000	0.000
Dividends paid	0.000	0.000	0.000
Surplus (deficit)	630.457	630.457	630.457
Cumulated cash balance	1558.594	2189.052	2819.509
Inflow, local	1944.530	1944.530	1944.530
Outflow, local	340.933	340.933	340.933
Surplus (deficit)	1603.597	1603.597	1603.597
Inflow, foreign	0.000	0.000	0.000
Outflow, foreign	973.140	973.140	973.140
Surplus (deficit)	-973.140	-973.140	-973.140
Net cashflow	630.457	630.457	630.457
Cumulated net cashflow	3106.794	3737.251	4367.708



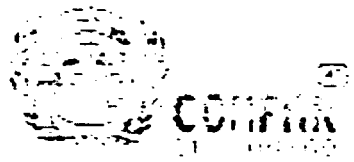
Cashflow Discounting:

a) Equity paid versus Net income flow:
Net present value ..... -1412.18 at 20.00 %
Internal Rate of Return (IRRE1) .. 5.39 %
b) Net Worth versus Net cash return:
Net present value ..... -1362.56 at 20.00 %
Internal Rate of Return (IRRE2) .. 6.28 %
c) Internal Rate of Return on total investment:
Net present value ..... -1188.56 at 20.00 %
Internal Rate of Return (IRR) .. 11.59 %
Net Worth = Equity paid plus reserves



Net Income Statement in 1000 us

Year	1991	1992	1993	1994	1995
Total sales, incl. sales tax	643.510	930.800	1328.140	1767.120	1944.530
Less: variable costs, incl. sales tax.	412.607	596.812	851.579	1133.045	1246.797
Variable margin	230.903	333.988	476.561	634.075	697.733
As % of total sales	35.882	35.882	35.882	35.882	35.882
Non-variable costs, incl. depreciation	314.400	314.401	314.401	314.400	314.401
Operational margin	-83.497	19.587	162.160	319.674	383.332
As % of total sales	-12.975	2.104	12.210	18.090	19.713
Cost of finance	390.000	390.000	351.000	312.000	273.000
Loss profit	-473.497	-370.413	-188.840	7.674	110.332
Allowances	0.000	0.000	0.000	0.000	0.000
Taxable profit	-473.497	-370.413	-188.840	7.674	110.332
Tax	0.000	0.000	0.000	0.000	0.000
Net profit	-473.497	-370.413	-188.840	7.674	110.332
Dividends paid	0.000	0.000	0.000	0.000	0.000
Undistributed profit	-473.497	-370.413	-188.840	7.674	110.332
Accumulated undistributed profit	-473.497	-843.910	-1032.750	-1025.076	-914.744
Gross profit, % of total sales	-73.580	-39.795	-14.218	0.434	5.674
Net profit, % of total sales	-73.580	-39.795	-14.218	0.434	5.674
ROE, Net profit, % of equity	-36.395	-28.471	-14.515	0.590	8.481
ROI, Net profit+interest, % of invest.	-2.779	0.639	5.154	9.875	11.709



Net Income Statement in 1000 us

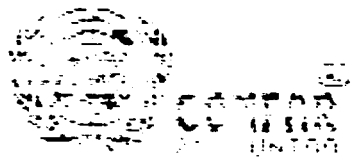
Year	1996	1997	1998	1999	2000
Total sales, incl. sales tax	1944.530	1944.530	1944.530	1944.530	1944.530
Less: variable costs, incl. sales tax.	1246.797	1246.797	1246.797	1246.797	1246.797
Variable margin	697.733	697.733	697.733	697.733	697.733
As % of total sales	35.882	35.882	35.882	35.882	35.882
Non-variable costs, incl. depreciation	253.401	253.401	253.401	253.401	143.401
Operational margin	444.332	444.332	444.332	444.332	554.332
As % of total sales	22.850	22.850	22.850	22.850	28.507
Cost of finance	234.000	195.000	156.000	117.000	78.000
Gross profit	210.332	249.332	288.332	327.332	476.332
Allowances	0.000	0.000	0.000	0.000	0.000
Taxable profit	210.332	249.332	288.332	327.332	476.332
Tax	0.000	0.000	0.000	0.000	0.000
Net profit	210.332	249.332	288.332	327.332	476.332
Dividends paid	0.000	0.000	0.000	0.000	0.000
Undistributed profit	210.332	249.332	288.332	327.332	476.332
Accumulated undistributed profit	-704.412	-455.080	-166.748	160.584	636.916
Gross profit, % of total sales	10.817	12.822	14.828	16.833	24.496
Net profit, % of total sales	10.817	12.822	14.828	16.833	24.496
ROE, Net profit, % of equity	16.167	19.165	22.162	25.160	36.613
ROI, Net profit+interest, % of invest.	13.573	13.573	13.573	13.573	13.950

Net Income Statement in 1000 us

Year	2001	2002	2003	2004	2005
Total sales, incl. sales tax	1944.530	1944.530	1944.530	1944.530	1944.530
Less: variable costs, incl. sales tax.	1246.797	1246.797	1246.797	1246.797	1246.797
Variable margin	697.733	697.733	697.733	697.733	697.733
As % of total sales	35.882	35.882	35.882	35.882	35.882
Non-variable costs, incl. depreciation	206.151	206.151	206.151	206.151	206.148
Operational margin	491.582	491.582	491.582	491.582	491.584
As % of total sales	25.280	25.280	25.280	25.280	25.280
Cost of finance	39.000	0.000	0.000	0.000	0.000
Loss profit	452.582	491.582	491.582	491.582	491.584
Allowances	0.000	0.000	0.000	0.000	0.000
Taxable profit	452.582	491.582	491.582	491.582	491.584
Tax	0.000	0.000	0.000	0.000	0.000
Net profit	452.582	491.582	491.582	491.582	491.584
Dividends paid	0.000	0.000	0.000	0.000	0.000
Undistributed profit	452.582	491.582	491.582	491.582	491.584
Accumulated undistributed profit	1089.498	1581.080	2072.663	2564.245	3055.829
Gross profit, % of total sales	23.275	25.280	25.280	25.280	25.280
Net profit, % of total sales	23.275	25.280	25.280	25.280	25.280
ROE, Net profit, % of equity	34.787	37.785	37.785	37.785	37.785
ROI, Net profit+interest, % of invest.	12.371	12.371	12.371	12.371	12.371

Projected Balance Sheets, construction in 1000 us

Year	1989	1990
Total assets	1897.000	3251.000
Fixed assets, net of depreciation	0.000	1896.598
Construction in progress	1896.598	1272.599
Current assets	0.000	80.000
Cash, bank	0.000	0.000
Cash surplus, finance available	0.402	1.803
Loss carried forward	0.000	0.000
Loss	0.000	0.000
Total liabilities	1897.000	3251.000
Equity capital	1301.000	1301.000
Reserves, retained profit	0.000	0.000
Profit	0.000	0.000
Long and medium term debt	596.000	1950.000
Current liabilities	0.000	0.000
Bank overdraft, finance required	0.000	0.000
Total debt	596.000	1950.000
Equity, % of liabilities	68.582	40.018



COMFAR 2.1 - Feasibility Study Branch, UNIDO, Vienna

Projected Balance Sheets, Production in 1000 us

Year	1991	1992	1993	1994	1995
Total assets	3588.965	3778.660	3823.285	3689.854	3481.004
Fixed assets, net of depreciation	2922.072	2674.947	2427.822	2180.697	1933.572
Construction in progress	0.000	0.000	0.000	0.000	0.000
Current assets	174.958	246.402	345.214	454.382	498.501
Cash, bank	10.439	13.401	17.499	22.026	23.855
Cash surplus, finance available	0.000	0.000	0.000	0.000	0.000
Loss carried forward	0.000	473.497	843.910	1032.750	1025.076
Loss	473.497	370.613	188.860	0.000	0.000
Total liabilities	3588.965	3778.660	3823.285	3689.854	3481.004
Equity capital	1301.000	1301.000	1301.000	1301.000	1301.000
Reserves, retained profit	0.000	0.000	0.000	0.000	0.000
Profit	0.000	0.000	0.000	7.674	110.332
Long and medium term debt	1950.000	1755.000	1560.000	1365.000	1170.000
Current liabilities	35.699	50.695	71.436	94.349	103.610
Bank overdraft, finance required.	294.266	671.965	890.850	921.831	796.062
Total debt	2279.965	2477.660	2522.285	2381.180	2069.672
Equity, % of liabilities	36.331	34.438	34.028	35.259	37.374

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COMFAR 2.1 - Feasibility Study Branch, UNIDO, Vienna

Projected Balance Sheets, Production in 1000 us

Year	1996	1997	1998	1999	2000
Total assets	3184.547	2788.090	2352.633	2121.542	2335.303
Fixed assets, net of depreciation	1747.447	1561.322	1375.197	1189.072	1112.947
Construction in progress	0.000	0.000	0.000	0.000	700.000
Current assets	498.501	498.501	498.501	498.501	498.501
Cash, bank	23.855	23.855	23.855	23.855	23.855
Cash surplus, finance available	0.000	0.000	0.000	263.766	0.000
Loss carried forward	914.744	704.412	455.080	166.748	0.000
Loss	0.000	0.000	0.000	0.000	0.000
Total liabilities	3184.547	2788.090	2352.633	2121.542	2335.303
Equity capital	1301.000	1301.000	1301.000	1301.000	1301.000
Reserves, retained profit	0.000	0.000	0.000	0.000	160.584
Profit	210.332	249.332	288.332	327.332	476.332
Long and medium term debt	975.000	780.000	585.000	390.000	195.000
Current liabilities	103.610	103.610	103.610	103.610	103.610
Bank overdraft, finance required.	594.605	354.148	74.691	0.000	98.777
Total debt	1673.215	1237.758	763.301	493.610	397.387
Equity, % of liabilities	40.854	46.663	55.300	61.312	55.710

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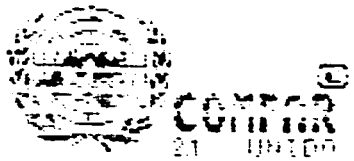

Projected Balance Sheets, Production in 1000 us

Year	2001	2002	2003	2004	2005
Total assets	2494.108	2985.690	3477.272	3968.854	4460.438
Fixed assets, net of depreciation	1674.072	1535.197	1396.322	1257.447	1118.576
Construction in progress	0.000	0.000	0.000	0.000	0.000
Current assets	498.501	498.501	498.501	498.501	498.501
Cash, bank	23.855	23.855	23.855	23.855	23.855
Cash surplus, finance available	297.680	928.137	1558.594	2189.051	2819.508
Loss carried forward	0.000	0.000	0.000	0.000	0.000
Loss	0.000	0.000	0.000	0.000	0.000
Total liabilities	2494.108	2985.690	3477.272	3968.854	4460.438
quity capital	1301.000	1301.000	1301.000	1301.000	1301.000
Reserves, retained profit	636.916	1089.498	1581.080	2072.663	2564.245
Profit	452.582	491.582	491.582	491.582	491.584
Long and medium term debt	0.000	0.000	0.000	0.000	0.000
Current liabilities	103.610	103.610	103.610	103.610	103.610
Bank overdraft, finance required	0.000	0.000	0.000	0.000	0.000
Total debt	103.610	103.610	103.610	103.610	103.610
Equity, % of liabilities	52.163	43.575	37.414	32.780	29.168

Sensitivity analysis of base-model

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2 year(s) of construction, 15 years of production
currency conversion rates:
foreign currency 1 unit = 1.0000 units accounting currency
local currency 1 unit = 1.0000 units accounting currency
accounting currency: 1000 us

Total initial investment during construction phase

fixed assets:	3169.20	83.503 % foreign
current assets:	80.00	100.000 % foreign
total assets:	3249.20	83.909 % foreign

Source of funds during construction phase

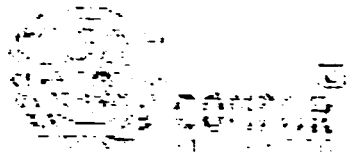
equity & grants:	1301.00	0.000 % foreign
foreign loans :	0.00	
local loans :	1950.00	
total funds :	3251.00	0.000 % foreign

Cashflow from operations

Year:	1	2	4
operating costs:	565.99	815.35	1314.07
depreciation :	247.13	247.13	247.13
interest :	390.00	390.00	312.00
production costs	1203.12	1452.48	1873.20
thereof foreign	51.73 %	56.25 %	64.39 %
total sales :	777.81	1166.72	1944.53
gross income :	-425.31	-285.76	71.33
net income :	-425.31	-285.76	71.33
cash balance :	-275.65	-314.06	43.03
net cashflow :	114.35	270.94	550.03

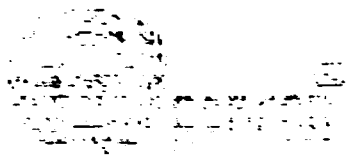
Net Present Value at: 20.00 % = -1055.32
Internal Rate of Return: 12.44 %
Return on equity1: 6.49 %
Return on equity2: 7.26 %

Index of Schedules produced by COMFAR



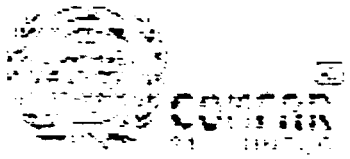
Total Production Costs in 1000 us

Year	1991	1992	1993	1994	1995
% of nom. capacity (single product).	40.000	60.000	80.000	100.000	100.000
Raw material 1	237.956	356.934	475.912	594.890	594.890
Other raw materials	128.236	192.354	256.472	320.590	320.590
Utilities	39.198	51.575	63.952	76.330	76.330
Energy	0.000	0.000	0.000	0.000	0.000
Labour, direct	20.650	30.975	41.300	51.625	51.625
Repair, maintenance	15.225	17.400	19.575	21.750	21.750
Spares	0.000	0.000	0.000	0.000	0.000
Factory overheads	71.252	106.878	142.504	178.130	178.130
Factory costs	512.516	756.116	999.716	1243.315	1243.315
Administrative overheads	34.758	34.758	34.758	34.758	34.758
Indir. costs, sales and distribution	12.720	24.480	30.240	36.000	36.000
Direct costs, sales and distribution	0.000	0.000	0.000	0.000	0.000
Depreciation	247.125	247.125	247.125	247.125	247.125
Financial costs	390.000	390.000	351.000	312.000	273.000
Total production costs	1203.120	1452.479	1662.839	1873.198	1834.198
Costs per unit (single product)	1.547	1.245	1.069	0.963	0.943
Of it foreign, %	51.726	56.245	60.835	64.393	65.762
Of it variable,%	41.452	51.504	59.984	66.560	67.975
Total labour	55.408	65.733	76.058	86.383	86.383



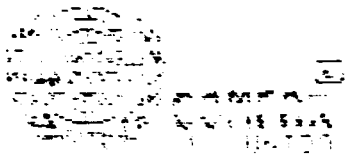
Total Production Costs in 1000 us

Year	1996	1997	1998	1999	2000
% of nom. capacity (single product).	100.000	100.000	100.000	100.000	100.000
Raw material 1	594.890	594.890	594.890	594.890	594.890
Other raw materials	320.590	320.590	320.590	320.590	320.590
Utilities	76.330	76.330	76.330	76.330	76.330
Energy	0.000	0.000	0.000	0.000	0.000
Labour, direct	51.625	51.625	51.625	51.625	51.625
Repair, maintenance	21.750	21.750	21.750	21.750	21.750
Spares	0.000	0.000	0.000	0.000	0.000
Factory overheads	178.130	178.130	178.130	178.130	178.130
Factory costs	1243.315	1243.315	1243.315	1243.315	1243.315
inistrative overheads	34.758	34.758	34.758	34.758	34.758
ndir. costs, sales and distribution	36.000	36.000	36.000	36.000	36.000
Direct costs, sales and distribution	0.000	0.000	0.000	0.000	0.000
Depreciation	186.125	186.125	186.125	186.125	76.125
Financial costs	234.000	195.000	156.000	117.000	78.000
Total production costs	1734.198	1695.198	1656.198	1617.198	1468.198
Costs per unit (single product)	0.892	0.872	0.852	0.832	0.755
Of it foreign, %	66.037	67.556	69.147	70.814	70.509
Of it variable,%	71.895	73.549	75.281	77.096	84.920
Total labour	86.383	86.383	86.383	86.383	86.383



Total Production Costs in 1000 us

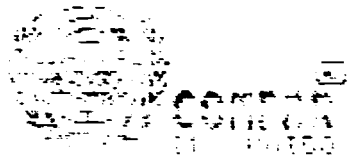
Year	2001	2002- 5
% of nom. capacity (single product).	100.000	100.000
Raw material 1	594.898	594.898
Other raw materials	320.590	320.590
Utilities	76.330	76.330
Energy	0.000	0.000
Labour, direct	51.625	51.625
Repair, maintenance	21.750	21.750
Spares	0.000	0.000
Factory overheads	178.130	178.130
Factory costs	1243.315	1243.315
Administrative overheads	34.758	34.758
Indir. costs, sales and distribution	36.000	36.000
Direct costs, sales and distribution	0.000	0.000
Depreciation	138.875	138.875
Financial costs	39.000	0.000
Total production costs	1491.948	1452.948
Costs per unit (single product)	0.767	0.747
Of it foreign, %	74.878	76.067
Of it variable,%	83.568	85.812
Total labour	86.383	86.383



Net Working Capital in 1000 us

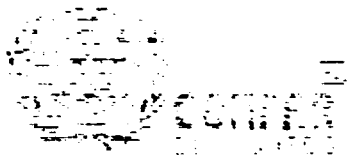
Year			1991	1992	1993	1994	1995-2005
Coverage	ndc	coto					
Current assets &							
Accounts receivable	30	12.0	47.166	67.946	88.726	109.506	109.506
Inventory and materials	90	4.0	101.347	150.216	199.084	247.953	247.953
Energy	0	---	0.000	0.000	0.000	0.000	0.000
Spares	0	---	0.000	0.000	0.000	0.000	0.000
Work in progress	10	36.0	14.237	21.003	27.770	34.537	34.537
Finished products	30	12.0	45.606	65.906	86.206	106.506	106.506
Cash in hand	30	12.0	11.824	15.834	19.845	23.855	23.855
Total current assets			220.180	320.906	421.631	522.356	522.356
Current liabilities and accounts payable	30	12.0	42.710	63.010	83.310	103.610	103.610
Net working capital			177.470	257.896	338.321	418.747	418.747
Increase in working capital			97.470	80.426	80.425	80.426	0.000
Net working capital, local			41.359	53.729	66.099	78.469	78.469
Net working capital, foreign			136.111	204.167	272.223	340.278	340.278

Note: ndc = minimum days of coverage ; coto = coefficient of turnover .



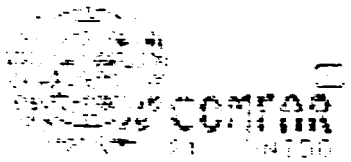
Cashflow tables, production is 1000 us

Year	1991	1992	1993	1994	1995	1996
Total cash inflow	820.522	1187.818	1575.926	1964.830	1944.530	1944.530
Financial resources	42.710	20.300	20.300	20.300	0.000	0.000
Sales, net of tax	777.812	1166.718	1555.626	1944.530	1944.530	1944.530
Total cash outflow	1096.175	1581.079	1711.639	1921.798	1782.073	1743.073
Total assets	140.100	100.725	100.725	100.725	0.000	0.000
Operating costs	565.995	815.354	1064.713	1314.073	1314.073	1314.073
Cost of finance	390.000	390.000	351.000	312.000	273.000	234.000
Repayment	0.000	195.000	195.000	195.000	195.000	195.000
rporate tax	0.000	0.000	0.000	0.000	0.000	0.000
ividends paid	0.000	0.000	0.000	0.000	0.000	0.000
Surplus (deficit)	-275.653	-314.062	-135.515	43.032	162.457	201.457
Cumulated cash balance	-273.850	-587.911	-723.426	-680.395	-517.938	-316.480
Inflow, local	788.084	1170.799	1559.705	1948.611	1944.530	1944.530
Outflow, local	618.369	832.921	848.652	864.384	808.933	769.933
Surplus (deficit)	169.714	337.878	711.053	1084.227	1135.597	1174.597
Inflow, foreign	32.438	16.219	16.219	16.219	0.000	0.000
Outflow, foreign	477.805	668.159	862.787	1057.415	973.140	973.140
Surplus (deficit)	-445.367	-651.940	-846.568	-1041.196	-973.140	-973.140
Net cashflow	114.347	270.939	410.485	550.032	630.457	630.457
Cumulated net cashflow	-2820.650	-2549.711	-2139.226	-1589.195	-958.738	-328.280



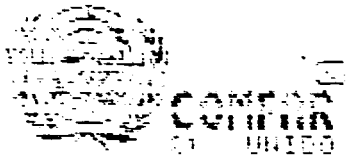
Cashflow tables, production in 1000 us

Year	1997	1998	1999	2000	2001	2002
Total cash inflow	1944.530	1944.530	1944.530	1944.530	1944.530	1944.530
Financial resources	0.000	0.000	0.000	0.000	0.000	0.000
Sales, net of tax	1944.530	1944.530	1944.530	1944.530	1944.530	1944.530
Total cash outflow	1704.073	1665.073	1626.073	2287.073	1548.073	1314.073
Total assets	0.000	0.000	0.000	700.000	0.000	0.000
Operating costs	1314.073	1314.073	1314.073	1314.073	1314.073	1314.073
Cost of finance	195.000	156.000	117.000	78.000	39.000	0.000
Repayment	195.000	195.000	195.000	195.000	195.000	0.000
Corporate tax	0.000	0.000	0.000	0.000	0.000	0.000
Dividends paid	0.000	0.000	0.000	0.000	0.000	0.000
Surplus (deficit)	240.457	279.457	318.457	-343.543	396.457	630.457
Cumulated cash balance	-76.023	203.434	521.891	179.348	575.806	1206.263
Inflow, local	1944.530	1944.530	1944.530	1944.530	1944.530	1944.530
Outflow, local	730.933	691.933	652.933	613.933	574.933	340.933
Surplus (deficit)	1213.597	1252.597	1291.597	1330.597	1369.597	1603.597
Inflow, foreign	0.000	0.000	0.000	0.000	0.000	0.000
Outflow, foreign	973.140	973.140	973.140	1673.140	973.140	973.140
Surplus (deficit)	-973.140	-973.140	-973.140	-1673.140	-973.140	-973.140
Net cashflow	630.457	630.457	630.457	-69.543	630.457	630.457
Cumulated net cashflow	302.177	932.634	1563.091	1493.548	2124.005	2754.462



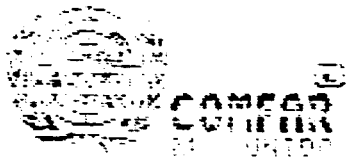
Cashflow tables, production in 1000 us

Year	2003	2004	2005
Total cash inflow	1944.530	1944.530	1944.530
Financial resources	0.000	0.000	0.000
Sales, net of tax	1944.530	1944.530	1944.530
Total cash outflow	1314.073	1314.073	1314.073
Total assets	0.000	0.000	0.000
Operating costs	1314.073	1314.073	1314.073
Cost of finance	0.000	0.000	0.000
Repayment	0.000	0.000	0.000
Corporate tax	0.000	0.000	0.000
Dividends paid	0.000	0.000	0.000
Surplus (deficit)	630.457	630.457	630.457
Cumulated cash balance	1836.720	2467.177	3097.634
Inflow, local	1944.530	1944.530	1944.530
Outflow, local	340.933	340.933	340.933
Surplus (deficit)	1603.597	1603.597	1603.597
Inflow, foreign	0.000	0.000	0.000
Outflow, foreign	973.140	973.140	973.140
Surplus (deficit)	-973.140	-973.140	-973.140
Net cashflow	630.457	630.457	630.457
Cumulated net cashflow	3384.919	4015.376	4645.833



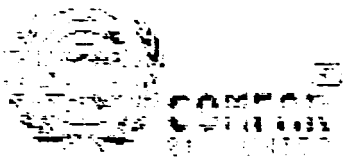
Cashflow Discounting:

a) Equity paid versus Net income flow:
Net present value ..... -1264.78 at 20.00 %
Internal Rate of Return (IRR1) .. 6.49 %
b) Net Worth versus Net cash return:
Net present value ..... -1229.32 at 20.00 %
Internal Rate of Return (IRR2) .. 7.26 %
c) Internal Rate of Return on total investment:
Net present value ..... -1055.32 at 20.00 %
Internal Rate of Return (IRR) .. 12.44 %
Net Worth = Equity paid plus reserves



Net Income Statement in 1000 us

Year	1991	1992	1993	1994	1995
Total sales, incl. sales tax	777.812	1166.718	1555.624	1944.530	1944.530
Less: variable costs, incl. sales tax.	498.719	748.079	997.438	1246.797	1246.797
Variable margin	279.093	418.639	558.186	697.733	697.733
As % of total sales	35.882	35.882	35.882	35.882	35.882
Non-variable costs, incl. depreciation	314.401	314.400	314.401	314.401	314.401
Operational margin	-35.307	104.239	243.786	383.332	383.332
As % of total sales	-4.539	8.934	15.671	19.713	19.713
Cost of finance	390.000	390.000	351.000	312.000	273.000
Gross profit	-425.307	-285.761	-107.214	71.332	110.332
Allowances	0.000	0.000	0.000	0.000	0.000
Taxable profit	-425.307	-285.761	-107.214	71.332	110.332
Tax	0.000	0.000	0.000	0.000	0.000
Net profit	-425.307	-285.761	-107.214	71.332	110.332
Dividends paid	0.000	0.000	0.000	0.000	0.000
Undistributed profit	-425.307	-285.761	-107.214	71.332	110.332
Accumulated undistributed profit	-425.307	-711.068	-818.283	-746.951	-636.619
Gross profit, % of total sales	-54.680	-24.493	-6.892	3.668	5.674
Net profit, % of total sales	-54.680	-24.493	-6.892	3.668	5.674
ROE, Net profit, % of equity	-32.691	-21.965	-8.241	5.483	8.481
ROI, Net profit+interest, % of invest.	-1.164	3.349	7.634	11.709	11.709

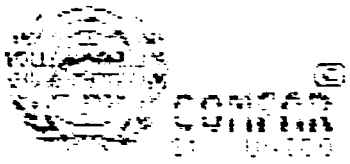


Net Income Statement in 1000 us

Year	1996	1997	1998	1999	2000
Total sales, incl. sales tax	1944.530	1944.530	1944.530	1944.530	1944.530
Less: variable costs, incl. sales tax.	1246.797	1246.797	1246.797	1246.797	1246.797
Variable margin	697.733	697.733	697.733	697.733	697.733
As % of total sales	35.882	35.882	35.882	35.882	35.882
Non-variable costs, incl. depreciation	253.401	253.401	253.401	253.401	143.401
Operational margin	444.332	444.332	444.332	444.332	554.332
" % of total sales	22.850	22.850	22.850	22.850	28.507
Cost of finance	234.000	195.000	156.000	117.000	78.000
Gross profit	210.332	249.332	288.332	327.332	476.332
Allowances	0.000	0.000	0.000	0.000	0.000
Taxable profit	210.332	249.332	288.332	327.332	476.332
Tax	0.000	0.000	0.000	0.000	0.000
Net profit	210.332	249.332	288.332	327.332	476.332
Dividends paid	0.000	0.000	0.000	0.000	0.000
Undistributed profit	210.332	249.332	288.332	327.332	476.332
Accumulated undistributed profit	-426.287	-176.955	111.377	438.709	915.041
Gross profit, % of total sales	10.817	12.822	14.828	16.833	24.496
Net profit, % of total sales	10.817	12.822	14.828	16.833	24.496
ROE, Net profit, % of equity	16.167	19.165	22.162	25.160	36.613
ROI, Net profit+interest, % of invest.	13.573	13.573	13.573	13.573	13.950

Net Income Statement in 1000 us

Year	2001	2002	2003	2004	2005
Total sales, incl. sales tax	1944.530	1944.530	1944.530	1944.530	1944.530
Less: variable costs, incl. sales tax.	1246.797	1246.797	1246.797	1246.797	1246.797
Variable margin	697.733	697.733	697.733	697.733	697.733
As % of total sales	35.882	35.882	35.882	35.882	35.882
Non-variable costs, incl. depreciation	206.151	206.151	206.151	206.151	206.148
Operational margin	491.582	491.582	491.582	491.582	491.584
As % of total sales	25.280	25.280	25.280	25.280	25.280
·t of finance	39.000	0.000	0.000	0.000	0.000
Gross profit	452.582	491.582	491.582	491.582	491.584
Allowances	0.000	0.000	0.000	0.000	0.000
Taxable profit	452.582	491.582	491.582	491.582	491.584
Tax	0.000	0.000	0.000	0.000	0.000
Net profit	452.582	491.582	491.582	491.582	491.584
Dividends paid	0.000	0.000	0.000	0.000	0.000
Undistributed profit	452.582	491.582	491.582	491.582	491.584
Accumulated undistributed profit	1367.623	1859.205	2350.787	2842.369	3333.954
Gross profit, % of total sales	23.275	25.280	25.280	25.280	25.280
Net profit, % of total sales	23.275	25.280	25.280	25.280	25.280
ROE, Net profit, % of equity	34.787	37.785	37.785	37.785	37.785
ROI, Net profit+interest, % of invest.	12.371	12.371	12.371	12.371	12.371



COMFAR 2.1 - Feasibility Study Branch, UNIDO, Vienna

Projected Balance Sheets, Production in 1000 us

Year	1991	1992	1993	1994	1995
Total assets	3567.560	3706.921	3667.735	3521.336	3202.879
Fixed assets, net of depreciation	2922.072	2674.947	2427.822	2180.697	1933.572
Construction in progress	0.000	0.000	0.000	0.000	0.000
Current assets	208.356	305.971	401.786	498.501	498.501
Cash, bank	11.826	15.834	19.845	23.855	23.855
Cash surplus, finance available	0.000	0.000	0.000	0.000	0.000
Loss carried forward	0.000	425.307	711.068	818.283	746.951
Loss	425.307	285.761	107.214	0.000	0.000
Total liabilities	3567.560	3706.921	3667.735	3521.336	3202.879
Equity capital	1301.000	1301.000	1301.000	1301.000	1301.000
Reserves, retained profit	0.000	0.000	0.000	0.000	0.000
Profit	0.000	0.000	0.000	71.332	110.332
Long and medium term debt	1950.000	1755.000	1560.000	1365.000	1170.000
Current liabilities	62.710	63.010	83.310	103.610	103.610
Bank overdraft, finance required	273.850	587.911	723.426	680.395	517.938
Total debt	2266.560	2405.920	2366.735	2149.004	1791.547
Equity, % of liabilities	36.468	35.097	35.471	36.946	40.620

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COMFAR 2.1 - Feasibility Study Branch UNIDO, Vienna

Projected Balance Sheets, Production in 1000 us

Year	1996	1997	1998	1999	2000
Total assets	2906.422	2509.965	2277.962	2233.319	2514.651
Fixed assets, net of depreciation	1747.447	1561.322	1375.197	1189.072	1112.947
Construction in progress	0.000	0.000	0.000	0.000	780.000
Current assets	498.501	498.501	498.501	498.501	498.501
Cash, bank	23.855	23.855	23.855	23.855	23.855
Cash surplus, finance available	0.000	0.000	203.434	521.891	179.348
Loss carried forward	636.619	426.287	176.955	0.000	0.000
Loss	0.000	0.000	0.000	0.000	0.000
Total liabilities	2906.422	2509.965	2277.962	2233.319	2514.651
Equity capital	1301.000	1301.000	1301.000	1301.000	1301.000
Reserves, retained profit	0.000	0.000	0.000	111.377	438.709
Profit	210.332	249.332	288.332	327.332	476.332
Long and medium term debt	975.000	780.000	585.000	390.000	195.000
Current liabilities	103.610	103.610	103.610	103.610	103.610
Bank overdraft, finance required	316.480	76.023	0.000	0.000	0.000
Total debt	1395.090	959.633	688.610	493.610	298.610
Equity, % of liabilities	44.763	51.833	57.113	58.256	51.737

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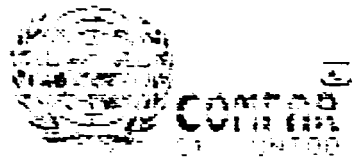
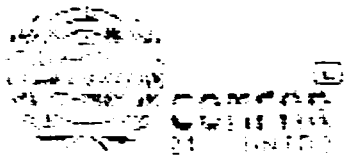


Projected Balance Sheets, Production in 1000 us

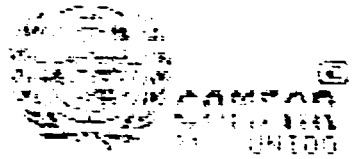
Year	2001	2002	2003	2004	2005
Total assets	2772.233	3263.815	3755.397	4246.979	4738.563
Fixed assets, net of depreciation	1674.072	1535.197	1396.322	1257.447	1118.574
Construction in progress	0.000	0.000	0.000	0.000	0.000
Current assets	498.501	498.501	498.501	498.501	498.501
Cash, bank	23.855	23.855	23.855	23.855	23.855
Cash surplus, finance available	575.805	1206.262	1836.719	2467.175	3097.632
Loss carried forward	0.000	0.000	0.000	0.000	0.000
Loss	0.000	0.000	0.000	0.000	0.000
Total liabilities	2772.233	3263.815	3755.397	4246.979	4738.563
Equity capital	1301.000	1301.000	1301.000	1301.000	1301.000
Reserves, retained profit	915.041	1367.623	1859.205	2350.787	2842.369
Profit	452.582	491.582	491.582	491.582	491.584
Long and medium term debt	0.000	0.000	0.000	0.000	0.000
Current liabilities	103.610	103.610	103.610	103.610	103.610
Bank overdraft, finance required	0.000	0.000	0.000	0.000	0.000
Total debt	103.610	103.610	103.610	103.610	103.610
Equity, % of liabilities	46.930	39.861	34.643	30.634	27.456



Total Cashflows at Adjusted Market Prices in 1000 us
Economic Analysis including indirect effects

	financial present values at 0 %	at 10.00 %	at 20.00 %	factor	adjusted present values at 0 %	at 10.00 %	at 20.00 %
Total cashflow :							
net cashflow	5822.98	422.98	-1230.28	1.01	5895.42	757.38	-810.36
net indirect effects . .	.....	.....	.....	.....	392.00	170.47	89.65
total cash inflow . . .	25059.40	11077.67	5717.64	0.00	20867.52	8862.13	4574.11
total cash outflow . . .	20236.41	10654.68	6947.92	1.00 >=	15344.10	8275.23	5474.10
taxes	4892.32	2379.46	1473.82	0.00	0.00	0.00	0.00
flow of funds:							
net flow of funds . . .	-1548.20	335.53	1179.68	1.00	-1548.20	335.53	1179.68
total funds, inflow . .	3354.61	3202.30	3081.11	1.00	3354.61	3202.30	3081.11
equity	1301.00	1301.00	1301.00	1.00	1301.00	1301.00	1301.00
subsidies, grants . .	0.00	0.00	0.00	0.00	0.00	0.00	0.00
loans & overdraft . .	2053.61	1901.30	1780.11	1.00	2053.61	1901.30	1780.11
total funds, outflow . .	4902.81	2866.77	1901.44	1.00	4902.81	2866.77	1901.44
interest	2849.20	1856.03	1329.04	1.00	2849.20	1856.03	1329.04
repayment	2053.61	1010.74	572.40	1.00	2053.61	1010.74	572.40
dividends distributed	0.00	0.00	0.00	0.00	0.00	0.00	0.00
net flow, foreign funds	0.00	42.00	39.74	1.00	0.00	42.00	39.74
foreign funds, inflow .	81.10	58.04	43.40	1.00	81.10	58.04	43.40
equity	0.00	0.00	0.00	0.00	0.00	0.00	0.00
subsidies, grants . .	0.00	0.00	0.00	0.00	0.00	0.00	0.00
loans & overdraft . .	81.10	58.04	43.40	1.00	81.10	58.04	43.40
foreign funds, outflow .	81.10	16.04	3.66	1.00	81.10	16.04	3.66
dividends distributed	0.00	0.00	0.00	0.00	0.00	0.00	0.00
debt service	81.10	16.04	3.66	1.00	81.10	16.04	3.66
interest paid .	0.00	0.00	0.00	0.00	0.00	0.00	0.00
loan repayment .	81.10	16.04	3.66	1.00	81.10	16.04	3.66

economic rate of return (prelim.adjust) 13.57 %



Total Cashflows at Adjusted Exchange Rates in 1000 us
Economic Analysis including indirect effects

	preliminarily adjusted PV at 0 %	at 10.00 %	at 20.00 %	factor	adjusted present values at 0 %	at 10.00 %	at 20.00 %
t o t a l cashflow :							
net cashflow	5895.42	757.38	-810.34	1.65	9722.73	1888.12	-607.65
net indirect effects . .	392.00	170.47	89.65	1.00	392.00	170.47	89.65
total cash inflow . . .	20847.52	8862.13	4574.11	1.40	29186.52	12406.98	6403.76
total cash outflow . . .	15344.10	8275.23	5474.10	1.35)=	19855.80	10689.34	7101.06
taxes	0.00	0.00	0.00	0.00	0.00	0.00	0.00
flow of funds:							
net flow of funds . . .	-1548.20	335.53	1179.68	1.31)=	-1548.20	352.33	1195.57
total funds, inflow . .	3354.61	3202.30	3081.11	1.32)=	3387.05	3225.52	3090.47
equity	1301.00	1301.00	1301.00	1.00	1301.00	1301.00	1301.00
subsidies, grants . .	0.00	0.00	0.00	0.00	0.00	0.00	0.00
loans & overdraft . .	2053.61	1901.30	1780.11	1.32)=	2086.05	1924.52	1797.47
total funds, outflow . .	4902.81	2866.77	1901.44	1.31)=	4935.25	2873.18	1902.90
interest	2849.20	1856.03	1329.84	1.00	2849.20	1856.03	1329.84
repayment	2053.61	1010.74	572.40	1.31)=	2086.05	1017.16	573.06
dividends distributed	0.00	0.00	0.00	0.00	0.00	0.00	0.00
net flow, foreign funds	0.00	42.00	39.74	1.40	0.00	58.80	55.64
foreign funds, inflow .	81.10	58.04	43.40	1.40	113.53	81.26	60.76
equity	0.00	0.00	0.00	0.00	0.00	0.00	0.00
subsidies, grants . .	0.00	0.00	0.00	0.00	0.00	0.00	0.00
loans & overdraft . .	81.10	58.04	43.40	1.40	113.53	81.26	60.76
foreign funds, outflow .	81.10	16.04	3.66	1.40	113.53	22.46	5.12
dividends distributed	0.00	0.00	0.00	0.00	0.00	0.00	0.00
debt service	81.10	16.04	3.66	1.40	113.53	22.46	5.12
interest paid .	0.00	0.00	0.00	0.00	0.00	0.00	0.00
loan repayment .	81.10	16.04	3.66	1.40	113.53	22.46	5.12

economic rate of return (prelim.adjust) 13.57 %
economic rate of return (econom.prices) 16.50 %