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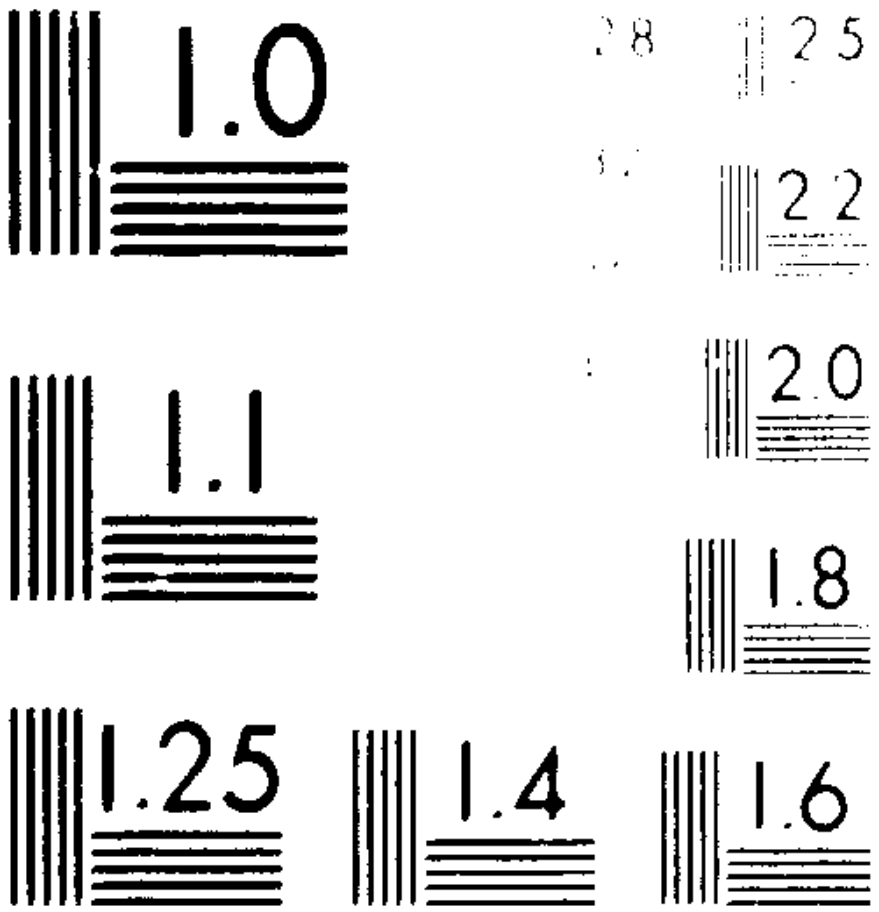
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Kienbaum Entwicklungs-Consult

11918

FINAL REPORT

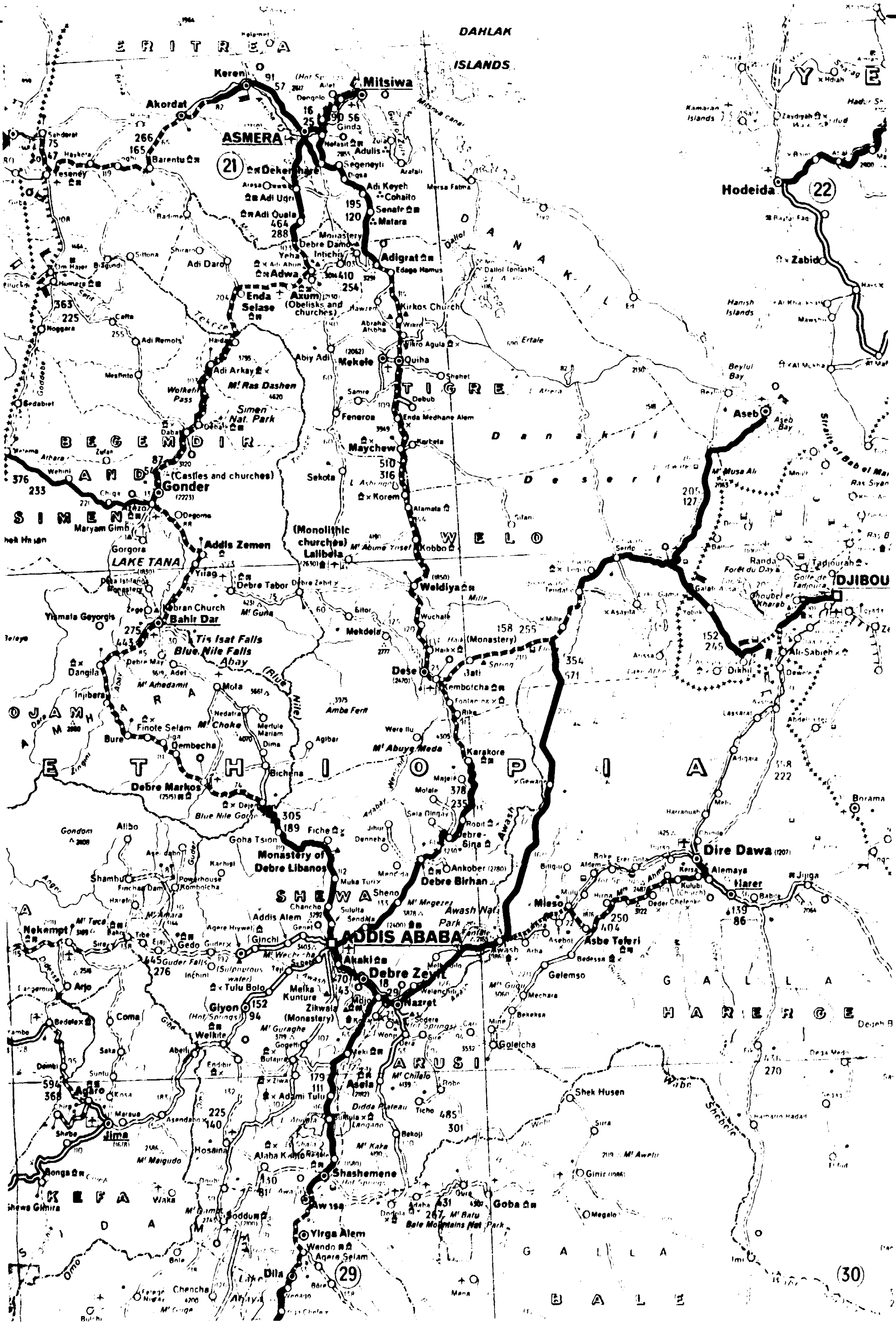
PROJECT NO. DP/ETH/80/013
UNIDO CONTRACT NO. 80/149
ACTIVITY CODE 10.20.31.4

SURVEY OF THE METALWORKING SECTOR IN ETHIOPIA

KIENBAUM ENTWICKLUNGS-CONSULT GMBH

GUMMERSBACH, FEDERAL REPUBLIC OF GERMANY,

1981



ERITREA
DAHLAK ISLANDS
Keren
Mitsiwa
Akordat
ASMERA
Barentu
Dekemhare
Adi Ugri
Adi Quala
Adi Keyeh
Senafe
Adigrat
Adwa
Axum
(Obelisks and churches)
Enda Selase
Mekele
Quiha
TIGRE
Dallol
DANAKIL
Danakil Desert
Mt Ras Dashen
Simen Nat. Park
BEGEMDIR
AND
SIMEN
Gonder
(Castles and churches)
Maychew
Korem
Sekota
(Monolithic churches)
Lalibela
Kobbo
WELO
Weldiya
Addis Zemen
LAKE TANA
Gorgora
Debre Tabor
Bahir Dar
Tis Isat Falls
Blue Nile Falls
Abay
(Monastery)
Dese
Kembolcha
Aseb
Hodeida
Zabid
Djibouti
Tadjourah
Dikhil
Ali-Sabieh
Dire Dawa
Harer
Jijiga
Alemaya
Borama
GOJAM
Debre Markos
Bichena
Dangila
ETHIOPIA
Fiche
Monastery of Debre Libanos
Debre Birhan
SHEWA
ADDIS ABABA
Debre Zeit
Nazret
Awash
Awash Nat. Park
Mieso
Asbe Teferi
Gelemso
HARERGE
GALLA
Nekemt
Gedo
Ambo
Giyon
Welkite
Jima
Agaro
Bonga
KEFA
Asela
ARUSI
Shashemene
Awasa
Yirga Alem
Dila
Goba
Bale Mountains Nat. Park
BALE
Shek Husen
Ginir
Hosaina
Sodo
(21)
(22)
(29)
(30)

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MAIN SOURCES OF INFORMATION

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21. Economic Commission for Africa, Addos Ababa

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23. Private Industries, Ethiopia

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25. BfA, Bundesstelle für Außenhandelsinformationen, Cologne

1. Introduction

On the basis of their offer and proposal of 4 November 1980, Messrs. Kienbaum Entwicklungs-Consult GmbH was awarded the contract and thus assigned by the United Nations Industrial Development Organization (UNIDO) to execute the necessary field work and the preparation of a comprehensive report showing a "Survey of the Ethiopian Engineering and Metal Working Sector".

This task was carried out, primarily during 1981, under the UNDP/UNIDO Project "Industrial Project Development, Phase II" DP/ETH/80/013 and in line with the Terms of Reference (TOR) which formed part of UNIDO's documents for the international tender. A copy of TOR is attached as Annex 1.

The survey meets the requirements for the intensified and accelerated development of basic industries and, in particular, basic metal and engineering industries in Africa as has been stressed by the United Nations General Assembly (1), the United Nations Economic Commission for Africa (ECA) (2(and in the UNIDO-Lima Declaration and Plan of Action (3).

The UNIDO-TOR give the following immediate objectives :

- assess the current status of the domestic basic engineering and metal industries;
- conduct a detailed study on future prospects of the sector especially in regard to the identification of new investment;
- opportunities, the acquisition and development of appropriate technology and the development of skilled manpower;
- to provide information and recommendations necessary to formulate policies and strategies for the planned development of the sector.

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(1) Resolutions 2626-XXV and 3201-S-VI

(2) Resolutions 218-X; 256-XXI; 267-XXI; 319-XXXI

(3) In March 1975, it was agreed that basic industries in the African Region shall be promoted through integrated industrialization covering among others the basic metal industry and the engineering industry.

Following these immediate objectives the TOR propose the five activities :

1. Review and appraisal of existing productic establishments;
2. Identification of new development opportunities;
3. Assessment of manpower requirements and charting of manpower development plans;
4. Evaluation of management information system;
5. Estimate of financial requirements;

In the line with these above objectives, the field work was carried out primarily early 1981 in close co-operation with the two Ethiopian counterpart organizations, the Ministry of Industries (MI) and the National Metal Working Corporation (NMWC).

The work was performed on the basis of a three-phase approach :

- Analysis and evaluation of facts;
- Elaboration of conclusions and concepts;
- Recommendation of a medium-term scheme and of more concrete short-term scheme of action.

A first preparatory field mission was performed in December 1980. On this occasion a definite program for practical work was discussed and mutually agreed with the Ministry of Industries and the NMWC (see Annex 2,3). Two counterparts out of the staff of NMWC were introduced into the methodology and program of the study and a questionnaire was given to them which should have been completed by them until start of second phase of field work during February/March 1981.

When the consultant's team arrived for second phase of field work end of February 1981 the two counterparts, however, were outside the country and questionnaires were not completed.
The first version of the draft final report was delivered on March 31, 1981. Comments of NMWC/UNIDO were received on May 5th/May 29th, 1981; a revised version of the draft finai report was delivered on October 2oth, 1981; additional comments of NMWC were received on July 22nd, 1982.

The Sector Study on Ethiopia's Metal Working Industries has yieled quite a number of results, i.e. propositions for improvement and further development of the entire sector as well as of individual plants of NMWC.

In some cases it tirned out that it was rather difficult to fulfill the terms of reference as given due to specific local conditions; on the other hand this report provided quite a number of details and recommendations which are more than the original terms of reference has requested (e.g. elaborating specific details of a central repair and tool shop (see Annex 6) and providing rather detailed organisational instructions (see e.g. Appendix "Operation Manual").

The team of Messrs. Kienbaum Entwicklungs-Consult consisting of :

- Dr. Mylenbusch (Teamleader)
- Prof. Dr. Völker (Economist)
- Mr. Mitländer (Metal Processing Engineer)
- Mr. Ruoss (Industrial Engineer)

wishes to express its appreciation for the valuable support and guidance received from the numerous representatives of the counterpart entities (the Ministry of Industry and the National Metal Works Corporation) and of the other institutions in Addis Ababa (National Productivity Center, HASIDA, Bureau of Standards, Central Statistical Office, Economic Commission for Africa and Private Metal Working Industries) the office of the United Nations Development Programme in Addis Ababa as well as of the United Nations Industrial Development Organization, Vienna/Austria and Federal Bureau of Foreign Trade Information, Cologne/Germany.

2. Summary of Findings

2.1 General Findings

Ethiopia is, according to UN-indicators, counted among the "least developed countries" (LLDCs) and the "most seriously affected countries" (MSACs) as well. Compared to other African countries its economy is still on rather a low level; there are, however, broad development potentials.

Industries play a relatively minor role in Ethiopia's economy. (15,5 % of GDP in 1978/79), small scale industries contributing appr. 3o % of all industries. There is surplus in unemployed unskilled labour, but great shortage in skilled labour and qualified management.

The metal working sector had a share of 5,1 % in the 1978/79 manufacturing industries' gross value of production. For the same year, the value added at factor cost was 4,3 %. When considering the manufacturing industries participatingin Ethiopia's 1978/79 GDP with 5 % only, the share of the metal working sector in the total GDP was less than o,3 %. Within the national economy, no doubt, an absolutely insignificant factor.

The metal working sector's production is exclusively destinated to the local market. At present, it is the Government's first and foremost target to substitute imported basic products by local production. The aim of producing goods for export has to be adjourned for the time being, since the products are not yet apt for exports both from the qualitative and cost point of view.

In 1974, all companies of the metal working sector having a basic capital of more than 5o,ooo Birr were nationalized. 8 of these are now under the control of National Metal Works Corporation (NMWC) in addition hereto, there are two larger joint venture companies with state participation, one of which is under the control of NMWC, the other one under Agriculture and Industrial Development Bank (AIDB).

The management functions of Ethiopia's public metal working industry were delegated by the Ministry of Industry to NMWC. NMWC coordinates centrally all general plant management functions for the 8 plants under its control, such as purchase, sale, financial planning, general production planning. Special management functions on plant operation level are delegated to the respective plant managers.

The production programme of the 8 plants comprises a wide range of iron bars, wire, nails, steel structures, corrugated iron sheets, pipes, metal tools, agricultural hand tools, etc. (see Annex 7).
These metal working plants (except United Abilities representing a special case) employ only a total of 1554 persons, which means that these 7 plants are to be classified as small - rather than as medium - scale enterprises. Bigger units would be more economic, a fact, which the more aggravates productivity decreases when considering the existing capacities are presently utilized to a very low extent, only.

Nationalized companies including the two joint ventures employ roughly 2ooo people; private enterprises with more than 1o employees each provide another 2ooo working places; small scale metal processing, mainly blacksmith working, private enterprises, which are promoted by the Government Handicraft and Small-Scale Industries Development Agency (HASIDA) employ approx. 2ooo people, the total employment in Ethiopia's metal working industries thus amounting to about 6ooo.

Private industries play a role within the country's metal working sector which should not be underestimated, both from the side of view as raw material consumers and suppliers of manufactured goods and - last not least - as employers for an estimated number of 4ooo workers.

2.2 Development Issues

The Ten-Years Development Program 198o/81 - 1989/9o expects GDP-annual growth rates of about 1o %. For the individual sectors, this means annual growth rates of :

- 5 % for agriculture
- 17,5 % for the industrial sector
- 12 % for services.

Under the assumption of these growth rates, the share of industrial production in GDP will increase from presently 16 % to 3o %, whereas that of agriculture will decrease from 51 % to 31 %.

This change in shares means a fundamental transformation of the Ethiopian economy. In effect it would change the national economy from the present development level to the higher level of the national economies of Tunesia, Greece, Thailand or Malaysia in 1977 (1).

The development plan provides an increase in gross investment of 22% per year (2). This corresponds to a cumulative total investment need of about 42,6 billion Birr at current prices. Thereof about 22 billion Birr are expected from foreign countries.

18,6 billion Birr (= 22 %) of the total investment volume provided for in the Ten-Years Plan are destinated to manufacturing industries (2). Within this sector, 94,6 % of the available funds are destinated to national industries, whereas the small remainder of 5,4 % shall be allocated to the promotion of private small-scale industries.

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(1) see table XIII
(2) see table XIV

Major investments will be allocated to building industrie with a cumulated volume of 1.27o million Birr in the ten years' period. Ranking next are sugar and textile industries with investment volumes of 958 and 9o5 million Birr respectively. Also the chemical sector with cumulative investments of 667 million Birr is one of the sectors promoted with priority.

With a cumulative investment volume of 352 million Birr only, planned for the 198os, the metal working sector is ranking 5th among manufacturing industries subsectors. In relation to overall investments into manufacturing industries (without small-scale industries) amounting to 8,82o million Birr (2), this subsector accounts for 4 %. In relation to Ethiopia's total investment volume of 42.635 million Birr this is just o,8 %.

Recent studies published by the Worldbank, IMF, the European Community, the Economic Commission for Africa and UN made several proposals to accelerate Ethiopia's development. These proposals refer to the foundation of new institutions viz. horizontal and vertical re-organisation of existing institutions in the field of planning, training and production. Additionally, numerous single projects were proposed (see Annex 13).

2.3 Results of this Study

2.3.1 General Propositions

This study of Ethiopia's metal working sector concentrates on NMWC and NMWC-plants. Prevailing facilities and conditions have been analysed and appraised, recommendations and propositions for improvements, expansion and new project investments have been worked out.

The general administrative and socio-economic framework in Ethiopia requires the Government to exercise also functions of industrial entrepreneur and investor. A rapid and efficient further development of the whole industrial subsector and in particular of the metal working sector will therefore require the Government and in particular the Ministry of Industries to improve working methods and efficiency. Such improvement will require adequate information systems and coordination leading to rapid decision making processes. Due consideration will have to be given to an appropriate allocation of the (necessarily always) short resources, i.e. such investments should be perferred where a maximum of return can be expected for the industrialization process and a good cost-benefit ratio under socio-economic aspects as well. In this connection, also the private sector will deserve adequate consideration, whose efficiency and valuable contribution to the employment situation and production in Ethiopia should be appreciated.

While NMWC exercises a holding/controlling/coordinating function for all NMWC-plants, NMWC is to take a key role in future improvement and development of the metal working sector.

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(2) see table XIV

It is recommended that a "NMWC-Advisory Service" is established, being responsible for elaboration of appropriate systems ("management tools") for organisation, administration and management and their introduction and proper application with all NMWC-plants and NMWC itself. These systems shall include an integrated management information system which is needed by NMWC and also the Ministry of Industry for their guiding and steering functions.

Some basic elements of a "NMWC-Operation Manual", representing the documentation of the above mentioned organisational systems are described in a separate volume as an appendix to this main report.

It can be expected that the performance of the NMWC-plants will considerably improve by application of improved management methods and techniques.

Introduction and application of improved management techniques must be supported by intensive training of management personnel. The training needs for each NMWC-plant have been assessed and are shown in the tables No. 1 - 14 and 15.

Recommendations and propositions for technical improvements, concerning flow of material, maintenance and repair, quality control and replacements and investments are given for each plant as well. Investment- and training requirements have been assessed and are shown in the tables No. 1 - 14 and 16.

In order to be able to meet unforeseen and unpredictable requirements for investments in major repairs, spare parts, replacements and general improvements of plant facilities NMWC should earmark annually an amount of US $ 200,000 (100,000 in local and 100,000 in foreign currency), which will be allocated to ad-hoc demands.

Besides improvements and expansions of existing NMWC-plants several new projects will have to be established. Priority must be given to those projects which include training facilities, as personnel development is likely to remain the key problem for many years to come. So the Central Machine Repair/Tool Shop and Training Centre, the Productive Foundry and the Agricultural Implements and Tools and the Progressive Pump Assembling/Manufacturing and Repair projects should be given highest priority. Another project of highest priority should be the rehabilitation, implementation and operation of the furnace and rolling mill with Ethiosider. For several reasons this will be a by far better and effective investment than the establishment of a mini steel plant.

As reconditioning or even replacement of existing obsolete equipment is urgent in many cases considerable investments are proposed for the next two years. Simultaneously it will require great efforts of NMWC to train and develop the personnel which is needed for improved operation of existing facilities and newly invested machinery. Therefore no additional investments for capacity and/or production/programme expansion are proposed before 1986. It is expected that by then rehabilitation, consolidation and personnel development programmes will have been performed successfully so that the implementation of new production activities can be started from 1987.

2.3.2 Specific Results

With reference to the Terms of Reference as given for this study (see Annex 1) the results may be summarized as follows :

- An immediate objective of this study was the assessment of the current status of the domestic basic metals and engineering industries.

  It has been outlined that the metal working sector, contributing at present only o,3 % of Ethiopia's GDP needs accelerated development and requires more attention (investment and raw material) than foreseen in the new 1o-Years Plan.

  Nearly all existing machinery is more than 2o years old and must be categorized "obsolete" under international standards. Consequently productivity and quality of produce is rather low. Since it is impossible to replace all machinery at once, it is proposed to concentrate on rehabilitation and stepwise improvements. Furthermore it is recommended to simultaneously improve management and manufacturing skills, maintenance and repair. Last not least, regular and sufficient supplies of raw and auxiliary materials are essential.

  Future development prospects of the sector are limited by critical shortage of management and manufacturing skills. Training and personnel development will be essential prerequesit for the possibility of further expansion. It will take at least five years to develop sufficient personnel for existing plants only.

  Several new projects (see chapter 5) which are urgently needed shall include their own personnel development.
  A summary of personnel requirements is given in table 15.

  Policies and strategies for the development of the sector must be oriented at the requirements of the economy of the whole country on one hand and at available resources and possibilites on the other side.

  The requirements for most urgent investments as described in this report amount to about 1o million US Dollar for improvement of existing plants and approx. 1o million US Dollar for new projects (without the mini steel plant under discussion requiring alone approx. 1oo million US Dollar) (see table 17).

- The review and appraisal of existing NMWC-establishments, as described in detail for each plant in chapter 4.2 has yieled the following general results :

  Operating performance of all plants is rather poor, compared with international standards of similar plants (see Annex 12). Differences in performance among the individual plants are considerable; the same applies to allocation of personnel to administration resp. production (see Annex 11).

Performance of all plants can be improved by

- better management and organisation
- better trained personnel
- better maintained machinery.

Some typical examples are: application of punching devices in window/door-manufacturing with Kaliti Steel (chapter 4.2.3), better arranged flow of materials in practically all plants, improved loading and storage facilities in several plants, regular and more systematic maintenance and repair in all plants.

At present, only one 10-tons arc furnace is in operation in Addis Ababa. Its capacity is said to be around 8000 tons per year. The consultants think that the capacity of this furnace may increase up to 14,000 tons under optimal operating conditions.

The smelter in Asmara is not yet in operation and partly even unpacked in the original crates. Costs for installation and start-up of operation are estimated at 850,000 Birr. It should be one of the first projects to bring this plant into operation.

- in some cases, where the production process comprises several processing sections unbalanced installed capacities have been identified. Wherever this applies, recommendations for better utilisation of all existing machinery are given. Some typical examples are: the capacity of the annealing furnace and the rolling mill with Ethiopian Iron & Steel Foundry Akaki Beseka (chapter 4.2.1) is bigger than that of the smelter; an increased input of imported billets is proposed; this would allow to operate 3 shifts and increase production by nearly 50 %.

  The galvanizing line with Ethiosider (chapter 4.2.2) is used at only approx. 30 % of its capacity. The only way to use this equipment better is to produce more galvanized products by introducing new galvanized products or by concentrating the production of all galvanized products in Ethiopia at Akaki Metal Products (see chapter 4.2.5).
  Further recommendations are given for the plate-scissor with Ethiopian Tools Factory (chapter 4.2.4), the pipe manufacturing line with Akaki Metal Products (see chapter 4.2.5) and the bordering machine and the chrome polishing machine with Ethiopian Household Utensils (see chapter 4.2.7) and the proposed cooperation in nail production between Ethiopian Iron & Steel Foundry, Akaki Beseka and Ethiosider Iron & Steel Factory, Asmara (see chapter 4.2.1 and 4.2.2).

- Present machine productivity and efficiency levels had to be assessed in general terms, as most machines are old and in bad condition. It is impossible to determine exact standards which are to be achieved by individual machines before and / or after the recommended measures for rehabilitation or replacement.
  Compared with machinery as used in Germany the efficiency level must be rated at not more than 50 % in most cases.

- The levels of quality of products have been assessed under due consideration of prevailing conditions (machinery, materials). Compared with European standards design, precision and finish are low and these products could not be sold in international competitive markets. Improvements of machinery, tools etc., as resommended will not only increase the efficiencylevel but also improve the quality of produce. Whereever practical, specific recommendations for improvements of quality have been given see e.g. cutting of sections and welding, chapter 4.2.3; coating, chapter 4.2.5, zinc-nail production, chapter 4.2.2; furniture, chapter 4.2.3, quality-control-equipment has been recommended in several cases .

- Fixed assets other than production equipment such as buildings, handling and storage facilities, workshops etc. are generally old and in similar (bad) condition as machinery and equipment. Nevertheless, these deficiencies do not represent a mayor, immediate hindrance for improvements in quality and quantity of output. Whereever necessary improvements of handling and storage facilities,of internal transport by paving traffic areas, of flow of materials by better arrangement and of particular workshops have been proposed.

- Whereever possible additional products have been named which can be produced with existing machinery and facilities (see e.g. chapters 4.2.3, 4.2.4, 4.2.5). While practically all raw materials have to be imported the problem of procurement has been dealt with in chapter 4.1; a more systematic operation (supply market analysis) and more flexibility in the procurement function with regard to specific requirements are recommended.

- Machinery-documents and manuals usually supplied together with the machine, are in no plant available. Some incomplete information could be collected, but in most cases not even the definite age of the machines could be found out. Nowadays practical performance cannot be assessed (guessed!) but must be observed and registered over a period of at least three months, considering maintenance and repair, raw materials, etc. It is recommended that the technical management of each plant prepares registers and descriptions of their machines and equipment in connection with improvements of maintenance and repair as recommended for each plant in chapter 4.2 - 4.8 and in systematic terms in the appendix "Operation Manual", chapter 4, where also examples for appropriate forms as given.

- According to criteria of industrialized countries most of the machinery should be replaced as soon as possible. Nevertheless it must be possible for Ethiopia to use most of the existing equipment and machinery for several years, provided proper maintenance and repairs. In some cases an immediate replacement or at least reconditioning is proposed. Investment cost estimated for reconditioning and replacement during the next few years are given in tables 1 - 16.

- Alternative technologies are discussed (see e.g. chapter 4.2.5). As existing machinery is very old, alternative technologies are only possible together with the installation of new equipment.

  Nevertheless, improved production methods were proposed despite existing obsolete equipment in many individual cases (better flow of materials, application of devices, quality control equipment, etc.).

- It is recommended to introduce a systematic maintenance system for all NMWC-plants. Basic elements of a proposed system are given in the Appendix. There the systematic elements and also practical forms for servicing and inspection plans, monthly and yearly maintenance and repair/overhauling plans and fault recording are described in detail. Improved maintenance and repair is of utmost importance in the prevailing situation and condition of NMWC-plants and will quickly result in higher production and quality as well.

- A central repair shop is proposed and described in detail for immediate implementation.

- Prevailing working conditions are poor and in some cases below tolerable level. Better arrangement of flow of materials and production, improved handling and transportation facilities, utilization of devices etc. will improve the conditions for the workers and will improve simultaneously labour motivation and thus the performance.

  Many definite propositions are made in chapter 4.2.1 - 4.2.8. Special attention shall be paid to safety devices which do not exist or are not used in many cases (see chapter 4.2.1 - 4.2.8).

- Private metal working industries contribute a significant share in the total output of the entire metal working sector in Ethiopia (see chapter 4.3). Performance in private industries is higher than in NMWC-plants, quality is better and prices are lower, due to better management and better motivation of workers.
  For further development of the private sector it is recommended to provide a liberal framework for their operation. In particular adequate access to financing including foreign exchange for import of equipment and raw material will increase the contribution of this subsector thanks to existing private entrepreneurial initiative.

- Economic aspects of Ethiopia's national economy are briefly assessed in chapter 3. Recent statistical data and facts of the new 1o-Years-Plan, however, were kept confidental.
  Price controls together with shortage of supply due to import restrictions and limited local production made it impossible to assess actual current demand or even give a projection of demand as usually possible under free market conditions. In Ethiopia's planned economy only the targets of the 1o-Years-Plan provide orientation and form a basis for integrated development planning; these figures, however, are mostly based on forecasts of the public production units and not on the demand in the market.

In spite of these basic problems several specific new projects are described which are needed for further development of the country. For quite a number of investment projects studies have been made, indicating capacities, technologies and investment cost. For projects, which are likely to be realized in the near future, no other capacities nor technologies are proposed and the mentioned studies represent a sufficient basis for further measures. (see chapter 5).

It is recommended, however, to first concentrate on improvements and expansion of existing plants adding only some special investments as such measures will yield considerable improvements by relatively low capital requirements.
The great shortage of skilled labour and management represents a hindrance for fast expansion, irrespective availability of investment capital.
A survey on new investment projects and capital requirements is given in table 17.

- It is found that the work force in NMWC-plants is higher than needed for proper operation. High rates of absence - beyond tolerable levels - hinder acceptable rates of productivity (see Annexes 11 and 12). While at present the promotion of workers to specific wage categories is handled rather unsystematically and different from plant to plant it is proposed to introduce a systematic pay-system in all NMWC-plants. The basic elements of such a job classification and remuneration system are given in the Appendix "Operational Maunual", chapter 6.

  By far too low levels of skill are - besides shortage of raw materials and spares - the main problem of Ethiopia's metal working industries. This has been described in detail in chapter 4. Training requirements are assessed for each plant and compiled in the tables 1 - 17. Furthermore, requirements of assistance by expatriate experts are assessed and summarized in these tables.

  5 - 8 years will be required to develop a sufficient number of suitable skilled managers and workers for nowadays existing NMWC-plants. New investment projects require additional training efforts for the formation of an additional work force and management.

- The overall organisation of the metal working industries's sector in Ethiopia and the main institutions dealing with its planning,control and development are described in chapters 3.2 and - in particular NMWC - in 4.1. An analysis of existing NMWC working systems and methods is shown and definite propositions for improvements are given, in particular for marketing (installation of marketing and distribution officers in each plant and NMWC), pricing (improvement of cost accounting and calculating system), pianning (more flexibility), procurement (reduction of stocks), training (5-years job rotation for managers instead of 2 years,coordination of local and foreign training programmes), remuneration. A further proposition is made to install a NMWC-advisory service and to elaborate a "NMWC-Operation Manual". A basis-model for this Operation Manual is given in a separate volume of this report as Appendix, dealing with systems for organisation, finance planning, production planning and control, maintenance and repair, cost accounting and control, remuneration. Every qualified middle manager can use these basis models and adapt them to his specific conditions.
  (It should be noted that this Appendix is by far more than could normally by expected under a sector study).

Once these systems - in particular improved systematic cost accounting - are practised (as prerequesits) the implementation of a comprehensive management information system will be possible without major problems. Further propositions for improving NMWC's efficiency refer to the installation of working groups and cooperation-arrangements.
Personnel requirements to meet the a.m. propo[illegible]ons are given and included in table 15.

- In addition to the central NMWC-advisory servic[illegible] a Central Repair and Tool Shop is proposed (see Annex 16)

  As designs must be made in close cooperation and communication with specific production a central design office is not proposed.

- Capital requirements for rehabilitation, replacement and new investments are estimated and given in tables 2, 4, 6, 8, 1o, 12, 14, 16 and 17. In addition to these amounts of investment capital - mainly foreign exchange - working capital in local currency will be needed. The needed amount of working capital has to be calculated on the basis of quite a number of different figures such as raw material/components in stock, material/in process, finished/semifinished goods, products in stock, terms of payment for procurement and sales, monthly payments for labour, utilities etc., etc. and on the basis of cash flow calculation. Considering present operating of NMWC a rough estimate of six month's cost of production (excluding depreciation) may serve as a guide line. The definite amounts of these additional financial requirements, however, will depend on the organisation and administration, in particular marketing and distribution, of NMWC and their plants on one side and conditions of purchasing contracts (terms of payment) on the other. While this is under reorganisation and additional recommendations have been made in this report (see chapter 4) - in particular with regard to more flexibility - details of working capital requirements can only be assessed after decision about organisational measures.

The output of the survey, as demonstrated above, covers all aims of the terms of reference. It provides clear recommendations what to do in the foreseeable future under due consideration of prevailing conditions and possibilities, i.e. being rather practical than theoretical. The consultants are sure that their recommendations will yield appropriate results.

S U M M A R Y

P E R S O N N E L R E Q U I R E M E N T S

Table 15 Training			
Qualification	Number	Period local (m/months)	Period abroad (m/months)
Management	3o	126	89
Skilled Labour	1oo	972	15o
Total	13o	1o98	239

Additional Personnel						
Qualifcation	Number	1982	1983	1984	1985	1986-9o
Managers		2				
Skilled Workers		28	15			
NMWC		3	3			
Total		33	18			

Expatriate Experts		
	Number	m/years
	26	54

Table 16 Summary
Investment Requirements

	Item	.000 US Dollar					Total
		1982	1983	1984	1985	1986-90	
1	Fthiop.Iron & Steel Foundry	250	450			300	1.000
2	Ethiosider Iron & Steel	985)1	15				1.000
3	Kaliti Steel Industry	140)2					140
4	Ethiopian Metal	50					50
5	Akaki Metal Tool	215					215
6	Kolfe Household	50	250				300
7	Ethiopian Household	700					700
8	United Abilities	3.000					3.000
9	NMWC	200)3	200	200	200	1.000)4	1.800)5
10	Total	5.590	915	200	200	1.300	8.205)6

)1 60 = local currency
)2 25 = local currency
)3 100 = local currency
)4 500 = local currency
)5 900 = local currency
)6 1.585 = local currency

Table 17 New Projects

Project	Total cap.inv. (mill.US$)	Implementation
1. Central mach. rep. tool shop	3 - 3,5	1982/83
2. Productive foundry	4 - 5	1982/83
3. Agric. impl. and tools	o,3	1982/83
4. Pumps	1	1983/84

B O D Y

3. Assessment of the Metal Working Sector

4. Assessment and Development Propositions for Metal Working Industries in Ethiopia

3. Assessment of the Metal Working Sector

3.1 Basic Economic Data

For considerations regarding necessary changes in the capacity and/or structure of the Ethiopian engineering and metal working sector, the consultant compiled relevant economic data for easy reference. More details are given in the Statistical Annex of this report.

3.1.1 Population and Purchase Power

1980 (E.C. 1972), Ethiopia's population was estimated at31 million, about 26 inhabitants per sq. km. The estimated and annual propulation growth is about 2.6%. The total population, of which presently 80% are living in rural areas, will have augmented to about 52 million by the end of this century.

In 1977, the increasing average life expectancy was 39 years; the present 15 million working population is suffering from under-employment in rural areas (10-25%) and from unemployment in urban areas (10%).

The purchase-power of wage earners whose income level is frozen since 1975 eroded due to inflation about which general, country-wide information is not available. A "retail price index at market prices" for the Addis Ababa region, however, indicates price increases of more than 225% for the period 1970 - 1979 although with decreasing annual rates during the last years. In 1978 - 1979, per capita cash availability per year may have been in the order of US $ 50 equivalent in rural areas, while 50% of the urban households did earn less than US $ 450 per year and 80% less than US $ 1.200 equivalent per year.

3.1.2 GDP, Foreign Trade, Balance of Payment

The Gross Domestic Product (GDP) at factor cost of 2.1 billion US $ was produced in 1978/1979 by agriculture with 47 %, by industry with 15 %, by commerce/distribution with 15 % and by other services with 23 %.

On the consumption side (at current prices), 92 % of the GDP were used for consumption purpose in 1976/1977. Nearly 85 % of this amount was destinated to private consumption (1)

(1) see Annex 17, Statistics, Table I,II

For the year 1979/8o, the Gross Domestic Product per capita and year was estimated at 117 US $. This average value does not reflect, however, that the majority of the population, i.e. the rural p opulation, only disposes of 5o - 6o US $ per capita and year.

The ten-year development programme of the Government which may finally be adopted for the period 1983 - 1993 aims at annual GDP-growth rates of about 1o % in real terms which would mean about doubling the GDP within 1o years.

Under the planned conditions, a 5 % annual grwoth would be expected for agriculture, 17,5 % for industry and 12 % for services; this would lead to a GDP of US 4,5 billion in 1993 produced by agriculture with only 31 %, industry with 3o % and by other services with 39 %.

The foreign trade statistics show major imports of petroleum (-products), machines, cars and chemicals and exports of coffee, hides and skins and pulses. The largest international trade partners of Ethiopia are industrialized countries with market economy.

The Balance of Payment (BoP) showed deficits since mid 197o'ies years, primarily due to a negative trade balance which could not be balanced by the service sector, by transfer-payments and by capital imports during the last three years (see Table VI, Statistical Annex.)

Until June 198o, Ethiopia's foreign debt increased through the preceeding five years by US $ o,38 billion equivalent to US $ o,64 billion of which 48 % were financed by the World Bank Group, 22 % by the USA, 1o % by West-Germany.

Compared with developing countries (see Annexes 14 and 15) it turns out that Ethiopia has to cope with several extremely great problems : Rel. low GNP per capita, low growth rate of GNP and low literacy, meaning shortage in educted labour for industrialization. Tunesia, e.g. has a rate of adult-literacy of 55 % (in 1975) and a GNP per capita of 95o US $ (in 1978), while the figures for Ethiopia are 1o% (rate of adult-literacy) and 12o US $ (GNP per capita). Education and training therefore deverse highest priority in the future economic development of Ethiopia.

3.2 Industrial Development

3.2.1 Manufacturing Industries

The Ministry of Industries is responsible for planning and design of new industrial enterprises or capacities.

At present, the ministry controls

- the National Productivity Centre (NPC)
- The Handicraft and Small-Scale Industries Development Agency (HASIDA)
- 13 State Corporations, e.g. National Metal Works Corporation (NMWX), National Textile Corporation, etc. (see Annex 6)
-

Manufacturing industries comprise the following sectors: food, beverages, tobacco, textiles, leather and shoes, wood and furniture, printing and paper, chemicals, non-metal, metal and electrical.(1)

Between 1967/68 and 1978/79 the share of manufacturing, handicraft and small-scale industries in GDP ranged between 8.8 and 9.7 %, that of manufacturing industries between 4.1 and 5 % (2).

In the year of 1978/79, there were 416 industrial plants employing more than 10 persons. The total number of employees was 76 837. Out of the total of all industrial plants, 179 were state-owned representing a share in production of 94 % (3).

According to an International Money Fund study (4), the handicraft sector contributed nearly 50 % to the manufacturing sector's total production. This volume is produced in some 250 000 cottage industries and small workshops. Employing 2 - 3 persons on an average, these industries represent a potential of 500 000 jobs.

With regard to the plants employing more than 10 persons, food industries had a share of 32 % in the 1978/79 value added at factor cost (National Accounts Concept). Textile industries with 23 %, chemical industries with 13 % and beverage industries with 10 % were ranking next. Metal industries had a share of 4 % (3).

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(1) Sectoral classification according to: Results of the Survey of Manufacturing Industries 1970 (1977/1978 G.C.), Statistical Bulletin No. 25, Central Statistical Office,Addis Ababa, May 1980
(2) see table VII, Statistical Annex
(3) see tables VIII and IX, Statistical Annex
(4) IMF, Ethiopia - Recent Economic Developments, op.cit.,p. 9

Industrial production concentrates mainly on two regions: the province Shewa with its centre Addis Ababa and Akaki and the province Eritrea with its centre Asmara.

57 % of manufacturing industries are located in the greater Addis Ababa region and 26 % in Eritrea. Some plants are located along the railway line Dire Dawa and in Southern regions (Sidamo).

Investment in manufacturing industries has been declining in real terms since the early 197os, with nominal investment in 1977/1978 reaching about 4o % of the 197o/71 level. Major increase rates are to be observed only by 1978/79.

Despite stagnant production and low investment, employment and thus total wages have been increasing. Real value added per employee in manufacturing industry is estimated to have been 11 percent lower in 1975/76 than in 1972/73, while the average real product wage(1) fell by about the same amount. This trend has apparently not been reversed in more recent years; employment in public sector industries increased by over 1o,ooo or 19 percent, between 1975/1976 and 1977/1978 while, as has been, gross output increased only marginally.

3.2.2 Metal Working Sector

Metal (including the electrical) industries(2) are part of the manufacturing industries sector which developed mainly through Italian expatriates late in 193o's. The industrial development was dominated by the production of consumer goods for import substitution. A basic, integrated development like the establishment of a national iron and steel industry was therefore impossible.

In the metal working sector equal to other industrial subsectors, expatriates owned and managed the individual enterprises. Expatriates also held positions in the middle management.

At the time of Ethiopia's revolution in 1974 and in view of the subsequent nationalization, many expatriates left Ethiopia leaving a gap in top and middle management; this gap is still not yet filled by newly trained national personnel.

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(1) Average wages and salaries deflated by the implicit GDP deflator for manufacturing.
(2) For more information see Annexes 7 and 8

In 1978/79, the Ethiopian metal working sector had a share of 5,1% in the manufacturing industries' gross value of production. For the same year, the value added at factor cost was 4.3 %. When considering that manufacturing industries participated in Ethiopia's 1978/79 GDP with 5 %, only, the share of the metal working sector in the total GDP was less than o,3 %. Within the national economy, no doubt, an absolutely insignificant factor.

The Ethiopian metal working sector concentrates mainly on the areas of Greater Addis Ababa and Greater Asmara.

In 1974, all companies of the metal working sector with equity capital of more than 5oo ooo Birr were nationalized. 8 of these are now under the control of NMWC. In addition hereto, there are two larger joint venture companies with state participation, one of which is under the control of NMWC the other one under AIDB.

Ethiopia's metal working sector comprises today eight nationalized enterprises and one additional joint venture, all under the control of the National Metal Works Corporation. Another joint venture in the metal working sub-sector is under the control of the state-owned Agriculture and Industrial Development Bank (AIDB). (1)

In addition, there are still a considerable number of smaller private enterprises which play an important role in the country's metal working sub-sector. This part of the metal working sector with enterprises larger than 1o employees each is in total employing more than 2 ooo workers which exceeds the employment of NMWC. (1)

Finally, there are numerous metal processing (mainly blacksmith wor- executing) enterprises in urban as well as rural areas. Although these small handicraft enterprises are being promoted and partly organized in cooperatives by the Government "Handicraft and Small-Scale Industries Development Agency (HASIDA) (1), no comprehensive, reliable data for entire Ethiopia are available so far.

All exisiting plants of the metal working sector are too small to contribute to the overall economic development with strong forward and backward linkages. Even for the effective mechanization of the large agricultural sector in Ethiopia the metal working sector enterprises are to small. A significant business for general repair and spare part production also remains to be established.

(1) For more information see Annexes 6, 7 and 8.

Besides HASIDA with 4 regional offices and 600 employees, other metal working industries promoting and supporting institutions are :

- NPC, the National Productivity Centre, is a semi-autonomous agency under the Ministry of Industry, operating 7 workshops (1981). It is responsible for training of middle level technical and managerial manpower. NPC has also started consultancy services for the leather industry. The present activities for the metal working industry are limited to training a few people.(1)

Like other national institutions, NPC suffers from shortage of technical manpower. At the plant level, the NPC is intended to institute in-Plant training in each industry and to train trainers as well.

- The Ethiopian Science and Technology Commission

  It is the task of this commission to generally promote technological developments as well as the search for natural resources

- The Ethiopian Standards Institution

  Its objective is to introduce international standards (ISO)

- The Faculty of Technology, Addis Ababa University

  The Faculty was established with German Federal Republic assistance in 1964 and trains civil engineers, electrical engineers as well as specialists i- building technology.

- Technical Schools : at Addis Ababa, Asmara, Mulugeta Bali

- Polytechnique : at Bahrdar

The chief problems of the metal working sector are :

- Personnel

  Studying recent developments it was found that after the nationalization of all major enterprises in 1974, many Italian and other expatriate managers left the country, leaving a gap which could not yet be filled by local manpower. The National Productivity Centre, being responsible for training the necessary personnel for the manufacturing industries, will not be able to cope for training needs for years. Expatriate technical personnel, managers, experts and consultants from industrialized countries cannot do more but offer a mere interim assistance until sufficient local resources of qualified personnel are available.

(1) see table X, Statistical Annex

Generally it was learnt that the plants are not very happy with their personnel having been through local Technical Schools. It is said that this training is too tneoretical. Like in many developing countries, it was also observed in Ethiopia that Technical School graduates dislike practical work and "dirty hands".

Another problem are remunerations. Technical School graduates earn more for a similar work on a machine than their older colleagues having only practical experiences. This unequal remuneration scheme causes troubles and demotivation.

Under optimal, i.e. considerably improved conditions, the new training of a good stock of qualified labour will take at least 10 years; under the conditions presently existing, most probably 15 - 20 years.

- Raw Materials

Besides hydro-electric energy, Ethiopia does not dispose of practically any kind of raw material for the metal working sector. All raw materials have to be imported. Since Ethiopia is very short of foreign exchange, imports are only available for products of "national interest". These imports are mainly destinated to state-owned corporations. Enterprises under private ownership have theoretical possibilities of buying raw materials from certain state corporations or the NMWC. Generally it has to be stated, however, that all visited private plants complain about the severe scarcity of raw materials. Only a part of this gap can be filled by imports on the basis of agreements.

- Spare Parts

It is very difficult to obtain spare parts for the obsolete machines (some of them are more than 40 years old); but even in case one is lucky to find some, these are extremely expensive special makes.

- Transport

Due to the disorders in the country, the transport of goods is an extremely difficult and expensive undertaking. Larger quantities of metal industry products (fences, nails, barbed wire, etc.) are produced in Asmara. Transports are made by trucks to Mitsiwa, then by ship to Aseb and again by truck over a distance of about 1ooo kms with a net aititude difference of 25oo m to Addis Ababa. Since these goods are exclusively mass products of the metal sector, most certrainly transport costs often are higher than the production value.

The net cost price of these products often is higher than that of import products including freight, a national-economic wastage which only can be justified by national reasons (job creation, equal distribution of social benefits).

Production plans of the metal working sector for the next 10 years are based on the National Development Plan. Reference indicators for this plan are the available data on the past 2 - 4 years. There are no sales market analysis of the present and furute demand, reflecting consumer wishes. It appears that the coordination of the individual sector plans is extremely difficult.

3.2.3 Present Situation and Development Concepts for the Metal Working Sector

Since 1978/79, three annual National Revolutionary Development Campaigns (Zemetcha) have been declared by the Government to accelerate the economic growth and to increase industrial output.

In order to achieve the Zemetcha aims for the metal working sector, the following strategy was set forth:

- Re-conditioning viz. substitution of old plants
- Re-opening of all production plants, especially those in Asmara
- Introduction of additional work shifts (two to three shifts)
- Improvement of repair opportunities
- Relieving manpower and technical constraints
- Improving the process of industrial project implementation
- Ensuring a regular supply of raw materials and spare parts.

As a result of these activities, the Ethiopian economy was expected to grow within the frame of Zemetcha by 5.9 % in 1978/79 and by 7.4 % in 1979/80.

Comparing these targets with the results actually achieved in the past (1968 - 1975 = 2.8 % and 1973 - 1976 = 0.8 %) one has to state that these targets were very ambitious.

In 1978/79 the growth target was reached by 88 %: 5.2 % real growth in GDP versus the plan figure of 5.9 %.

In 1979/80 the growth target was reached by 76 %: 5.6 % real growth in GDP versus a plan figure of 7.4 % (1).

Though the plan targets were not completely achieved, the results reached have to be appreciated as big success under the given circumstances.

(1) see tables XI and XII

From 1980/1981 a Government Ten Years Development Plan has been designed which might be finally adopted in a slightly revised version for the period 1983 - 1993.

Bearing in mind the general exisiting weakness in the manufacturing industry, namely low level of investment, shortage of local and foreign financing, outdated technology, old and partially even obsolete equipment, shortage of skilled labour and deficient organizational infrastructure, the Ten Years Development Plan is designed to increase agriculture by 5 % p.a.,industry by more that 15 % p.a. and services by 12 % p.a.
This will result in a decrease of the share of agriculture in total GDP to about 30 % from present 50 %. The industrial share in GDP, however, will increase from presently 16 % to 30 %.

The development plan provides an increase in gross investments of 22 % per year (2). This corresponds to a cumulative total investment need of about 42.6 billion (10^9) Birr at current prices. Thereof about 22 billion (10^9) Birr (equivalent to about 11 billion US-Dollars), i.e. approximately 50 %, are expected to be provided from foreign countries.

Out of total investments provided for in the Ten-Years Plan, 22 % are destinated to agriculture, 22 % to manufacturing industries, 18 % to the sectors of mining, construction, energy and water supplies, 20 % to transport and communication and 18 % to services. 36 % of all investments scheduled under the Ten-Years Plan are intended to be effected during the first 5 years.

According to the Ten-Years Plan, the annual savings rate is expected to increase by about 24 %.

Exports are expected to increase by about 14 % and imports by about 15 % per year.

The cumulative investments of 352 million Birr for the metal working sector are subdivided into investments destinated to already existing industries (1) and to newly planned projects (2).

The respective investment needs for the metal sector have been assessed along the following method: It is known fact from the past three years that 35 - 40 % of investments destinated to the manufacturing sector are reserved for the construction sector. The construction sector, on the other hand, is the main potential consumer of products from the metal industries sector. When extrapolating past developments into the future, and assuming furthermore an average annual growth rate of 14 %, one may easily conclude from the construction sector's development the demand arising for metal products, such as e.g. construction steel, nails, corrugated metal sheets, wire, pipes, windows, doors, etc. (3).

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(1) see table XVI, Statistical Annex
(2) see table XVII
(3) see table XVIII

The expected demand for concrete bars, heavy sections, nails and wire of 46,000 tons in the year of 1984/85 and 56,000 tons in the year of 1989/90 is said (according to statements of NMWC executives) to be achieveable if the existing capacities in Addis Ababa and Asmara are completely utilized (1).

At present, only one 10-tons arc furnace is in operation in Addis Ababa. Its capacity is said to be around 8000 tons per year. The consultants think that the capacity of this furnace may increase up to 14,000 tons under optimal operating conditions.

The smelter in Asmara is not yet in operation and partly even unpacked in the original crates. Costs for installation and start-up of operation are estimated at 85.000 Birr. It should be one of the first projects to bring this plant into operation.

Referring this overall strategy to the metal working sector, the following general objectives can be summarized :

- To exploit the natural resources such as Cu, Al, Fe. To dress these ores. To draw on these raw materials for the production of consumer and capital goods for the local market.
- To expand the production of :
  nails, wire mesh, metal and tools, aluminium household, utensils, pipes, metal parts for furniture industry, metal window frames, door frames, profiles, corrugated metal sheets, cans, locks, umbrellas, office furniture, bathroom armatures, fittings, razor blades, electrical cables, clocks, batteries, saws, knives, bolts, nuts, screwdrivers, zips, etc.
- To produce :
  parts and machines for the metal and wood sector, such e.g. generators, engines, air compressors, pumps, cranes, concrete mixers, tractors, trucks, gas lamps, general spare parts.
- To produce :
  parts and machines for the electricity sector, such e.g. transformers, electro-engines, electrical cables (Cu), switches, refrigerators, electrical fittings for cars, television apparatus, radios, casette recorders.
- To produce :
  parts and machines for the transport sector, such as e.g. production of buses and tr .ks, trailors, tractors, wheelbarrows, motorcycles, etc.

(1) see table XIX

NMWC intends under the Ten-Years Plan to continue the previous priority efforts already started under the earlier annual National Revolutionary Development Campaigns :

- Reconditioning viz. substitution of old plants;
- Re-opening of all production plants, especially those in Asmara;
- Introduction of additional work shift (two to three shift operation);
- Improvement of repair facilities;
- Relieving manpower and technical constraints;
- Improving the process of industrial project implementation;
- Ensuring regular supply of raw materials and spare parts.

The cummulative investment volume of 352 million Birr during the ten years planning period are subdivided into 36 million Birr for rehabilitation and/or expansion/diversification of already exisiting industries and into 316 million Birr for new investment projects (see tables XVI and XVII of the statistical annex).

3.2.4 Development Issues

Since the economic system in Ethiopia is centrally planned and since supplies neither of consumer nor of industrial goods meet demands it is not possible to derivate any trends in consumer markets. As far as available data of the new 1o-Years-Plan have been elaborated above; more detailed information or figures were not available for the consultants of the time of their field work for this study.
Once the detailed information and figures of the new 1o-Years-Plan will be published they will show more details about the future development of the Ethiopian Economy and the industrial sectors, as planned by the Government.

Recent studies published by the Worldbank, IMF, the European Community, the Economic Commission for Africa and UN made several proposals to accelerate Ethiopia's development. These proposals refer to the foundation of new institutions viz. horizontal and vertical re-organisation of existing institutions in the field of planning, training and production. Additionally, numerous single projects were proposed (see Annex 13).

Some of these proposals have been included into the new 1o-Years-Plan which has already been dealt with the chapter 3.2.3 of this study.

Within the frame of this "Survey of the Ethiopian Engineering and Metal Working Sector" it is impossible to analyse in depth each individual project proposal. Some of the projects, being of particular importance for the short-term development of the metal working sector, however, will be subject to more detailed consideration in chapter 4.4.

An indispensable pre-requisite for an accelerated development of Ethiopia's metal working sector will be stablish a high quality systematic training scheme for all qualification levels. The present programmes, as well as the ILO modular training programmes and the NPC in-plant crash courses, though improving the sector's present training situation, will not lead to the necessary fundamental change in the training situation. The ambitious development targets of the Ethiopian 1o-Years-Plan do, however, require such changes.

Since an accelerated industrialization is aimed at, preparation and training on the requirements of an industrialized future have to be started already in school. In industrialized countries, the young people wishing to choose an industrial profession, start their vocational training with a three-years's apprenticeship in an appropriate industrial plant, accompanied by theorectical courses in a vocational school. The apprenticeship is terminated by a journeyman's examination.
After various years of professional experience, these journeymen may pass through another examination as technican. A further career e.g. as foreman requires additional practical and theoretical courses and a public examination.

It is felt highly recommendable that all Ethiopian enterprises are compelled to offer appreticeships and that the apprentices are trained along a standardized training schedule. A sound professional training of a sufficient stock of skilled labour in Ethiopia will take at least 1o years all in all.

On the technical management level, the personnel should not only pass through general universities but should also get an advanced training at practice-oriented engineering and business administration schools.

Generally it can be stated that the pre-requisites for such training schemes are existing in Ethiopia (NPC. Engineering Schools, (Technical) University). What is still missing is a long-term investment in human capital pays off better than short-term crash programmes.

For an interim period, i.e. for the next 5 years, at least, it will be indispensable to draw on the assistance of a large number of expatriate experts as advisors, trainers and managers.
It can be expected that the number will decline within the course of years, according to the development of Ethiopian expertise.

To mazimize the benefit from this expatriate assistance, it will be important for NMWC to assign these experts as efficiently as possible and to coordinate on the job training of qualified local personnel. Since these foreign experts will have to deal with a relatively wide range of tasks, they should be given the possibility of getting backstopping assistance from their home office.

For a rapid and efficient further development of the whole industrial subsector and in particular of the metal working sector, it will be indispensable for the Government, especially the Ministries, which besides administration also exercise the functions of industrial entrepreneurs and investors to improve their working methods and efficiency.

Such improvement will also require more adequate information systems and coordination as well as more rapid decision making processes. Due consideration will have to be given to an appropriate allocation of the (necessarily always) short resources, i.e. such cases should be preferred where a maximum of return on investment can be expected for the industrialization process.

In this connexion, also the private sector will deserve adequate consideration, whose efficiency and valuable contribution to the employment situation and production in Ehtiopia should be appreciated.

Within the development process of a country, the manufacturing industries in general and the metal working industry in particular play a key role. This role is an established fact and is also emphazied by the Ethiopian development plan, providing a share of the manufacturing sector in Ethiopia's GDP of one third in one decade. The role the metal working sector is intended to play in the development plan, appears to be critical, however. Due to historical developments, this sector is still on a relatively low level of development.

Metal industries play an important role in the industrial development since the metal processing sub-sector is a major supplier for practically all other sub-sectors of the Ethiopian economy. Within the frame of manufacturing industries, this sector therefore deserves utmost attention and promotion.

Considering the importance of this sector, the investment of about 35o million planned for one decade are absolutely too low.

4. Assessment and Development Propositions for Metal Working Industries in Ethiopia

4.1 National Metal Works Corporate (NMWC)

NMWC exercise major functions of management and business administration for the plants under their control. These functions comprise among others :

- Determination of production plan figures
- Determination of wages and salaries
- Budgeting and control
- Procurement of imported materials
- Controlling
- Distribution (marketing)

In addition, NMWC provides schemes for specific administrative procedures such as e.g. price calculation and advisory services in general management/organization/business administration and technology.

In compliance with these tasks, NMWC has installed five departments :

- Planning
- Finance
- Administration
- Technology
- Commercial

Marketing, Distribution

A smaller percentage of the plants' production is marketed by the Commercial Department of NMWC, whereas the major part is distributed by the Ethiopian Domestic Distribution Corporation (EDDC). Besides that, there are direct plant-to-plant supplies among government plants. A chart of the flow of goods in the metal working sector is attached in Annex 9.

For the uture, it is intended to market all goods via EDDC. This procedure might be adequate and reasonable for mass-products, consumer goods and commodities. However, it is doubted whether this is the right way for marketing goods produced on the basis of individual orders such as e.g. steel structures.

For future improved operations it is recommended to have one responsible staff member for marketing and distribution in each plant and one for coordination function with NMWC.

Within the plants these two staff members (marketing and coordination) should directly report to the general manager of the respective plant. The functions of the marketing staff member should include :

- keeping contact with old clients
- identifying new clients
- identifying new market requirements
- follow up orders from receipt to delivery
- doing everything to satisfy all clients.

Pricing

The general pricing scheme is attached in Annex 10 (Cost Analysis Sheet). From the plants' profit, 50 % tax and 40 % dividend to government have to be paid; the remaining 10 % are at free disposal (internal reserve).

In order to cover its expenditures for transport, storage, handling, etc., the NMWC Commercial Department adds 1.8 % extra charge - besides taxes - on the ex factory sales prices. It is doubted that this small extra charge covers actual costs and taxes.

The scheme given in Annex 10 is relatively simple and will certainly have to be adapted to new, improved procedures of cost accounting and controlling.

In addition, however, NMWC will have to give due attention to sales and distribution of the products manufactured by NMWC plants. It should be the Corporation's task to assure that prices achieved cover production costs and that EDDC or all other clients take the delivery and pay punctually, in order to relieve the NMWC plants from the burden of storing finished products, binding additional capital and thus generate additional costs.

Planning

NMWC-plans for the plants under their control are made along the following system: After coordination with the individual plant managers, the NMWC submits a plan proposition for the metal working sector to the Ministry of Industry. The ministry coordinates the plans of the individual Corporations and integrates them into an overall industrial plan. This plan proposition of the Ministry is passed on to the Central Planning Supreme Council, which coordinates all plans received from the individual Ministries and correlates them to the national targets. After approval by superordinated government authorities, the plan is submitted by the Central Planning Supreme Council as directive to the subordinated authorities.

The individual Corporations under the Ministry of Industry are bound to fulfill their part in the plan as independet units within the country's economy.

It is strongly recommended to introduce some more flexibility into this planning system, i.e. leaving certain limits (± 10 %e.g.) to pragmatic and flexible measures of operating units, i.e. NMWC and individual plants as well. This applies to setting targets and planning as well as to managing practical operations.
Some flexibility in practical operations is necessary not only to meet changing market requirements and conditions but also to cope with unforeseen problems such as e.g. shortage in raw materials or spare parts. The responsibility of the management of NMWC for all metal working industries under their control as a whole and of the general managers of the plants should be to meet their overall targets in production and productivity while means and measures should be left to their individual and specific performance.

Procurement

NMWC manages imports of all raw materials, semi-finished products and components for the plants under their control. The plants indicate their demands every six months (in some cases every three months), so that NMWC is in a position to invite respective tenders and procure the total consolidated requirements.

This central procurement procedure certainly has its advantages. On the other hand, due consideration has to be given to the fact that the relatively long procurement rhythm of 6 months necessarily causes large temporary stocks paid for in foreign currency and with a relatively low turn-over. For this reason it should be tried to procure as much as possible material in a rythm of three months or even in shorter periods.

Finding out most favourable sources for supply and delivery able condition willrequire world-wide, systematic procurement analysis as well as the establishment of an adequate, qualified product - suppliers documentation. On this basis it will also be possible to publish tencers in those supplier markets where most favourable supplies can be expected.

It is recommended to improve efficiency of this central procurement function of NMWC by some more systematic procedures, including a comprehensive documentation and data bank. As procurement is one of the most important factors in overall performance of metal working industries in Ethiopia it is proposed to have an experienced expatriate specialist for introducing modern management methods and techniques and train several NMWC-staff members for this function for a period of minimum two years.

In future more and more items, raw materials, semi-finished goods, components will be available in Ethiopia either from extended own production or from stock of improved whole-sale dealing.

This development should be observed by NMWC carefully. As far as possible local procurements then should be left to the individual plants in order to allow quick reaction and flexible management.

Training and Personnel Policies

Another NMWC task is to coordinate the training programmes jointly with NPC and to control the job rotation system of the top management level for the NMWC plants.

The present job rotation system is felt to be not very effective. For the purpose of just a training, a rhythm of a two years' stay in one job is too long; 6 or at most 12 months would be absolutely sufficient. Such a training scheme would, however, imply that all posts are permanently filled and that the manager-trainees pass through the system as additional assistants to be trained on the job. Such a system would certainly be reasonable and desirable; it is, however, subject to the possibilities of increasing the number of permanent managers in the plants. Due to the lack of managers this form of job rotation is impossible for the time being and during the next years to come.

For the time being the present job rotation system with managers staying of up to two years is too short for the manager to reach his maximum productive efficiency in a job. In this case, a minimum continuance of 5 years would be more adequate and beneficial to the respective plants.

Elaborating manpower-development- and in-detail-training-schemes for each plant and for NMWC as a whole is part of the overall planning system. It is recommended to cover 5-years' planning periods with rough figures and a 3 years' planning period in detail.

Training should include efforts in Ethiopia and abroad as well. Training abroad can be obtained not only in highly industrialized countries but also in advanced developing countries such as Kenya, Singapore, India, Indonesia, Korea, Greece, Yugoslavia, etc. Training abroad should be provided primarily to Ethiopian trainers while the majority of skilled workers and middle-managers should be trained on-the-spot.

NMWC has also a guiding and controlling function over personnel questions including remuneration. As may be learnt from annex 12, page 2, average monthly wages/salaries differ from 105 to 280 E.-Birr between NMWC-plants. An appropriate remuneration system should be followed by all NMWC plants and NMWC should control its proper application.

NMWC-Advisory Service

While NMWC acts as guiding and steering body for all NMWC-plants, the Corporation is responsible also for management performance within the NMWC-plants. The most essential factors of good management performance are efficient organisation, sound and consident policy and skilled application of appropriate management-tools. NMWC therefore should provide management instructions and assist in their implementation and application.

It is recommended to introduce a NMWC-technical advisory service for the NMWC plants. A team of one or two expatriate experts and 5 or 6 experienced Ethiopian engineers should give advice and assistance in solving technological problems and provide instruction and training on the job. The expatriate experts should develop the whole system and work with it for at least 3 years. This would be the most efficient mean of transfer and improvement of technology in Ethiopia.

The advisory service should deal in particular with the following problem-areas :

- planning and budgeting
- cost accounting and controlling
- management information systems (plant-, NMWC-, Ministry- level)
- production technologies
- production planning and control
- materials management
- maintenance and repair
- incentive remuneration systems
- business administration and management.
- personnel policy.

Improvement is needed in particular for NMWC's planning system and its development into a physical and financial "integrated planning, budgeting and control system" (see above remarks under "Planning). That system should be operated atindividual plant level and integrated at NMWC level as well. Improved cost accounting and control systems at all NMWC-plants and also at the Cooperation will be indispensable.

Systematic and comprehensive cost accounting is an indispensable basis for

- calculation of prices
- cost controlling (and all rationalization activities).

An effective cost accounting and controlling system also provides information about contributions to overall productivity and profitability and serves as a basis for allocation of funds for rationalization, replacements, new investments.

The cost accounting and controlling system so is the link in the planning - controlling - planning - circle. It is recommended to elaborate a flexible basic system for all NMWC-controlled units.

A basic cost accounting and controlling system will only require minor adaptations for each individual plant in order to meet the specific requirements of the individual production program.The individual plant system shall, however,be designed in such a way,that all essential key-figures - irrespective specific detailed break-down - of all NMWC-units are comparable and can be consolidated within an integrating Management Information System (MIS), which provides specific/differnt data for specific/different levels in specific/different intervals. (See also UNIDO-Monograph No. 4, New Perspectives in Management Development).
The development and implementation of a NMWC-advisory team requires the assistance of at least two expatriate experts over a period of two, preferably three years.
As a basis and guideline for their work the NMWC-advisory team shall elaborate a NMWC-Operation Manual

NMWC - Operation Manual

All basic principles and schemes for organisation and operation of all NMWC-units shall be described in a NMWC-Operation Manual.

It is the purpose of such operation manual to

- describe all operations and procedures of the Corporation and the individual NMWC-plants
- define the basic systems for management and business administration
- provide a general basis for design and application of special systems within individual NMWC-plants
- define duties, authority and responsibility of key personnel at various levels.

The Operation Manual shall be an aid to the executives of the Corporation and serve as an aide-mémoire and reference book in cases of doubt as well as to facilitate the induction of new executives.

The contents of the Operation Manual cannot be determined by one central department which is engaged in planning and organisation functions for the whole Corporation.

The Operation Manual must be subject to the continuous control of the Planning and Organisation Department. Only such instructions can be adopted which the Planning and Organisation Department has approved. The provisions laid down in the Manual are binding for all staff members.

If the staff members discover that the provisions are not or no longer observed, they are held to report this matter through the channel of his supervisor to the Planning and Organisation Department. The responsible department manager is bound to enforce the application as prescribed or to develop together with the Planning and Organisation Department any necessary modification.

The key elements of such a NMWC-Operation Manual are presented in a separate volume as an appendix to this report.

The systems which are described there are :

1. Organisation Structure
2. Financial Planning
3. Production Planning and Control
4. Maintenance and Repair
5. Departmental Cost Accounting
6. Remuneration.

The description as given in the Appendix are "Standard"-Elements, which have been selected and adjusted to the general requirements of NMWC.

The descriptions as given in the Appendix will allow already the present management to improve their operations and performance. Assistance of expatriate management consultants, as mentioned above, however, should be obtained as soon as possible.

As soon as the above mentioned advisory service team is implemented further details of the management system and their successive introduction to all NMWC-plants will have to be worked out. All systems, however, should be kept as simple as possible in order to allow improvement of skills by training on the job. More sophisticated systems and techniques, eventually also electronic data processing (computer based/aided systems) should be left to a second phase of improvement.

Working Groups

NMWC should improve professional exchange of knowledge and experience bet ween the NMWC plant managers. For this purpose, working groups should be established for certain subjects.

In addition to this theoretical exchange of experience, also the exchange of practical information and hints might contribute to an improvement of the production and help to avoid losses. One practical example in the field of transfer of technology may explain the idea of working groups.

In order to accelerate economic and in particular industrial development, transfer of appropriate technology from more developed countries to less developed countries has proven to be a highly efficient means. While "technology" basically means "know how , skill and expertise" it is likely to be transferred from person to person rather than by procurement of sophisticated machinery and equipment.

Collaboration between NMWC and NMWC-plants and other companies orproduction entities from higher industrialized countries would be an effective method for more transfer of technology. Collaboration may be practized in the form of techn. assistance- and/or lincence agreements as well as in joint ventures.

It is recommended that NMWC takes the initiative to develop more cooperation with suitable partners.

4.2 NMWC-Plants

A survey of the essential facts on NMWC-plants is given in Annex 7. A comparative survey of their performance is given in Annexes 11 and 12.

Since the plants, on the one hand, are very similar as to their general organization and operations and, on the other hand, are well-known to all persons concerned both in NMWC and the Ministry of Industries, it is felt that a narrative description of general organization and operations is not needed for understanding the following appraisals and propositions.

The following recommendations and propositions deal in particular with problems of production, equipment, personnel and investments, as far as it is especially relevant to the specific plant; recommendations which are applicable in all plants are given in chapter 5.

Organizational, management and administration problems have been described in general in chapter 4.1. A general proposition for the organization structure of NMWC-plants is made in the Appendix "NMWC - Operation Manual".

Furthermore it is strongly recommend not to try to improve existing elements of administration and/or management systems as they exist in the various NMWC-plants. Even when they are more or less useful under present conditions - as e.g. with Ethiosider Iron Steel Factory Asmara - they are not suitable to be part of a homogenous overall NMWC-system. It is therefore recommended to elaborate first all necessary details of the NMWC-Operation Manual and then, operating from this central basis, elaborate adapted and specifically designed systems for each plant according to its production program and special requirements.

4.2.1 Ehtiopian Iron and Steel Foundry Akaki Beseka

With approximately 4oo employees Ehtiopian Iron and Steel is the biggest of NMWC-plants. The annual turnover at totalling to nearly 19 million Birr(79/80) distributes on the various products as follows :

65 % reinforcement bars, 3o % nails, 5 % barbed wire/fencing and mesh wire/bed springs.

The plant is generally in poor condition. Traffic and storage areas are not paved and the buildings are partly rotton so that basic conditions for proper handling and flow of materials are unsatisfactory. Equipment and machinery are old, partly more than 4o years and origin from various suppliers, mostly Italians. The low productivity - in particular of nail and wire manufacturing - results from poor condition and machinery, lack of skilled workers and high rate of absence. Reasons for this high rate of absence must be supposed to be others than sickness, as it was found, that the rate of absence in private industries in the same region are essentially lower. The plant could easily be run with a maximum of 25o employees including 3o for management and administration, including the allowance for the high rate of absence of 15 %. Middle management and skilled manpower in administration as well as in production should undergo training to become sufficiently qualified.

Due to low motivation of personnel (indicated, e.g. by a rate of absence of 28 %), insufficient qualification of management and skilled workers and bad condition of machinery and equipment Ethiopian Iron and Steel Foundry must be considered as one of the NMWC-plant with relatively low overall performance (see Annex 12). Ethiopian Iron and Steel Foundry Akaki rates only sixth (equal with Kaliti steel) among the seven NMWC-plants. Considerable reserves can be mobilized by better management, training of personnel and some minor investments.
Reinforcement Bars.

Scraps received are stored without prior sorting and the different materials are not stored separately, In order to achieve good quality products it is essential to sort out plastics, aluminium and other non-ferous metals such as brass, copper etc. With respect to quality also supplementing charges should be dosed according analysis and proper weighing.

For a qualified control of steel smelting it is indispensable to have at least simple test equipment like a "Poldi-Hammer" and equipment for simple chemical (colorimetric) and spark-photometric analysis. A good solution for the whole plant would be the establishment of a well equiped work shop and laboratory (details see below).

The present procedure of chilling the billet castings with water provided poor quality compared with slow controlled cooling. Under the same aim the homogenisation/annealing furnace should be equiped with appropriate temperature control equipment. (Costs approximately US $ 15,ooo).

The rolling mill is operational, although past repairs were made with insufficient means; shaft couplings are fixed simply by wire rods; the rolls are worn out, the roll bearings are slack beyond tolerable limits. Spare parts are missing for various reasons, such as lack of preventive maintenance schemes and proper planning and eventually also foreign exchange.

A basic overhaul of the rolling mill cannot be done in Ethiopia completely. Parts would have to be shipped to the supplier. Considering the high costs (6o - 7o % of the price for a new one) and the long stand still (at least 3 months) it seems more recommendable to plan procurement of a new mill in 3, maximum 5 years. (Approximate cost US $ 3oo,ooo, possibility of reconditioned second-hand equipment).

Actual performance of the reinforcement bar production line is approxemately 8,7oo t per year. Since the capacity of the annealing furnace and the rolling mill is bigger than that of the smelter an extended input of imported billets would allow considerable increase of production (3 shifts). Increase of productivity can be achieved also by proper maintenance (weekly inspection, maintenance and repair, application of quality-spare parts); further more reconditioning of the furnace (building - in new bricks) at weekends (i.e. outside of normal working hours) would improve the utilisation of installed machinery and thus increase output. Exchange of experience with Ethiosider Asmara and, e.g. adaption of their main demand scheme would yield quick results.

Product mix of 6 or 8 mm bars or other diameters will have to be according to market requirements. With respect to minimising set-up-times the production of individual lots should have a volume of at least one full shift production output if not a multiple of one shift.

With existing machinery no technology different from the present one can be performed. Continuous casting of billets is possible, would, however, only marginally improve the output of the smelter and is therefore not recommended.

If it will be decided to set up the smelter and the rolling mill of Ethiosider Asmara (see chapter 4.2.2) at Akaki Baseha a comprehensive improvement scheme will yield best results.

Overall productivity would also be improved by paving roads within the plant in order to facilitate internal transport and handling of materials. First priority, however, should be given to improving the workshop by high quality equipment for general maintenance and repair, combined with a small laboratory for quality control. The laboratory should have equipment for simple chemical analysis (colorimetric, titrimetric) and spark photometric/spectrometric analysis. (Total cost approximately US $ 15o,ooo)

Such a workshop would require at least 5 highly skilled workers. At present, no personnel is available in the plant disposing of such qualification. The following instructors would be needed :

2 toolmakers, for a period of at least 3 years
1 engineer fitter, for a period of at least 3 years.

These experts should work jointly with 5 counterparts having a basic knowledge as well as 4 counterparts having already practical experience. In view of the high qualification being required for this job, it might also be recommendable to even recruit engineers disposing also of the necessary theoretical knowledge.

Within the production section, the department heads need a qualified training on their jobs. Such training should also include stays abroad with visits to similar production plants. This refers to the following department :

- smelter : 2 persons for at least 6 months
- rolling mill : 2 persons for at least 6 months.

Present actual performance of the reinforcement bar production line can be rated at 6o - 7o % of general (European) industrial standards (1). The performance of the measures as described above would increase output by 2o - 25 %, i.e. to appr. 12.ooo t per year in 3 shifts.

Assuming that the above recommendations are followed it may be expected that the equipment for reinforcement bar production will serve for at least another 5 years.

Nail Production

This line gives a rather poor impression. The whole production hall is in complete disorder.
Flow of production is far from systematic and efficient order; out of a total of 26 nail making machines appr. 4o % are not in operation primarily due to lack of maintenance and repair as well as of spare parts. Condition of tools is poor, most of them are not properly fitted, some of them even with wire instead of screws. Jolt-heads are worn out, cutting edges are not treated properly.
Protective devices such as covers etc. are mostly not used, partly they even have been removed. Thus safety has to be considered poor; the noise within the plant was found embarrassing.

An exemption are the new machines which have been installed in the wire drawing section. Up to now they operate satisfactorily. Proper treatment (general brief inspection, cleaning etc. at the end of each shift, proper preventing maintenance and repair at the end of each week) will keep them serving for 1o or even more years.

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(1) "general industrial standard"
= appr. 8o % of installed theoretical capacity

Actual production of nails is approximately 4,ooo t per year (2 shifts). All existing machinery and equipment are well balanced; no other technology is possible.

Nevertheless the whole nail production line should be rearranged to allow for a smooth flow of material. The new hall which is now only partly used would allow a proper arrangement and grouping of machines. In addition all old machines including tools need urgently a complete overhaul. Several tools will have to be replaced by new ones. (Costs appr. US $ 25,ooo). Thereafter they may serve at least another 5 years.

Also the deburring drums should be regrouped to achieve the required smooth flow of material. Charging should be carried out with assistance of a small hoist; discharging by using slides conveying they nails directly to the packing tables. For this purpose the drums should be installed in a somewhat higher position.

In order to improve labour efficience at least three skilled workers should enjoy intensive instruction and training on their job for at least 3 months.

If the above recommendations are followed production output can be increased to at least 5.ooo t per year, based on the present product mix. Additional productivity-improvements, however, can be achieved by concentrating on big nails at this plant, while the production of smaller sizes of nails could be concentrated in Ethiosider,Asmara.

The nail production, however, should be complemented by adding a manufacturing line for steel/machine screws of various sizes. Types and quantities will have to be determined by a detailed feasibility study. It can be estimated, however, that more than 5o % of present local demand can be met by 3 machines of appropriate sizes. This would not only save imports and increase value added in the country, but also reduce ordering time (lead time) and necessary stock levels.

Estimated costs would be

appr. 25o,ooo US $ for 3 machines
appr. 8o.ooo US $ for tools etc.
appr. 11o.ooo US $ for heat treatment equipment.

For start up, training and consulting the services of 3 expatriate experts for a period of preferable 3 years are recommended.

Manufacture of Barbed Wire, Fencing and Meshed Wire, Bed Springs.

The wire drawing section is in good condition and operates satisfactorily. The machinery for manufacturing wire products, however, is obsolete. The barbed wire machine is only operating at bout 2/3 of its capacity;

dies and tools are considerably worn out. After reconditioning and with proper tools production output can be increased up to approx. 2oo t per year in single shift operation.

Manufacturing of fencing and meshed wire and bed springs is running at not more than 2o % of installed capacity. While these products make up only a negligible part of total production these products should be taken over by another plant, e.g. Ethiosider Asmara. Such local concentration of a reduced number of production lines would yield better efficiency. Those machines which are still in appropriate condition should be overhauled and subsequently be installed of another plant, f.e. at Ethiosider.

Summary on Ethiopian Iron and Steel Foundry

The reinforcement bars production urgently requires an annealing temperature control equipment, the reconditioning of the rolling mill and improved preventive maintenance. The input of billets and the introduction of a 3. operational shift of the arc furnace would improve the balance of existing equipment and thus increase the output by about 25 % or to 12.ooo t per year. Major new investments would be the pavement of site transportation roads and a new (or possibly second-hand) rolling mill. Training of middle management (production supervisic[illegible] key operators is indispensible).

The nail production starts off with new wire drawing machines, however, suffers from badly maintained nail making machines, most of which even without protective devices.
Concentrating national production of bigger nails in this plant may lead to 3o - 5o % production increase. This production could be complemented by a new steel/machine screws production.

Manufacturing of fencing and meshed wire should be transferred to another NMWC-plant, e.g. Ethiosider Asmara.

Under qualified management the total plant could be operated with approx. 25o employees (25 skilled administrators, 5o skilled workers, 1oo semi-skilled workers, 75 unskilled workers).

A survey of future investment and personnel requirements is given on the following pages.

PERSONNEL REQUIREMENTS

Table 1 Training

Qualification	Number	Period local (months)	Period abroad (months)
Management	7	3	3
Skilled Workers	1o	12	
Total	17	15	3

Additional Personnel

Qualification	Number	1982	1983	1984	1985	1986-9o
Toolmaker		6				
Engine Fitter		3				
Skilled Workers (machine/screws)			15			
Total		9	15			

Expatriate Experts

Qualification	Number	Period
Toolmaker	2	1982 - 1985
Engine Fitter	1	1982 - 1985
Machine-Screw Makers	2	1982 - 1985
Heat Treatment	1	1983 - 1986
Total	6	

Table 2 Investment Requirements

	Item	.000 US Dollar					Total
		1982	1983	1984	1985	1986-90	
1	Quality Control Equipment	15					15
2	Workshop/Laboratory	150					150
3	Tools for Nails	20					20
4	Tools for Wire	15					15
5	Machine-Screw-Line		450				450
6	Pavements	50					50
7	Rolling Mill					300	300
	Total	250	450			300	1.100

4.2.2 Ethiosider Iron & Steel Factory, Asmara

Ehtiosider's production program is rather similar to that of Ethiopian Iron and Steel Foundry Akaki Baseka:

Nails	74 %
Black Wire	12 %
Bed Spring	6 %
Barbed Wire	3 %
Gabion	3 %
Fencing Net	2 %

At present, only the old part of Ethiosider's production facilities for the manufactur of nails and other products is in operation whereas the modern part, furnace and rolling mill, is standing idle (the furnace is not even yet installed).

The actual situation is the more regrettable since the Gulf area has a great demand for steel structures which Ethiosider could easily produce at competitive prices and even earning foreign exchange through exports!

The part of the plant in operation is highly obsolete and therefore does not work economically. Output and profitability could be improved, if the plant was completely overhauled and some smaller replacement investments were carried out, in particular in the tool shop (lathe, shaping machine, grinding machines).

Management :

For several reasons, the organisational set-up of this plant is better than that of other plants described in this chapter. They dispose, for instance, of a work planning, a machine occupation planning, a maintenance programme, etc. However, the registration for above planning systems still needs improvement. This is particularly true for the production departments: performance and capacity utilisation rates of the indivual machines are not recorded precisely enough. Nevertheless, these organisational schemes should be considered and integrate, as far as useful, when the NMWC - Operation - Maunual will be elaborated. (see chapter 4.1 and the Appendix of this report).

Capabilities of the management personnel are good. The department heads are generally well-informed. Skilled labour, however, is very short.
It is recommended to prove to top and middle management study tours to plants in industrialised or newly industrialised countries, having same or similar production programmes. In this way, top and middle managers will become familiar with modern technologies, efficient industrial engineering.
(Production planning and control, quality control, materials management etc.).

Wire and Nail Production;

The existing machines are obsolete but maintained still in an operational condition. In comparison to Iron and Steel Factory Akaki, their productive efficiency can be rated at 4o % higher. Compared with European standards however, it cannot be rated more than 2o - 25 % on average.
Tools are in a good condition, though not optimal.

The wire drawing machines are technically outdated although they are operating still satisfactorily. The drawing dies are re-dressed in a rough-and-ready manner in the own plant. It is recommended, however, not to produce new drawing dies from common steel. The material is too soft so that these drawing dies only have a service life of 6 - 8 hours, against at least 8o hours of high quality drawing dies. A better makeshift would be to try and build drawing dies from old roller bearings by an appropriate heat treatment.

Wire and nail production should be improved by :

a.) better arrangement of flow materials and production within existing buildings; only some minor reconstruction measures will be necessary. (costs approx. 25,ooo Birr),

b.) reconditioning of machines, new drawing dies for wire, stamping and cutting tools for nails. (costs approx. 5o,ooo US Dollar),

c.) some minor investments in tools, spares, etc. (costs approx. 2o,ooo US Dollar).

Production is likely to be improved by these measures of wire from actual 32o t to 35o t and of nails from about 92o t to 1.ooo t per year in one-shift operation.

It is felt reasonable and viable to share the nail production between Ehtiopian Iron and Steel Foundry Akaki and the Asmara factory. Each of the plants should specialize in certain sizes of nails. A decision on which types of nails should be produced in with plant depends on the machinery and equipment existing in the two plants . Two shift operation is possible and recommended. In this connection, due consideration should also be given to the rehabilitation of the wire drawing plants.

When distributing the nail production between Akaki and Asmara the minimizing of transport should be considered. (Vincinity of site of production and place of consumption).

Another decision criterion is also the question of tools; the establishment of a central tool shop would certrainly help solving the problem.

The machinery and equipment of the existing tool shop does not meet requirements. The machines, lathes and a shaping are completely obsolete and also cutting tools do not at all correspond to modern standards. The grinding

machines are only partly usable for the necessary work . In particular, the grinding discs are inadequate for the work to be carried out.

The required raw materials (tool-steels of different quality) are not available.

Heat treatment facilities, like hardening furnace, oil bath, measuring equipment, etc. as well as other equipment for quality control are not available.
The qualification level of the tool shop personnel needs improvement. The knowledge of producing tools in own workshop, as it is necessary, and of doing professional repair works, is not sufficient. Investment requirements in equipment such as precision lathe and shaper amount to approx. 25,ooo US Dollar.

The galvanizing line is used only during appr. 30% of total time; this installed galvanizing capacity is by far greater than corresponding capacities for nail production and for meeting demand for other galvanized products. The only way to use this equipment better is to make special efforts to sell more galvanized products for the whole country, (e.g. components for construction industries, furniture industries, electric industries).

The equipment for production of bed springs, fencing nets and barbed wire is rather obsolete. It urgently needs rehabilitation (costs approx. 25,ooo US Dollar). This, however, implicates, that several spare parts which are no longer produced by the former supplier of the machinery, have to be manufactured.

This is one example - among others - for the urgent need of a central machine repair/tool shop (see chapter 4).

The production of gabions is completely manual and therefore at present prices not profitable. In order to meet the existing demand for this traditional product, however, production should be left as it is. Considering the small volume there are neither organisational nor technical improvements (e.g.mechanisation) feasible.

Quick improvements, however, are possible by better stock operations. Major parts of raw materials (wire, e.g.) are stored in open air and traffic areas and this subject of corrision. As a consequence, besides losses, further processing becomes more difficult, dies are overcharged, etc., resulting in lower output at high costs and poor quality. Better arrangement and order of stocks, including finished goods, would allow to store all goods under roof. This is not a technical but a management problem; additional buildings and constructions are not needed.

Product quality is sufficient with regard to the product's function,compared with European standards,the quality would be too poor to be sold, e.g. in a competitive market. Essential improvements could be achieved by implementating a small laboratory and a central tool shop as proposed. Further improvements, however, would require completly new machinery.

The rolling mill is not in operation; the new electric smelter is still unpacked.

The installation of the smelter and resumption of operatio of the rolling mill would not cause major problems.

There is sufficient space at the plant site; electricity for operation as well as scrap as main input are available.

This decision, however, is less a technicaß nor economic one but essentially a question of overall sectoral and regional strategy of NMWC and the Ministry of Industries. Under economic aspects it is recommendable that the mill should start operation as soon as the general situation in the region allows. If not so, the mill should be installed in a plant at Addis Ababa, e.g. Ethiopian Iron and Steel Foundry. As outlined in chapter 4.2.1 a close cooperation, e.g. product-sharing between the two plants is recommended. At present approx. 8o % of Ethiosider's output is sold in the Addis Ababa area. At least part of these transport costs can be saved.

Leaving the question of the final location aside, operation should start as soon as possible in order to increase local production and this local supply. The equipment should not be kept idle, particularly when the danger of corrosion does exist.

When putting the new smelter into operation special attention should be paid to appropriate training of personnel (4 for smelting, 4 for rolling, 2 metallurgy).

In addition it is recommended to draw on the assistance of foreign experts :

1 expert for the rolling stand, for a period of 2 years
1 expert for the smelter, for a period of 2 years
1 expert specializing in metallurgy (laboratories) for a period of 2 years.

Furthermore it will be necessary to establish a laboratory for quality control. In case central laboratories were established in Addis Ababa, a small laboratory at the plant would suffice. Estimated cost : approx. 5o,ooo US Dollar (see also chapter 4.2.1, page 24 and 25).

As already mentioned above, the rolling mill once having been put into operation might produce steel sections for structure of various kinds (welded, riveted, screwed).

Summary on Ethiosider Iron & Steel Factory.

Wire and nail production need some minor investments, totalling to approx. 7o,ooo US Dollar and Eth. Birr 25,ooo in order to improve the output by nearly 1o %.

Production programmes for nails should be allocated to Ethiosider and Ethiopian Iron and Steel Foundry respectively in such a way that specialisation with higher yields can be achieved.

It is strongly proposed to arrange for a tool shop. Including some equipment for process control needed investments amount to US Dollar 25,ooo.

The new smelter and rolling mill should be installed and operated as soon as possible, be it at the Asmara site or at an Addis Ababa site (e.g. Ethiopian Iron & Steel Foundry).

For the complete mill a small laboratory for quality control will be needed; investment costs amount to approx. US Dollar 5o,ooo.

When starting the operation of the new smelter and rolling mill, special attention should be paid to appropriate training of personnel. In addition it is recommended to draw on the assistance of 3 foreign experts.

It is also recommended to provide study tours for top and middle management into higher industrialized countries in order to improve their knowledge in efficient industrial engineering in similar industrial plants.

A survey about future investment and personnel requirements is given on the following pages.

PERSONNEL REQUIREMENTS

Table 3 Training			
Qualification	Number	Period local (months)	Period abroad (months)
Management	3	3	3
Skilled Workers	15	12	
Total	18	15	3

Personnel						
Qualification	Number	1982	1983	1984	1985	1986-90
Smelters		6				
Mill Operators		8				
Skilled Workers		2				
Total		16				

Expatriate Experts		
Qualification	Number	Period
Rolling Mill Operators	1	1982-1984
Smelters	2	1982-1984
Total	3	

Table 4 Investment Requirements

	Item	.ooo US Dollar					Total
		1982	1983	1984	1985	1986-90	
1	Wire, Nail Lines Improvements	6o)[x]	15				75
2	Tool Shop	25					25
3	Laboratory	5o					5o
4	Implementation of Rolling Mill	85o)[xx]					85o
	Total	985	15				1.ooo

)[x] US $ 1o.ooo in local currency
)[xx] US $ 5o.ooo in local currency

4.2.3 Kaliti Steel Industry

With its nearly 300 employees Kaliti Steel Industry is one of the major NMWC-plants, producing important products (structures, roofing, components) for other industries and construction.

Performance, however, is relatively poor (see Annex 12). Management and production engineering need urgent improvements in order to make full use of all facilities.

Organisation and Mangement

The management is overloaded. The diversified production programme of the plant would require a management team disposing of both the specific technical knowledge and the organizational capabilities in order to manage and structure the production centers suitable for more efficient operation.

Kaliti Steel does not only produce large product series for the anynymous market but also individually ordered products (e.g. in steel construction) for specific clients. Therefore the administration has to elaborate individual offers for such orders. It is therefore particularly disadvantangeous that systematic cost accounting services, especially standard costing and final cost control are missing.

The top managers should have a possibility to visit similar production plants abroad. The following persons should be granted a one-month's stay abroad for studies: General Manager, Production Managers for the profiling department, steel construction department and window production department. Over a period of two years, the management team should get an intense on-the-job training as counterparts of at least one, better 3 international experts (one for each department).

Personnel

Qualification and training of personnel are insufficient. However, a major problem is - for various reasons - bad motivation. Kaliti Steel need a core of at least 15 highly skilled workers/engineers.

In order to achieve a higher productivity, it will be indispensable to draw on the assistance of experts for all production areas. Concerning the section rolling machines, an expert specialized in this production will be needed for a period of one year in order to train local manpower accordingly. With regard to the mechanical production, a toolmaker with special knowledge in the field of the section rolls production and heat treatment should be made available for a period of two years.

Raw Material Reception and Storage

Unloading facilities (travelling crane) are sufficient in terms of bearing capacity and space coverage. The loading device, however, does not correspond to requirements (chains, loops and ropes). The goods to be handled are mainly coils which are unneccarily damaged by the aforementioned loading facilities. The coils mentioned above are piled improperly. This leads to deformation and damages of the edges. (see pictures on page 85). As a result, further operations are difficult and a large part of the production goes to scrap.

For the main raw materials, specific loading frames should be procured which eventually can be manufactured in own production. The coils should be stored in adequate storage shelves or palettes which also might be produced in the own plant and recommendations for improved loading devices for coils.

Section Line

Amon the existing section rolling machines, all of which are in a relatively good operating condition the machine producing the pipes of larger diameters (more than 15 cm) is occupied most. This is also the production facility showing major wear as a result of heavy work load.
The sections rolls do no more correspond with requirements for tools; wear is too significant. The machinery and equipment existing in the plant's own workshop are not adequate for a repair. In particular, cutting tools of goos quality and raw material as well as the necessary heat treatment facilities are missing. These facilities should be procured as soon as possible. In adition proper raw material (steel parts) for replacements and repair and adequate cutting tools for the machines in the workshop must be made available. The machines in the workshop need repair and reconditioning.

The individual tools of the section rolling machines are not properly adjusted. Transformation at the stations is not regular and causes an overloading both of the material and the rolls. The product shows surface damages.

Since there are no marks and stops on the adjustment device, adjusting operations are unnecessarily difficult and require longer setting periods than normally needed.

All other section rolling machines operate without problems. However, rolls do not correspond with acceptable standards for such production. The surface of the rolls is not hard enough.

The total production is depending on one single man having the knowledge of setting the machine. He ist at the same time manager of the repair shop. The other personnel tries its best to keep the machines operating, however, they do not even dispose of basic technical knowledge.

Steel Construction

This department mainly concentrates on the production of steel roof structure processing sections out of own production.

Cutting of the sections is very imprecise. Miters are cut by hand at eye sight on the cutting machine, without fixtures or jigs. When assembling the structures, the faults caused by imprecise cutting have to be balanced by metal sheets (up to a thickness of 25 mm!), a procedure which weakens the bearing strength of the total construction. The existing welding machines need considerable improvement by proper fixtures and application of protection-gas welding technology, in order to allow for distortion-free welding.

Generally it was observed in all sections of the steel construction department that security facilities are not made use of. Protection covers are missing on edge grinding machines, grinding glasses are not used. The welding places are not protected by antidazzle shields. There are no exhausters for gases arising from welding operations.

First priority must be given to the procurement of miter cutting devices to be attached to each cutting machine.
The welding unit should be adapted to protection-gas welding with continuous welding rod infeed (wig-mig-procedure). There are already two apparatus of this kind which, however, cannot be used as the necessary protection gas is not available. The welding joints could be improved considerably by the use of such welding apparatus. Finishing operations and the elimination of slags and splashes were no more necessary.
An essential advantage of this procedure should not be overlooked, namely that welders operating this kind of apparatus can be trained completely within two weeks, whereas the training of an arc welder for electrodes will take a minimum of 2 months.

In addition hereto, the steel construction department should be improved by using exchangeable welding equipment, in particular fixtures.

Production of Windows and Doors

Generally it can be stated that production planning and production flow in this department obviously are very good. However, some deficiencies were observed which still need improvement : after welding galvanized materials, the welded joints are not covered by corrision inhibitors. The location holes for hinges and fittings are filed out, an inadequate and time-consuming procedure. Gauges for a precise location marking of the holes are not in use. Some of the finished frames need re-straightening which is done in a very complicated way.

Immediately after welding, the welding joints should be covered by zinc paint to protect them against corrosion.

The location holes for fittings and locks should be cut by small punching devices with variable adjusting attachements. The procedure would allow to increase productivity by about 7o %.

Furthermore it is proposed to introduce dressing devices (with compressed air cylinders) in order to straighten the finished window and door frames and assure their proper working.

Production of Metal Furniture and Small Parts

The overall layout of this relatively new department is not appropriate. The production methods are unsuitable, the quality of the products (chairs, sheet metal frames, barrows, etc.) is hardly acceptable. This department should be closed down immediately or completely re-organised. Competing products of unobjectionable quality and at considerably lower prices are offered by private industries.

For this department, planning of future development should consider the following two alternatives :

One possibility would be to conclude a know how transfer contract with a well-established manufacturer of office furniture. The complete production unit needs re-structuring and new equipment. Before making final decisions, it will be indispensable to have elaborated a comprehensive study and planning and to take this as basis for any decision. In this connection, due consideration should be given to the fact, that there are already procedures in the market (private industry) offering good quality products at favourable prices.

In case this alternative proves not to be workable, it should be decided to drop this production line, since available machinery and euqipment is absolutely insufficient, skilled labour is missing and the whole department is uneconomical. Under present conditions production costs are too high; on the other hand is the product quality so poor, that products could be sold - if at all - only at low prices which would not even cover variable cost.

Maintenance and Repair

Maintenance of machines and equipment is neglected. Usual maintenance as customary for every educated engineer and proper repair would considerably reduce. As it is mentioned in chapter 4.2.1 for Ethiopian Iron and Steel Foundry Akaki Beseka and also in chapter 4.1 (page 22) an exchange of experience in NMWC-working group could provide quick improvements.

Productivity and quality of products could be improved essentially. It is strongly recommended to give special training in maintenance and repair to a minimum of five engineers or highly skilled workers.

Additional Products

With the existing capacities and machinery and equipment available, one might also start producing semi-finished products for other industries, such as e.g. :

- truck side boards
- sheet metal structures like silos, storage equipment, shelves; light steel structure as standard parts like halls, water tanks, etc.
- fixtures and fitting (a production line which could be started with low investment cost and might also cover fittings needed for own window production)
- Another major field of possible activities is the production of steel structures, sheet metal structures, silos, containers, pipe systems, etc. for new projects such as e.g. in the agro-industries sector (33o washed-coffee plants !)
- For the assembly of such structures and parts, an assembly team could be trained accordingly offering its special services all over the country whenever required.

Other ideas for additional lines are :

- pressure regulating pipes
- materials handling equipment (e.g. palettes, boxes, etc.)
- welded (bolted, riveted) wheels with and without rubber lining.

Summary on Kaliti Steel

This industry manufacturers products important for other industries. By some minor investment and in particular better management - including maintenance and repair - considerable improvements of productivity and product quality can be achieved. Training needs are predominant. As an efficient management tool Kaliti Steel needs a systematic production planning and control procedure, as mentioned under NMWC and described in the Appendix to the Report.

Production of metal furniture and other small parts should be dropped or fundamentally reorganised. Prevailing equipment and space would allow to manufacture quite a number of different additional products as outlined.

A survey of investment and personnel requirements is given on the following pages.

P E R S O N N E L R E Q U I R E M E N T S

Table 5

Training

Qualification	Number	Period local (months)	Period abroad (months)
Top Management	2	3	1
Department Heads	2	3	3
Skilled workers	15	12	
Maintenance & Repair	5	12	
Total	24	3o	4

Additional Personnel

Qualification	Number	1982	1983	1984	1985	1986-9o
Management		2				
Maintenance & Repair Manager		1				
Total		3				

Expatriate Experts

Qualification	Number	Period
Sectio Line	1	1982
Toolmaker	1	1982 - 1983
Welding Expert	1	1.1982 - 6.1982
General Production Engineer (incl.Maintenance & Repair)	1	1982 - 1984
Total	4	

Table 6 Investment Requirements

	Item	.ooo US Dollar					Total
		1982	1983	1984	1985	1986-9o	
1	Loading Equipment	5o[x]					5o
2	Welding Machine	1o					1o
3	Cutting Devices	5					5
4	Tools for Sections	5o					5o
5	Generals	25					25
	Total	14o					14o

x 25 = Local currency, own production

4.2.4 Ethiopian Metal Tools Factory

Under the aspect of production program and applied technology Ethiopian Metal Tools Factory is one of the leading industries in Ethiopia (see Annex 12). Originating from former own marketing activities cost control- and statistical data-systems are applied to a certain extend. Price-calculation, however, is too general (ex factory price = 2,4 x cost of material), and a systematic, retroactive evaluation of data is missing. Nevertheless Ethiopian Metal Tools' performance is ranking first among NMWC-plants, resulting primarily from efficient management and good motivation of employees (low rate of absence).

Some more attention of management in administration as well as in production, however, would allow to utilize prevailing machinery better and to improve productivity by at least 3o %, so coming to nearly 8o % of European standards.
Despite this overall good performance, selected areas can be improved. To serve an example, the plate-scissor utilization is around 1o % of total working time only. On the other side strips which could be cut easily on this plate-scissor are imported at present.

Further improvements in productivity and output can be achieved by better arrangements for flow of materials and production. Available space would allow to even double the output. Proper production planning for the relatively wide range of products would allow a high utilization of all existing machinery-capacities. Maintenance not only of production machinery but also of buildings and floor areas as well as of storage-, handling- and transport-facilities can easily be improved by some more attention and care only. The present bottle-neck is the shortage of raw material.

Some specific examples may indicate further improvements which can be realized by better management :

The whole tool shop has to be re-arranged neatly and orderly. The present disorder causes damages on tools and parts.

Machines have to be overhauled, guides must be re-adjusted. Cutting tools and measuring equipment corresponding to modern technology standards have to be procured.

In view of the insufficient qualification of the machine operators, it is recommended to prefer tools with reversible cutting plates.

The existing machinery and equipment of the tool shop suffice for the works to be done in the plant.

inserted tooth cutters, turning tools and measuring equipment.

The existing tools need rehabilitation with greater precision.

A heavy press equipped with a three-phase tool was operated by one worker only. Thus a finished part is ejected every third stroke of the machine; the output which could be increased if the machine was operated by 2 or 3 persons.

Most of the tools used for hot forming operations have to be cooled. Since there do not exist any cooling facilities, the tools are subject to an unnecessarily rapid wear, poor performance, frequent change.

In order to improve management efficiency the department heads should have intensive training in industrial engineering. This applies in particular to production planning and control and to quality control.

As an important part of production planning assessment of optimum working-lots should be introduced.

lity of produc is fairly good, better tools and more attention to

In order to introduce quality standards Ethiopian Metal Tools should have a foreign quality-improvement- and control expert for at least six months who also should provide training on the job.

In order to improve tool design two skilled workers should enjoy training courses, evtl. locally, preferable also abroad. If possible a foreign expert should provide training on the job.

Summary

Equipment and applied technologies with Ethiopian Metal Tools Factory are generally of satisfying level, so that no specific major investments are needed. For some general improvements in tools, spares etc. an mount of US Dollar 5o,ooo is needed. Improvements in management skills, in particular production planning and control and maintenance and repair, will yield considerable increases of productivity and output (5o % seem achievable).

A survey of personnel an.' training requirements is given on the following pages.

Products which can be manufactured additionally on the same machinery are :

- drop forgings of all kinds up to a weight of 5 kgs/piece
- rough forgings for gear wheels
- simple farm implements such as e.g. ploughs, harrows and spares
- wheelbarrows with iron wheels.

PERSONNEL REQUIREMENTS

Table 7 Training			
Qualification	Number	Period local	Period abroad
Department Heads	2	6	
Quality Expert	1	2	
Tool Designer	2	6	(6)
Maintenance & Repair	2	6	
Total	7	3o	(6)

Expatriate Experts		
Qualification	Number	Period
Quality Expert	1	1.1982 - 6.1982
Toolmaker	1	1.1982 - 6.1982

Table 8 Investment Requirements

	Item	.oo US Dollar					Total
		1982	1983	1984	1985	1986-9o	
1	Generals	5o					5o
	Total	5o					5o

4.2.5 Akaki Metal Products

Galvanized steel-products are used in many fields. Akaki Metal Products therefore is of special importance for Ethiopian metal working industries.

At present, however, no full use is made of existing facilities. The pipe-manufacturing line is not in operation; the combined galvanization line has already become obsolete. As pipes of various types are imported it is recommended to recondition the equipment and take-up pipe production with Akaki Metal Products as soon as possible.

This will require the reconditioning of the pipe manufacturing line and a new galvanizing line. Costs are estimated to about US Dollar 1oo,ooo for manufacturing equipment and US Dollar 4o,ooo for tools and improved tool-storage facilities.

Additional workers are not needed, as work force for the pipe manufacturing and galvanizing line can easily be taken from other departments. A foreign expert, however, is needed for proper implementation and start-up of the line. One experienced tool maker should be engaged; he should be assisted and trained on-the-job by a foreign tool making expert who, in particular, should help in the expansion of the production program.

For the present (simple) operations the organisational set up of the plant is appropriate. A ratio of nearly 1 : 1 of personnel in production and administration, however, is inadequate and contributes to low overall productivity of the plant (see Annexes 11 and 12).
Administrative personnel should be reduced by 5o %. While skill of employees is adequate motivation is missing.

The galvanizing line operates satisfactorily. Technology is relatively labour-intensive but appropriate. More sophisticated technology with a higher extend of mechanisation and automation is not recommended, as it would be more difficult to operate and maintain, expensive and less labour-intensive and would not yield essential improvements.

In order to improve safety/health-precaution exhaust equipment for the zinc smelting shop should be installed.

In order to improve the quality of the coatings two measures are recommended :

- first the preheating pot for the zinc to be refilled must be used. It is not used at present. As a consequence the temperature of coating zinc is too low, resulting in inhomogenous coatings.

- second the thickness of the coatings should be continously controlled with adequate measuring equipment (costing approx. US Dollar 250 only). At present quality is controlled by occasional weighing; this, however, is insufficient.

There are two coating lines, out of which, however, only one is operated, while the second is being reconditioned or being held as stand-by.
As the market requires larger quantities of galvanized products (considerable quantities are imported) the management of Akaki Metal Products should make all efforts to take up full production and sell the products according to market requirements.

Major improvements are needed for handling - in particular - unloading - and storing - equipment and facilities. Steel sheets are delivered by truck; the existing crane is insufficient, as the hange attachments of the crane cannot grab the load properly and safely. Use of palettes and a fork lift would contribute to safety and reduction of losses.

Buildings should be kept in better condition; furthermore it is recommended to pave the whole storage floor.

As in all plants, maintenance and repair need improvement.

Summary on Akaki Metal Products

Akaki Metal Products supplies galvanized products for many applications. It is recommended to improve this plant and make it the centre for production of galvanized products in Ethiopia.
With better management and some minor investments the galvanized capacity can be doubled. The manufacturing line for galvanized pipes should be put into operation again as soon as possible.

Additional products can be manufactured; some examples are :

all drawn, pressed, punched parts; fittings; sleeves; sliders; boxes; in general : galvanized metal parts and components.

A survey of investment and personnel requirements is given on the next pages.

P E R S O N N E L R E Q U I R E M E N T S

Table 9 Training			
Qualification	Number	Period local (months)	Period abroad (months)
Department Heads	2		6
Galvanizing Experts	2		12
Maintenance & Repair	3	6	
Total	7	6	18

Personnel						
Qualification	Number	1982	1983	1984	1985	1986-90
Toolmaker		1				
Total		1				

Expatriate Experts		
Qualification	Number	Period
Toolmaker	1	1982 - 1984
Pipe Production	1	1982
Total	2	

Table 1o Investment Requirements

	Item	.ooo US Dollar					Total
		1982	1983	1984	1985	986-9o	
1	Pipe-Galvanizing-Line	1oo					1oo
2	Tools, Tool-Storage	4o					4o
3	Fork Lift	25					25
4	Generals	25					25
5	Pavements	25[X]					25
	Total	215					215

X local currency

4.2.6 Kolfe Household Utensils

This plant is in particularly bad condition. All equipment and facilities are very old, badly maintained and more or less obsolete. Overall performance of Kolfe Household Utensils is lowest of all NMWC-plants (see Annex 12). Design and quality of produced need urgent improvement . As the products of Kolfe are badly needed in the country, a quick and comprehensive rehabilitation is recommended. This is easly possible, as needed production technologies for appropriate household utensils are relatively simple and no special qualification and skill of workers is required.

It must be appreciated that the present management makes great efforts to keep the plant in operation; for a rehabilitated plant, however, improved skills of management as well as of workers are indispensable. An intensive training program and the assistance of at least two expatriate management and production experts will be needed.

It is recommended to design and plan a detailed rehabilitation sheme, including

- production program
- technologies, machinery and equipment, reconditioning of existing equipment
- production engineering, flow of materials and production
- handling and storage facilities
- rehabilitation, reconstruction of buildings and structures
- organisation, management and manpower.

This design and planning work and its implementation will require the assistance of two expatriate experts.

For quick improvements the following recommendations may be useful :

- the production program should be revised. Manufacturing of all products which can be sold only in small quantities should be dropped. This applies in particular to many products which only differ slightly in size.

  Also those items/design which are especially difficult to be produced with existing machinery and equipment, should also be dropped. In some cases the design should be changed in order to allow less complicated manufacturing.

  An efficient cooperation and coordination with Ethiopian Household Utensils, Asmara, will allow to allocate products appropriately to the respective existing manufacturing facilities.

Within such cooperation even several additional products which can be manufactured easily and efficiently with existing machinery and equipment, can be taken into consideration. Some examples are :

- simple aluminium castings
- aluminium fittings and fixtures for construction purposes and door handles, etc.
- special makes of aluminium parts for apparatus and vehicle building.

The total production program of Kolfe Housekols Utensils should be streamlined and reduced to about 2o-25 different products only. This will provide higher output at higher productivity and improved product quality.

- Flow of production and materials should be re-arranged in order to improve possible speed of production and avoid damages of products. Better design/arrangement of working places, transport, handling and storage facilities will contribute to both, higher productivity and less losses and to improved safety for the workers as well.

- All machinery and equipment needs immediate repair, overhaul and proper maintenance. The spinning lathes should be equipped with proper spinning devises; the spinning cores should be replaced by cores of modern design, i.e. of multiple glued plywood or of plastic. The riveting machines must be equipped with devices which fit to the individual products, in order to avoid damages.

  The spout production should be re-structured in a way to allow partial mechanization. The steel casting molds, presently filled and turned by hand, should be turned automatically in order to assure a homogenous distribution of the material. The casting ladles should be dimensioned in such sizes that they take the exact quantity of liquid aluminium needed. Such a procedure allows to save material, to improve quality and to considerably reduce subsequent finishing operations.

  The workshop should be separated from the production area. Its machinery and equipment has to be complemented by a small milling machine, a bandsaw and several small tools.

- Training programs should be started immediately.

- Buildings and all rooms, floors, etc. should be cleaned and repaired, painted, etc.

These measures, which do not require special know how nor major new, additional investments would improve output, productivity and quality of produce as well.

Essential - and desirable - improvements, however, will be achieved by implementing a practically reorganising the entire plant.

This comprehensive rehabilitation should be considered and managed like a new investment project. In particular, production program and capacity should be designed according future requirements and in line with the 1o-years-Development Plan.

Investment capital requirements for machinery rehabilitation and slightly higher capacity may be estimated at US Dollar 25o,ooo.

Summary on Kolfe Household Utensils

Kolfe Household is in particular condition; all equipment and facilities are very old, more or less obsolete. As the products of Kolfe, however, are badly needed in the country, a quick and thorough rehabilitation is recommended. Furthermore coordination and cooperation with Ethiopian Household Utensils, Asmara, will allow to allocate products appropriately to the respective existing manufacturing facilities.
This streamlining of production programs will increase overall output and allow to manufacture several additional products.

P E R S O N N E L R E Q U I R E M E N T S

Table 11 Training

Qualification	Number	Period local	Period abroad
Management /Departm.Heads	6	12	3
Skilled Workers	2o	12	
Skilled Workers	1o		12
			12
Total	36	24	27

Personnel

Qualification	Number	1982	1983	1984	1985	1986-9o

Expatriate Experts

Qualification	Number	Period
Production Engineer	1	1982-1985
Enamelling	1	1982-1984

Table 12 Investment Requirements

	Item	.ooo US Dollar					Total
		1982	1983	1984	1985	1986-9c	
1	Immediate Improvement	5o					5o
2	Rehabilitation		25o				25o
	Tr	5o	25o				3oo

4.2.7 Ethiopian Household Utensils

For the same reasons which are relevant to Kolfe Household Utensils, Ethiopian Household Utensils is of great importance for Ethiopia and should be brought to efficient production. A thorough rehabilitation is needed and possible also in the case of this plant. Irrespective of extremely poor conditions of technical facilities, performance of Ethiopian Household Utensils is relatively good among NMWC-plants. (see Annexes 11 and 12), resulting from high organisational skill of management. Production management and -engineering, however, require essential improvements.

Production Facilities

The overall production facilities are obsolete and so badly maintained that - under normal conditions - about 8o % have to be considered scrap.

Most of the machines installed in the pressing shop are of Chinese origin. It is not possible to trace their age. The machines have been installed in 1968 but were already second-hand. It is estimated that the equipment was manufactured around 1935 -194o.

The bad condition of the machines is mainly due to inadequate maintenance and repair and missing spare parts. For repairs and spares unsuitable materials were used. Moreover, the spare parts were copied from worn parts so that it is not possible to reach the necessary accurancy and tolerance limits. The machines used for the manufacture of spare parts are not suitable for such precision work and bad results are inevitable.

Working conditions in the pressing shop are so bad that the workers never will be able to manufacture quality products even if they would try their utmost. Material flow is hard to follow-up, the handling of semi-finished parts is confusing accident prevention is neglected to a critical degree, safety devices have been removed. Also heat, noise and dust nuisance are embarrassing.

The production of aluminium parts suffers from the same faults as the black sheet production. Pressing tools are worn out and the machines needed especially for this production are obsolete and badly maintained and thus no more in a condition to assure good product quality.

Also the enamelling shop - representing the "bottle neck" of the whole production - does not dispose of adequate production facilities.

Cleaness in this department is satisfactory, protection guards, especially against vapors, are, however, missing.

Cleaned parts are not adequately transported; the parts get dusty. Enamel coating operations are notsatisfactory, the coat thickness is not controlled by suitable measurements. While being dried (on the discharge opening of the furnace) the items get dusty again, which causes burning faults. Indeed into the furnace is done so carelessly that the major part of the lots are regularly damaged. The furnace is operated without the necessary temperature control; measuring equipment is missing. As a consequence, the items are badly burnt and often even overheated and burnt off. According to normal quality standards, 95 % of the products would have to go to scrap.

The further handling of the enamelling products until dispatch is extremely inadequare. Products which have not gone to scrap or been damaged up to now, most certainly will be damaged during packing or transport.

The production facilities in the plastic component-production line correspond to requirements. Maintenance and repair could be improved. In comparison to the other departmens, it is, however, satisfactory.

The existing production capacities for cardboard are utilized to a very low extent, only. The machines are not properly arranged. The quality of the cardboard is not satisfactory. In all departments, maintenance, quality control and safety measures are lacking. Many of the working places are unhealthy and accidentprone (switch boxes are usually not closed, running gears e.g., are not covered by protection shields).

Within the production departments, the following measures, requiring relavely little funds, should be performed as an immediate measure program :

- more adequate order/arrangement of machines and storage equipment
- improvement of maintenance and repair
- improved production planning and control (optimum lot sizes)
- improved quality control
- strict safety control
- general rehabilitation/reconditioning of machines and equipment.

The investment expenditures required for these measures are estimated at :

- approx. US Dollar 300.000 for the pressing shop
- approx. US Dollar 150.000 for the enamelling shop
- approx. US Dollar 100.000 for general purposes.

The complete production unit for aluminium utensils should be shifted over to Kolfe. The production and processing of aluminium products should be concentrated in one plant (Kolfe) disposing of the most favourable facilities. The production program should be streamlined. Another important aspect is that nearly all transport is effected. by air, an expensive procedure with the risk of additional damage. If the goods were produced in Addis Ababa, also transport costs would be reduced since the transport of raw materials would be much cheaper.

The cardboard production should be subject to closer examination with a view to find our whether and to which extent this section should be extended or whether it should eventually be separated from the plant.

The workshop and the maintenance unit have to be completely re-established. It is proposed to establish one joint workshop for both. Ehtiopian Household Utensils and Ethiosider Iron & Steel in Asmara.

Investment costs for such a joint workshop are estimated at US Dollar 150.000. If each plant establishes its own workshop, investment costs are estimated at US Dollar 100.000 each.

In any case to utilize the existing flanging machine, which presently is standing idle most of the time, it is recommended to produce oval or any angular sheet metal items (such as e.g. trays).

Furthermore it is recommended to make use of the chrome polishing facilities existing with Ethiosider Iron & Steel Factory.

Additional products to be included into the production program of Ethiopian Household Utensils are principally the same as those recommended for Kolfe Household Utensils.

The improvement of manufacturing facilities will naturally also improve the product quality, with regard to precision and finish.

Personnel

The Department Heads should have the possibility of visiting two factories abroad specializing in similar production lines. Time needed for this informative trip : 6 - 8 weeks.

Some skilled workers in production and in maintenance and repair should attend local training courses.

For the sections pressing and sheet metal processing, one advisor will be needed for a period of at least two years. This expert should have a profound knowledge on the production of household utensils, on the operation of respective machines and the design of tools, as well as a capability to train local personnel.

The enamelling shop also needs assistance of an expert specializing in enamelling operations and having experiences in training workers on their jobs. He should be assigned for a period of two years.

For the plastic materials unit, an advisor should be assigned for a period of 3 - 6 months. Necessary qualification : Knowledge in processing plastic materials, in building tools and molds, experience in the design of work places for the mechanical finishing of plastic parts.

Summary

Production machinery and equipment are in extremely bad condition. Since household utensils are badly needed in the country, all efforts should be made to rehabilitate production facilities. The production program should be streamlined and partly (aluminium products) shifted to Kolfe. A new workshop should be implemented as joint facility for Ethiopian Household Utensils and Ethiosider Iron & Steel as well. Department heads should have the opportunity to visit modern plants in industrialised countries (jointly with the department heads of Kolfe). Three expatriate experts will be needed to perform the rehabilitation program and bring the production lines to efficient operation.

A survey of investment and personnel requirements is given on the next pages.

PERSONNEL REQUIREMENTS

Table 13 Training			
Qualification	Number	Period local (months)	Period abroad (months)
Top Management/ Department Heads	3		2
Skilled Workers	10	12	
Maintenance & Repair	2	12	
Total	15	24	

Expatriate Experts		
Qualification	Number	Period (months)
Metal-Production Expert	1	24
Enamelling Expert	1	24
Plastic Processing Expert	1	6
Total	3	54

Table 14 Investment Requirements

	Item	.000 US Dollar					Total
		1982	1983	1984	1985	1986-90	
1	General Reconditioning	100					100
2	Pressing Shop	300					300
3	Enamelling Shop	150					150
4	Workshop	150					150
	Total	700					700

4.2.8 United Abilities

This plant, producing flash light batteries and umbrellas, is designed to employ disabled workers. So usual terms and criteria of technology and productivity cannot be applied.

The umbrella line was started as early as in 1964 and start-up of manufacturing batteries was in 1973.

At present, United Abilities employ 215 people in the umbrella line and 18o people in the battery line, out of which 85 % of total employees are disabled. 55 people work in technical supervision, administrative and auxiliary jobs, including drivers, gardeners, etc. Roughly 7o % of all employed are male, 3o % female. Fresent output of United Abilities is approximately 6oo.ooo umbrellas per year (several types) and approx. 14 million batteries per year (one type: R 2o). Production equipment would allow manufacturing of two smaller types of batteries, but due to limited demand these types are not manufactured for the time being.

In general, the United Abilities plant makes a good impression. Everything seems to be well managed and everybody must appreciate that the National Metal Working Corporation and in particular the plant management are doing a great job for poor unlucky people and contribute as well to the country's supply with actually needed products.

Umbrella Line

Each individual working place has been designed according to the abilities/ disabilities of the specific worker. Nevertheless the whole manufacturing technology and machinery and equipment are not at a modern standard. Improvements of machinery and equipment would also allow higher quality of finished products and better working conditions for the workers. As the products do, however, meet present local demand, modernization of this line is not so urgent.

Raw materials (steel and silk cloth) are imported. Plastic parts are made with an 8 years old Japanese injection molding machine from imported plastic raw material. At present, no Ethiopian workshop is able to supply United Abilities with new molds.

The working environment could be improved essentially only in a larger building providing more space. In particular, when production output is to be extended a larger building or a second hall is needed.

Battery Line

Know how and special equipment for this line was provided by Tayo Takasayo Dry Battery Co., Japan. They also supply spares and chemical raw materials.

Annual production targets are defined jointly by the General Manager and the management of the Corporation. Procurement of raw materials and spares is handled by NMWC according to a "Purchasing Schedule" which is worked out and submitted to the Corporation every 6 months. Sales are handled by Ethiopian Domestic Distribution Corporation (EDDC).

Since technology and the production line originate from 1973, improvement is urgently needed in order to avoid growing demand of spares and to reduce costs, expand capacity (annual consumption amounts to approx. 2o - 25 million per year) and create additional working places. An improvement program is already under work in collaboration between United Abilities and Tayo Takasayo Dry Battery Company,resulting to investments of approx. 3 million US Dollar.

Exhaust equipment is most urgentiy needed in the battery production line, in particular in the raw material section. This would contribute to better and healthier working conditions.

It should be possible to raise special funds for United Abilities in Japan and/or European countries from caritative institutions, even outside and beyond the ordinary program of the Government. This in particular as the year 1981 happens to be officially the "International Year of disabled".

The department heads should attend NPC-training courses, in particular in cost accounting and control, production planning and control, materials management.

Details of measures for improvement are not given here as an improvement program has already been worked out and shall be realized as soon as possible.

4.3 Private Industries

Private industries, as a part of the Ethiopian metal working sector, have already been subject of consideration in chapt. 3.2.3.Within the scope of this study, several of the major private industries were visited in Addis Ababa and Asmara. The questions discussed during these visits with the owners and managers corresponded to those of the detailed questionnaires for the analysis of NMWC plants. It is quite understandable that the private managers were relatively relucant to convey their confidential company data. For this reason, private industries are not described each individually but generally as a whole.

Generally it can be stated, that the productivity in private plants is by far higher than that in comparable NMWC plants. The products manufactured in these plants are of better quality, the workshops are generally cleaner and more orderly. Machinery and equipment exisiting in these plants is obolete as well, but in a better maintenance condition. Moreover, auxiliary materials(tools, appliances, etc.) being in use, reveal that these industries strictly pursue modern technology.

Remuneration of the workers employed in private industries is by 8o% higher on an average than in comparable other plants. In addition hereto, the workers are better motivated by additional premiums for attendance, for meeting production plans, quality standards, etc. Each own initiative of a worker is thus honoured by special premiums, a procedure which results in higher productivity and preparedness for performance. The result of such motivation of all employees is that manufactured products conform with market requirements, both from the quality as from the price point of view. For instance, the prices for chairs produced in private plants are considerably lower than those quoted for chairs from NMWC plants; and the quality is even better. Since raw materials are supplied by same sources, these differences in products are obviously due to the working methods and more careful work done in private plants.

The following examples underline above statements: the welding joints of tubular frames are smoothed accurately, the screws in seats are scuttled and parallel to surface, edgeds of wooden parts are rounded off, varnishes are workmanlike.

In the window and door production departments it was observed that the profiles (from Kaliti) are cut very exactly and are fitting precisely. Welding joints are protected against corrosion by zinc paint. The fittings and fixtures are partly of better quality, in any case they are mounted very accurately.

Generally it was observed: productivity and profitability are given such attention which is necessary to achieve workmanlike and high performance. As was observed during the visits, the private industries are run to capacity, a fact that proves their good market position. A major obstacle to production extension was said to be the tight raw material supply situation.

Since the private lay major emphasis on controlling the economic efficiency of their performance, they also use more advanced methods and systems of management and business administration, in particular for cost control.

Also in the field of standardization and classification, the private plants have already started some first practical approaches, though there is not yet any standardization and classification in Ethiopia.

As an outstanding example of private industries the Automotive Manufacturing Company of Ethiopia (AMCE), a joint venture between the State of Ethicpia (1o %) and FIAT, is described :

A.M.C.E. Automotive Manufacturing Company of Ethiopia (FIAT)	
Production Programme:	Trucks Buses Tippers
Employees:	123, thereof administrative personnel: 19 = 15 %
Turnover in 1980:	29,535,000 Birr
Turnover per capita:	240,122 Birr
Absenteeism rate:	approx. 10 %
Productivity rate:	approx. 80 %

Distribution of products being produced (312 vehicles in 1980):

5 tons trucks:	32 pieces	= 10 %
10 tons trucks:	217 pieces	= 70 %
10 tons tippers:	60 pieces	= 19 %
buses, 26-seater:	3 pieces	= 1 %
	312	100 %

Management:

The management team, being composed of expatriate experts, is doing a qualified and efficient job.

Production:

All production facilities, though no more corresponding to most modern standards as well, are in an excellent condition. The production area was outstandingly clean and orderly. The individual working places are well-designed and -equipped.

Personnel:

The personnel is trained on the job by special training courses. The quality control unit is functioning well and is equipped with the necessary facilities. There are 4 persons engaged in quality control, i.e. 5 % of all employees engaged in production.

Capacity:

At present, the plant is not run to full capacity. It is felt highly recommendable that all parties concerned should try their utmost to reach full capacity utilization of these valuable production potentials, in order to assure a reliable and sufficient supply of the Ethopian market.

With a view to the excellent conditions of this plant, considerations should be made in the direction of installing here a training center for truck repair shops.

Furthermore it should be reflected whether certain parts, such as side boards, tanks, etc., can be supplied by Ethiopian companies in order to reduce necessary imports. Such a cooperation is, however, subject to certain quality standards which must correspond to those of AMCE.

For further development of private industries in Socialist Ethiopia the following policy will be appropriate :

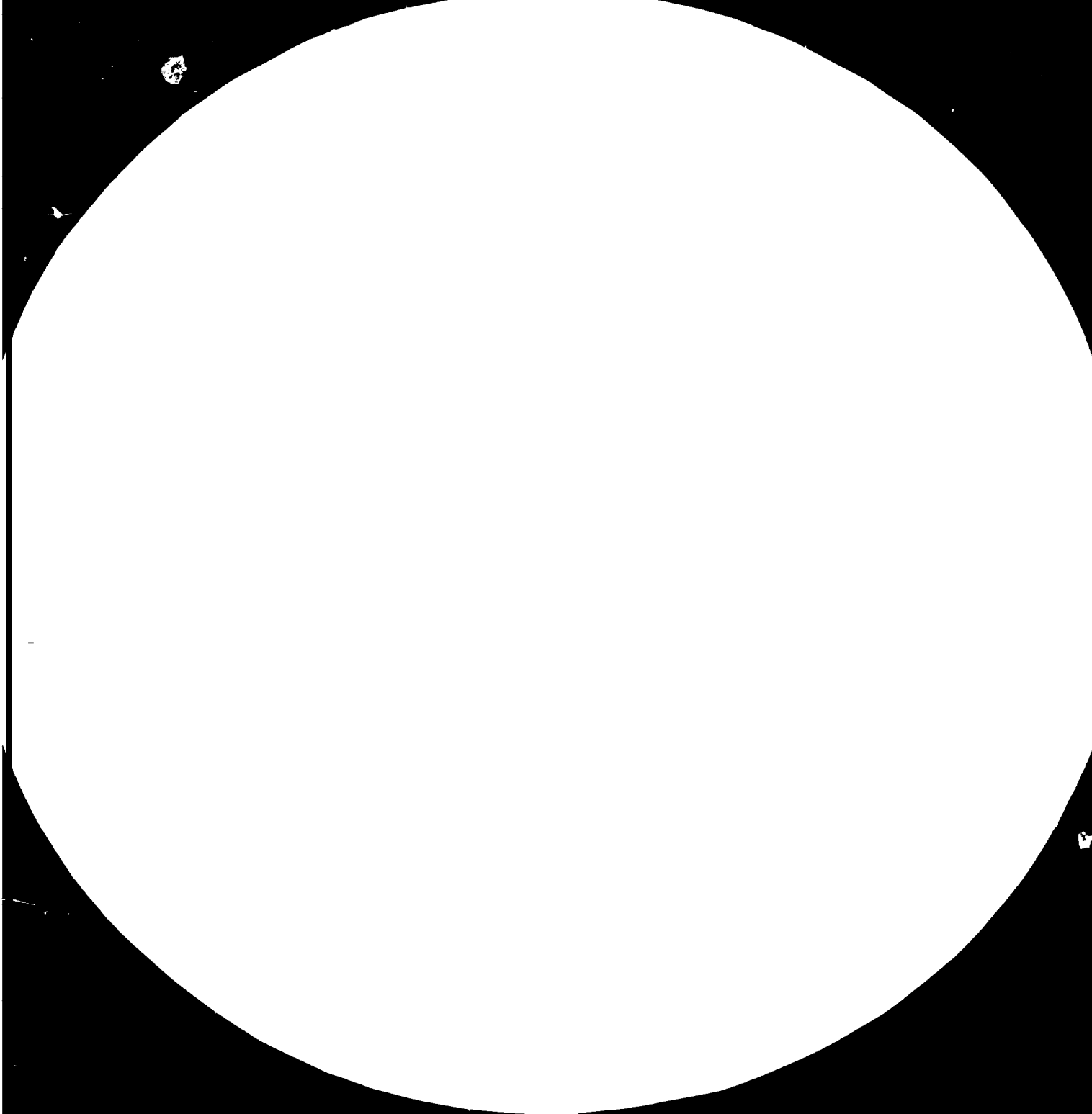
While Small Scale Industries are sponsored by HASIDA and not by NMWC it should be left to HASIDA to design and implement adequate means an measures for improving and promoting this part of metal working industries.

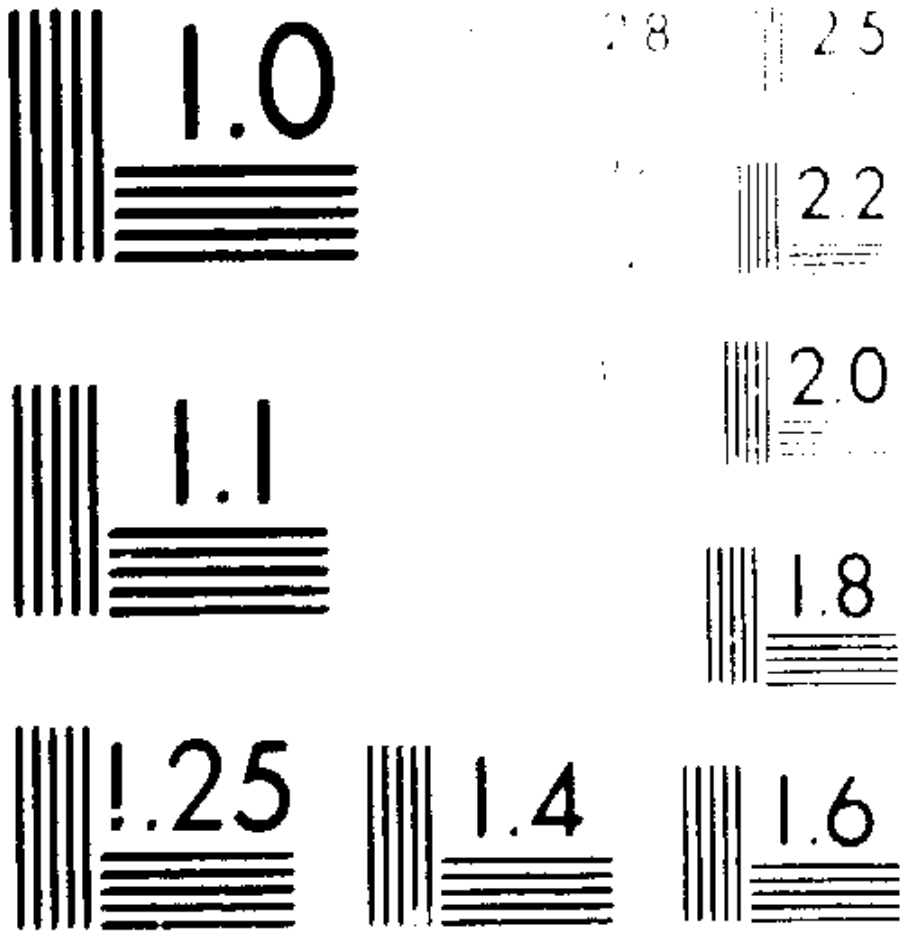
Medium sized private industries as mentioned (see Annex 16) should be given due to consideration, within the general industrial - specifically metal working - development plans and measures.

Considering and respecting the foreign currency requirements of private industries for e.g. imports of raw materials, spares and machinery and equipment it must be borne in mind that several hundred small and about 25 medium sized private enterprises employ more than 2ooo workers, which is is even more than all NMWC-plants (see chapter 3.2.2 and Annex 8).

Leaving details to their private initiative the Government/Ministry should take care that private industries have access to financing capital, that they have the possibility of procuring needed raw materials, spares and machinery locally and abroad and that they can send personnel to public training institutions, all this in an adequate relation to their contribution to employment and to the GNP.

As may be learnt from other developing countries private initiative and investment can contribute essentially to growth and wealth of an economy. Within the general rules and frame work of overall government policy private entrepreneurship can provide incentives and opportunities for efficiency without omitting the aim of more equal distribution of incomes.

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TERMINAL SECTION

5. New Projects

5. New Projects

As outlined in the previous chapters priorities for further development of Ethiopia's metal working industries and allocation of funds must be set as follows :

1. Training and development of skilled labour and management
2. Rehabilitation of existing industries
3. Expansion of existing industries
4. New projects.

Rehabilitation and expansion of existing plants as outlined in chapter 4.2., will require utmost efforts to meet the related financial and personnel requirements for at least the next 3 - 5 years to come.

New projects will have to contribute to improved development performance in line with the 1o Years' Development Plan by closing crucial gaps in the existing structure. They must be designed to reduce import requirements and make use of local resources.
Quite a number of new investment projects are under discussion (see annex 13).
No doubt, the enormous capital means needed for implementing these projects can only be raised within the course of several decades.
On the other hand, it was stressed several times in this report that new projects will only be able to work efficiently or are purposeful at all, if sufficient qualified personnel is available. Just training the minimum requirements of qualified personnel for the production plants already exisiting, will however take at least 5 - 8, most probably even 1o years.

Within the frame of overall economic development, first priority should therefore be given to agriculture, cattle raising,forestry and fishery, since these sectors do not require so much highly qualified but more semi-skilled personnel than it is needed for manufacturing industries and in particular for the engineering sector of which metal working industries are a part. Engineering industries, however, will have to serve agriculture and agroindustries by providing maintenance and repair services and supplying spare parts and components.

Therefor one may of course not renounce to most urgently needed investment measures which certainly do have to be executed as rapidly as possible. These investments are necessary on the one hand to secure viz. improve the serviceability of existing industries (repair shop, toolshop, foundry for spares, e.g.) and on the other hand, to start local manufacture of urgently needed products so as to save foreign exchange by import substitution. Quite a number of additional products which can be produced with existing or improved facilities are named in chapter 4.2. Some investment measures require relatively low capital amounts but are very effective. Thus the manufacture of machine screws with Ethio Iron & Steel should be started as soon as possible. Investments required for that just amount to 450,000 US Dollar. Such measures should, however, be linked to the assignment of an experienced expatriate expert being made available (possibly by the machine supplier) for a period of 2 years, in order to secure production and quality and train local personnel accordingly.

As indicated above for various reasons only relatively few out of the long list of desirable new projects can be realized during the next years to come.
Priority will have to be given on the basis of comprehensive cost-benefit analysis.

The very first new investment to be made should be the implementation of the new smelter and rolling mill which were provided for Ethiosider Iron & Steel Factory and which was delivered to the plant site but not yet installed (see chapter 4.2.2).

New projects under consideration with good potential are :

- foundry
- agricultural implements and tools
- pump manufacturing
- agricultural tractor assembling
- truck assembling
- central machine repair/tool shop and training centre.

The proposition for the Central Machine Repair/Tool Shop and Training Centre is a result of this study.

As described in chapter 4.2 most of the installed machines in NMWC-plants are rather old; they are serving more or less satisfactorily and many of them will have to do so for quite a number of years to come, as replacements can be done only step by step. These sold machines, however, require proper maintenance and also repairs. Repair includes frequently spare parts. An efficient repair service and supply of spare parts therefore is of essential importance for future performance of Ethiopia's metal working industries and also all other industries.

In order to meet the country's cruical need for spare parts, tools and repair services it is strongly recommended to establish as soon as possible a central repair and tool shop with a combined training centre. It shall be designed to supply the whole metal working plants of the Corporation - and possibly also other plants - with the tools required in these plants, to repair worn out tools and to assist in putting into operation new tools in the production plants.

In order to come into operation quickly it shall be designed to use easily available raw materials and components;close collaboration with the planned productive foundry will be an asset.

From the personnel point of view, the best manpower available in the country should be recruited. However, since it is expected that even these people will not fully comply with the qualification level required by this shop, an additional team of expatriate experts will be necessary to fulfil the tasks as set forth above (2 - 3 experts for 3 - 4 years). These expatriate experts should also exercise training functions.

Machinery and equipment of this workshop should comprise modern machine tools, a hardening shop and a metallurgical laboratory. The shop will employ 6o - 7o specialized workers and require machinery investments of about 3 million US Dollar. As up to now no detailed study has been made yet, the layout and needed equipment has been elaborated and is given in Annex 16.(It should be noted that this information is by far more than could normally be expected under a sector study).

The foundry project has been under investigation since several years, see e.g. UNDP/UNIDO project report "Establishment of Mechanical Workshop With Integrated Foundry and Forging Sections", June 1979. The foundry is designed to have a capacity of 14oo tons of gray iron and non-ferrous castings per year with possible extension to 18oo tons per year. Capital requirement are calculated at 9 million Ethio. Birr, annual sales at nearly 8 million Ethio. Birr; employment will be about 25o. The forging section is designed to have a capacity of 1.ooo tons of forged parts per year. Capital requirements are calculated at 6.6 million Ethio. Birr, annual sales at nearly 9 million Ethio. Birr; employment will be 42.

It is recommended to include facilities for steel casting. As raw material scrap and billets can be used. The produce would fill a cruical gap in Ethiopia's metal working industries. In order to have the opportunity of including steel casting the furnace must be an electric arc furnace. The integration of steel casting would increase total investment capital by not more than 2o to 25.ooo US Dollar.

This project, including training facilities requires high priority and should be implemented simultaneoulsy and coordinated with the Central Repair and Tool Shop.

Another project of high priority is the Agriculture Machinery Improvement Centre which has been also under FAO/UNIDO investigation.
This centre should be linked to existing facilities at Nazareth and Assila. Cost of additionally needed machinery and equipment was calculated in 1979 at approx. Ethio. Birr 0,5 million; including buildings, constructions and auxiliary equipment total investment cost at 1982 prices are likely to amount to approx. Ehtio. Birr 1 million.

It should be checked whether the - relatively small - sickle project which is also under discussion should be integrated within this project.

Another recommendable project which would serve agriculture would be an Irrigation Pump Project. It should start with an engineering maintenance and repair shop and develop assembling and at a later stage, progressive manufacturing. A study on this project, including wind driven pumps should be made soon. In a recently performed similar study on a progressive pump assembly and engineering project in another African country equipment investments were calculated in 1979 at about US Dollar 350,000, a new foundry section at another US Dollar 400.000.- .

The aforementioned projects are:

- urgently needed in the country
- require relatively low investments
- can be expected to yield a high cost/benefit ratio
- can be realized quickly.

Besides the rehabilitation programmes as recommended in chapter 4.2 of this report they should be given highest attention and priority.

Mentioned cost for all projects have to be recalculated, considering inflation (app.8-10%p.a. internationally) as well as actual exchange rates for US Dollar or Deutsche Mark. Compared with 1979, e.g., 1982-prices are about 20 - 25 % higher.

The assembling plants for agricultural tractors and trucks have come into discussion more recently. They would contribute considerably to the total production value of the sector. They will require, however, considerable imports of components while their added value contribution is relatively low.

In 1980/81 the installed capacity of A.M.C.E. was not fully used.
It should be investigated, therefor, whether it would not be more recommendable to add a tractor assembling line to the existing truck assembling line with A.M.C.E. In any case these projects can only be realized in a license co-operation/joint venture with an experienced truck and tractor manufacturer from a highly industrialized country.

Further projects under discussion are :

- batteries for motor vehicles (additional capacities)
- electric bulbs
- radio assembly (UNIDO-study made)
- "mini-steel plant".

Particularly for the radio assembly, but also for electric bulb manufacturing, it must be expected - according to the consultant's experience - that local production would be relatively expensive and that all in all, foreign change will hardly be saved since most of the components will have to be imported. So these projects should not be given priority and they should be taken into new consideration after realization of those projects which are needed urgently.

Battery production for motor vehicles should be developed according to requirements for newly assembled cars and trucks and replacements in old cars, trucks and motorcycles. According to experience complete manufacturing is economic only at relatively big capacities (depending on product mix); for smaller capacities production of selected parts, in particular production of salt-free water and mixing with concentrated sulphuric acid to acid of appropriate battery-concentration and assembling with imported components is more recommendable.

A "Mini Steel Plant" with integrated continuous casting-rolling mill has been under discussion already severyl years. Existing plans propose a capacity of 3o - 5o.ooo tons of rounds, beams, bars, rods and other items per year. As raw material iron ore and pellets as well are under discussion; natural gas shall serve as fuel and also as mean for direct reduction. Total investment cost have been estimated at not less than 1oo million US Dollar.

Since this metal producing project would represent a new technology for Ethiopia's existing metal working industries, some remarks may be made :

So far,only one plant of the proposed type (technology and capacity) is in operation (in Birma). It is an integrated plant, comprising a direct reduction unit using natural gas, a continuous casting line and a rollung mill. The applied technology is Italian (Kinglor). It is reported that performance (technical feasibility) is not satisfactory. The reasons are supposed to be special technical problems because of the rather low capacity. Minimum-capacities of other direct reduction technologies with satisfactory technical performance require higher capacities, so e.g. Danieli 1oo.ooo tons per year: Codir/Krupp 15o.ooo tons per year, Korf 4oo.ooo tons per year.

Moreever essential prerequesits for the economic feasibility of such a plant are that it is located next to the gas field and that local iron ore or cheap (site at seaside) sponge iron/pellets can be used.

Local iron are with sufficiently large grain size is necessary since pelletizing of local iron ore fines in such small quantities is not feasible because of the economy of scale. The import of iron ore or pellets may also be uneconomic due to high inland transport cost (no railway or river boat transport is available.)

If cheap electric power is available the technology of using coal/charcoal in an electric furnace (Krupp technology) provides a better solution for a mini capacity of 5o.ooo tons per year.
Investments cost for an integrated plant amount to about 8o million US Dollar.
Charcoal can be produced from wood grown in special plantations.

It is strongly recommended that the mini steel project be carefully studied and appraised before a final decision is taken.

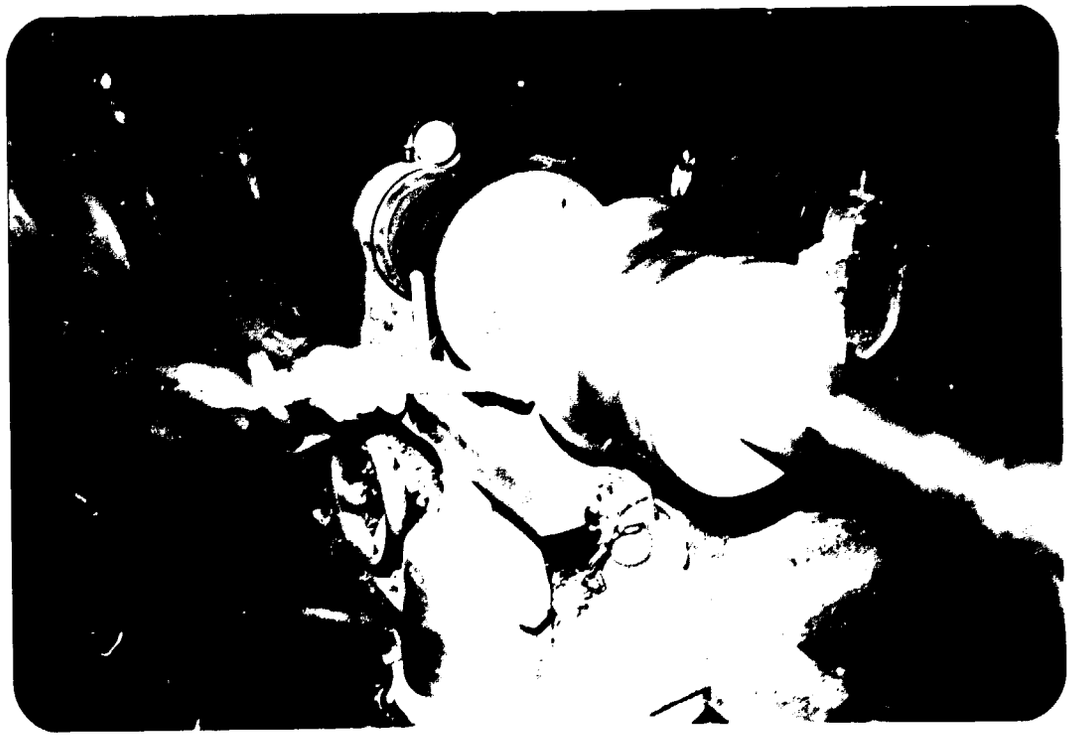
Some Examples

demonstrating poor production management

Valuable raw materials
spoiled by bad handling and storage

Disorder, ineffective flow of materials

Poor technology/arrangement of equipment



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ANNEXES

LIST OF ANNEXES

ANNEX 1

UNIDO's Terms of Reference

Annex D

DP/ETH/80/013

UNITED NATIONS DEVELOPMENT PROGRAMME

AND

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

TERMS OF REFERENCE

FOR

SURVEY OF THE ETHIOPIAN ENGINEERING AND METAL WORKING SECTOR

VIENNA,
September 1980

TERMS OF REFERENCE

A SURVEY OF THE ETHIOPIAN ENGINEERING AND METAL WORKING SECTOR

1. Background

According to a recent general study, Ethiopia's metal processing sector can be grouped according to products as follows:

A. Basic iron and steel industries producing mainly construction materials such as reinforcement iron bars, wires, corrugated iron sheets, nails, structure and furniture pipes and agricultural implements;

B. Manufacture of handtools, general hardware and cutlery including aluminium household utensils and spare parts;

C. Manufacture of structural metal products such as structures, furniture, large drums and tanks;

D. Manufacture of fabricated metal products such as crown corks, cans, household utensils, buckets, foundry products, window and door frames.

The National Metal Works Corporation (NMWC) was established in 1975 to operate and develop the metal working industries in the state sector. NMWC at present manages eight factories that are engaged in the basic metal industry (processing various forms of sheets, sectors, wires, etc.,) and the engineering industry (processing of sheets, sectors, wires, etc., into various utensils, tools, fittings, etc.) NMWC produces about 28,000 tons of products in the two categories of activities and employs about 1900 persons.

There are also enterprises in the private sector that are significant in the production of engineering products. Furthermore cottage and artisan operations supply quantities of simple handicrafts, agricultural implements and household utensils.

Since the metal and engineering industries provide the impetus for the expansion of growth activities in the economy, it is important to give high attention to its development. At present, many difficulties confront the existing industries. Shortages in the supply and availability of raw materials, difficulties connected with production, acquisition and adaptation of technology, the shortage of skilled manpower and the scarcity of available investment capital are some of the difficulties. To overcome these difficulties, it is necessary to have accurate information on the present state of the industry and the choices available for rehabilitation and development.

2. Development Objective

The ~~development~~ objective of the project is to accelerate the development of the basic metal and engineering industrial sub-sector.

3. Immediate Objectives

The immediate objectives of the project are: (1) the improvement of the present state and operating efficiency of the industry so that more of the important needs of the basic metal and engineering markets are satisfied; and (2) the determination of the appropriate steps that may be followed to develop the potential of the industry in a way that is economically and socially desirable.

Some of the immediate objectives of the project may be summarized as follows:

- To assess the current status of the domestic basic metals and engineering industries;
- To conduct a detailed study on future prospects of the sector especially in regard to the identification of new

investment opportunities, the acquisition and development of appropriate technology and the development of skilled manpower;

- To provide information and recommendations necessary to formulate policies and strategies for the planned development of the sector.

4. Activities

A survey of the metal and engineering sector will be carried out through a reputable consulting firm. The main activities under this survey can be summarized as follows:

A. Review and appraisal of existing production establishment;

B. Identification of new development opportunities;

C. Assessment of manpower requirements and charting manpower development plans;

D. Evaluation of management information systems;

E. Estimates of financial requirements.

A. Review and Appraisal of Existing Establishment

This aspect of the study will concentrate primarily on those plants under the NMWC and on an existing assembly plant for four-wheel drive vehicles, trucks and microbuses. General attention will also be given to enterprises in the private sector. The following analysis are is required for evaluating the existing production units.

1. Calculate the current production capability of each factory indicating where process sections are not balanced and whether the acquisition of balancing machinery would be appropriate. Quantify the benefits that would result from such acquisition.

.../...

2. Analyse the operating performance of each factory and make comparisons with appropriate standards.

3. Analyse prevailing machine productivity and efficiency levels in each factory, indicate appropriate target standards and what steps should be taken to attain such standards.

4. Analyse the levels of quality attained and recommend steps to be followed and measures to be taken to bring about appropriate improvements.

5. Recommend what improvements, replacement, or additions are necessary for:

   - buildings;
   - service installations including process effluent disposal;
   - storage facilities;
   - workshop and other auxiliaries.

6. Suggest an optimum range of products to make the most effective use of the existing production facilities and the available raw materials so that overall production may be rationalized and market demand satisfied.

7. Prepare registers of all items of machinery and equipment, where such list is not available, giving significant details on:

   - general description including make and year of manufacture;
   - year installed in factory; and
   - ratings such as running speed, rate of production, capacity, etc.

8. Assess and provide written details of the conditions and degree of obsolescence of machinery and equipment and draw up proposals to indicate what improvements, replacement additions are necessary and estimate expenditures that should be incurred to provide an appropriate standard of production.

Such proposals should be arranged to cover:

- the years 1981 and 1982;
- the years 1983, 84 and 85.

In carrying out the assessment, it is necessary to catagorize the findings and recommendations into:

- What is and will continue to be economically operational without or with only minor modifications giving an estimate of the remaining service life on the assumption of normal operation and maintenance;
- What can be made economically operational with substantial but acceptable modifications, again giving an estimate of the remaining service life;
- What is unsatisfactory or uneconomical and should be withdrawn from service or replaced, giving justifications for the choice of any replacement items recommended.

Furthermore, quantitative estimates of the benefits which would result from the implementation of the proposal should be provided.

9. Assess the desirability of using alternative methods of production to increase either the capacity of the basic metal and engineering industries sector and/or the quality of the manufactured products. Suggest also the economic plant size for such processes and quantify the benefits.

10. Devise an efficient maintenance management systems mainly for the plants under the NMWC and prepare:

- preventive maintenance schedules;
- overhauling schedules;
- fault recording systems.

11. Evaluate the need and propose a method for the establishment of centralized repair and maintenance institutions.

12. Assess the condition of the working environment from the aspects of the contribution of labour performance, and the provision of adequate health care and safety facilities.

13. Assess the existing metal processing capability in the private sector, including the small scale and handicraft industries, and recommend ways and measures to be taken for their development.

B. Identification of New Development Opportunities

1. Collection and analysis of main economic indicators will be carried out for the whole metal processing sector. The data collected and the analysis presented will be the basis for consideration on future development plans of the sector in general. It should identify promising investment opportunities and indicate the subsequent measures that might be taken to advance the opportunities closer to implementation.

2. The work in this area would include the following:

a) assess the past and current levels of demand and consumption and the share of domestic production of the metal processing industry;

b) investigate the various areas of the metal processing industry with the aim of making projections of consumption trends over the next ten years;

c) identify new investment opportunities that may be considered desirable either on grounds of market demands or because they may be catalytic in stimulating the growth of the economy. Information on these opportunities should include indications of viability based on estimates of capital costs and magnitudes and costs of major inputs. This would be complemented, where appropriate, by other criteria of desirability . There should also be recommendation on follow-up action that may be taken to bring the identified opportunities closer to implementation;

d) investigate alternative technologies available for the implementation of the identified investment opportunities and indicate those considered suitable for Ethiopian conditions, taking future trends and likely developments into account. Recommend follow-up action to be taken in the acquisition and adaptation of the appropriate technology.

C. <u>Assessment of manpower requirements and charting manpower development plans</u>

1. The analysis of the existing manpower situation and suggestions on the optimum requirements of manpower will be the basis for considerations on future development of a strategy on the allocation of the available manpower, arrangement of training programmes and the establishment of training centres for the metal processing sector.

2. The work in this area shall include the following:

a) analyse the work force at each factory in relation to machinery and equipment in use and the volume and quality of products. Compare the wages categories and numbers currently engaged with an optimum estimate of requirements;

.../...

b) assess the levels of skill available in each factory and recommend measures for the upgrading of skills and the development of training programmes and facilities;

c) analyse the existing pay system for work performed. Indicate any anomalies and draw up plans to rationalize systems both for the individual plans and the whole sector;

d) suggest a system of job classification and job evaluation for the plants under the MSMC;

e) make an assessment of the sector's manpower and training requirements by skill categories and draw up plans for meeting such needs:

- over the next five years; and
- over the next fifteen years.

D. Evaluation of Management Information Systems

1. The analysis to be carried out in this area is expected to form the basis for the introduction of efficient information systems and re-organization schemes enhancing the development of the sector. The work in this area shall include the following:

2. Analyse the main institutions which deal with the control and development of the sector and evaluate their effectiveness.

3. Analyse existing methods of procuring local and imported raw materials and recommend ways of improving the methods or instituting new ones.

4. Suggest suitable systems to improve the effectiveness of production planning, production control, stock control, quality control, costing and cost control, and management accounting. Indicate the personnel requirements to carry out the duties involved.

5. Investigate the need of new institutions, such as design offices, whose establishment may accelerate the development of the sector.

.../...

D. Estimates of Financial Requirements

1. The estimates on the financial requirements will first be shown separately for (1) improvement of existing plants and (2) development of new production units. In addition, financial requirements should also be shown with local and convertible currency components.

2. Yearly forecasts should be given for a period of 15 years or for a minor period, after which last of the proposed new production facilities will have reached production at capacity so that no additional working capital is required anymore.

5. Output of the Survey

The output of the project will be a study with a recommendation on the measures required to improve the efficiency of the existing plants and institutions of the metal processing sector. It shall also provide a development plan for the plants and the sector as a whole.

In more detail, the report shall cover the following:

- review and critical evaluation of the present status of all assets, manpower production and maintenance, management practics of the plant, and the control, development and planning institutions of the sector;

- a scheme indicating what changes are required to improve utilization and organization of the sector;

- a development programme giving guideline for the industry over the next ten years and details of the parameters to be taken into account;

- a description of how the objectives are to be attained by such a developmer programmes and how to monitor progress towards such goals.

.../...

A N N E X 2

Itinery Report, 9th - 1[illegible]th Dec., 1980

ITINERARY OF INITIAL FIELD-WORK MISSION

Dr.H. Mylenbusch 9th. - 13. December 1980
UNIDO Project DP/ETH/80/013, Contract 80/149

SURVEY ON ETHIOPIAN ENGINEERING AND METAL WORKING SECTOR

1.	9th. December 1980	Departure
2.	10th.December 1980	Arrival
3.	10th.December 1980	Meeting with Mr. Martz, UNIDO
4.	10th.December 1980	Meeting at Ministry of Industries Ato Woldo, Head PPPD of the Ministry Ato Solomon, Coordinator of the Ministry Ato Gebrehikiot, Dy. Gen. Man.NMWC, Ato Nega, Economist NMWC, Mr. D. Martz, UNIDO
5.	10th.December 1980	Meeting at NMWC Ato Gebrehikiot Ato Solomon Ato Nega
6.	11th.December 1980	Meeting at NMWC Ato Gebrehikiot Ato Solomon Ato Nega
7.	11th.December 1980	Visit of Kalit Steel Works attended by Ato Solomon and Ato Nega
8.	12th.December 1980	Meeting at HASIDA Mr. Sjöblom, Project Manager Ato Solomon Ato Nega
9.	12th.December 1980	Meeting at Ministry of Industries Ato Woldo Ato Solomon Ato Gebrehikiot Ato Nega Mr.D. Martz

1o.	12th.December 198o	Visit of HASIDA-Workshop Mr. Sjöblom Ato Solomon Ato Nega
11.	12th.December 198o	Meeting at National Productivity Centre (NPC) Ato Kebede, General Manager Ato Solomon Ato Nega
12.	12th.December 198o	Final Meeting at NMWC Ato Gebrehikiot Ato Solomon Ato Nega
13.	12th.December 198o	Final Meeting with Mr. Martz, UNIDO
14.	13th.December 198o	Return

ANNEX 3

Working Plan

U N I D O - P R O J E C T

Survey of Ethiopian Metal Working Sector

DP/ETH/8o/o13

WORKING PLAN

1. Scope of Work

a.) Assessment and appraisal of existing metal working industries taking into consideration actually planned investments

b.) Rehabilitation/Improvement Program for exististing industries (1981 - 1985)

c.) Further Expansion of existing capacities for prevailing production programs.

d.) Identification of new/additional products to be produced in existing plants or new plants

e.) Perspective program for development of metal working sector indicating adequate investments (1985-199o)

2. Aspects to be considered

a.) general engineering technology

b.) specific machinery/equipment

c.) raw materials, intermediates, spares

d.) skilled labour

e.) management/in particular production-management

f.) capital requirements (local/foreign)

g.) transfer of technology

3. The survey will be performed by a team of experts consisting of

project director

economist

mechanical engineer

production engineer

Additional experts may be called in whenever the necessity arises.

4. The time schechule is as follows :

Preperatory mission	9 - 13.12.198o
Fieldwork	15.1. - 15.2.1981
Submission of draft report	End of March 1981
Discussion of Draft	21. - 26. April 1981
Submission of Final Report	End of May 1981

5. Reports

It is proposed that half of the total number of reports (1o draft and 15 final each) will be sent to UNIDO Vienna and the other copies directly to the Ministry of Industries, attention Ato Woldo, Head of PPPD.

Dr. H.Mylenbusch
Project Director
Kienbaum Consult

17th December, 198o

ANNEX 3/1

Counterpart's Questionnaire

STATISTICAL DATA

1. G.D.P. by sectors during 1970 - 1979 (80)
2. Employees by sectors 1970 - 1979
3. Added values by sector - " -
4. Investments by sector - " -
5. Imports of metal products
6. Imports of machinery, electrical , transport
7. Exports of metal products
8. Development Plans
9. List - name, address, type of products, quantity of annual (monthly) production, employees - of existing private metal working industries.

PLANT : _____

1. Production program - specify by type/material/dimensions/quality et.

2. Production output of each article: 1970, 1975, 1976, 1977, 1978, 1979, 1980 by month (tons and value);

3. Installed (theoretical) capacity by products;

4. Installed machinery and equipment specify by type/capacity/dimensions/precision/age/etc.

5. Usual stock (quantity) of:

   - raw materials
   - intermediates
   - finished goods

6. Personnel, number, during 1970 through 1980

   Specified by
   - unskilled
   - skilled
   - administration/management

7. Investments planned for 1981 or later.

Questionnaire: Ethiopian Metal Working Industry

1. Date: 25-1-81

   Interviewers: MTL RUO

   C P: Mr. Solomon

2. Name of plant: Ethiopian [illegible] Foundry

   Former name of plant: [illegible] Company

   Address: Akaki BCK4

   P. O. Box:

   Telephone:

   Telex:

   Date of foundation: 1961

   Date of nationalization: 1975

   Name and position of person (s) interviewed:

   Gen. Man. BEGGASA BEYE

   Acc. Dep. Head Mr. YOSEF TEWOLDE BERHAN

3. Status of company (check one)

   State-owned = ✓

   Private =

   State-/private = (ratio 100 %)

4. State according to which calendar year your accounts and books are being kept. (check one)

   Fiscal year (year ending July 7th) ☐

   Ethiopian year (year ending September, 10) ☐

   Gregorian year (year ending December, 31) ☐

   Other June 30 Specity _____

..//..

5. Production programme, production, production capacity (1979/80) EY 72)

Product	1S1C-No	Production			Capacity	Notes
		Quantity	Unit	Price		
[illegible] Bar. 6 – ⌀ 32 mm 6-8-10-12-14 16-18-20-22 24-26-28 30-32 ⌀		~~9.-23-tc~~ 9.705	tc	11.760.980 Br.	[illegible] 3 shift	1 shift
Nails various		3 495	tc	6.001.565 Br.		working 2 shifts
Bed spring		215	tc	560.456 Birr		1 shift
Fencing wire		51	tc	85.750 Birr		1 shift
Barb. wire		279	tc	329.610		2 shifts
Mesh Wire		78	tc	105.344	tc [illegible]	
		Σ 4 582		Σ [illegible] zus. = 18.838.[illegible]		

1. ex factory unit price

6. New lines of production taken up between 1976/77 and 1979/80 (Fy 68 and 72)

Product	ISIC-No	Year	Initial Capacity	Notes
NC				

7. Plans

7.1 Expansion of already existing lines of production
a) up to 1984/85)
(E Y '77)
b) Upto 1989/90 (EY'81)

Product	IS1C-NO	Year	Additional Capacity	Notes
a)				
b)				

b)

7.2 New lines of production a) up to 1984/85 - EY '77)
b) Up to 1989/90 - EY '82)

Product	IS1C-No	Year	Capacity	Notes

7. Material Inputs (1979/80 - BY 72)

NO	Type of input	?IC-No	Quantity (unit)	Value (currency)	Origin (country)	Prices of inputs: High	Prices of inputs: Fair	Prices of inputs: Low	Notes
	billets		1.412 to	1,[illegible] [illegible]	[illegible]		X		[illegible] for all dates
	ingots out of scrap		1.172 to	136.600 [illegible]	[illegible]				
	Wire 5,5 low carbon		116 to	143,200 [illegible]					
	" 2,2 galvanized		143 to	[illegible] [illegible]	JAPAN				
	Wire 5.7 low carbon		139 to	140.[illegible] [illegible]					

...///...

8. Development of turnover, number of employees, total wages and salaries

Item	1975/76	1976/77	1977/78	1978/79	1979/80	1980-81 (istimate
	'68	69	70	71	72	73
Turnover (x1,000 Birr) In million Birr	>	9,450 ~~9.95~~	10,250 ~~10.25~~	12,369 ~~12.36~~	16,540 ~~16.54~~	14,074
Number of employees		267	289	337	395	400
Wages and salaries (x1,000 Birr		682 ~~682.290~~	954 ~~954,180~~	1,072 ~~1,072,424~~	1,036 ~~1,036,088~~	10,728

9. Development of unit prices of major products

Product*	1975/76	1976/77	1977/78	1978/79	1979/80	1980-81
	'68	'69	'70	71	72	73
Iron Nails	-	1.30	1.30	1.50	1.51	1.51
	-					
Fencing Net.	-	1.65	1.65	2.50	2.50	2.50

* same as do as under point 5

..//..

10. Investment in recent years (1975/76 to 1979/80/ '68 - 72)

	Type*	ISIC No	Year	Cost Currency	Origin (country)	Supplies	Quality Original	Quality Present
1.	Draw bench (TANISAKA WIRE DRAWING MACHINE)		1976/77 77/78	~~[illegible]~~ 847,094.90	Japan	MITSUI & CO LTD		
2.	NAILS Making Machine		78/79	236,917.44	Czechoslavakia	STROJ-IMPORT		

Product		Consumer Sector		Numbersand regional distribution of main consumers
Description	1S1C No	Description	1S1C No	

11. Main consumer sectors by product

12. Which sectors will be for which products the main consumer in the next 5 and so years?

13. Company data

13.1. Employees 397

Staff incl. Clerks ~~61~~ 61

	Eng.	Techn.	Skilled workers	Un skilled
direct production	2	-	~~40~~	~~230~~ 200
+ indirect "	1	-	40	30
quality control	-	-	-	-

13.2. Productivity

available machine hours/month over all in one shift _____ two shifts _____

" labor hours /month theoretical _____ . actual _____

overtime in general per month/hours 26.529 . production 19.843 administration 6.686

+ storage, transport, maintenance

13.3. Plant lay out

space over all	152,450	sqm
sheltered area	12,018	sqm
administration	474	sqm
production	7,615	sqm
storage raw material	6,579	sqm
" finshed goods	1,660	sqm
maintenance area	250	sqm
social rooms as cafeteria, first aid ect.	406	sqm

13.4. Energy supply

electricity input	KVA			volts	
water available	cbm/h				
industrial water	"				
railroad connection	yes	☐	no	☒	used ☐

installed electric consumption by machines — KVA ☐

13.5. PKt. 13 write in full in here

in this company _____

13.5 Problem Analysis*

Problem Evaluation Schema

Sector	Evaluation Groups 4	3	2	1	Remarks
Supplies	✓				
Production		✓			
Manpower	✓				NO
Marketing					
Financing		✓			
Management	✓				

4 = very important
3 = important
2 = less important
1 = not important

Why they still remain?

What is the planning of the Company in changing products and why?

What kind of new products are planned for the near future and in long range?

reason for

* All points have to be seen from the design point of view

..//..

14. Production

14.1Ch. 14.1 Man

14.2C . 8.2 Machines and Equipment

14.3C 8.3 Material

14.4Ch. Methods

14.5 Organisation

14.6 Jeneral/Assessment

14.1 Production : Man

14.1.1.	Level of skill required per product ☒ High ☐ Med. ☐ Low ☐ Non
14.1.2.	Training Need per product /~~New Product~~ Time: 3 month - 6 month - 12 month more No. of person ☐ - ☐ - ☐ ☒
14.1.3.	Working Hours per Month (30 days) Labour: ~~50~~ - 100 100 - 200 Birr Foremen: 150 - 250 Mgtm: 450 - 700
14.1.4.	Payment: Month/Day/Week/Other (Birr) Labour: Month Foremen: Mgtm:
14.1.5.	Other Benefits: Transport / Clothing
14.1.6.	Working Conditions: (Labour) Excellent ☐ Good ☐ Fair ☐ Bad ☒
14.1.7	Ratio: Labour - Foremen - Engineer 10 3 1
14.1.8.	Typical Bottlenecks: 30 % Workforce Absentism Old Machinery (Mill) Nailmaking

14.2 Production: Machines and /Equipment

14.2.1.	Type of Machine: LATHE MACHINE KIRLOSKAR Number of such Machine: 1 EACH.
14.2.2.	Date/Make
14.2.3.	Working Dimensions/capacity/Units hrs. 3,70 mt.
14.2.4.	Special attachments /Tools
14.2.5	Importnace of this machine/Eq. for production Very important ☒ important ☐ other ☐
14.2.6.	Condition:: good ☐ Working ☒ Serviceable ☐ Scrap ☐
14.2.7.	Power Consumption (EL) KW/hr.
14.2.8	Accuracy: Very good ☐ good ☒ Suffic. ☐ Below Req. ☐ Out __
14.2.9	Mach. Tools only Closest possible Tolerance: IT VARYS WHEN THE NEED REQUIRE.
14.2.10	Auxilliarys: (if any) good ☐ sufficient ☐ below ☐
14.2.11	Maintenance situation: Service daily __ type of service: Monthly ☐ Yearly ☐ Never ☐ Remarks:
14.2.12	Machine cost per hour:
14.2.13	Average Working hours/month:

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14.2 Production: Machines and /Equipment

14.2.1.	Type of Machine: L I D Number of such Machine: 6 EACH
14.2.2.	Date/Make 1952
14.2.3.	Working Dimensions/capacity/Units hrs.
14.2.4.	Special attachments /Tools
14.2.5	Importnace of this machine/Eq. for production Very important ☒ important ☐ other ☐
14.2.6.	Condition:: good ☐ Working ☒ Serviceable ☐ Scrap ☐
14.2.7.	Power Consumption (EL) KW/hr.
14.2.8	Accuracy: Very good ☐ good ☒ Suffic. ☐ Below Req. ☐ . Out __
14.2.9	Mach. Tools only Closest possible Tolerance:
14.2.10	Auxilliarys: (if any) good ☐ sufficient ☒ below ☐
14.2.11	Maintenance situation: Service daily __ type of service: Monthly ☐ Yearly ☐ Never ☐ Remarks:
14.2.12	Machine cost per hour:
14.2.13	Average Working hours/month: 16 hrs a day 63,2 k P/H. EACH.

..//..

14.2 Production: Machines and /Equipment

14.2.1.	Type of Machine: L 50 Number of such Machine: 3 [illegible]
14.2.2.	Date/Make 10/62
14.2.3.	Working Dimensions/capacity/Units hrs.
14.2.4.	Special attachments /Tools
14.2.5	Importnace of this machine/Eq. for production Very important ☒ important ☐ other ☐
14.2.6.	Condition:: good ☐ Working ☒ Serviceable ☐ Scrap ☐
14.2.7.	Power Consumption (EL) KW/hr.
14.2.8	Accuracy: Very good ☐ good ☒ Suffic. ☐ Below Req. ☐ Out __
14.2.9	Mach. Tools only Closest possible Tolerance:
14.2.10	Auxilliarys: (if any) good ☐ sufficient ☒ below ☐
14.2.11	Maintenance situation: Service daily __ type of service: Monthly ☐ Yearly ☐ Never ☐ Remarks:
14.2.12	Machine cost per hour:
14.2.13	Average Working hours/month: 16 hrs a day 13.5 hrs.

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WORK SHOP

14.2 Production: Machines and /Equipment

14.2.1.	Type of Machine: MILLING MACHINE Number of such Machine: 1 EACH
14.2.2.	Date/Make
14.2.3.	Working Dimensions/capacity/Units hrs. 1.00m² 150 x 100 cm
14.2.4.	Special attachments /Tools
14.2.5	Importnace of this machine/Eq. for production Very important ☒ important ☐ other ☐
14.2.6.	Condition:: good ☐ Working ☒ Serviceable ☐ Scrap ☐
14.2.7.	Power Consumption (EL) KW/hr.
14.2.8	Accuracy: Very good ☐ good ☒ Suffic. ☐ Below Req. ☐ Out __
14.2.9	Mach. Tools only Closest possible Tolerance: IT VARIES AS THE NEED REQUIRES.
14.2.10	Auxilliarys: (if any) good ☐ sufficient ☒ below ☐
14.2.11	Maintenance situation: Service daily __ type of service: Monthly ☐ Yearly ☐ Never ☐ Remarks:
14.2.12	Machine cost per hour:
14.2.13	Average Working hours/month:

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14.2 Production: Machines and /Equipment

14.2.1.	Type of Machine: RADIAL DRILL PRESS Number of such Machine: ONE (1)
14.2.2.	Date/Make
14.2.3.	Working Dimensions/capacity/Units hrs. 4/0 mt.
14.2.4.	Special attachments /Tools 4 EACH
14.2.5	Importnace of this machine/Eq. for production Very important ☒ important ☐ other ☐
14.2.6.	Condition:: good ☒ Working ☐ Serviceable ☐ Scrap ☐
14.2.7.	Power Consumption (EL) KW/hr.
14.2.8	Accuracy: Very good ☐ good ☒ Suffic. ☐ Below Req. ☐ Out —
14.2.9	Mach. Tools only Closest possible Tolerance: IT VARIES AS THE NEED REQUIRES.
14.2.10	Auxilliarys: (if any) good ☐ sufficient ☒ below ☐
14.2.11	Maintenance situation: Service daily — type of service: Monthly ☐ Yearly ☐ Never ☐ Remarks:
14.2.12	Machine cost per hour:
14.2.13	Average Working hours/month:

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WORK SHOP

14.2 Production: Machines and /Equipment

14.2.1.	Type of Machine: SHAPERED MACHINE Number of such Machine: 2 EACH DIFFERENT IN SIZE
14.2.2.	Date/Make
14.2.3.	Working Dimensions/capacity/Units hrs. 86 cm 84 X 185 cm
14.2.4.	Special attachments /Tools
14.2.5	Importnace of this machine/Eq. for production Very important ☒ important ☐ other ☐
14.2.6.	Condition:: good ☐ Working ☒ Serviceable ☐ Scrap ☐
14.2.7.	Power Consumption (EL) KW/hr.
14.2.8	Accuracy: Very good ☐ good ☒ Suffic. ☐ Below Req. ☐ Out —
14.2.9	Mach. Tools only Closest possible Tolerance:
14.2.10	Auxilliarys: (if any) good ☐ sufficient ☒ below ☐
14.2.11	Maintenance situation: Service daily — type of service: Monthly ☐ Yearly ☐ Never ☐ Remarks:
14.2.12	Machine cost per hour:
14.2.13	Average Working hours/month:

WORK SHOP.

14.2 Production: Machines and /Equipment

14.2.1.	Type of Machine: HEAVY DUITY LATHE MACHINE FOR ROLLERS ONLY Number of such Machine: 'EACH'
14.2.2.	Date/Make
14.2.3.	Working Dimensions/capacity/Units hrs. 2 mt 200x60 cm
14.2.4.	Special attachments /Tools
14.2.5	Importnace of this machine/Eq. for production Very important ☒ important ☐ other ☐
14.2.6.	Condition:: good ☐ Working ☐ Serviceable ☒ Scrap ☐
14.2.7.	Power Consumption (EL) KW/hr.
14.2.8	Accuracy: Very good ☐ good ☐ Suffic. ☒ Below Req. ☐ Out __
14.2.9	Mach. Tools only Closest possible Tolerance: VERY CLOSS
14.2.10	Auxilliarys: (if any) good ☐ sufficient ☒ below ☐
14.2.11	Maintenance situation: Service daily __ type of service: Monthly ☐ Yearly ☐ Never ☐ Remarks:
14.2.12	Machine cost per hour:
14.2.13	Average Working hours/month:

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WORK SHOP.

14.2 Production: Machines and /Equipment

14.2.1.	Type of Machine: SURFACE GRINDER. Number of such Machine: 1 EACH.
14.2.2.	Date/Make
14.2.3.	Working Dimensions/capacity/Units hrs. 80cm 80×32
14.2.4.	Special attachments /Tools
14.2.5	Importnace of this machine/Eq. for production Very important ☒ important ☐ other ☐
14.2.6.	Condition:: good ☐ Forking ☒ Serviceable ☐ Scrap ☐
14.2.7.	Power Consumption (EL) KW/hr.
14.2.8	Accuracy: Very good ☐ good ☒ Suffic. ☐ Below Req. ☐ Out __
14.2.9	Mach. Tools only Closest possible Tolerance:
14.2.10	Auxilliarys: (if any) good ☐ sufficient ☒ below ☐
14.2.11	Maintenance situation: Service daily __ type of service: Monthly ☐ Yearly ☐ Never ☐ Remarks:
14.2.12	Machine cost per hour:
14.2.13	Average Working hours/month:

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14.2 Production: Machines and /Equipment

14.2.1.	Type of Machine: Number of such Machine:
14.2.2.	Date/Make
14.2.3.	Working Dimensions capacity/Units hrs.
14.2.4.	Special attachments /Tools
14.2.5	Importnace of this machine/Eq. for production Very important ☐ important ☐ other ☐
14.2.6.	Condition:: good ☐ Working ☐ Serviceable ☐ Scrap ☐
14.2.7.	Power Consumption (EL) KW/hr.
14.2.8	Accuracy: Very good ☐ good ☐ Suffic. ☐ Below Req. ☐ Out __
14.2.9	Mach. Tools only Closest possible Tolerance:
14.2.10	Auxilliarys: (if any) good ☐ sufficient ☐ below ☐
14.2.11	Maintenance situation: Service daily __ type of service: Monthly ☐ Yearly ☐ Never ☐ Remarks:
14.2.12	Machine cost per hour:
14.2.13	Average Working hours/month:

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14.2 Production: Machines and /Equipment

14.2.1.	Type of Machine: DRILL PRESS Number of such Machine: 1 EACH
14.2.2.	Date/Make
14.2.3.	Working Dimensions/capacity/Units hrs. 80 Cm 384 80 Cm
14.2.4.	Special attachments /Tools N/A
14.2.5	Importnace of this machine/Eq. for production Very important ☒ important ☐ other ☐
14.2.6.	Condition:: good ☐ Working ☒ Serviceable ☐ Scrap ☐
14.2.7.	Power Consumption (EL) KW/hr.
14.2.8	Accuracy: Very good ☐ good ☐ Suffic. ☒ Below Req. ☐ Out —
14.2.9	Mach. Tools only Closest possible Tolerance:
14.2.10	Auxilliarys: (if any) good ☐ sufficient ☒ below ☐
14.2.11	Maintenance situation: Service daily — type of service: Monthly ☐ Yearly ☐ Never ☐ Remarks:
14.2.12	Machine cost per hour:
14.2.13	Average Working hours/month:

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WORK SHOP

14.2 Production: Machines and /Equipment

14.2.1.	Type of Machine: HYDROLICK PRESS Number of such Machine: 1 EACH
14.2.2.	Date/Make
14.2.3.	Working Dimensions/capacity/Units hrs. 100 Ton 100X100
14.2.4.	Special attachments /Tools
14.2.5	Importnace of this machine/Eq. for production Very important ☒ important ☐ other ☐
14.2.6.	Condition:: good ☐ Working ☒ Serviceable ☐ Scrap ☐
14.2.7.	Power Consumption (EL) KW/hr. N/A
14.2.8	Accuracy: Very good ☐ good ☒ Suffic. ☐ Below Req. ☐ Out __
14.2.9	Mach. Tools only Closest possible Tolerance:
14.2.10	Auxilliarys: (if any) good ☐ sufficient ☒ below ☐
14.2.11	Maintenance situation: Service daily __ type of service: Monthly ☐ Yearly ☐ Never ☐ Remarks:
14.2.12	Machine cost per hour:
14.2.13	Average Working hours/month:

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14.2 Production: Machines and /Equipment

14.2.1.	Type of Machine: OVEN HEAT TREATMENT Number of such Machine: 1 ERICH.
14.2.2.	Date/Make
14.2.3.	Working Dimensions/capacity/Units hrs. 51 cm 58X32 cm
14.2.4.	Special attachments /Tools
14.2.5	Importnace of this machine/Eq. for production Very important ☒ important ☐ other ☐
14.2.6.	Condition:: good ☐ Working ☒ Serviceable ☐ Scrap ☐
14.2.7.	Power Consumption (EL) KW/hr.
14.2.8	Accuracy: Very good ☐ good ☒ Suffic. ☐ Below Req. ☐ Out __
14.2.9	Mach. Tools only Closest possible Tolerance:
14.2.10	Auxilliarys: (if any) good ☐ sufficient ☒ below ☐
14.2.11	Maintenance situation: Service daily __ type of service: Monthly ☐ Yearly ☐ Never ☐ Remarks:
14.2.12	Machine cost per hour:
14.2.13	Average Working hours/month:

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14.2 Production: Machines and /Equipment

14.2.1.	Type of Machine: LATHE MACHINE Number of such Machine: TEN (10)
14.2.2.	Date/Make
14.2.3.	Working Dimensions/capacity/Units hrs.
14.2.4.	Special attachments /Tools
14.2.5	Importnace of this machine/Eq. for production Very important ☒ important ☐ other ☐
14.2.6.	Condition:: good ☐ Working ☒ Serviceable ☐ Scrap ☐
14.2.7.	Power Consumption (EL) KW/hr.
14.2.8	Accuracy: Very good ☐ good ☐ Suffic. ☐ Below Req. ☒ Out __
14.2.9	Mach. Tools only Closest possible Tolerance:
14.2.10	Auxilliarys: (if any) good ☐ sufficient ☒ below ☐
14.2.11	Maintenance situation: Service daily __ type of service: Monthly ☐ Yearly ☐ Never ☐ Remarks:
14.2.12	Machine cost per hour:
14.2.13	Average Working hours/month:

..//..

ROLLING

14.2 Production: Machines and /Equipment

14.2.1.	Type of Machine: Number of such Machine: 4 EACH
14.2.2.	Date/Make
14.2.3.	Working Dimensions/capacity/Units hrs.
14.2.4.	Special attachments /Tools
14.2.5	Importnace of this machine/Eq. for production Very important ☐ important ☐ other ☐
14.2.6.	Condition:: good ☐ Working ☐ Serviceable ☐ Scrap ☐
14.2.7.	Power Consumption (EL) KW/hr.
14.2.8	Accuracy: Very good ☐ good ☐ Suffic. ☐ Below Req. ☐ Out __
14.2.9	Mach. Tools only Closest possible Tolerance:
14.2.10	Auxilliarys: (if any) good ☐ sufficient ☐ below ☐
14.2.11	Maintenance situation: Service daily __ type of service: Monthly ☐ Yearly ☐ Never ☐ Remarks:
14.2.12	Machine cost per hour:
14.2.13	Average Working hours/month:

..//..

ROLLING MILL

14.2 Production: Machines and /Equipment

14.2.1.	Type of Machine: COILER Number of such Machine: 2 EA
14.2.2.	Date/Make
14.2.3.	Working Dimensions/capacity/Units hrs.
14.2.4.	Special attachments /Tools
14.2.5	Importnace of this machine/Eq. for production Very important ☒ important ☐ other ☐
14.2.6.	Condition:: good ☐ Working ☒ Serviceable ☐ Scrap ☐
14.2.7.	Power Consumption (EL) KW/hr.
14.2.8	Accuracy: Very good ☐ good ☐ Suffic. ☒ Below Req. ☐ Out __
14.2.9	Mach. Tools only Closest possible Tolerance:
14.2.10	Auxilliarys: (if any) good ☐ sufficient ☐ below ☐
14.2.11	Maintenance situation: Service daily __ type of service: Monthly ☐ Yearly ☐ Never ☐ Remarks:
14.2.12	Machine cost per hour:
14.2.13	Average Working hours/month:

..//..

BED SPRINGS FACE WIRE

14.2 Production: Machines and /Equipment

14.2.1.	Type of Machine: FENCE WIRE MAKING MACHINE Number of such Machine: 2 EACH.
14.2.2.	Date/Make 50 mt. OF PRODUCTION @ 8/m.
14.2.3.	Working Dimensions/capacity/Units hrs. MAX. 2 m
14.2.4.	Special attachments /Tools
14.2.5	Importnace of this machine/Eq. for production Very important ☒ important ☐ other ☐
14.2.6.	Condition:: good ☐ Working ☒ Serviceable ☐ Scrap ☐
14.2.7.	Power Consumption (EL) KW/hr.
14.2.8	Accuracy: Very good ☐ good ☒ Suffic. ☐ Below Req. ☐ Out —
14.2.9	Mach. Tools only Closest possible Tolerance: 20 cm
14.2.10	Auxilliarys: (if any) good ☐ sufficient ☒ below ☐
14.2.11	Maintenance situation: Service daily — type of service: Monthly ☐ Yearly ☐ Never ☐ Remarks:
14.2.12	Machine cost per hour:
14.2.13	Average Working hours/month:

..//..

14.2 Production: Machines and /Equipment

14.2.1.	Type of Machine: TSB-SN TYPE BRAID WIRE MAKING MACHINE Number of such Machine:
14.2.2.	Date/Make
14.2.3.	Working Dimensions/capacity/Units hrs. 8'6" 9'6" x 4'8"
14.2.4.	Special attachments /Tools
14.2.5	Importnace of this machine/Eq. for production Very important ☒ important ☐ other ☐
14.2.6.	Condition:: good ☒ Working ☐ Serviceable ☐ Scrap ☐
14.2.7.	Power Consumption (EL) KW/hr.
14.2.8	Accuracy: Very good ☐ good ☒ Suffic. ☐ Below Req. ☐ Out —
14.2.9	Mach. Tools only Closest possible Tolerance: minimum 1mt.
14.2.10	Auxilliarys: (if any) good ☐ sufficient ☒ below ☐
14.2.11	Maintenance situation: Service daily — type of service: Monthly ☐ Yearly ☐ Never ☐ Remarks:
14.2.12	Machine cost per hour:
14.2.13	Average Working hours/month:

..//..

14.2 Production: Machines and /Equipment

14.2.1.	Type of Machine: Screw bench CSD-600 Number of such Machine: 5 EACH
14.2.2.	Date/Make 10/1977
14.2.3.	Working Dimensions/capacity/Units hrs. 500 K/H.
14.2.4.	Special attachments /Tools MOTTORS & VARIOUS SIZE OF DIES
14.2.5	Importnace of this machine/Eq. for production Very important ☒ important ☐ other ☐
14.2.6.	Condition:: good ☒ Working ☐ Serviceable ☐ Scrap ☐
14.2.7.	Power Consumption (EL) KW/hr.
14.2.8	Accuracy: Very good ☐ good ☒ Suffic. ☐ Below Req. ☐ Out __
14.2.9	Mach. Tools only Closest possible Tolerance:
14.2.10	Auxilliarys: (if any) good ☒ sufficient ☐ below ☐
14.2.11	Maintenance situation: Service daily __ type of service: Monthly ☐ Yearly ☐ Never ☐ Remarks:
14.2.12	Machine cost per hour:
14.2.13	Average Working hours/month: 16 hrs. a day

..//..

14.2 Production: Machines and /Equipment

14.2.1.	Type of Machine: [illegible] Number of such Machine: [illegible]
14.2.2.	Date/Make
14.2.3.	Working Dimensions/capacity/Units hrs. [illegible]
14.2.4.	Special attachments /Tools
14.2.5	Importnace of this machine/Eq. for production Very important ☒ important ☐ other ☐
14.2.6.	Condition:: good ☐ Working ☒ Serviceable ☐ Scrap ☐
14.2.7.	Power Consumption (EL) KW/hr.
14.2.8	Accuracy: Very good ☐ good ☐ Suffic. ☒ Below Req. ☐ Out —
14.2.9	Mach. Tools only Closest possible Tolerance:
14.2.10	Auxilliarys: (if any) good ☐ sufficient ☒ below ☐
14.2.11	Maintenance situation: Service daily — type of service: Monthly ☐ Yearly ☐ Never ☐ Remarks:
14.2.12	Machine cost per hour:
14.2.13	Average Working hours/month: [illegible]

..//..

NALC MAKING PLANT

14.2 Production: Machines and /Equipment

14.2.1.	Type of Machine: THA - 31/40R Number of such Machine: 3 EACH.
14.2.2.	Date/Make 19/79
14.2.3.	Working Dimensions/capacity/Units hrs.
14.2.4.	Special attachments /Tools
14.2.5	Importnace of this machine/Eq. for production Very important ☒ important ☐ other ☐
14.2.6.	Condition:: good ☐ Working ☒ Serviceable ☐ Scrap ☐
14.2.7.	Power Consumption (EL) KW/hr.
14.2.8	Accuracy: Very good ☐ good ☒ Suffic. ☐ Below Req. ☐ Out __
14.2.9	Mach. Tools only Closest possible Tolerance:
14.2.10	Auxilliarys: (if any) good ☐ sufficient ☐ below ☐
14.2.11	Maintenance situation: Service daily __ type of service: Monthly ☐ when it is Completely out of Yearly ☐ use. Never ☐ Remarks:
14.2.12	Machine cost per hour:
14.2.13	Average Working hours/month: 16 hrs per day 600 K 55 K per hr.

NEW [illegible]

14.2 Production: Machines and /Equipment

14.2.1.	Type of Machine: [illegible] Number of such Machine: 3 Each.
14.2.2.	Date/Make 19/78
14.2.3.	Working Dimensions/capacity/Units hrs.
14.2.4.	Special attachments /Tools
14.2.5	Importnace of this machine/Eq. for production Very important ☒ important ☐ other ☐
14.2.6.	Condition:: good ☐ Working ☒ Serviceable ☐ Scrap ☐
14.2.7.	Power Consumption (EL) KW/hr.
14.2.8	Accuracy: Very good ☐ good ☒ Suffic. ☐ Below Req. ☐ Out __
14.2.9	Mach. Tools only Closest possible Tolerance:
14.2.10	Auxilliarys: (if any) good ☐ sufficient ☐ below ☐
14.2.11	Maintenance situation: Service daily __ type of service: Monthly ☐ Yearly ☐ Never ☐ Remarks:
14.2.12	Machine cost per hour:
14.2.13	Average Working hours/month: 16 hrs P/day 55 k P/hr

..//..

14.2 Production: Machines and /Equipment

14.2.1.	Type of Machine: MTS-3 Number of such Machine: 1EACH
14.2.2.	Date/Make 1976
14.2.3.	Working Dimensions/capacity/Units hrs. 5
14.2.4.	Special attachments /Tools
14.2.5	Importnace of this machine/Eq. for production Very important ☒ important ☐ other ☐
14.2.6.	Condition:: good ☐ Working ☒ Serviceable ☐ Scrap ☐
14.2.7.	Power Consumption (EL) KW/hr.
14.2.8	Accuracy: Very good ☐ good ☒ Suffic. ☐ Below Req. ☐ Out —
14.2.9	Mach. Tools only Closest possible Tolerance:
14.2.10	Auxilliarys: (if any) good ☐ sufficient ☐ below ☐
14.2.11	Maintenance situation: Service daily — type of service: Monthly ☐ Yearly ☐ Never ☐ Remarks:
14.2.12	Machine cost per hour:
14.2.13	Average Working hours/month: 16 hr. a day 17.4 K p/H.

NE2 m-3... / ...

14.2 Production: Machines and /Equipment

14.2.1.	Type of Machine: m-3-c ... Number of such Machine:
14.2.2.	Date/Make 10/76
14.2.3.	Working Dimensions/capacity/Units hrs. 2...
14.2.4.	Special attachments /Tools
14.2.5	Importnace of this machine/Eq. for production Very important [X] important [ ] other [ ]
14.2.6.	Condition:: good [ ] Working [X] Serviceable [ ] Scrap [ ]
14.2.7.	Power Consumption (EL) KW/hr.
14.2.8	Accuracy: Very good [ ] good [X] Suffic. [ ] Below Req. [ ] Opt __
14.2.9	Mach. Tools only Closest possible Tolerance:
14.2.10	Auxilliarys: (if any) good [ ] sufficient [X] below [ ]
14.2.11	Maintenance situation: Service daily __ type of service: Monthly [ ] Yearly [ ] Never [ ] Remarks:
14.2.12	Machine cost per hour:
14.2.13	Average Working hours/month: 16 hrs a day 30 ...

..//..

14.2 Production: Machines and /Equipment

14.2.1.	Type of Machine: MTG - D Number of such Machine:
14.2.2.	Date/Make 1976
14.2.3.	Working Dimensions/capacity/Units hrs. 105
14.2.4.	Special attachments /Tools
14.2.5	Importnace of this machine/Eq. for production Very important ☒ important ☐ other ☐
14.2.6.	Condition:: good ☐ Working ☐ Serviceable ☐ Scrap ☐
14.2.7.	Power Consumption (EL) KW/hr.
14.2.8	Accuracy: Very good ☐ good ☒ Suffic. ☐ Below Req. ☐ Out __
14.2.9	Mach. Tools only Closest possible Tolerance:
14.2.10	Auxilliarys: (if any) good ☐ sufficient ☒ below ☐
14.2.11	Maintenance situation: Service daily __ type of service: Monthly ☐ Yearly ☐ Never ☐ Remarks:
14.2.12	Machine cost per hour:
14.2.13	Average Working hours/month: 16 hr. a day 95 k p/H.

..//..

14.2 Production: Machines and /Equipment

14.2.1.	Type of Machine: MTG-F Number of such Machine: /
14.2.2.	Date/Make 19/76
14.2.3.	Working Dimensions/capacity/Units hrs. 205
14.2.4.	Special attachments /Tools
14.2.5	Importnace of this machine/Eq. for production Very important ☒ important ☐ other ☐
14.2.6.	Condition:: good ☐ Working ☒ Serviceable ☐ Scrap ☐
14.2.7.	Power Consumption (EL) KW/hr.
14.2.8	Accuracy: Very good ☐ good ☒ Suffic. ☐ Below Req. ☐ Out __
14.2.9	Mach. Tools only Closest possible Tolerance:
14.2.10	Auxilliarys: (if any) good ☐ sufficient ☒ below ☐
14.2.11	Maintenance situation: Service daily __ type of service: Monthly ☐ Yearly ☐ Never ☐ Remarks:
14.2.12	Machine cost per hour:
14.2.13	Average Working hours/month: 16 hr a day 81.2 K P/H.

..//..

14.2 Production: Machines and /Equipment

14.2.1.	Type of Machine: ~~[illegible]~~ T3 Number of such Machine: 1 EACH.
14.2.2.	Date/Make
14.2.3.	Working Dimensions/capacity/Units hrs.
14.2.4.	Special attachments /Tools
14.2.5	Importnace of this machine/Eq. for production Very important ☐ important ☐ other ☐
14.2.6.	Condition:: good ☐ Working ☐ Serviceable ☐ Scrap ☐
14.2.7.	Power Consumption (EL) KW/hr.
14.2.8	Accuracy: Very good ☐ good ☐ Suffic. ☐ Below Req. ☐ Out __
14.2.9	Mach. Tools only Closest possible Tolerance:
14.2.10	Auxilliarys: (if any) good ☐ sufficient ☐ below ☐
14.2.11	Maintenance situation: Service daily __ type of service: Monthly ☐ Yearly ☐ Never ☐ Remarks:
14.2.12	Machine cost per hour:
14.2.13	Average Working hours/month: 16 hrs accuracy 17.3 k p/h?

..//..

14.2 - Production: Machines and /Equipment

14.2.1.	Type of Machine: UNKNOWN Number of such Machine: 1 EACH
14.2.2.	Date/Make UNKNOWN
14.2.3.	Working Dimensions/capacity/Units hrs.
14.2.4.	Special attachments /Tools
14.2.5	Importnace of this machine/Eq. for production Very important ☒ important ☐ other ☐
14.2.6.	Condition:: good ☐ Working ☒ Serviceable ☐ Scrap ☐
14.2.7.	Power Consumption (EL) KW/hr.
14.2.8	Accuracy: Very good ☐ good ☒ Suffic. ☐ Below Req. ☐ Out —
14.2.9	Mach. Tools only Closest possible Tolerance:
14.2.10	Auxilliarys: (if any) good ☐ sufficient ☐ below ☐
14.2.11	Maintenance situation: Service daily — type of service: Monthly ☐ Yearly ☐ Never ☐ Remarks:
14.2.12	Machine cost per hour:
14.2.13	Average Working hours/month: 16 hr a day 117.5 K p/H.

..//..

DRAW BEAM FOR BED SPRING

14.2 Production: Machines and /Equipment

14.2.1.	Type of Machine: Number of such Machine: 1 EACH
14.2.2.	Date/Make
14.2.3.	Working Dimensions/capacity/Units hrs. 180 cm
14.2.4.	Special attachments /Tools
14.2.5	Importnace of this machine/Eq. for production Very important ☒ important ☐ other ☐
14.2.6.	Condition:: good ☐ Working ☒ Serviceable ☐ Scrap ☐
14.2.7.	Power Consumption (EL) KW/hr.
14.2.8	Accuracy: Very good ☐ good ☐ Suffic. ☒ Below Req. ☐ Out __
14.2.9	Mach. Tools only Closest possible Tolerance:
14.2.10	Auxilliarys: (if any) good ☐ sufficient ☐ below ☐
14.2.11	Maintenance situation: Service daily __ type of service: Monthly ☐ Yearly ☐ Never ☐ Remarks:
14.2.12	Machine cost per hour:
14.2.13	Average Working hours/month: 16 hr. a day. 56·2 K P/H.

..//..

14.2 Production: Machines and /Equipment

14.2.1.	Type of Machine: IMA – 31/70 Number of such Machine: 5. EACH.
14.2.2.	Date/Make
14.2.3.	Working Dimensions/capacity/Units hrs.
14.2.4.	Special attachments /Tools
14.2.5	Importnace of this machine/Eq. for production Very important ☒ important ☐ other ☐
14.2.6.	Condition:: good ☐ Working ☐ Serviceable ☒ Scrap ☐
14.2.7.	Power Consumption (EL) KW/hr.
14.2.8	Accuracy: Very good ☐ good ☐ Suffic. ☒ Below Req. ☐ Out —
14.2.9	Mach. Tools only Closest possible Tolerance:
14.2.10	Auxilliarys: (if any) good ☐ sufficient ☐ below ☐
14.2.11	Maintenance situation: Service daily — type of service: Monthly ☐ Yearly ☐ Never ☐ Remarks:
14.2.12	Machine cost per hour:
14.2.13	Average Working hours/month: 16 hrs a day, 12.2 K P/Hr.

..//..

14.3 Material / per plant production:

14.3.1	Iron Material used: Sheets: ton/year Profiles: ton/year Castings: ton/year Wires / Galv. Wires 5.5 mild Coil 1119 ton Galv. Wire, 2.2 mm 556 tons
14.3.2	Non-Iron used Aluminium: ton/year Brass: ton/year Copper: ton/year Lead: ton/year Other Metals: ton/year
14.3.3	Other Materials ton/year Specity: NA
14.3.4	Consumable Materials (all) Birr/year Oct - Dec. (3 Month) = 282 100 Bir
14.3.5	Average Material Delivery Time: ..9.. Month
14.3.6	Material used suitable [✓] yes [ ] No [ ] with modifications.
14.3.7	Power consumption Month/KWh. 282 300.— KWh / Month

14.4 Production: Method

14.4.1	Production Method Single Prod. ☐ Batch ☐ Series ☑
14.4.2	Method per product Bench work (%) per product/time Chipwork (%) per prod. Chipless work (%) per prod. Special Machines (%) 10 per prod. OUTSIDE WORK (%) per prod/Birr value (subcontractines) Standard parts (%) per prod./Birr value
14.4.3	Product Time per Unit hrs/actually
14.4.4	Product Time calculated hrs.
14.4.5	Prod. Flow/product Single: Line: Series: ✓
14.4.6	Process Flow: Balance: ☑ Unbalanced ☐ none ☐
14.4.6	Quality Concept: Yes (No)
14.4.7	Quality Control: Yes (No.)
14.4.8	Remarks on quality
14.4.9	% of scrap per total production N.A. ≈ 10 %

14.5 Production: Organisation

14.5.1	Organized Structure	Yes ✗	No
14.5.2	Non-Organized structure Remarks	Yes	No
14.5.3	Flow of command Hirarchical Structure	Yes ✗	No
14.5.4	Blook Structure	Yes	No
14.5.5	Level Structure	Yes	No
14.5.6	Type of Management by: Delegation ☒ : Team ☐ : Choos ☐ : No Mgtm. ☐		
14.5.7	Mgtm. information system (MIS) Excellent ☐ good ☐ insufficient ☒ MIS by: (Type of information) Type of communis.		
14.5.8	Recording Methods Recording of ✗ Time Yes/No " ✗ Material Yes/No " ✗ Cost Yes/No		

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ANNEX 4

Work Schedule for Field Work

ENTWICKLUNGSBERATUNG EB GmbH

UNIDO, H. Martz
Tel. 44 0 64 5
44 86 75

Mr. Walter Mitlander
Mr. Hans Ruoss
Mr. Gottfried Voelker
Mr. Solomon Angoro
Mr. Nega Seyoum

WORK SCHEDULE JANUARY 20 - FEBRUARY 10, 1981

DATE	DUTIES	
20 - 1 - 81	Arrival at Addis Ababa Airport Transfer to hotel by UNIDO Informal meeting with Mr. Martz - UNIDO Meeting with Col. Alula Berhane at National Metal Works Corporation	Team-Mr. Martz- UNIDO, CP
21 - 1 - 81	Visit of four companies:- - Kaliti Steel Industry - O.C.F.A., Iron & Metal Works (private) - Akaki Metal Factory -	Team - CP
22 - 1 - 81	Meeting at National Metal Works Corp. Work Programme Preparation of questionnaire	Team - CP
23 - 1 - 81	Collect Data - Kaliti Steel Industry	Mtl, Ru, CP
	Discussion regarding national development in Ethiopia with Mr. Gebrehiwot	Vo, CP
24 - 1 - 81	Sum-up data of Kaliti Steel Industry	Team
26 - 1 - 81	Collect data - Akaki Metal Products	Mtl, Ru, CP
	Discussion of ten years development plan for the metal working industry at National Metal Works Corp.	Vo, CP
	Discussion of small scale industry at HASIDA	Vo, CP

DATE	DUTIES	
27 - 1 - 81	Sum-up data of Akaki Metal Products	Team
	Discussion of ten years development plan for the metal working industry at National Metal Works Corp.	Vo, CP
	Meeting at the Embassy of the Federal Republic of Germany	Vo
28 - 1 - 81	Collect data - Ethiopian Iron & Steel Foundry	Mtl, Ru, CP
	Collect information on future investments in the metal working industry	Vo, CP
	Meeting with Mr. Martz - UNIDO	Vo
29 - 1 - 81	Visit a private company of the metal working sector	Ru
	Sum-up data of Ethiopian Iron & Steel F.	Team
	Discuss the pricing and the distribution system in the metal sector	Vo, CP
30 - 1 - 81	Collect data - Ethiopian Metal Tools Factory	Mtl, Ru, CP
	Visit National Productivity Centre - Training	Vo, CP
	Arrival of Dr. Mylenbusch (14:45)	
31 - 1 - 81	Sum-up data of Ethiopian Metal Tools Factory	Team
	Visit a private company of the metal working sector	Ru
	Discussion with Mr. Martz - UNIDO	My, Vo
	Team meeting with Dr. Mylenbusch	
2 - 2 - 81	Departure to Asmara	Mtl, Ru, CP
M,	Collect data - Ethiopian Household Utilities	Mtl, Ru, CP
	Visit a private company of the metal working sector	Ru, CP
	Discussion on work progress with: Col. Alula Berhane - National Metal Works Ato Woldu GEMichael - Ministry of Industry Mr. Martz, UNIDO	My, Vo, [illegible]

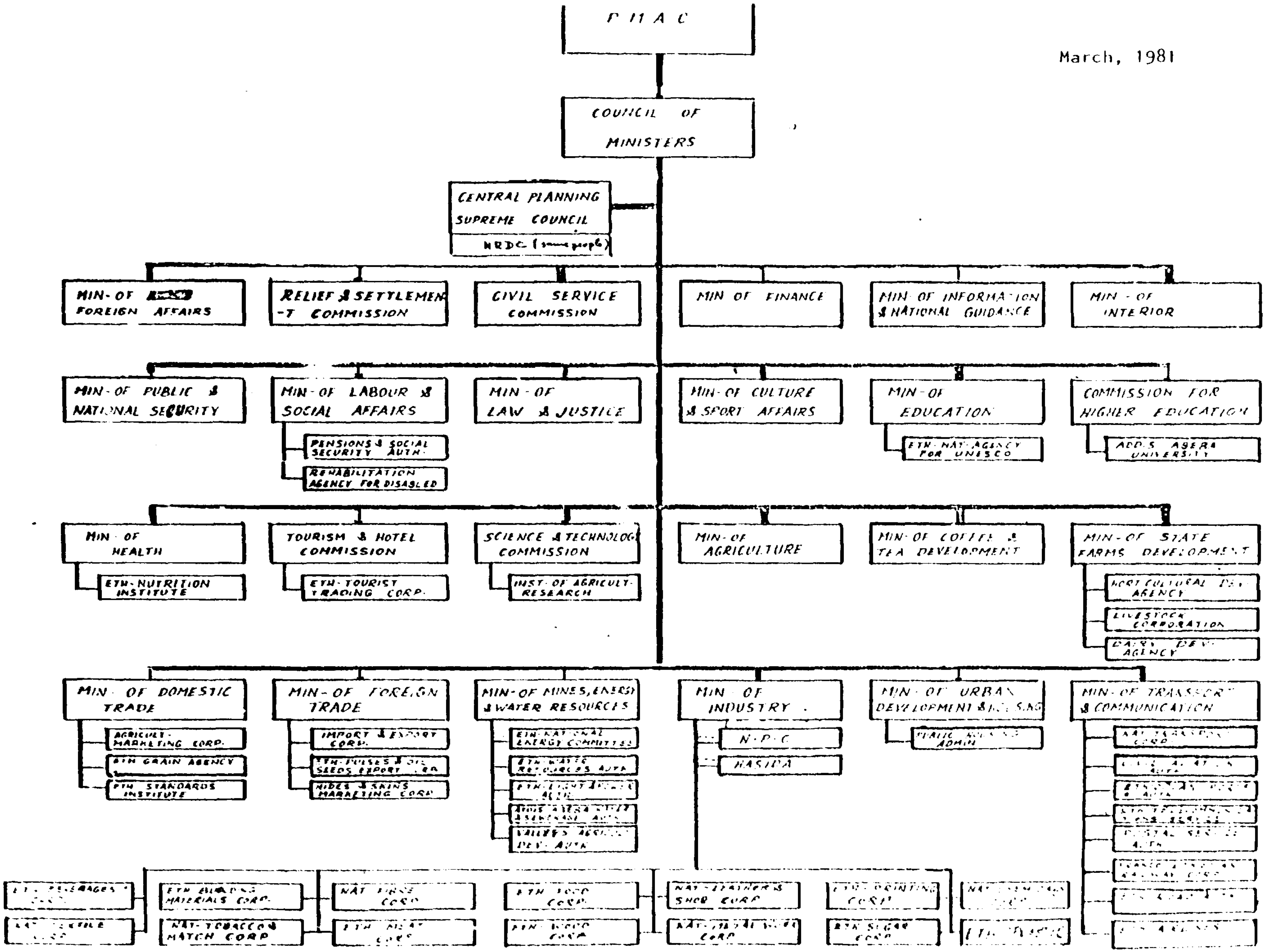
DATE	DUTIES	
3 - 2 - 81 Tu	Collect data - Ethiopian Asmara	Mtl, Ru, CP
	Visit a private company of the metal working sector	Ru, CP
✓	Meeting with Econ. Attache at the Embassy of the Federal Republic of Germany	My, Vo
Mr. Mitner ✓	Collect macro-economic data on Ethiopia at the office of the National Planning Commission	Vo, CP
4 - 2 - 81 Wed	~~Team returns from Asmara~~	Mtl, Ru, CP
	Collect data - United Abilities Co.	Mtl, Ru, CP
Eth. Food Corp. ✓ Mush/ECA ✓	Collect data on: energy and water supply transport bottle-necks in the metal sector	Vo, CP
5 - 2 - 81 Thur	Collect data - Kolfe Household Utensils	Mtl, Ru, CP
	Sum-up data of the private industry in the metal sector	Vo, CP
6 - 2 - 81 Fri	Ru, Mtl return from Asmara Collect data - AMCE	Mtl, Ru, CP
	Prepare outline for draft report Tools Factory	VO
7 - 2 - 81 Sat.	Sum-up data at AMCE, Tool Fact.	Team
	Prepare outline for draft report	Vo
9 - 2 - 81 Mo	Meeting at National Metal Works Corp. to discuss basic findings Foundry, ...	Team
10 - 2 81 Tue	Departure to Germany	

Programme discussed with Col. Alula Buhane on Jan 29, 1981

ANNEX 5

Organization of Ethiopian Ministries

March, 1981


PMAC
COUNCIL OF MINISTERS
CENTRAL PLANNING SUPREME COUNCIL
NRDC (same people)
MIN. OF FOREIGN AFFAIRS
RELIEF & SETTLEMENT COMMISSION
CIVIL SERVICE COMMISSION
MIN OF FINANCE
MIN OF INFORMATION & NATIONAL GUIDANCE
MIN OF INTERIOR
MIN. OF PUBLIC & NATIONAL SECURITY
MIN. OF LABOUR & SOCIAL AFFAIRS
PENSIONS & SOCIAL SECURITY AUTH.
REHABILITATION AGENCY FOR DISABLED
MIN. OF LAW & JUSTICE
MIN. OF CULTURE & SPORT AFFAIRS
MIN. OF EDUCATION
ETH. NAT. AGENCY FOR UNESCO
COMMISSION FOR HIGHER EDUCATION
ADDIS ABEBA UNIVERSITY
MIN. OF HEALTH
ETH. NUTRITION INSTITUTE
TOURISM & HOTEL COMMISSION
ETH. TOURIST TRADING CORP.
SCIENCE & TECHNOLOGY COMMISSION
INST. OF AGRICULT. RESEARCH
MIN. OF AGRICULTURE
MIN. OF COFFEE & TEA DEVELOPMENT
MIN. OF STATE FARMS DEVELOPMENT
LIVESTOCK CORPORATION
DAIRY DEV. AGENCY
MIN. OF DOMESTIC TRADE
AGRICULT. MARKETING CORP.
ETH. GRAIN AGENCY
ETH. STANDARDS INSTITUTE
MIN. OF FOREIGN TRADE
IMPORT & EXPORT CORP.
HIDES & SKINS MARKETING CORP.
MIN. OF MINES, ENERGY & WATER RESOURCES
ETH. NATIONAL ENERGY COMMITTEE
ETH. WATER RESOURCES AUTH.
VALLEYS AGRIC. DEV. AUTH.
MIN. OF INDUSTRY
N.P.C.
HASIDA
MIN. OF URBAN DEVELOPMENT & HOUSING
PUBLIC HOUSING ADMIN.
MIN. OF TRANSPORT & COMMUNICATION
POSTAL SERVICE AUTH.
ETH. BUILDING MATERIALS CORP.
NAT. TOBACCO & MATCH CORP.
NAT. FIBRE CORP.
ETH. FOOD CORP.
NAT. LEATHER & SHOE CORP.
ETH. SUGAR CORP.

ANNEX 6

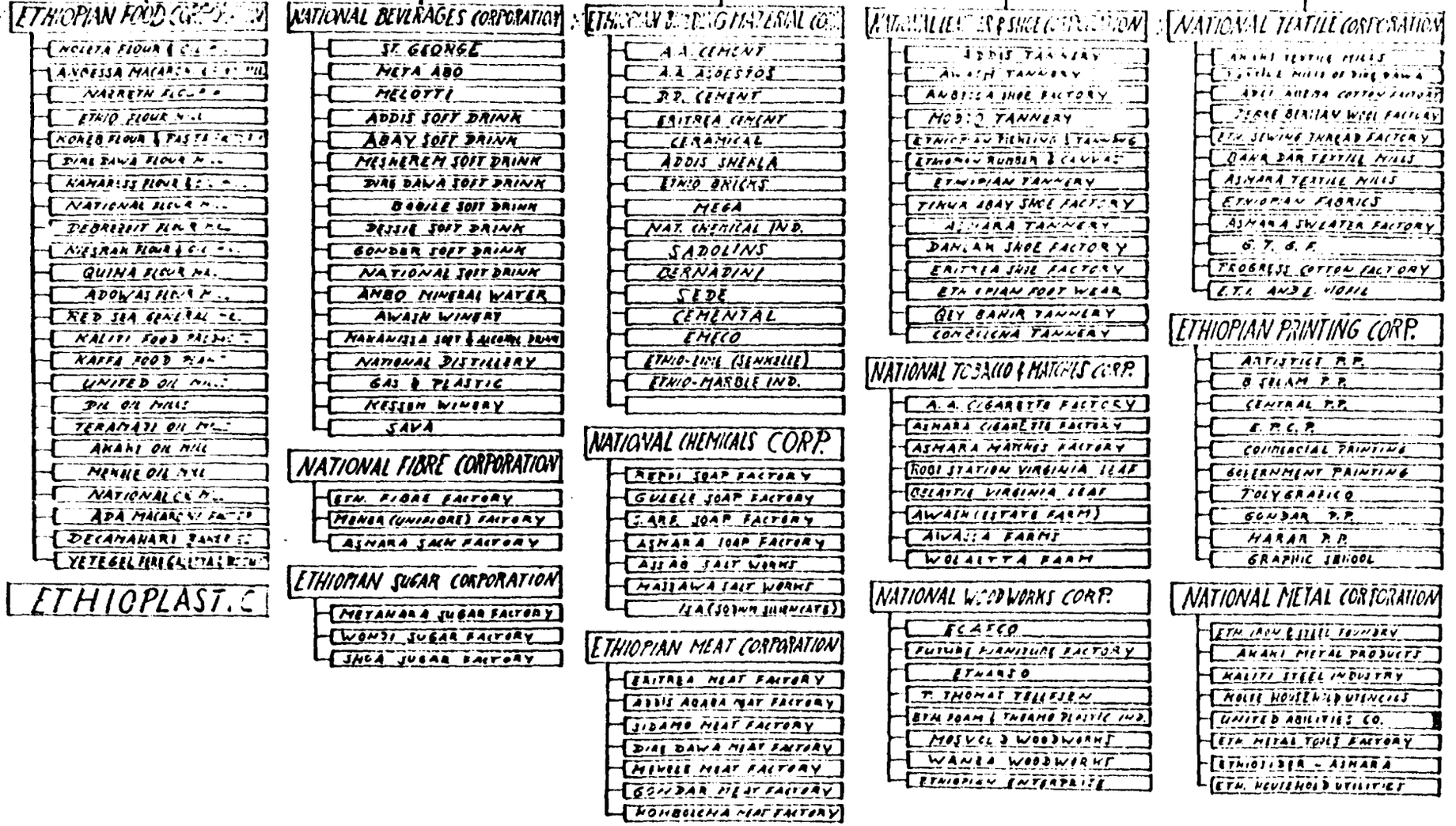
Ministry of Industries / Corporations

Ministry of Industry: Corporations Data: 1978/79

Name of Corporation	Number of Employees (permanent)	Major Products	No. of plants
Eth. Food Corporation	3.288	flour, oil, macaroni, spagetti, bread, biscuits, fafa (soap)	19
Eth. Beverage Corporation	4.403	beer, liquor, wine, soft drinks, mineral water, alcohol, gas (CO_2)	18
Tobacco and Matches Corporation	857	cigarettes, cigars, matches	3
National Textiles Corporation	28.179	cotton fabrics, nylon fabrics, cotton yarn, blankets, hosieries	15
National Leather and Shoe Corporation	4.305	leather shoes, leather upper, leather sole	13
Ethiopian Wood Works Corporation	1.163	builders' wood works, furniture	8
Ethiopian Salt Corporation	410	salt	2
Ethiopian Sugar Corporation	4.216	sugar	2
Ethiopian Meat Corporation	1.857	boiled beef, vegetable soup	8
Ethiopian Printing Corporation	1.435	printed matters	9
Ethiopian Building Matrial Corporation	2.109	cement, cement blocks and tubes, bricks	12
National Fibre Corporation	3.199	gunny bags, ropes	3
National Soap Corporation	212	soap	4
National Metal Works Corporation	1.491	iron bars, wires, nails, G.I. pipes steel structures, corrugated iron sheets, metal tools agricultural hand tools	8

March, 1981

MINISTRY OF INDUSTRY



A N N E X 7

National Metal Works Corporation (NMWC)

Plants

March, 1981

INFORMATION ON

PLANTS UNDER THE NATIONAL METAL WORKS CORPORATION

NAME OF THE PLANT	LOCATION	TYPE OF PRODUCT	ACTUAL PRODUCTION (1979/1980)		NUMBER OF EMPLOYEES
			UNIT	QUANTITY	
1. Ethiopian Iron & Steel Foundry old foundry - rolling mill	Akaki 20 km	- Reinforcement bars	Tons	8,705	
		- Iron Nails	"	3,995	
		- Bed spring net			
		- Fencing net			
		- Barbed wire	Tons	592	
		- Distempered wire			
		- Others			
Sub-total				13,292	403
2. Kaliti Steel Industry	Kaliti 15 km	- Structural and furniture pipes			
		- Secco profiles			
		- Ribbed sheet			
		- Black plane and pressed sheets	Tons	6,110	
		- Galvanized plane and pressed sheets			
		- Furniture units			
		- Assembled units			
		- Angle iron			
		- Others			
Sub-total				6,110	281

NAME OF THE PLANT	LOCATION	TYPE OF PRODUCT	ACTUAL PRODUCTION (1979/1980)		NUMBER OF EMPLOYEES
			U N I T	QUANTITY	
3. Ethiopian Metal Tools	A.A	- Deer bolts - Hammers - Pick axes - Shovels and spades - Axes - Crow bars - Others	Pcs.	964,411	
Sub-total				964,411	151
4. Akaki Metal Products	Akaki	- Corrugated iron sheets, USU 38,35 32,30,28,26,24	Tons	17,907	
		- Galvanized iron pipes, 3/8" to 3" dia.	Tons	-	
Sub-total				17,907	183
5. Kolfe Household Utensils	A.A	- Kettles - Cooking pans - Wash basins - Others	Pcs.	335,780	
Sub-total				335,780	84

NAME OF THE PLANT	LOCATION	TYPE OF PRODUCT	ACTUAL PRODUCTION (1979/1980) UNIT	ACTUAL PRODUCTION (1979/1980) QUANTITY	NUMBER OF EMPLOYEES
6. Ethio-Sider new rolling mill 1980	Asmara	- Reinforcement iron bars	Tons	-	
		- Iron nails	"	918	
		- Bed spring net	"	71	
		- Fencing net	"	20	
		- Barbed wire	"	36	
		- Black wire # Others	"	198	
Sub-total				1,243	92
7. Ethiopian House Hold Utensils	Asmara	- Kettles - Cooking pans - Wash basins - Others	Pcs.	270,741	
Sub-total				270,741	360
8. United Abilities	A.A	- Flash light batteries	Pcs.	14,387,245	1.554
		- Umbrellas	Pcs.	587,832	
Sub-total				14,975,077	541
					2.095

A N N E X 8

Private Industries in Ethiopia 1981

and Small-Scale and Handicraft Establishment

(HASIDA 1980 Assessments)

- Ethiopian Metal Tools, Addis Ababa
  Sickles
- Ethiopian Aluminium Company, Asmara
  Aluminium utensils
- Antionio Geni and Armando Ralle, Asmara
  Mechanical workshop
- D'Ensi Ernesto, Addis Ababa
  Foundry and mechanical workshop
- Kifle Desta
  Structural metal products
- Oficina Croce and Toccacio (OCFA), Addis Ababa
  Drums and tanks
- Costa Vincenco, Asmara
  Structural metal products
- Edili Di Constanzo, Addis Ababa
  Structural metal products
- General Works and Pattern Making, Addis Ababa
  Structural metal products
- D'Mauro Matteo, Asmara
  Structural metal products
- Vibro Cement, Addis Ababa
  Structural metal products
- Asmara Metal Manufacturer, Asmara
  Metal products
- Ethiopian Crown Cork and Can Making Industry, Addis Ababa
  Crown Corks, metal cans
- Etiopian Industrial and Commercial Ltd., Asmara
  Fabricated metal products
- Panto Scavi Foundry, Asmara
  Foundry
- Pinsenti Stefano, Asmara
  Fabricated metal products
- Ebla Brill, Addis Ababa
  Fabricated metal products
- Fabrica accumulator Eritrea (FAE), Asmara
  Accumulators
- Asmara Battery Industrie, Asmara
  Batteries
- Ethiopian Engineering Development, Asmara, Metsiwa
  Shipbuilding, repair.

Small-scale Industries: Metal Products

Key data from two surveys, together covering 23 towns in Ethiopia (all major ones, incl. Addis, Asmara.)

Total number of establishments	181
(Addis 53, Asmara 74)	
Total number of persons engaged	1,174
(Addis 373, Asmara 423)	
Total Gross Value of Production, approx/yr	4 million Birr
(Addis 1,430,926)	
(Asmara for 7 months only 1,212,650) raised for full year c:a 2,000,000)	

For further details see attached photocopies, incl. ~~one~~ two on capacity utilization (in Asmara - very low.)

The full report on SSI Surveys is expected to be bound and available within a few weeks.

Handicrafts establishments: Metal, mainly blacksmithy

Key data from two surveys, together covering 21 towns, not including Addis [redacted]

Total number of establishments	[redacted] 377
Total number of persons engaged, approx.	700
(detailed data from ten town gives a ratio of 2 employed per establishment)	

The data from the two first surveys on handicrafts are not very reliable and so many craftsmen work outside towns.

A much more reliable survey has been conducted this year on handicraft co-operatives, around 700 co-ops with around 60,000 members. The collected data will be processed and the report should become available by the middle of 1981.

Addis Ababa, 12 December 1980

Nils Sjoeblom
UNIDO/HASIDA

Table 4.1: Distribution of SSIs by major industrial classification and by town.

Reference Period	Serial No.	Town	Major industrial classification													
			Food Industry I	Food Industry II	Beverage	Tobacco	Textiles	Leather & Fur	Wood & Cork Products	Paper & Paper Products	Printing & Publishing	Rubber, Chemical, Plastic & Petroleum Products	Non-Metallic Mineral Products	Fabricated Metal Products	Manufacturing Industries not Elsewhere Classified	TOTAL
1969 (E.C)	1	Addis Abeba	371	48	3	-	7	26	58	1	8	3	11	53	1	590
	2	Assela	20	1	-	-	-	-	5	-	-	-	-	-	-	26
	3	Awassa	14	1	-	-	-	-	2	-	-	-	1	-	-	18
	4	Bahir-Dar	23	2	-	-	-	-	3	-	-	-	1	1	-	30
	5	Debre-Markos	28	3	-	-	-	-	2	-	-	-	-	1	-	34
	6	Dessie	23	5	-	-	1	-	9	-	-	-	1	4	-	43
	7	Dire-Dawa	15	15	-	-	-	-	7	-	-	-	3	9	-	49
	8	Gonder	30	2	-	-	-	-	6	-	-	-	1	6	-	45
	9	Jimma	24	15	1	-	-	-	3	-	-	-	2	4	-	49
	10	Nazreth	35	7	-	-	-	-	5	-	-	1	1	4	-	53
	11	Shashemene	19	1	-	-	-	-	3	-	-	-	-	3	-	26
		SUB - TOTAL	602	100	4	-	8	26	103	1	8	4	21	85	1	963
1970 (E.C)	1	Akaki	27	1	-	-	2	-	2	-	-	1	-	3	-	36
	2	Aseb	4	4	-	-	-	-	4	-	-	-	-	1	-	13
	3	Debre-Brehan	27	2	-	-	-	-	1	-	-	-	-	2	-	31
	4	Debre-Zeit	16	2	-	-	-	-	1	-	-	-	-	2	-	21
	5	Dilla	16	7	-	-	-	-	2	-	-	-	-	3	-	28
	6	Harrer	31	7	-	-	-	1	1	-	1	-	1	3	-	45
	7	Jijiga	5	-	-	-	-	-	1	-	-	-	-	1	-	7
	8	Gyion	15	-	-	-	-	-	-	-	-	-	-	1	-	16
	9	Nekel e	16	3	1	-	-	-	6	-	1	-	1	3	-	31
	10	Nekemtte	11	-	-	-	-	-	1	-	-	-	-	2	-	14
	11	Yirgalem	14	5	-	-	-	-	1	-	-	-	-	1	-	21
		SUB - TOTAL	182	31	1	-	2	1	19	-	2	1	2	22	-	263
1971 (E.C)	1	Asmera	56	40	10	1	94	10	44	3	14	8	4	74	2	360

The Reference period for Asmera is only seven months.

181 1,586

Graild T. Val

Table 4.2: Distribution of persons engaged in the SSIs by major industrial classification and by town.

Reference Period	Serial No.	Town	Major industrial classification: Food Industry I	Food Industry II	Beverage	Tobacco	Textiles	Leather & Fur	Wood & Cork Products	Paper & Paper Products	Printing & publishing	Rubber, Chemical, Plastic & Petroleum Products	Non-Metallic Mineral Products	Fabricated Metal Products	Manufacturing industries not Elsewhere Classified	TOTAL
[illegible] (E.C)	1	Addis Abeba	1372	2093	73	-	338	418	103[illegible]	87	288	102	415	373	11	6604
	2	Assela	58	15	-	-	-	-	65	-	-	-	-	-	-	138
	3	[illegible]	55	8	-	-	-	-	19	-	-	-	103	-	-	183
	4	[illegible]	66	[illegible]	-	-		-	[illegible]	-	-	-	15		.	202
	5	[illegible]	90	[illegible]	-	-	-	-	[illegible]	-	-	-	-		-	[illegible]
	6	[illegible]	[illegible]	[illegible]	-	-	[illegible]	-	[illegible]	-	-		81		-	[illegible]
	7	Dire-Dawa	52	[illegible]	-	-	-	-	[illegible]	-	-	-	17		-	[illegible]
	8	Gonder	243	32	-	-	-	-	41	-	-	-	9	4	-	309
	9	Jimma	98	175	19	-	-	-	61	-	-	-	63	15	-	431
	10	Nazreth	122	398	-	-	-	-	38	-	-	8	9	21	-	[illegible]
	11	Shashemene	67	15	-	-	-	-	29	-	-	-	-	7	-	118
		SUB - TOTAL	2488	3241	92	-	346	418	1418	87	288	110	712	484	11	9695
1970 (E.C)	1	Akaki	464	44	-	-	268	-	62	-	-	24	-	77	-	939
	2	Aseb	14	53	-	-	-	-	10	-	-	-	-	5	-	82
	3	Debre-Brehan	54	50	-	-	-	-	-	-	-	-	-	32	-	136
	4	Debre-Zeit	172	46	-	-	-	-	16	-	-	-	-	3	-	237
	5	Dilla	54	66	-	-	-	-	27	-	-	-	-	12	-	159
	6	Harrer	133	46	-	-	-	3	4	-	18	-	9	11	-	224
	7	Jijiga	20	-	-	-	-	-	2	-	-	-	-	2	-	24
	8	Gyion	54	-	-	-	-	-	-	-	-	-	-	2	-	56
	9	Mekele	314	42	3	-	-	-	30	-	2	-	11	17	-	419
	10	Nekemtte	49	-	-	-	-	-	1	-	-	-	-	3	-	53
	11	Yirgalem	57	30	-	-	-	-	7	-	-	-	-	2	-	96
		SUB - TOTAL	1385	377	3	-	268	3	159	-	20	24	20	166	-	2425
197[illegible] (E.C)	1	[illegible]	596	313	307	119	324	545	118	85	315	362	54	423	33	4194
Grand Total														1,174		16,314

The Reference period for Asmera is only seven months.

=153=

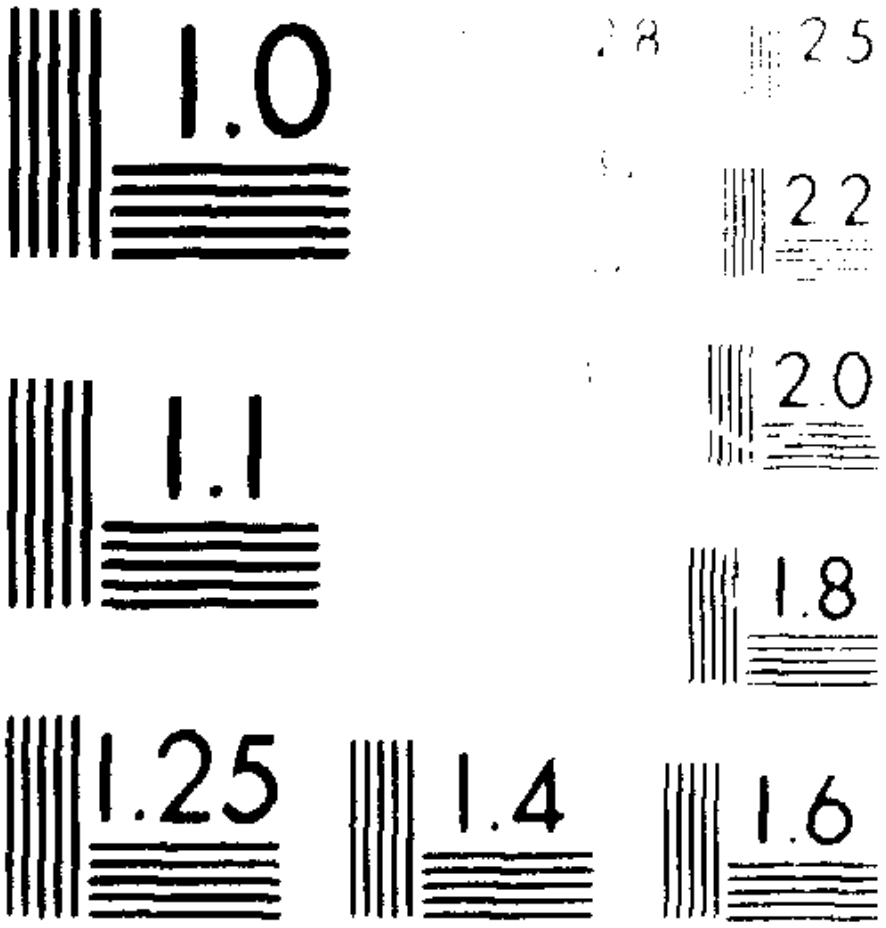

1.0
2.8
2.5
2.2
1.1
2.0
1.8
1.25
1.4
1.6

Table 4.6: Gross value of production by major industrial classification and by town.

Reference Period	Town	Major industrial classification													
		Food Industry I	Food Industry II	Beverage	Tobacco	Textiles	[illegible] & [illegible]	Wood & Cork Products	Paper & Paper Products	Printing & Publishing	Rubber, Che., Pla.& Petro. Products	Non-Metallic Mineral Products	Fabricated Metal Products	Other Manufacturing Industries	TOTAL
1969 (EC)	Addis A.	10774452	24821347	4463830	-	1687508	3325652	4755417	795943	3772013	4000263	1430926	1479560	10788	61317699
	Assela	144927	154200	-	-	-	-	130522	-	-	-	-	-	-	429649
	Awassa	159585	181750	-	-	-	-	64360	-	-	-	190532	-	-	596227
	[illegible]-D.	[illegible]	1334024	-	-	-	-	67612	-	-	-	16640	[illegible]	-	[illegible]
	[illegible]	[illegible]	[illegible]	-	-	-	-	[illegible]	-	-	-	-	[illegible]	-	[illegible]
	[illegible]	[illegible]	[illegible]	-	-	[illegible]	-	125991	-	-	-	[illegible]	[illegible]	-	[illegible]
	[illegible]	[illegible]	2815	-	-	-	-	[illegible]	-	-	-	[illegible]	[illegible]	-	[illegible]
	[illegible]	[illegible]	[illegible]	-	-	-	-	[illegible]	-	-	-	[illegible]	[illegible]	-	[illegible]
	Jimma	[illegible]	1180109	238829	-	-	-	294910	-	-	-	[illegible]	[illegible]	-	[illegible]
	Nazreth	202622	814230	-	-	-	-	168246	-	-	139650	97560	151800	-	2164108
	Shashe-mene	294603	108000	-	-	-	-	197122	-	-	-	-	20110	-	619835
	SUB-TOTAL	18817085	32942911	4702659	-	1697090	3325652	6081722	795943	3772013	4139913	[illegible]	[illegible]	10788	80398938
1970 (EC)	Akaki	10117351	440295	-	-	821644	-	240733	-	-	600000	-	977989	-	13198012
	Aseb	62680	837000	-	-	-	-	60478	-	-	-	-	4500	-	964658
	Debre-B.	117478	122084	-	-	-	-	-	-	-	-	-	31572	-	271134
	Debre-Z.	5673482	821825	-	-	-	-	28640	-	-	-	-	10258	-	6534205
	Dilla	197770	185832	-	-	-	-	98620	-	-	-	-	63695	-	545917
	Harrer	690702	736100	-	-	-	5016	6178	-	101872	-	24110	32317	-	1596295
	Jijiga	35181	-	-	-	-	-	2340	-	-	-	-	780	-	38301
	Gyion	231849	-	-	-	-	-	-	-	-	-	-	2400	-	234249
	Mekele	398451	427100	-	-	-	-	195049	-	16550	-	28206	57310	-	1154966
	Nekemtte	208564	-	-	-	-	-	5440	-	-	-	-	4680	-	218684
	Yirgalem	202355	194050	-	-	-	-	67780	-	-	-	-	600	-	464785
	SUB-TOTAL	17935863	3764286	32300	-	821644	5016	705258	-	118422	600000	52316	1186101	-	25221206
1971 (EC)	Asmera	1870537	2524574	1518087	489010	2420527	4512872	188606	226034	1194303	2252518	79680	1212650	49160	18543358

The Reference period for Asmera is only seven months.

Grand Total 3,776,567 124,383,...

Table 1.11:: Capacity Utilization of Manufacturing Industries in the Reference Period

Survey II : 12 Towns (Addis & Harar not included)

Code	Industrial Group	No. of estab. that provided informat.	Value of Ref. period prod. (Br.)	Value of capacity production (Br.)	Utilized Capacity
	Food Industry I				
215-1	Grain mills products	3	15,289,593	18,502,451	83%
216	Grain mills	12	683, 726	5,779,593	12%
	Food Industry II				
220	Bakeries	18	3,058,929	5,449,588	56%
223	Confectioneries	1	24,300	25,313	96%
225	Animal feed processing	1	440,295	880,590	50%
	Beverage Industry				
230	Alcoholic liquors	1	32,300	285,600	11%
	Manufacture of Textiles				
253	Sweaters	1	240,500	2,262,000	11
	Manufacture of Leather and Fur				
260	Tanneries & Leather products	1	240	480	50%
	Manufacture of wood and cork products				
311	Wood and cork products	1	142,933	285,866	50%
312	Manufacture of furniture and fixture mainly of wood.	16	340,657	923,661	37%
	Printing and Publishing				
330	Printing and Publishing	2	112,127	601,626	19%
	Rubber, Chemical, Plastic and petroleum products				
346	Plastic products	1	600,000	1,200,000	50%
	Non-Metallic mineral products				
353	The Manufacture of all type of cement products	2	46,066	899,005	5%
	Fabricated Metal Products				
371	Metal Furniture & fixture	11	128,378	1,132,221	11%
379	Fabricated metal products	1	912,176	1,504,418	61%
Total		72	22,054,220	39,732,412	56%

Capacity utilization - Asmara

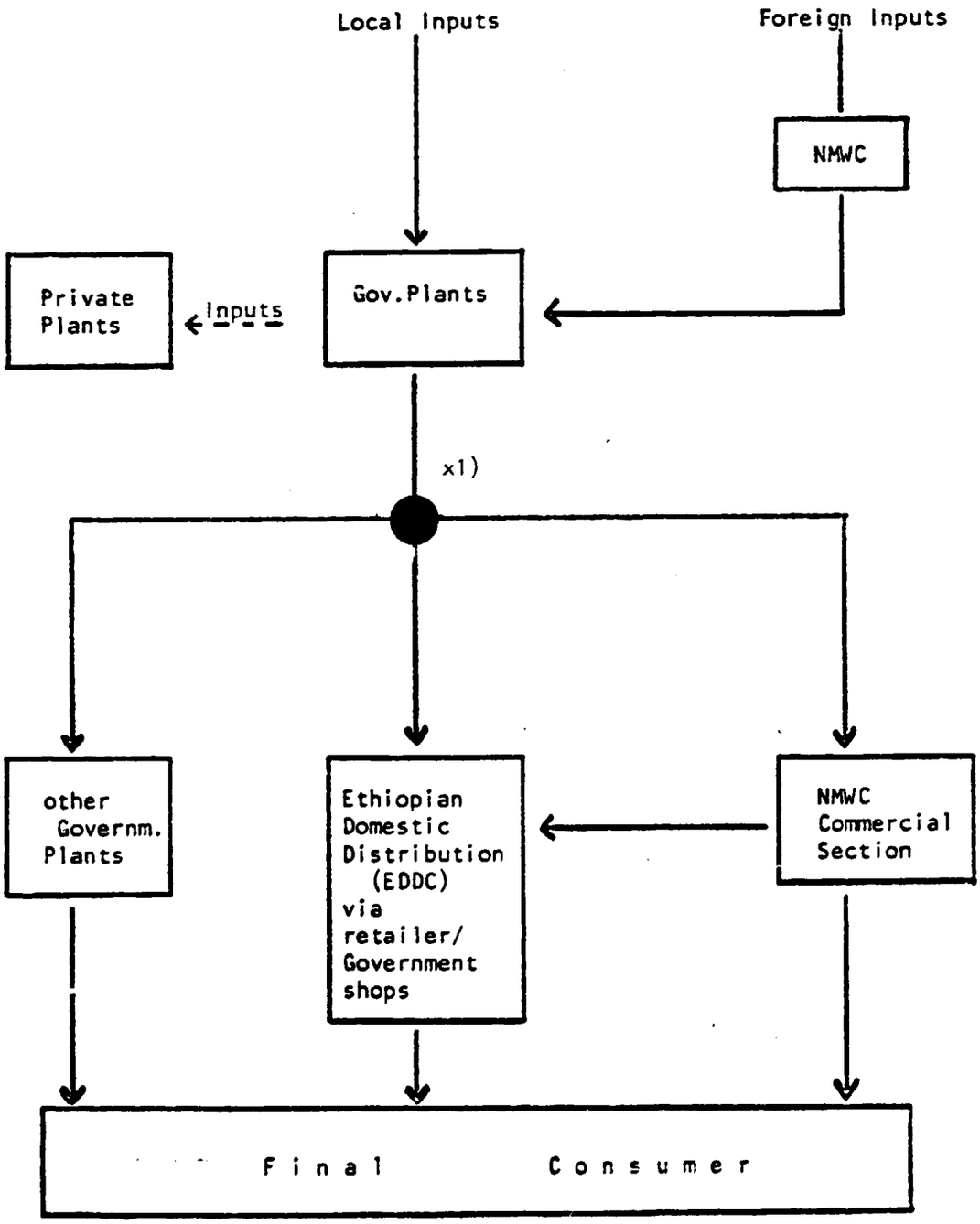
Code	Industriaà Group	No. of estab. that provided informat. ion	Value of Ref. period product-ion (Br.)	Value of capacity production.(Br.)	Utilized capacity (%)
	Paper and paper products				
321	Paper products	3	258,225	5,874,737	4%
	Printing and Publishing				
330	Printing and publishing	10	178,805	589,063	30%
	Rubber, Chemical, Plastic and Petroleum products				
340	Rubber products(tyres)	1	14,235	28,470	50%
342	Chemical products	-	1,581,600	7,152,562	22
346	Plastic products	4	968,247	2,947,423	-
	Non-Metallic Mineral pro.				
350	Glass products	3	69,480	146,770	47
354	Stone crushing	1	10,200	280,800	4%
	Fabricated Metal Products				
370	Cutlery and hand tools	6	269,145	8,899,026	3%
371	Metal Furniture & fixture	24	259,453	1,908,805	14%
372	Machinery & equipment (except electrical)	3	19,939	48,118	41%
373	Electrieal machinery	5	237,884	2,322,870	10%
376	House hold utensils	2	121,077	266,340	45%
377	Manufacture of steel wool	1	25,138	636,003	4%
379	Fabricated metal products	4	68,700	234,300	29%
	Manufacturing Industries not elsewhere classified				
390	Manufacturing products not elsewhere classified	2	49,160	791,914	6%
	Total	271	16,464,568	117,487,909	14%

ANNEX 9

Flow of Goods in the Ethiopian

Metal Working Sector

Flow of Goods in the Ethiopian Metal Working Sector



x1) distribution according to the criteria:

- Nature of product
- Government guidelines

ANNEX 10

Cost Analysis Sheet

COST ANALYSIS SHEET I

SUPPLIER _____ L/C NO. _____
IBC NO. _____
DESCRIPTION ..... INV. NO. _____
QUANTITY:
PCS _____
KGS _____
MTS _____

VALUE

FOB. F. CURRENCY	_____	ETH. BIRR	_____
FREIGHT	_____	" "	_____
COST & FREIGHT	_____	" "	_____
INSURANCE	_____	" "	_____
BANK & CABLE CHARGES		" "	_____
INTEREST		" "	_____
INLAND TRANSPORT	_____ PER _____	" "	_____
TRANSITORY COST	_____ PER _____	" "	_____
PORT DUES REC. NO.	_____	" "	_____
STORAGE COSTS REC. NO.	_____	" "	_____
CUSTOMS DUTY TARIFF NO.	_____ R.C. _____	DL.S. _____	_____
	_____ _____	_____	_____
	_____ _____	_____	_____
TRANSACTION TAX DL. NO.	_____ REC. N.	_____	_____
MUNICIPALITY TAX	_____ " "	_____	_____
EXCISE TAX	_____ " "	_____	_____
STANDARDS FEE	_____ " "	_____	_____
OTHERS	_____ " "	_____	_____
LAND COST	_____ " "	_____	_____

UNIT COST PER PC. _____
" KG. _____ ⟹ FACTORY INPUT COST
" MT _____

GOODS RECEIVED BY GRM. N. _____ DATE _____ QTY _____
_____ _____ _____
_____ _____ _____

SHORTLANDED	_____	_____	_____
DAMAGED	_____	_____	_____
EXCESS	_____	_____	_____

REMARKS: _____
_____
_____

PREPARED BY: _____ CHECKED BY: _____

APPROVED BY: _____

Source: NMWC, Commercial Section, Addis Ababa 1981

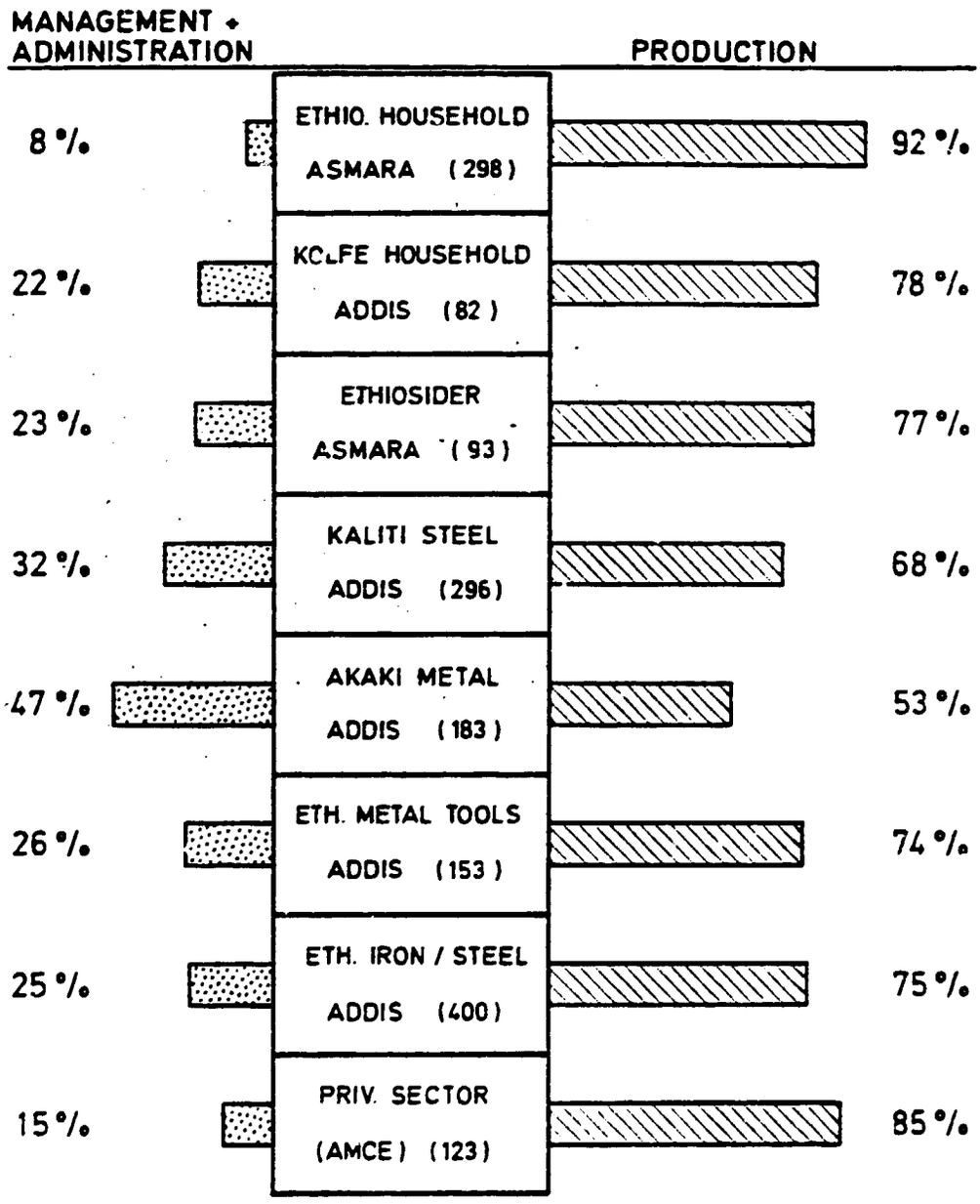
COST ANALYSIS SHEET II

FACTORY INPUT COST			ETH.BIRR _____
DIRECT LABOUR COST	ETH.BIRR	_____	
INDIRECT LABOUR COST	"	+ _____	
OVERHEADS	"	+ _____	
ADMINISTRATION COST	"	+ _____	
FACTORY SELLING COST	ETH.BIRR	= _____	⇒ _____
PROFIT			+ _____
FACTORY SELLING PRICE (FSP)			= _____
COMMERCIAL DEV.SERVICE CHARGE		_____	
7 % GOV. TAX on FSP		+ _____	
Commercial Division upmarking		= _____	⇒ + _____
DISTRIBUTION PRICE TO EDDC/ FINAL CONSUMER			= _____
10 % CHARGE EDDC (DISTRIBUTION AND AGENT FEE)			+ _____
FINAL CONSUMER PRICE			= _____

ANNEX 11

Allocation of Employees

ALLOCATION OF EMPLOYEES



A N N E X 12

Comparative Survey on the Performance

of NMWC Plants

Item	Company Name	Kaliti Steel	Akaki Metal	Ethio Iron & Steel Foundry	Ethio-sider Iron & Steel	Ethio Tools Factory	Kolfe House-hold Ut.	Ethiop. House-hold Ut.	Remarks
1	Employees	296	183	397	93	153	82	293	
2	Sales								see turnover sheet
3	Value Added	+ 2	+ 1	+ 2	+ 2	+ 3	+ 3	+ 3	
4	Productivity)[1]	- 2	- 2	- 2	- 2	+ 1	- 2	- 1	
5	Technology Level	- 1	0	0	- 1	0	- 2	- 1	
6	Maintenance	- 2	+ 1	- 1	- 2	- 1	- 3	- 1	
7	Production Organization	0	- 1	0	0	- 2	- 3	+ 1	
8	Materials Flow	- 1	+ 1	0	- 2	- 1	- 2	+ 1	
9	Safety	- 3	- 1	- 2	- 3	- 2	- 3	- 3	
10	Working Conditions	- 1	- 1	- 2	- 3	- 2	- 3	- 2	
11	Material Management	- 1	+ 1	0	- 1	+ 1	- 1	0	
12	Loss/Waste/Scrap	+ 2	+ 2	+ 2	+ 3	+ 1	+ 2	+ 2	
13	Productivity Reserves	- 2	+ 3	+ 2	+ 3	+ 2	+ 1	+ 3	
14	Product Design	0	0	0	0	+ 1	+ 1	0	
15	Product Quality	- 2	- 1	- 2	+ 2	+ 1	0	- 1	
16	Importance of Products	+ 3	+ 3	+ 3	+ 3	+ 3	+ 3	+ 3	
17	Export opportunities	+ 1	+ 2	0	0	+ 1	0	0	
18	Opportunity for other Production	+ 2	- 3	+ 1	0	+ 2	+ 1	0	
19	Qualification of Management	- 1	0	- 2	0	+ 1	0	+ 1	
20	Qualification of Employees	- 1	0	- 2	0	+ 1	0	+ 1	
21	Rate of Absence	- 2	- 2	- 2	- 1	- 1	- 2	- 1	
22	Training Regd. Management	- 2	- 2	- 2	- 1	- 1	- 1	- 1	high demand
23	Training Regd. Labour	- 2	- 2	- 2	- 1	- 1	- 1	- 1	high demand
General Rating / Plant)[2]		- 9	- 1	- 9	- 2	+ 6	- 12	+ 3	

Note: Rating based on -3 to +3 scale

)[1] +3 representing average standard of comparable German units

)[2] Method: 21 applicable colums, ± points given are subtracted from each other

	Company	Employees	Turnover (Birr)	Turnover/ capita (Birr)	Average wage/salary (Birr/month)	Absence (%)	Productivity (%)
1	Maliti Steel Works	296	15,907,000	53,730	230	30	40
2	Akaki Metal Prod.	183	43,029,804	235,135	280	24	60
3	Ethio Irion & Steel Foundry	397	16,540,000	41,873	220	28	Foundry: 70 Nails & Wire: 20
4	Ethiosider Iron & Steel	93	3,000,000	32,258	150	40	Nails: 30 Wire: 20
5	Ethio Tools Fact.	153	3,108,450	20,317	270	12	50
6	Kolfe Household	82	2,581,413	31,480	105	37	35
7	Ethio Household Utensils	298	5,470,000	18,356	126	25	25
	Private						
8	AMCE (FIAT)	123	29,535,00	240,122	700	10	80

ANNEX 13

Integrated Development Programme of Priority Projects

in Basic Metal and Engineering Industries in Ethiopia

as Proposed by the ACA/UNIDO Mission

Integrated Development Programme of Priority Projects in Basic Metal and Engineering Industries in Ethiopia as Proposed by the ACA/UNIDO Mission

Project Sources	Abbreviation
Rationalization projects i.e. Projects Operational under-study by the Ethiopian Government	PRU (existing)
Projects Identified by the ECA/UNIDO Mission in January 1979 during the meeting with government agencies	PIU (proposed)
Projects recommended by ECA/UNIDO Mission to achieve Integrated Development of Basic Metal and Engineering Industries	PNU (proposed)

Abbreviation (Government Institutions)

CPSC	-	Central Planning Supreme Council
MI	-	Ministry of Industry
MMPWR	-	Ministry of Mines, Power and Water Resources
MTC	-	Ministry of Transport and Communications
ME	-	Ministry of Education
MLSA	-	Ministry of Labour and Social Affairs
MA	-	Ministry of Agriculture
MF	-	Ministry of Finance
MCT	-	Ministry of Commerce and Tourism
NMWC	-	National Metal Works Corporation
NPC	-	National Productivity Centre
HASIDA	-	Handicrafts and Small-Scale Industries Development Agency
AIDB	-	Agricultural and Industrial Development Bank
P	-	Private Industry

Sequence of Programming:

(A) Basic Metal Development Programme

No.	Project Title	Source of Abbreviat.	Government Implementing Agency	Period of Development
1	Proposed UNIDO study mission for integrated mineral survey and exploration project	PIU (proposed)	MMPWR	1979-80
2	Establishment of a Central Ores Testing and Metallurgical Laboratory	PIU (proposed)	MMPWR	1980
3	Survey and pre-feasibility study for iron ores exploration Wollega region	PRU (existing)	MMPWR	1979-81
4	Survey for lignite coal in Nejo area	PRU (existing) PIU (proposed)	MMPWR	1979-80
5	Survey and pre-feasibility study of copper and zinc deposits at Adi-Nefas and Debarwa	PRU (existing)	MMPWR	1979-80
6	Survey and pre-feasibility study of Manganese at Gedem, Dalote	PRU (existing)	MMPWR	1980
7	Survey and pre-feasibility study of Nickel at Sidamo	PRU (existing)	MMPWR	1980-81
8	Project for the pre-feasibility study for refractory bricks at Ogaden and Blue Nile Region	PRU (existing) PNU (proposed)	MMPW	980-81
9	Testing and pre-feasibility study for processing of lignite for semi-processed coke	PRU (existing) PIU (proposed)	MMPWR	1980-81
10	Study on transportation of iron ores, coal, etc. including power requirement	PIU (proposed)	MMPWR MTC MF	1980
11	Feasibility study for integrated mini-steel plant for the production of direct reduction sponge iron using processed lignite (20,000 tons/year) and steel rolling mill	PIU (proposed) PRU (existing) PNU (proposed)	MMPWR MI NMWC MLSA MTC MF	1980-81
12	UNIDO mission for the feasibility study of Copper Pilot Plant Project	PIU (proposed)	MMPWR MI NMWC	1980-81

(B) Engineering Industries Development Programme

No.	Project Title	Source of Abbreviat.	Government Implementing Agency	Period of Development
13	Feasibility study for integrated foundry and central spare parts manufacturing workshop	PRU (existing)	MI, NMWC MTC, HASIDA ME, MLSA, MF	1979-80
14	Setting-up of small foundries for cast iron and brass shape castings (two in each province)	PNU (proposed)	HASIDA NMWC	1980-81
15	Feasibility study for the expansion of Ethiopian iron and steel foundry and rolling mills	PIU (proposed)	NMWC	1980-81
16	Setting-up of a welding electrode manufacturing plant (material from item 11 above electrode quality steel)	PNU (proposed)	NMWC	1981-82
17	Manufacture of brass ingots and manufacture of semi-finished and finished brass products	PNU (proposed)	NMWC	1982-83
18	Introduction of S.G. iron casting and malleable castings for the spare parts and shape castings for capital goods development in item 13 above	PNU (proposed)	NMWC	1980-81
19	Manufacture of hot rolled sheets (average 5mm thick and 480 to 700 mm width for agricultural discs and related products (should be linked with item 15 above)	PNU (proposed)	NMWC	1983-84
20	Ferrous die-cast component manufacture for water fittings, matt tools, etc. in existing pipe factories	PNU (proposed)	NMWC	1981-82
21	Manufacture of non-ferrous die-cast components etc. (can be integrated with item 17 above)	PNU (proposed)	NMWC	1982-83
22	Manufacture of simple machine tools in existing railway workshop	PNU (proposed)	MI, MTC	1982-82
23	Manufacture of animal drawn and simple power operated agricultural machinery (expansion of Ethiopian Metal Tools Ltd.)	PNU (proposed)	NMWC	1980-81

continued ...

(B) Engineering Industries Development Programme (continued)

No.	Project Title	Source of Abbreviat.	Government Implementing Agency	Period of Development
24	Assembly and gradual increased manufacture of agricultural tractors and implements upto 35 HP (proposed 3500 tractors per year)	PRU (existing)	NMWC	1979-80
25	Manufacture of water fittings in Seaben and Kaliti Steel (item 20 can be integrated)	PIU (proposed)	NMWC	1980-81
26	Feasibility study for the integrated kitchenware factory (expansion of existing two factories)	PNU (proposed)	NMWC	1979-82
27	Manufacture of agricultural and industrial pumps (supporting project of UNIDO. Hand pump and wind mill research; ETH/77/013)	PNU (proposed) PRU (existing)	NMWC (Science and Technology Commission and Water Research Authority	1979-81
28	Project on integrating the two pipe factories SABEAN and KALITI Steel	PRU , (existing)	NMWC	1979
29	Project for the bus body manufacture (36-seater), (existing track assembly plant can be extended)	PRU (existing)	NMWC	1980-81
30	Expansion project for 200,000 sickle of Metal Tools Ltd.	PRU (existing)	NMWC	1979-80
31	Expansion project for rivet manufacture and door hinge manufacture in Metal Tools Ltd.	PRU	NMWC	1979
32	Installation of Industrial Estates in each province	PNU (proposed)	MI HASIDA	1979-84
33	Expansion of existing small foundries	PRU (existing)	HASIDA (P)	1979-80
34	Implementation of 98 identified small-scale projects as identified by the Government of India mission	PRU (existing) PNU (proposed)	HASIDA (P)	1979-80
35	Manufacture of hardware, bolts nuts, etc.	PNU (proposed)	NMWC	1979-80
36	Manufacture of forged mechanical hand tools	PNU (proposed)	NMWC	1981-82

continued...

(B) Engineering industries Development Programme (continued)

No.	Project Title	Source of Abbreviat.	Government Implementing Agency	Period of Development
37	Integrated plant for the manufacture of metal cans for food industries etc.	PNU (proposed)	NMWC	1979-81
38	Manufacture of bayonet type caps for lamps	PNU (proposed)	NMWC	1981-82
39	Manufacture of razor blades	PNU (proposed)	NMWC	1981-83
40	Manufacture of fabricated stainless steel vessels etc.	PNU (proposed)	NMWC	1979-81
41	Manufacture of electrical accessories etc.	PNU (proposed)	NMWC	1980-81

(C) Projects for Training Centre, Education, Research, Training and Manpower Development for Basic Metal and Engineering Industries Development

Sequence of Projects:

No.	Project Title	Source of Abbreviat.	Government Implementing Agency	Period of Development
42	Establishment of a metallurgical laboratory, quality control and training centre for Ethiopian iron and steel foundry	PIU (proposed)	NMWC	1979-80
43	Project to set up a training centre for proposed iron and steel complex	PIU (proposed)	MMPWR	1980-81
44	Feasibility study for metal development and training centre	PIU (proposed)	NMWC MLSA, ME	1980-81
45	Strengthening of the Geological survey (UNDP/ETH/71/537)	PRU (existing)	Institute of Geological Surv.	Ongoing Project
46	UNDP Project of Training for Rural Electrification (ETH/79/001)	PRU (existing)	Ethiopia Governmt.	Ongoing Project

continued ...

(C) Projects for Training Centre, Education, Research, Training and Manpower Development for Basic Metal and Engineering Industries Development

(continued)

No.	Project Title	Source of Abbreviat.	Government Implementing Agency	Period of Development
47	Proposed National Centre for Transfer of Technology (ETH/77/001)	PRU (existing)	NPC and UNCTAD/ UNIDO	1979
48	Assistance to the National Productivity Centre for in-plant training advisory service (ETH/77/009)	PRU (existing)	MI and ILO	Ongoing
49	Assistance to Industrial projects development (ETH/75/008)	PRU (existing)	MI and UNIDO	Ongoing
50	Handicraft and small-scale industries development (ETH/77/018)	PRU (existing)	HASIDA and UNIDO	Ongoing
51	Establishment of quality control and testing centre (ETH/79/003)	PRU (existing)	Ethiopia Standard Institute and UNIDO	Ongoing
52	Project on rural radio-call service (ETH/78/027)	PRU (existing)	MTC and ITU	Ongoing
53	Labour intensive rural road construction (ETH/78/019)	PRU (existing)	Rural Road Authorities and ILO	Ongoing
54	Programme for higher and middle management development - Training courses for senior executives - Training courses of young managers - Training courses for industrial engineers - Training courses for maintenance engineers	PNU (proposed)	NPC, ME, MI	2 years

continued ...

(C) Projects for Training Centre, Education, Research, Training and Manpower Development for Basic Metal and Engineering Industries Development

(continued)

No.	Project Title	Source of Abbreviat.	Government Implementing Agency	Period of Development
55	Post-graduate training programme for graduates engineers/diploma holders	PNU (proposed)	ME	2 years
56	In-plant quality control inspection courses	PNU (proposed)	NPC	1 year
57	In-plant courses on machine shop practice	PNU (proposed)	NPC, MI	3 years
58	In-plant courses on tool rooms work	PNU (proposed)	NPC, MI	4 years
59	Ad-hoc courses on preventive maintenance	PNU (proposed)	NPC, MI	6 months
60	Ad-hoc courses on industrial design and tool design	PNU (proposed	NMWC NPC, MI	6 months
61	Introduction of industrial engineering courses at University Technical College level	PNU (proposed)	ME	2 years
62	Introduction of special courses for engineering design and draftsmanship	PNU (proposed)	ME, NPC, MI	2 years
63	Skilled technician/workers training courses - General machinist - Fitters, welders, fabricators - High-skilled toolroom operatives - Quality control-viewers/ inspectors - Skilled maintenance operatives - Skilled operatives for forging and hot treatment - Maintenance technicians for heavy industries	PNU (proposed)	MLSA, NPC, MI, ME	6 months to 1 year

A N N E X 14

Basic Indicators

	Population (millions) Mid-1978	Area (thousands of square kilometers)	G.N.P per capita		Average annual rate of inflation (percent)		Adult literacy rate (percent) 1975	Life expectancy at birth (years) 1978	Average index of food production per capita (1969-71 = 100) 1976-78
			Dollars 1978	Average annual growth (percent) 1960-78	1960-70	1970-78			
Bangladesh	84.7	144	90	- 0.4	3.7	17.9	26	47	90
Ethiopia	31.0	1,222	120	1.5	2.1	4.0	10 (3)	39	84
Mozambique	9.9	783	140	0.4	2.8	10.9	..	46	81
Malawi	5.7	118	180	2.9	2.4	9.1	25 (3)	46	99
Tanzania	16.9	945	230	2.7	1.8	12.3 (1)	66 (3)	51	93
Egypt	39.9	1,001	390	3.3	2.7	7.0	44 (3)	54	93
Tunisia	6.0	164	950	4.8	3.7 (2)	7.1	55	57	128
Algeria	17.6	2,382	1,260	2.3	2..	13.4	37	56	82
Yugoslavia	22.0	256	2,380	5.4	12.6	17.3	85	69	117
Italy	56.7	301	3,850	3.6	4.4	14.0	98	73	100
German Dem. Rep.	16.7	108	5,710	4.8	..	..	..	72	127
Germany, Fed Rep.	61.3	249	9,580	3.3	3.2	5.9	99	72	104
Switzerland	6.3	41	12,100	2.2	4.6	6.6	99	74	113

(1) Figures for 1970-77, not 1970-78

(2) Figures for 1961-70, not 1960-70

(3) Figures are for years other than 1975, but generally not more than two years distant

Source: World Development Report 1980, World Bank

Annex 14
BASIC INDICATORS

ANNEX 15

Growth of Production

GROWTH OF PRODUCTION (average annual growth rate, percent)

	G.D.P.		Agriculture		Industry		Manufacturing		Services	
	1960-70	1970-78	1960-70	1970-78	1960-70	1970-78	1960-70	1970-78	1960-70	1970-78
Bangladesh	3.6	2.9	2.7	1.6	7.9	5.9	6.6	5.3	3.8	4.7
Ethiopia	4.4 (1)	1.8	2.2 (1)	0.5	7.4 (1)	0.4	8.0 (1)	1.3	7.8 (1)	4.5
Mozambique	4.6	- 3.2	2.1	- 1.8	9.5	- 5.1	6.6	- 6.1	6.4	- 3.7
Malawi	4.9	6.5	..	4.2	..	6.8	..	6.7	..	9.6
Tanzania	6.0	5.0	..	4.5	..	2.3	..	4.5	..	6.4
Egypt	4.5	7.8	2.9	3.1	5.4	7.2	4.7	7.6	5.1	12.0
Tunisia	4.6 (1)	7.9	2.0 (1)	5.6	8.7 (1)	8.1	7.6 (1)	11.0	4.2 (1)	8.7
Algeria	4.6	5.3 (2)	0.4	0.2 (2)	12.9	5.9 (2)	7.7	6.9 (2)	- 3.0	5.5 (2)
Yugoslavia	5.8	5.6 (2)	3.3	3.3 (2)	6.3	8.0 (2)	5.7	9.3 (2)	6.9	4.0 (2)
Italy	5.3	2.8	2.8	0.5	6.2	2.7	7.2	3.3	5.1	3.3
German Dem.Rep.	3.1	4.7	..	..	..	.	..	..	..	..
Germany,Fed.Rep.	4.4	2.4	1.5	1.6	5.2	2.1	5.4	2.0	4.2	1.7
Switzerland	4.3	0.1	..	..	..	..	..	..	..	..

(1) figures are for 1961-70, not 1960-70

(2) figures are for 1970-77, not 1970-78

Source: World Development Report 1980, World Bank

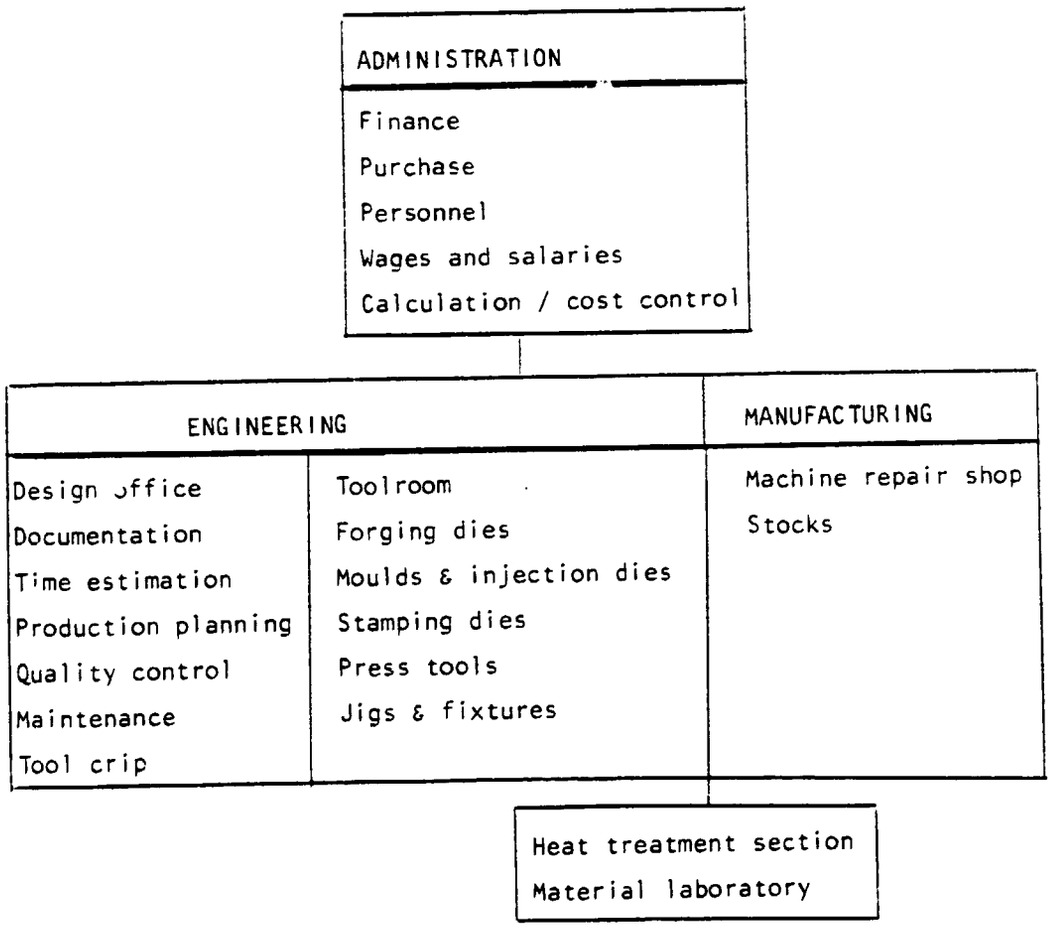
A N N E X 16

Outlay of Central Repair and Tool Shop

OUTLAY OF CENTRAL REPAIR AND TOOL SHOP

The following gives an outline of what organisation personnel and machinery and equipment are required.

Organisation :



Proposed Machinery and Equipment for the Machine Repair Shop:

3 milling machines with different working dimensions, including accessories and tools
3 lathes with different working diameter, incl. cutting tools
1 surface grinder
2 universal cylindrical grinders with internal attachment
1 radial arm drill press
3 column drill presses, different working range
3 drill presses, bench type
diverse small and hand machines
cleaning tank and equipment
ARC-MIG/TIG welding equipment
1 foot shear up to 10 mm, 1200 mm shearing length
1 screw press, 2.5 tons
1 horizontal honing machine
10 work benches

Proposed Machinery and Equipment for the Toolroom:

4 milling machines with different working dimensions, including accessories and tools
4 lathes with different working diameter incl. cutting tools
2 surface grinders
2 universal cylindrical grinders with internal grinding attachment
1 universal tool and cutter grinder
1 jig grinding and boring machine
1 engraving machine
1 radial arm drill press
3 column drill press, different working range
4 drill presses, bench type
1 spark erosion machine

1 try out press

1 vertical band saw

1 circular saw

ARC-MIG/TIG welding equipment

2 double grinding stands

3 double grinders, bench type

diverse small and hand machines

polishing equipment

15 work benches

For both sections together:

- heat treatment facilities
- materials testing laboratory, shall be used also for incoming materials tests
- tool crip with grinding machines for reconditioning of cutting tools, drills, saw blades, etc.
- quality control section, equipped with all necessary measuring tools, measuring tables, hardness tester, etc.
- compressor room
- maintenance section with spare part store for all machines in both workshops, with special tools for machine repair and plumberwork and electric repair and installation
- design office with approx. 5 drawing boards, blueprinting equipment, photocopy equipment
- documentation office with library; there should be kept the operation and repair manuals for the machines and equipment in both shops, as well as the standards from different countries and also technical information.

The above list does not claim to be a final one, although it specifies all major items required for equipping a machine repair and tool shop of this kind. In order to find out the precise requirements, it is recommended to conduct a detailed planning considering all factors involved, in particular the fields this workshop is destinated to work for.

Investments required for this workshop are estimated at approximately 3 million US$, cost for buildings not included.

Personnel Requirements for both workshops in the size order of the equipment listed above:

- Design Office:

  2 designers, toolmaking

  3 draftsmen, toolmaking

  1 designer, machinebuilding

  3 draftsmen, machinebuilding

  1 designer as advisor, toolmaking, expatriate

  1 designer as advisor, machinebuilding, expatriate

- Documentation and Library:

  1 engineer with knowledge of foreign languages

- Time Estimation and Process Planning:

  2 engineers

- Quality Control:

  1 engineer, machine tool building

  2 engineers, metallurgists

  2 technicians

  1 engineer as advisor, quality control specialist, expatriate

- Maintenance:

  1 engineer, all-round and specially machinery engineering
  2 technicians

  1 engineer as advisor, expatriate

- Tool Crip:

  1 technician
  1 skilled worker
  1 grinding specialist

- Toolroom:

  6 toolmakers
  3 milling machine operators
  3 lathe operators
  2 grinding machine operators
  1 specialist for jigs and tools and cutter grinders
  1 specialist for erosion machine
  1 welder

  2 toolmakers as advisors, expatriate

- Machine Repair Shop:

  4 machine fitters
  2 milling machine operators
  2 lathe operators
  1 grinding machine operator
  1 welder
  3 semi-skilled workers

  2 machine fitters as advisors, expatriate

- Heat Treatment and Materials Testing Laboratory:

  1 specialist for heat treatment, metallurgist

  1 help (technician) for the specialist

  1 technician, metallurgist, for materials testing

  1 metallurgist and heat treatment specialist, expatriate

- Buildings:

  Approximately 500 square meters for the work shops

  Approximately 180 square meters for administration

  Approximately 100 square meters for social rooms.

The toolroom should be outlined in a way to work as independant cost and profit center, i.e. it should cover its expenses by its own output. Thus the organizational set-up would have to be laid out in the same way as for a production plant.

Indispensable pre-requisite for an efficient performance of such a toolroom would be that material procurement complies with the necessarily high requirements expected from the materials.

The two alternatives of erecting a completely new plant for the repair/tool shop or linking it to the Ethiopian Metal Tools Factory as independant, separately organized cost/profit centre, are principally equivalent and will have to be subjected to closer investigation before taking any final decisions.

As a "makeshift" interim solution for the critical repair and maintenance situation, it is proposed to possibly install some kind of a mobile workshop until the central repair shop has been established. For this purpose the following facilities would be required:

1 truck, 5 - 7 tons

1 trailer with electric generator

1 workshop equipment

Costs for such a unit are estimated at 250 000 DM minimum.

The implementation of this project should be given highest priority.

ANNEX 17

STATISTICS

Table I:

Gross Domestic Product by Industrial Origin at Constant Factor Cost of 1960/61 (G.C) in millions of Birr

Fiscal Years Ethiopian Fiscal Years Industrial Origin	1976/77 1969	%	1977/78 1970	%	1978/79 1971	%
Agriculture	1.953,3	48,3	1.922,2	47,9	1.968,4	46,7
- Agriculture	1.838,7	45,4	1.308,1	32,6	1.352,3	32,1
- Forestry, Hunting, Fishing	114,6	2,8	614,1	15,3	616,1	14,6
Industries	602	14,9	583,1	14,5	653,0	15,5
- Mining and Quarrying	6,5	0,2	6,3	0,2	6,3	0,1
- Manufacturing	176,0	4,4	169,1	4,2	211,0	5,0
- Handicraft and Small Scale Industries	192,6	4,8	188,9	4,7	196,5	4,6
- Building and Construction	183,3	4,5	175,0	4,4	188,5	4,5
- Electricity and Water	43,6	1,1	43,8	1,0	50,7	1,3
Distributive Services	619,7	15,3	569,3	14,2	642,7	15,2
- Wholesale and Retail Trade	345,6	8,5	302,3	7,5	353,1	8,4
- Transport and Communication	274,1	6,8	267,0	6,7	289,6	6,8
Other Services	870,6	21,5	934,7	23,4	953,4	22,6
- Public Administration and Defence	315,1	7,8	366,5	9,1	369,1	8,8
- Others	555,5	13,7	568,2	14,3	584,3	13,8
Total	4.045,6	100	4.009,3	100	4.217,5	100

Sources: Ethiopia, Statistical Abstract 1978
National Bank of Ethiopia, 1980
BFAI Marktinformationen, 1980

Table II:

Expenditure on Gross National Product at Current Market Prices 1973/74 - 1976/77 in millions of Birr

Fiscal Years Ethiopian Fiscal Years	1973/74 1966	1974/75 1967	1975/76 1968	1976/77 1969	%
Gross Domestic Expenditure	5.361,2	5.716,7	6.062,0	7.041,3	100
- Consumption	4.811,1	5.158,1	5.484,0	6.480,4	92
- Private	(4.226,0)	(4.428,0)	(4.618,0)	(5.485,3)	
- Public	(585,8)	(730,1)	(866,0)	(995,1)	
- Gross Investment	549,4	579,7	578,0	560,9	8
- Private	(381,4)	(380,1)	(284,0)	(./.)	
- Public	(168,0)	(199,6)	(294,0)	(./.)	
Recurence Balance	190,0	-213,3	-58,0	-215,0	
GDP at market prices	5.551,2	5.524,5	6.004,0	6.826,3	
- Net factor income from abroad	-38,5	-35,1	-2,7	-6,2	
GNP at market prices	5.512,7	5.489,4	6.001,3	6.820,1	
- National savings	700,9	331,3	517,3	379,7	
- Domestic savings	739,4	366,4	520,0	385,9	

Sources: - National Accounts Division, National Revolutionary Development Campaign and Central Planning Supreme Council Secretariat

- World Bank, Economic Memorandum on Ethiopia, April 22, 1980
- Ethiopia, Statistical Abstract 1978

Table III:

Ethiopia-Retail Price Index of Market Prices
for Addis Ababa (Excluding Rent)
1970/71 - 1978/79
Average for Period, 1963 = 100

Fiscal Year Average	General Index		Food	Household	Clothing	Transport	Medical Care	Personal Care	Reading and Recreation	Other Goods and Services
Weights (%)	85,4		49,0	14,6	6,7	4,5	1,8	0,8	2,6	5,4
		(%)x2								
1970/71	145,7	-	160,6	130,9	140,3	100,0	135,3	156,2	121,2	114,5
1971/72	138,2	-5,1	144,2	137,1	142,3	100,0	140,6	162,2	120,4	117,3
1972/73	139,5	+9,0	143,2	142,5	152,5	100,0	143,1	158,5	123,7	117,8
1973/74	154,4	+10,7	163,1	148,3	169,4	101,9	152,1	166,2	140,6	123,4
1974/75	161,6	+4,7	166,4	165,4	184,5	103,7	165,8	183,6	151,2	128,6
1975/76	192,2	+18,9	207,1	193,4	199,8	106,4	192,0	201,2	159,7	129,5
1976/77	234,2	+21,2	268,0	225,3	210,2	107,5	199,2	198,2	173,2	134,1
1977 x1	270,8	+15,6	303,8	293,2	230,6	125,5	216,0		174,5	"
1978 x1	307,8	+13,7	352,6	318,6	252,5	125,3	260,0		180,0	"
1979 x1	331,2	+7,6	388,9	312,9	251,2	131,2	273,6		184,6	"

Sources :- Central Statistical Office
- World Bank, Economic Memorandum on Ethiopia, April 22, 1980

x1 BFAI Marktinformationen, Äthiopien Wirtschaftliche Entwicklung 1979, Oktober 1980

x2 changes in percent against precedent year.

Table IV:

Value of Imports by End Use 1972/73 - 1978/79
in millions of Birr

Fiscal Years	1972/73	1973/74	1974/75	1975/76	1976/77	1977/78	1978/79	1979/8o
Ethiopian Fiscal Years	1965	1966	1967	1968	1969	197o	1971	1972
Raw materials	2o	22	39	26	27	38	51	-
Semi-finished Goods	76	115	147	13o	124	126	18o	-
Fuel	48	68	162	1o7	137	158	2oo	-
Capital Goods	149	121	92	167	216	281	4oo	-
- Transport	(49)	(45)	(52)	(1o6)	(92)	(96)	(173)	-
- Agriculture	(11)	(9)	(14)	(8)	(12)	(16)	(17)	-
- Industrial	(89)	(67)	(26)	(53)	(112)	(169)	(21o)	-
Consumer Goods	14o	171	249	233	25o	336	37o	-
- Durable	(64)	(73)	(97)	(89)	(85)	(93)	(13o)	-
- Nondurable	(76)	(98)	(152)	(144)	(165)	(243)	(24o)	-
Unrecorded imports	-	13	44	24	131	12o	-	-
Miscellaneous	3	4	5	2	25	36	1o	-
Total imports c.i.f.	436	514	738	689	91o	1.o95	1.211	1.544
Change in % based on previous year	-	+18	+43	-7	+32	+2o	+11	+27

Sources:
- World Bank, Economic Memorandum on Ethiopia, April 22, 198o
- UN-Statistics, Addis Ababa 1981
- Custums data as reported by the National Bank of Ethiopia, Quarterly Bulletin and as adjusted by the NBE Research Department for Balance of Payments purpose
- IMF, Ethiopia-Recent Economic Development, July 1979

Table V

Value of Exports of Major Commodities
1972/73 - 1979/80
in millions of Birr

Fiscal Years	1972/73	1973/74	1974/75	1975/76	1976/77	1977/78	x1 1978/79	x1 1979/80
Ethiopian Fiscal Years	1965	1966	1967	1968	1969	1970	1971	1972
Coffee	200	166	118	298	409	515	542	686
Hides and Skins	70	58	37	43	52	58	107	142
Pulses	43	116	74	52	48	30	18	25
Sub-total	313	340	229	393	509	603	667	853
Minor exports and re-exports	144	259	247	146	134	49	54	146
Total Exports x2 f.o.b.	457	599	476	539	643	652	721	999
Change in % based on previous year	-	+31	-21	+13	+19	+ 1	+11	+39

Sources : - World Bank, Economic Memorandum on Ethiopia, April 22, 1980
- UN-Statistics, Addis Ababa 1981
- IMF, Ethiopia-Recent Economic Development, July 1979

x1 Provisional
x2 See table IV for explanation of adjustments made to custom data

Table VI

Balance of Payments of Ethiopia

1975/76 - 1979/80

in millions of Birr

Fiscal Years	1973/74	1974/75	1975/76	1976/77	x1 1977/78	x1 1978/79	x1 1979/8o
Ethiopian Fiscal Years	1966	1967	1968	1969	197o	1971	1972
Trade balance	86	-262	-15o	-268	-443	-49o	-545
- Export f.o.b.	(599)	(476)	(539)	(643)	(652)	(721)	(999)
- Import c.i.f. x2	(514)	(738)	(689)	(91o)	(1.o95)	(1.211)	(1.544)
Net services	66	13	9o	44	41	45	35
Net transfers	83	93	1o5	122	141	162	2oo
Current account balance	235	-156	45	-1o2	-261	-283	-31o
Nonmonetary capital (net)	66	16o	71	112	48	122	2oo
-Private long-t.	(64)	(41)	(17)	(12)	(7)	-	(22o)
-Public long-t.	(55)	(1o1)	(1o6)	(93)	(69)	(144)	
- Short-term	(-53)	(18)	(-52)	(7)	(-28)	(-22)	(-2o)
Net errors and omissions	-37	9	-35	38	-48	-29	63
SDR allocations	-	-	-	-	-	1o	
Overall balance	264	13	81	48	-261	-18o	-47
Net monetary movements x3	-264	-13	-81	-48	261	18o	47

x1 Preliminary

x2 See Table IV for explanation of adjustments made to custum data

x3 Increase in net assets denoted by minus sign.

Sources: IMF, Ethiopia-Recent Economic Development, July 1979

UN-Statistics, Addis Ababa 1981

Table VII

Gross Domestic Product, Value Added of Manufacturing, Handicraft and Small-Scale Industries Sectors at Constant Factor Cost of 1960/61 in millions of Birr

Fiscal Years	1970/ 71	1971/ 72	1972/ 73	1973/ 74	1974/ 75	1975/ 76	1976/ 77	1977/ 78	1978 79	1979/ 80
Ethiopian Fiscal Years	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
Gross Domestic Product (GDP)	3,606	3,778	3,880	3,936	3,940	4,031	4,046	4,009	4,218	4,454
GDP Growth Rate (%)	-	4.8	0	1.4	-0.1	2.3	0.4	-1	5.2	5.6
Manufacturing, Handicraft & Small-Scale Industries	337	351	368	365	361	355	369	358	408	-
Share of manufacturing and small-scale industries sector in GDP (%)	9.3	9.3	9.5	9.3	9.2	8.8	9.1	8.9	9.7	-
Manufacturing (10 and more employees)	158	164	175	173	171	167	176	169	211	-
Share of manufacturing sector (10 and more employees) in GDP (%)	4.4	4.3	4.5	4.4	4.3	4.1	4.3	4.2	5.0	-

Sources: UN Statistics, Addis Ababa, 1981
Ministry of Industry, Addis Ababa, 1981

Table VIII

Results of the Survey of Manufacturing Industries 1978/79

INDUSTRY GROUP	Number of Establishments			Gross Value of Production '000 Birr			Industrial and Non-industrial costs ('000 Birr)			() Public Indirect Taxes ('000 B.)	Value Added in National Accounts Concept ('000 Birr)						No. of Employees	'000 Birr Investment	
											at market price			at factor cost					
	pub.	pri.	tot.	pub.	priv.	total	pub.	priv.	total		pub.	priv.	total	pub.	priv.	total		pub.	priv.
Food	51	79	130	396 009	32 707	428 716	195 998	25 330	221 328	57 439 (56 250)	200 011	7 377	207 388	143 761	6 188	149 949	15 953	11 573	1 296
Beverage	18	12	30	157 527	9 963	167 490	51 992	3 020	55 012	66 422 (58 878)	105 53'	6 943	112 478	46 657	1 399	48 056	5 154	22 055	74
Tobacco	2	-	2	81 266	-	81 266	43 588	-	43 588	13 262	-	-	37 678	-	-	24 416	761	711	-
Textile	26	22	48	334 028	8 293	342 321	200 188	5 356	205 541	29 576 (29 272)	133 840	2 937	136 777	104 568	2 633	107 201	30 651	11 155	37
Leather & Shoe	12	9	21	78 835	3 596	82 431	55 931	5 222	58 453	4 377 (4 228)	22 904	1 074	23 978	18 676	908	19 584	5 968	3 685	23
Wood & Furniture	17	60	77	22 382	13 824	36 206	11 597	7 313	18 910	1 706 (909)	10 785	6 484	17 269	9 876	5 687	15 563	5 326	667	277
Printing & Paper	11	17	28	55 346	6 555	61 901	26 427	3 255	29 628	2 319 (1 912)	28 919	3 354	32 273	27 007	2 947	29 954	2 967	3 747	255
Chemical	18	11	29	311 843	9 115	320 958	266 058	5 609	271 667	7 255 (6 335)	45 785	3 506	49 291	39 450	2 586	42 036	4 770	2 843	1 028
Non-Metal	14	12	26	21 084	2 557	23 641	12 449	1 487	13 936	1 432 (1 306)	8 635	1 076	9 711	7 329	944	8 273	3 278	1 498	61
Metal	10	15	25	75 520	8 075	83 595	52 341	5 250	57 591	6 165 (5 654)	23 179	2 825	26 004	17 535	2 304	19 839	7 007	1 247	77
TOTAL	179	237	416	1533 840	94 685	1628 525	916 569	59 132	975 701	187 953 (177 996)	617 271	35 553	652 824	439 275	25 596	464 871	76 837	59 181	3 123

Source: National Metal Works Corporation, Addis Ababa, 1981 (Collected by Ato Nega)

Table IX

Summary of Results of Manufacturing Industries
with 10 and more employees

1975/76 - 1977/78

Fiscal Year	1975/76	1976/77	1977/78	1978/79
Ethiopian Fiscal Year	1968	1969	197o	1971
Number of Establishments	43o	42o	416	416
Number of Employees	59.222	62.472	65.858	76.837
Fixed Capital Assets (x 1.ooo Birr)	354.169	37o.872	354.795	-
Gross Value of Production (x 1.ooo.ooo Birr)	1.o11	1.o99	1.1o8	1.629
Wages and Salaries Paid (x 1.ooo Birr)	1o6.335	121.491	13o.969	157.516
Capital Expenditure (x 1.ooo Birr)	34.164	28.219	24.851	62.3o4
Averages per Employee				
Earnings	1.796	1.945	1.989	2.o5o
Outputs	17.o71	17.592	16.824	21.188
Fixed Assets	5.98o	5.937	5.387	-

Sources: Results of the Survey of Manufacturing Industries 1970 (1977/78), Addis Ababa, May 1980
NMWC, Addis Ababa, 1981

Table X:

NPC Training Courses for the
Engineering and Metal Working Sector

Course	No. of participants	Total / Year	Year
Training officer's course	2		78
Job description and evaluation	8	10	78
Preparation of financial statements	6		79
Maintenance management problems solving seminar	4		79
Vocational training	13	23	79
Management accounting	4		8o
Preparation of financial statements	6		8o
Maintenance staff training	5		8o
Production Management	4		8o
Maintenance training	2		8o
Preparation of financial statements	3		8o
Production staff training	7	44	8o
TOTAL		77	

Source: National Productivity Centre, Addis Ababa, 1981

Table XI:

Achievements of the National Revolutionary Development Campaign's First Year (1978/79)

Sector / Subsector	Target	Performance	Performance as % of Target
1. Agriculture			
Area (ha)	5.662.5oo	5.492.6oo	97.o
Production (million ton)	5.699.2oo	4.69o.62o	82.3
1.1 Cereals			
Area (ha)	4.745.9oo	4.6o1.5oo	97.o
Production (million ton)	4.988.11o	4.o9o.84o	82.o
1.2 Pulses			
Area (ha)	6o8.7oo	698.4oo	114.7
Production (million ton)	535.77o	5o1.51o	93.6
1.3 Oilseeds			
Area (ha)	3o7.9oo	192.7oo	62.6
Production (million ton)	175.32o	98.27o	56.1
1.4 Livestock Products (state sector production only)			
Milk (ltrs.)	5.9oo.ooo	9.9o5.8oo	167.9
Butter (kg)	47.6oo	121.4oo	255.o
Pork (kg)	86.1oo	91.6oo	1o6.4
Fattened cattle (No.)	5.ooo	8.382	167.6
Eggs (doz.)	417.5oo	113.3oo	27.1
1.5 Forestry			
Planting of tree seedlings (No.)	63.363.ooo	63.368.ooo	1oo.o
Raising of tree seedlings (No.)	59.448.ooo	87.448.ooo	147.1
Terraces (km)	2o2.5oo	116.5oo	57.5

Sector / Subsector	Target	Performance	Performance as % of Target
2. Industry Public Sector (millions of Birr)			
2.1 Food	351	324	92.3
2.2 Tobacco	36	39	1o8.3
2.3 Beverages	176	137	77.8
2.4 Textiles	264	262	99.2
2.5 Leather & shoes	91	85	93.4
2.6 Wood	19	17	89.5
2.7 Non-metals	24	18	75.o
2.8 Paper & printing	44	44	1oo.o
2.9 Chemicals	63	62	98.4
2.10 Metals	8o	79	98.8
3. Exports			
3.1 Coffee (million (ton)	1oo.ooo	83.134	83.1
3.2 Hides & Skins			
- Raw hides (million ton)	2.2oo	3.866	175.7
- Raw skins (doz.)	6oo.ooo	832.oo5	138.7
- Semi-processed skins (doz.)	333.ooo	261.372	78.5
- Semi-processed hides (sq.ft.)	1.o5o	1.255	119.5
3.3 Pulses (million ton)	55.ooo	31.o12	56.4
3.4 Oilseeds (million ton)	15.ooo	8.6o1	57.3
3.5 Oilseed cake (million ton)	5o.ooo	48.728	97.5
3.6 Meat			
- Canned (million ton)	2.798	1.868	66.8
- Frozen (million ton)	51	195	382.4
- Animal feed & bone (million ton)	2.6o8	1.18o	45.3
3.7 Incense (million ton)	1.ooo	277	27.7
4. Rural Water Development			
4.1 Bores (No.)	251	75	29.9
4.2 Hand-dug wells (No.)	222	82	36.9
4.3 Springs-development (No.)	77	9	11.7

Sector / Subsector	Target	Performance	Performance as % of Target
5. Road Construction			
5.1 Asphalt roads (km)	221	17o	76.9
5.2 Feeder roads (km)	136	152	111.8
5.3 Gravel roads (km)	8o	59	73.8
5.4 Rural roads (km)	522	354	67.8

Table XII:

Achievements of the National Revolutionary Development Campaign's Second Year (1979/80)

Sector / Subsector	Target	Performance	Performance as % of Target
1. Agriculture			
Area (ha)	5.658.800	5.848.800	103.4
Production (million ton)	5.427.720	5 353.310	98.6
1.1 Cereals			
Area (ha)	4.744.300	4.891.500	103.1
Production (million ton)	4.732.090	4.631.070	97.9
1.2 Pulses			
Area (ha)	608.600	735.900	120.9
Production (million ton)	535.770	591.610	110.4
1.3 Oilseeds			
Area (ha)	305.900	221.400	72.4
Produktion (million ton)	159.860	130.630	81.7
1.4 Livestock Products (state sector production only)			
Milk (ltrs.)	14.163.500	11.699.00	82.6
Butter (kg)	143.000	161.400	112.9
Cheese (kg)	40.000	46.800	117.0
Pork (kg)	250.000	137.000	54.8
Eggs (doz.)	304.400	126.500	41.6
Fattened cattle (No.)	18.000	9.479	52.7
Chicken meat (kg)	67.500	29.800	44.1
1.5 Forestry			
Planting of tree seedlings (No.)	83.400.000	54.285.000	65.1
Raising of tree seedlings (No.)	109.000.000	109.000.000	100.0
Terraces (km)	150.000	150.000	100.0

Sector / Subsector		Target	Performance	Performance as % of Target
2.	Industry-Public Sector (millions of Birr)			
2.1	Food	368	359	97.6
2.2	Tobacco	37	41	11o.8
2.3	Beverages	162	15o	92.6
2.4	Textiles	276	3o3	1o9.8
2.5	Leather and shoes	9o	1o8	12o.o
2.6	Wood	18	18	1oo.o
2.7	Non-metals	28	27	96.4
2.8	Paper & printing	46	53	115.3
2.9	Chemicals	67	66	98.5
2.10	Metals	83	87	104.8
3.	Exports			
3.1	Coffee (million ton)	1oo.ooo	86.9oo	86.9
3.2	Hides & skins			
	- Raw hides (million ton)	4.182	4.583	1o9.6
	- Raw skins (doz.)	783.715	62o.947	79.2
	- Semi-processed hides (sq.ft.)	1.5oo.ooo	1.37o.ooo	91.3
	- Semi-processed skins (doz.)	325.785	322.8o5	99.1
3.3	Pulses (million ton)	48.ooo	33.53o	69.9
3.4	Oilseeds (million ton)	16.1oo	6.713	41.7
3.5	Oilseed cake (million ton)	5o.ooo	18.685	37.4
3.6	Fruits & vegetables (million ton)	2.4o3	8.7oo	362.o
3.7	Cotton (million ton)	5.ooo	3.88o	77.6
3.8	Meat			
	- Canned (million ton)	5.7o5	4.623	81.o
	- Frozen (million ton)	576	1.123	195.o
	- Animal feed & bone (million ton)	1.42o	1.464	1o3.1
3.9	Live animals			
	- Sheep & goats (No.)	3o.ooo	31.1oo	1o3.7
	- Cattle (No.)	12.2oo	3.2oo	26.2
3.10	Incense (million ton)	535	11o	2o.6
3.11	Sugar (million ton)	1o.ooo	16.7oo	167.o
3.12	Molasses (million ton)	34.56c	34.56o	1oo.o
3.13	Salt (million ton)	77.91o	55.2oo	7o.9

Sector / Subsector		Target	Performance	Performance as % for Target
4.	Rural Water Development			
4.1	Bores (No.)	2o9	176	84.2
4.2	Hand-dug wells (No.)	212	172	81.1
4.3	Springs-development (No.)	54	17	31.5
5.	Road Construction			
5.1	Asphalt roads (km)	255	233	91.4
5.2	Feeder roads (km)	3o1	161	53.5
5.3	Gravel roads (km)	317	151	47.6
5.4	Rural roads (km)	554	488	88.1
6.	Education			
6.1	Elementary schools (No.)	7oo	226	32.3
6.2	Junior second. schools (No.)	25	23	92.o
6.3	Senior second. schools (No.)	9	9	1oo.o
7.	Health			
7.1	Clinics (No.)	2o6	126	61.2
7.2	Health centres (No.)	13	9	69.2

Table XIII: The Ten Years National Development Programme 1979/80 - 1989/90 (1)

(in millions of Birr)

	1979/80 actual	1980/81	1981/82	1982/83	1983/84	1984/85	1985/86	1986/87	1987/88	1988/89	1989/90	Cumulative 1979/80 - 1989/90	Average Growth Rate (%)	Share of GDP (%)		
														1979/80	1984/85	1989/90
Gross Domestic Product at Market Prices	8.430	9.290	10.237	11.281	12.432	13.700	15.097	16.637	18.334	20.204	22.289	-	10.2	-	-	-
Population ('000)	31.065					35.616					41.123	-	2.8	-	-	-
GDP per capita (Birr)	271					385					542	-	7.2	-	-	-
Gross Fixed Capital Formation	881	1.978	2.415	2.954	3.614	4.425	4.736	5.067	5.413	5.778	6.255	42.635	22.0	10.4	32.3	28.1
Total Consumption	7.907	8.642	9.434	10.285	11.197	12.169	13.199	14.284	15.716	16.586	17.831	-	8.5	93.8	88.8	80.0
Domestic Savings	523	648	803	996	1.235	1.531	1.898	2.353	2.918	3.618	4.458	20.458	24,0	6.2	11.2	20.0
Savings Gap	358	1.330	1.612	1.958	2.379	2.894	2.838	2.714	2.495	2.160	1.797	22.177	17.5	4.2	21.1	8.1
Imports of goods and services	1.500	2.122	2.491	2.935	3.468	4.109	4.437	4.791	5.168	5.574	6.072	42.167	15.0	17.8	30.3	27.2
Exports of goods and services	1.141	1.301	1.483	1.691	1.928	2.198	2.506	2.857	3.257	3.713	4.233	25.167	14.0	13.5	16.0	19.0
Foreign exchange gap	359	821	1.008	1.244	1.540	1.911	1.931	1.934	1.911	1.861	1.839	16.000	17.7	4.2	13.9	8.2
GDP at current factor cost	7.629	8.407	9.624	10.209	11.250	12.397	13.661	15.054	16.589	18.281	20.232	-	10.2	-	-	-
of which																
- Agriculture	3.872	4.066	4.269	4.482	4.706	4.941	5.188	5.447	5.719	6.005	6.305	-	5.0	50.7	39.8	31.2
- Industry, construction, etc.	1.194	1.471	1.781	2.127	2.512	2.940	3.415	3.942	4.525	5.170	5.968	-	17.5	15.6	23.7	29.5
- Services	2.563	2.870	3.214	3.600	4.032	4.516	5.058	5.665	6.345	7.106	7.959	-	12.0	33.6	36.4	39.3

(1) Preliminary Data

Sources: Ministry of Industry
NMWC
UN-Statistics

Table XIV:

TEN YEARS DEVELOPMENT PLAN

INVESTMENT PROGRAMME 1980/1981 - 1989/90

Sector	PLANNED INVESTMENT (in millions of Birr)			
	1980/81-1984/85	1985/86-1989/90	1980/81-1989/90	Rate of Total (%)
1.AGRICULTURE	3,640	5,792	9,432	22.
1.1 -PEASANT FARMING	373	650	1,023	
1.2 -STATE FARMS	200	371	571	
1.3 -EXPORT CROPS	322	600	922	
1.4 -IRRIGATION	1,275	2,370	3,645	
1.5 -SETTLEMENT (RRC)	1,110	1,000	2,110	
1.6 -FORESTRY	100	300	400	
1.7 -LIVESTOCK	250	481	731	
1.8 -FISHERIES	10	20	30	
2.INDUSTRY	3,200	6,120	9,320	21.9
2.1 -MANUFACTURING INDUSTRIES	3,000	5,820	8,820	
2.2 -SMALL-SCALE INDUSTRIES AND HANDICRAFTS	200	300	500	
3.MINING, ENERGY & WATER SUPPLIES	2,548	5,137	7,685	18.0
3.1 -MINING	515	1,150	1,665	
3.2 -CONSTRUCTION	100	235	335	
3.3 -ELECTRICITY	1,480	2,695	4,175	
3.4 -WATER SUPPLIES	453	1,057	1,510	

Sector (continued)	1980/81-1984/85	1985/86-1989/90	1980/81-1989/90	Rate of Total (%)
4. TRANSPORT & COMMUNICATIONS	3,116	5,391	8,507	20.0
4.1 -ROADS	1,000	2,100	3,100	
4.2 -RAILWAYS	500	1,600	2,100	
4.3 -PORTS & HARBOURS	326	326	652	
4.4 -SHIPPING	200	-	200	
4.5 -AIR TRANSPORT	275	275	550	
4.6 -TELECOMMUNICATIONS	300	355	655	
4.7 -POSTS	15	15	30	
4.8 -TRANSPORT VEHICLES	500	720	1,220	
5.SOCIAL SERVICES	2,527	4,164	6,691	15.7
5.1 -EDUCATION	1,177	1,514	2,691	
(a) SCHOOLS	1,000	1,151	2,151	
(b) HIGHER EDUCATION	117	363	540	
5.2 -HEALTH	350	650	1,000	
5.3 -HOUSING	1,000	2,000	3,000	
6.OTHER SERVICES	355	645	1,000	2.3
6.1 -TRADE	90	160	250	
6.2 -ADMINISTRATION	175	325	500	
6.3 -TOURISM	90	160	250	
GRAND TOTAL	15.386	27,249	42,635	100

Table XV:

Investment Plan for the Manufacturing Industries

1980/81 - 1989/90

(in millions of Birr)

Sectors (selected)	1980/81	1984/85	1989/90	Total investments 1980/81 - 1989/90
Building industries	29.0	211.6	1.4	1,270
Sugar	54.3	203.5	3.4	958
Textiles	24.4	162.8	44.5	905
Chemical industry	5.8	79.5	2.1	667
Metal industry	3.2	38.6	0.5	352
Food	21.3	24.7	13.5	267
Beverages	25.8	28.1	5.3	264
Leather/shoes	5.2	23.1	2.3	173
Printing	3.4	17.8	6.0	154
Fibre	0.4	1.5	-	59
Wood working	1.4	15.8	-	46
Meat	0.7	6.7	2.5	34
Total	175.8	817.5	81.6	5,149

Source: Ministry of Industry, Addis Ababa, 1981

Table XVI : Estimated Investment for the Present Engineering and Metalworking Sector 1980/81 - 1989/90

Plant	Investment (Birr)	Purpose	Status
E.I.S.F.	350 000	Extension of nails and wire fencing production to three-shift operation	Plannings terminated
Ethiosider	725 000	Start-up of plant standing idle	-
Ethiosider or E.I.S.F.	3 000 000	10 tons electric arc furnace	Location not yet known
Akaki, Addis Ababa	2 300 000	Reconditioning of old rolling mill, extension of the plant for 6 mm construction steel	Offer invited from Italian supplier
Asmara Rolling Mill	340 000	Purchase of an overhead moving crane	-
Akaki	3 600 000	Hot rolling section, 7500 tons, for heavy structures	-
-	1 470 000	Expansion of nail production	Location open
-	700 000	Production of 1350 tons roofing nails	Location open
Akaki	160 000	Galvanizing unit for bed springs and fencing wire	-
Akaki	440 000	Modification of 2nd lin or corrugated iron sheets	-
Eth.Steel Factory	300 000	Cost for production start-up	-
KASI	2 640 000	Production of window and door frames	-
United Abilities	10 000 000	New plant for fully automatic production of 52 millions of batteries (dry)/year	-
United Abilities	85 000	Extension of umbrella production	-
Metal Hand Tools	3 000 000	Production of metal products for agricultural purposes	-
-	6 700 000	Production of household utensils, erection of a new plant	-

Table XVII : New Investment Projects for the Engineering and Metal Working Sector

Investment purpose (in process)	Investment (millions of Birr)	E.C. year started/completed	Demand / Year	Status
1. Radio assembyl/manufact.	8	74/76	200 000	Pre-Feasibility Study, no location
2. Sickles	3	73/74	500 000 (1974) 1 000 000 (1977)	Contract has been given, A.A.
3. Workshop and foundry for spare parts	66	74/78	5 000 tons	Feasibility Study has been completed (Swedish Consulting firm), A.A.
4. Tractor (assembly) and implements (manufacturing)	25	75/76	Tractors: 10 000 Ploughs: 4 700 Harrows: 7 400	Pre-Feasibility Study completed, Nazareth
5. Bicycles Proposal: tricycle, Asia	3	75/76	22 000	UNIDO study, no real result
6. Bus, truck, trailers (assembly/manufacturing)	75	74/77	Bus:) Truck:) 740 Trailer/Truck: 3000	Discussion within the NMWC
7. Pilot foundry	-	-	-	Under UNIDO consideration

Investment purpose (planned)	Investment (millions of Birr)	Study to be started (E.C.)	Demand/Year
1. Copper smelting, cables	28	1974	200 000 tons
2. Welding rod	6	1974	2 700 tons
3. Bolts and nuts	3.5	1973	1 500 tons
4. Tin cans for canning	15	1973	150×10^6 pieces
5. Cutlery	2	1973	113 tons
6. Fittings	4.5	1973	2 000 tons
7. Office furniture	2.8	1974	57 000 pieces
8. Pumps and switchgear	16	1973	9000 + 1500 (S.G.)
9. Wheelbarrows	2	1973	22 000
Engineering, electrical			
1. Electric motors/ transformers	3	1974	16 000
2. Refrigerators, ovens	150	1981	500 000
3. Electric bulbs	8	1974	3 million
4. Electric installation and fittings	16	1974	8 million pieces
5. Electric wire	8	1974	4 200 tons
6. Batteries (accumulators)	20	1974	200 000

Table XVIII :

Estimated Demand for Metal Products

Product \ Years	1980/81	1984/85	1989/90
Reinforcement bars (tons x 1000)	16	33	40
Roofing sheets (tons x 1000)	18	33	40
Nails (tons x 1000)	4	8	10
Tubes (iron) (tons x 1000)	4	8	10
Window/door profiles (tons x 1000)	0.8	1.6	2
Roofing nails (tons x 1000)	0.5	1	1.3
Metal band (1 cm wide) (tons x 1000)	0.2	0.35	0.4
Hot rolled sections (tons x 1000)	2	4	6
Water pipes (tons x 1000)	2	4	5
Other metal products for construction (tons x 1000)	4.1	7	11
Electrical fittings ($\times 10^6$)	4	5	8
Bulbs ($\times 10^6$)	0.9	1.4	2.4
Isolators (x 1000)	95	150	265

Source: NMWC, Addis Ababa, 1981

Table XIX :

Estimated Demand for and Production
Capacity for Iron and Steel
1984/85 to 1989/90

	Demand / Year	
	1984/85	1989/90
Iron for reinforcement bars, nails, fencing wire (tons x 1000)	46	56
	Production / Year	
	1984/85	1989/90
Capacity of furnace and rolling mills working three shifts:		
Addis Ababa) (tons x 1000)	15	15
Asmara)	15	15
- One additional furnace, 10 tons. Place not decided, yet		
- One new rolling mill. Place not decided, yet		
(tons x 1000)	21	26
TOTAL	51	56

Source: NMWC, Addis Ababa, 1981