THE ROLE OF METAL INDUSTRY IN THE ETHIOPIAN ECONOMY AND FACTORS INFLUENCING ITS PRODUCTIVITY

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ABSTRACT

The purpose of this thesis is to examine the relative importance of the metal industry in the Ethiopian economy and productivity situation in the metal factories. In the pursuit of the former objective, the historical development and the role of the metal industry in different socio-economic settings vis-a-vis the Ethiopian reality were analysed. To achieve the latter objective, economic and non-economic factors influencing productivity have been analysed. Based on the findings, attempt has been made to make relevant policy recommendations in order to: improve the role and map out the strategy for the development of the sub-sector and improve the factor use efficiency of the sub-sector. The problem has arisen because of the little recognition and support provided to the sub-sector in Ethiopia.

The results of the study indicate that the successful development of the sub-sector plays a key role in the economic and social progress of a country. Although the potential role of the sub-sector is important in the Ethiopian economy, it is still by far lower than the role of the sub-sector in different economic settings. It is also found that the sub-sector has increasingly become associated with high cost of production. It therefore pays to focus on the strategy for the development of the sub-sector and the removal of all managerial and operational bottlenecks to progressively improve and make the industry more profitable.

Chapter 1

Introduction

1.1 Statement of the Problem

In countries where iron and steel industry played an important role in the process of industrialization, its development was closely linked with the other sectors of the economy. At the end of the eighteenth century it provided the main inputs for the production of agricultural implements, and later on for the manufacturing of textiles and machine tools.[1]

During the nineteenth century the massive construction generated an accelerated growth of the iron and steel industry. Then a new forward impetus appeared in the twentieth century because of the growth of the automobile industry. For example, the world crude steel production increased from 113 million tons in 1945 to a peak production of 747 million tons in 1979.[2]

The last ten years (1974-1984) have been a period characterized by the need to economize on materials and energy. This is because of the rise in the cost of energy, particularly that of oil, the effects of the international "monetary shocks" and the diverse other problems which will be discussed in chapter two. This has had a dampening effect on investments in energy-intensive industries, and has resulted in cutback in steel production and consumption in the world. The fluctuations of world steel production and consumption between 1974 and 1984 have been shown in the recent works of United Nations Industrial Development Organization (UNIDO).[3]

Several studies also indicate that the general trends in the iron and steel industry are not reflected uniformly throughout different countries and regions. In developed countries for example, the trend of

specific steel consumption is decreasing while in developing countries it is increasing. The consumption of developing countries grew from 96 million tons in 1980 to 100 million tons in 1984, although the increases in production were not uniformly distributed among these countries.[4]

Among the developed countries the United State has experienced the most serious crisis in the iron and steel industry, with consumption having fallen to the level of 1960 during 1984, and production below the 1960 figure in the same year. The situation in the EEC manifests a similar pattern, with the production level of 1984 falling to less than that of 1968, and consumption to less than that of 1964. In Japan, the situation is slightly better. A small increase was achieved in production and consumption in 1984 in comparison with previous years. In the Commission for Mutual Economic Assistance (CMEA) countries production and consumption continued to increase but at a very slow rate.[5]

In spite of the recent overall decline of production in the metal industry, it is universally recognized that the successful development of the subsector plays a key role in the economic and social progress of a country. In addition to the promotion of the development of other sectors, it can make significant contribution to the gross domestic product, employment, foreign exchange earnings and the government revenue. This industry can lead to the generation of surplus which is essential for capital formation and modernization of the economy. It is this branch of industry which produces capital goods which in turn are used for the production of other goods and services. Hence, it can be considered as the core industry of the economy. In the recognition of these potential benefits different economies attach top priority in their development strategy to the subsector.

Relatively more emphasis is given to it in socialist countries in early stage of development. Various countries, including some African countries have also assigned relative importance to the development of metal industry.[6]

The industrial establishments may be classified as large, medium or small scale depending upon their sizes. The general characteristic of the large-scale metal industry indicates that it has technological complexity, large capacity and economies of scale. It also requires large-scale supporting infrastructure, a large proportion of qualified manpower and high capital investment. This level of metal industry will not be applicable to great majority of developing countries where the resources are limited and large investment may not be effectively supported by existing economic structure.

In countries where agriculture is the main economic activity the appropriate strategy would be to promote small and moderate-sized steel and capital goods industries. This approach has been shown to be successful in very many countries. For example, the industry was developed at the outset in small workshops in the People's Republic of China, Czechoslovakia and France. However, at a later stage of development, the drive was in favour of larger industries in the search of economies of scale as well as better quality products.[7]

The existing situation in Ethiopia does not seem to allow the establishment of large-scale metallurgical activities. The pre-conditions for developing the industry are not sufficiently available. For example, the market is limited. The imports of basic iron and steel products in 1979-1981 were a minimum of about 40,733 tons and a maximum of 46,748 tons. By 1984

this has increased to about 71,000 tons. This quantity is not sufficient for setting integrated heavy iron and steel works. However, it is sufficient for setting up a small-scale plant.

Mineral prospecting is at a very low stage of development in Ethiopia. So far, geological mapping has been undertaken for only 11 percent of the area of the country. Some 20 million tons of iron-ore deposit has been identified in Wollega and it is believed that this is enough to support a small-scale plant. Therefore, appropriate current policy for Ethiopia appears to be that of strengthening the existing small-scale basic and engineering works and establishing new ones, until the pre-conditions for large-scale production are fulfilled. This is the proper approach for the effective promotion of the development of this subsector.

In spite of the potential dynamic role that the sub-sector can play in various economies, it is a subsector which is not well understood or provided with adequate support in Ethiopia.

First, the need is felt for a better understanding of the role played by the sub-sector in different socio-economic settings. A search of the pertinent literature reveals no evidence that research has been conducted to show the role and place of the metal industry in the economy in general and in the manufacturing sector in particular. This wider survey and analysis of the sub-sector makes it possible to characterize the role of Ethiopian metal industry in the economy.

Second, it seems that the sub-sector lacks appropriate recognition on the part of the Government. The amount of investment allocated, the overall conditions instituted by the Government, the amount of research work devoted to improve the sub-sector, etc. indicate that it is one of the most neglected industries in the manufacturing sector. The need is therefore also felt to indicate the appropriate conditions under which this industry can play a more effective role in the development of the

Third, since no general evaluation has ever been done of the metal industry it is impossible to say anything regarding the productivity situation. It is therefore, believed that this information gap might have contributed to a failure of introducing efficient and realistic policies.

It is the recognition of these problems which has given rise to the objectives of this study.

1.2. Objective of the Study

The specific objectives of this study are the following:

1) To analyse the role of the metal industry in different socio-economic settings;
2) To establish the relative importance of the metal industry in the Ethiopian economy, in the light of the analysis under the first objective;
3) To analyse the productivity situation in the metal factories; and
4) Based on the above findings, to make relevant policy recommendations in order to:
   a) improve the role of and map out the strategy for the development of the sub-sector, and
   b) improve the factor use efficiency of the sub-sector.

1.3. Significance of the Study

The circumstances under which industrial enterprises operate vary from time to time and from country to country. A clear knowledge of these particular circumstances is essential in order to better plan for the

future strategy of development. This is lacking in the Ethiopian case as evidenced by the dearth of research in this field.

As explained in the foregoing paragraphs this study is a modest attempt to fill the information gap. Furthermore, the study will serve as a humble beginning to arouse the interest of other researchers to undertake extensive and intensive studies in this particular field.

1.4. Methodology

1. In pursuit of the first objective, analysis will be made of the following:
   a) the historical development of the industry;
   b) the development strategies and models for promoting integrated development between the sub-sector and other sectors of the economy, especially in the light of the present situation and the future outlook of the development of the industry at world level, based on selected country experiences;and
   c) the impact of the industry on output, employment, foreign exchange and government revenue.

Simple analytic techniques such as averages, percentages, trend analysis and figures as well as qualitative methods will be used in the analysis of the information available.

2. To establish the relative importance of the metal industry in the Ethiopian economy, analysis will be made of the following:
   a) the gross domestic product, i.e. output and value added of the sub-sector and other sub-sectors of the industry;
   b) employment and income generation, considering number of workers both Ethiopian and expatriate, permanent and seasonal, and wages by type in major sub-sectors of the industrial branches;

c) government revenue;

d) foreign exchange;

e) the possible linkage effects within the sub-sector and different sectors of the economy, i.e. the extent to which the sub-sector purchases domestically produced inputs and produces inputs for other sectors of the economy; and

f) the structure of the sub-sector, i.e. ownership, regional distribution, etc.

Again the analyses have been based on simple and comparative analytic techniques. However, it might be noted here that the contribution to foreign exchange is measured by the amount of foreign exchange earned due to the export of the sub-sector's output, and the amount of foreign exchange saved because of producing formerly imported goods. The latter will be based on the domestic resource cost (DRC) estimates. For this purpose two DRC estimates for Ethiopian manufacturing, one by Gusinger (1972) and the other by the World Bank (1983) are used for comparison. Melisachew's estimates of DRC ratio of various metal products for 1980/81 are also considered to assess the degree of efficiency of the enterprises in saving foreign exchange.

3. Economic and non-economic factors have been considered to determine productivity situation in the industry.[8] These factors include the following:

a) the nature and quality of the raw materials used and production process employed;

b) the size and efficiency of plant (i.e. industrial equipment employed);

c) the continuity of production and the extent of effective utilization of manpower;

d) the supply of skilled manpower in all job categories, finance, and imported and domestic raw materials;

e) managerial and administration system, wages and job promotion policy, and employees relations;and

f) the demand pressure, the transport facilities and distribution system of raw materials and industrial products.

To reinforce the above analyses a detailed study is conducted of Kotebe Tools Factory. This has required the estimation of production function.

There are four methods of estimating production functions.[9] These are the covariance matrix method, the factor shares method, the instrumental variable method and the single-equation least-square method.

1) The covariance matrix method has not been used extensively. This is because the equations are non-linear in the coefficients and little useful information is available for small sample sizes;

2) The factor shares method is a neglected method of estimation. This is because the marginal productivity relation was not used in estimation and does not enable to test hypotheses about economies of scale;

3) The instrumental variable method is also a method hardly used. To find variables with the characteristics of the instrumental variables in cross-section studies is very difficult.

4) The single equation least-squares method is the most popular method of estimating the parameters of the Cobb-Douglas function. The attractive properties of this method are simplicity of computations, the small standard errors of the coefficients, and the high level of efficiency in predicting output for given inputs. It is this method which is used in this study.

Multiple regression has been applied in the analysis to generate the estimates of the parameters of the model. Elasticities of output and marginal productivities of each factor can thus be estimated. The production function is tested both with and without the intercept term. "Linear production functions of manufactured products should normally have zero intercept, since output is zero when the factor inputs are zero."[10]

The models are in the form of

$$Y = B_0 + B_1L + B_2K + B_3R + B_4O_1 + B_5O_2 + B_6O_3 + B_7E + B_8X_1 + B_9X_2 + B_{10}X_3 + B_{11}X_4 + U \text{ and}$$

$$Y = B_1L + B_2K + B_3R + B_4O_1 + B_5O_2 + B_6O_3 + B_7E + B_8X_1 + B_9X_2 + B_{10}X_3 + B_{11}X_4 + U$$

The following are candidate explanatory variables all of which are quantifiable (except the periodic campaign nature of production and employee relations, the analyses of which are supplemented by qualitative information), and are considered as the determinants of the pattern of productivity:

i) Labour = L

ii) Capital = K

iii) Raw materials = R

iv) Occupational categories = O

  a) production workers = O_1

  b) professional and technical workers = O_2

  c) administrative employees = O_3

v) Energy = E

vi) Bottlenecks in raw materials = X_1

vii) Bottlenecks in spare parts = X_2

viii) Bottlenecks in miscellaneous inputs = X_3

ix) Bottlenecks in machine breakdown = X_4

B_0, B_1..., B_{11} are the parameters to be estimated and U stands for the random disturbance term.

In this analysis, output is not taken in physical volume estimation. Since products are heterogeneous this method of measurement poses a problem. Hence, in the absence of homogeneity, value estimation is used.

Monetary value is considered for raw materials and energy. The occumpational categories are represented by the number of workers. In the case of capital, a stock of capital approach is used in this study. This is particularly relevant in the context of underdeveloped countries where stocks are mostly used for a period far beyond their accounting life. All the variables used in value terms are in 1983 prices. Production bottlenecks are estimated by the average day time lost in three months (i.e. stoppages). The problems related to measurement of inputs are discussed elsewhere.[11]

1.5. Sources of Data and Data Collection Process

This study relies on data and information gathered from both primary and secondary sources as follows:-

1) The data and information sources to provide the theoretical framework of metal industry in different socio-economic settings are published documents of the international agencies such as UNIDO, International Labour Organization (ILO), the World Bank or the United Nations Year Book of Industrial Statistics, International Iron and Steel Institute (IISI), and the provisions of Monrovia Strategy, Lagos Plan of Action and the Final Act of Lagos. Fortunately, the above documents are available in the documentation Center of the University library and are used extensively by the author.

2) Regarding the data and information to establish the relative importance of the metal industry in the Ethiopian economy, the sources are both published and unpublished materials of the Central Statistics Office (Results of the Annual Survey of Manufacturing Industry, the Statistical Abstract, etc.), the Ministry of Industry's Statistical Bulletins I, II, III, and IV of 1983, 1984, 1986 and 1987, respectively and others, as well as the records of each factory under the study and the National Metal Corporation.

3) To analyse the productivity situation of the metal industry data and information on economic and non-economic factors are obtained from the questionnaire that is distributed to sixteen factories operating under the National Metal Corporation. Other sources include both published and unpublished records of each factory, the Metal Corporation and the Ministry of Industry. On different occasions interviews with the authorities concerned are made extensively so as to update the information.

4) The data and information for the case study are secured on a quarterly basis from the files and records of the factory since 1981.

Notes to Chapter

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9. A.A. Walters, "Production and Cost Functions; An Econometric Survey" Econometrica 31 (January - April), 1963, pp. 1-66.

10. A Koutsoyiannis, Theory of Econometrics, Second Edition, the MacMillan Press Ltd. 1977, p. 65.

11. A.A. Walters, op.cit, 1963, pp. 1-6.

Chapter 2

The Role of Metal Industry in Different Socio-economic Settings

The purpose of this chapter is to review the role of metal industry in different socio-economic settings. Its organisation includes the following main sections: the historical development, the pattern of integrated development and the role of the metal sub-sector.

2.1 The Historical Development of the Industry

Iron ore has been extracted and iron produced from it since ancient times. However, Iron and Steel industry as a sector of the economy began to develop rapidly in the first half of the 18th century. The industry had benefited from the first boom of the industrial revolution in Great Britain and Western Europe.

At the end of the 18th century, agriculture, the first customer of the iron and steel industry had made use of the improvement of iron and steel production. Later on the industry provided the main inputs for the manufacturing of steam engines, textiles and machine tools.[1]

During the 19th century, iron and steel production took a real leap forward due to the increase in construction of railway networks. Between 1860 and 1880, a significant technological development took place in the industry. This enabled it to meet the demands of different sectors of the economy such as ship building, construction, etc.

In the 20th century, the automobile industry generated another greater push for growth and technological change in the iron and steel industry. It was necessary to supply the automobile industry with special steel as well as giant furnaces, continuous casting, continuous rolling mills, etc. Since the end of the second World War, there has been an accelerated growth of the industry. For example, the world crude steel production had increased by 561.1 percent or multiplied by 6.6 in the period of 35 years from 1945 to 1979.

The world iron and steel products increased significantly for almost three decades since 1950. The level of production which was 192.0 millions of tonnes in 1950 increased by 304.2 percent to 776.0 millions of tonnes in 1979.[2]

The growth of iron ore production in the USSR and U.S.A., the two giant producers of the mineral in the world is particularly noteworthy. In the USSR for a period of 59 years between 1913 and 1971 iron ore production has been constantly increasing. It increased from 9.2 million tonnes in 1913 to 203 million tonnes in 1971 - an increase of 2106.5 percent. In the United States, albiet growth was irregular, total production grew by 24.7 percent between 1937 and 1970.[3]

The last ten years have been a period characterized by the need to economize on materials and energy. This is because of the rise in the cost of energy particularly that of oil, the effects of the international "monetary shocks" and the diverse other problems which will be discussed in detail in this chapter. This factors had a dampening effect on investments in energy intensive industries, and resulted in cut-back in steel production and consumption in the world.

The trend of world production of crude steel from 1974 to 1985 is given in Table 1. The production which has reached the level of 710 million tonnes in 1974 collapsed to a level of 643 million tonnes in 1975, rose again to 716 million tonnes in 1978 and then up to 746 million tonnes in 1979, to fail again to 645 million tonnes in 1982. A recovery began in 1983 with a production of 663 million tonnes; the recovery was maintained in 1984 and 1985.

Table 1. The World Production of Crude Steel

(in million of tonnes)

Years	1974	1975	1978	1979	1982	1983	1984	1985	Annual growth rate between 1974-1985 (%)*
Production	710	643	716	746	645	663	710	719	0.11

* Growth rate is computed by the author.

Source: Pierre Judet, "The World Crisis of the Iron and Steel Industry and its Impact in the Development of the Industry in Developing Countries," UNIDO, June 1986, p.1. The figure for 1985 was obtained from B.R. Nizhawan, "Global Iron and Steel Industry, Some Reflections and Projections", UNIDO, June 1986, p.20.

Over those twelve years between 1974 and 1985, the average annual growth rate of steel production did not exceed 0.11 percent. Had the comparison been with 1979 production, the average annual growth rate would have been negative.

If we consider the world iron and steel products since the Second World War, we can observe the following. Over the 25 years from 1950 to 1974, the average annual growth rate was 10.7 percent. But the annual growth rate fell to -0.14 percent between 1974 and 1983. (refer to Table 2).

Table 2. The Growth of The World Iron and Steel Production

(in million of tonnes)

Year	1950	1960	1970	1974	1979	1980	1981	1982	1983	Annual Growth rate* between 1950-74 (%)	Annual Growth rate* between 1974-83 (%)
Production	192.0	345.5	559.8	716.0	777.0	749.4	744.6	684.2	706.6	10.7	-0.14

*Growth rate is computed by the author.

Source: Pierre Judet, op.cit., p.10.

The restructuring process taking place on the world-wide level has reduced total world demand for steel. This process is characterized by the following developments.[4]

a) The changes in technological process of the capital goods industry (the industry with which iron and steel industry has important linkages), requiring steels of high performance and lower cost;

b) The trend towards the production of smaller and more fuel-efficient automobiles, which was initiated by the energy crisis, requiring new types of steel which are stronger and lighter, and substitution of steel by other materials such as plastics and ceramics;

c) The development of micro-electronics which has an impact on iron and steel industry by strengthening the tendency to reduce the amount of iron and steel used per unit of output and by increasing the demand for higher quality steels;

d) The advances in chemical-process technology and industry which required increasing amount of stainless steel because of its high resistance to corrosion, weldability and formability, as well as the tendency to reduce the thickness of tubes by using high strength materials;

e) The need for iron and steel materials by oil and gas industry which are more economical and lighter to use, as well as capable of withstanding severe environmental conditions;and

f) The crisis of tractor-based mechanized agriculture, with tractor sales down by 25 percent throughout the world and the creation of less sophisticated agricultural machinery, implements and tools thus reducing the quantity and changing the composition of steel used.

The reduction of iron and steel production has triggered off or accelerated a move towards quality. The day of general-purpose steel is over. Today the trend is towards iron and steel products of lighter weight, with higher strength and of more precise quality.

Generally, the tendency is towards a reduction in the consumption of steel.[5] For example, in the Federal Republic of Germany between 1970 and 1977 specific steel consumption declined fro 412 to 370 kg of steel per 100 kg of electric machinery; 873 to 668 kg of steel per 100 kg of ship building products; 612 to 557 kg of steel per 100 kg of railway rolling stock;and 883 to 783 kg of steel per 100 kg of nuts and bolts.

In the Soviet Union, between 1950 and 1980, the weight of diesel locomotives was reduced from 30 to 15 kg per horse power (HP). In France, during the same period the resistance of the steel used for concrete reinforcement was multiplied by 4, which resulted in saving

of 1,600,000 tonnes of reinforcing steel as opposed to what would have been used in 1956 for the same volume of construction.

In the United States, the average weight of an automobile declined from 1800 kg in 1970 to 1397 kg in 1980 and to 925 kg in 1985. It was possible to manufacture the same number of automobiles using 770,000 tonnes of steel in 1985 instead of 1,570,000 tonnes in 1975.

General trends in the iron and steel industry are not reflected uniformly throughout different countries and regions. The development of iron and steel production and consumption has varied very considerably from one region of the world to another. Table 3 illustrates the structure of the world consumption and production of crude steel by region between 1971 and 1983.

Table 3. Growth in the Pattern of World Consumption and Production of Crude Steel

(in percentage)

Region	Consumption			Production		
	1971	1974	1983	1971	1974	1983
EEC	18.4	17.6	13.4	22.0	22.0	16.5
North America	23.9	22.8	16.0	20.6	20.5	13.2
Eastern Europe	27.1	27.0	31.8	28.0	26.1	31.8
Japan	10.0	10.3	10.0	15.1	16.5	14.7
Other OECD Countries	8.3	7.9	6.2	6.4	6.3	7.2
Developing Countries	12.3	13.9	22.6	7.9	8.6	16.6
(Latin America)	(3.4)	(4.3)	(3.5)	(2.4)	(2.5)	(4.4)
(Asia	(7.3)	(7.1)	(14.7)	(5.3)	(5.8)	(11.4)
(Africa)	(0.7)	(0.9)	(1.9)	(0.2)	(0.3)	(0.4)
(Middle East)	(0.9)	(1.6)	(2.5)			
Total	100	100	100	100	100	100

Source:- Pierre Judet, "The Integrated Development of the Iron and Steel Industry and the Capital Good Sectors in Developing Countries", UNIDO, June 1986, pp. 6-7.

The pattern of consumption in the EEC and North America decreased less rapidly between 1971 and 1974 than between 1974 and 1983. In Eastern Europe a 4.8 percent growth was registered between 1974 and 1983. But Japan maintained its share in 1983. In the other Organization for Economic Cooperation and Development (OECD) countries, decline was observed in the two periods. The developing countries gained 9 percentage points between 1974 and 1983. These gains came mainly from the Asian countries. It is believed that it is this increment in the trend of consumption of the developing countries and changing technology in developed countries, which appreciably transformed the structure of the world consumption of crude steel. It has reduced the level of consumption of developed countries from the level of 86.1 percent of world consumption in 1974 to 77.4 percent in 1983.

Almost the same trend as world consumption of steel was maintained in the case of world production of steel. The change in the structure was brought about mainly by the growth in the share of the developing countries (Table 3). The share increased by 8.7 points between 1971 and 1983. Within the developing countries themselves there were contrasting developments, the growth being generated mostly from the Asian countries.

2.2. The Integrated Development of the Metal Industry

2.2.1. The Need for Integration

The world economic situation has led most developed countries to establish barriers to imports as well as credit restrictions. These actions forced the developing countries to promote policies for a more integrated development among the different sectors within their own economies. This strategy of development is most necessary and urgent

in those industrial sectors where future growth is very much affected by restrictive measures, as is the case of the metal industry.[6]

Because of its significant role of supplying basic inputs to the main sectors of the economy, the iron and steel industry in developing countries can contribute to the creation of a coherent national production system. It, therefore, follows that the industrialization process in developing countries should account for all the possible links between the metal industry and the other sectors of the economy. But the modality of this integration process will depend upon the specific structural characteristics of the different developing countries. The characteristics constitute mainly the availability of raw materials, the level of technical development and manpower training, and the basic needs of the populations.[7]

2.2.2. An Approach to the Integrated Development of the Sub-Sector in the National Economy

To build a more resilient and self-reliant economy, the interrelated development between the iron and steel and the capital goods industries and other sectors of the economy is necessary. However, there is a marked difference in the approach to the integrated development not only between the developing countries but also between each country in the two sets of countries. The difference in the approach stems from the different economic and social characteristics of each of these countries.

An illustrative model of the inter-relationship between the various iron and steel products and the various sectors of an economy, relevant to developing countries, is given schematically in figure 1 below.

Initially it will be relevant for developing countries to go in for light and simple steel products which require less sophisticated technology for their production. This partly reduces the financial constraint which is being felt today by many developing countries. But later on, as the economy develops and the needs become more diversified, steel products of more sophisticated technology will be required.

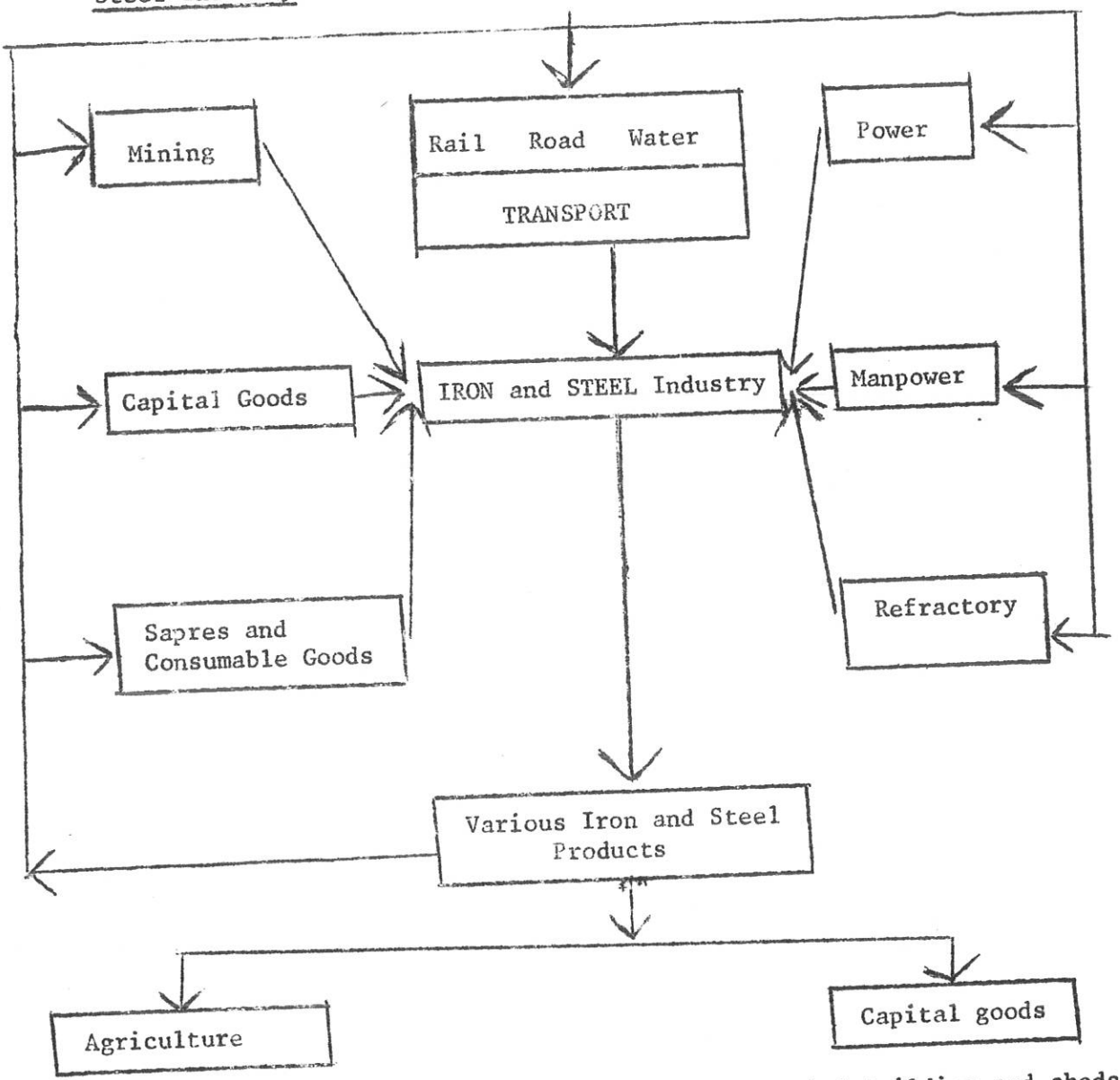
As can be observed from Figure 1, the metal industry sub-sector has the multiplier effect in stimulating all round growth of the economy. There are linkages with mining, power, transport, engineering industries, agroindustries, irrigation, storages and processing of agricultural produce, light consumer industries etc. resulting in the growth of all these sectors.[8]

The growth models with bias on heavy industries may be suited for large populous developing countries with innate potential of natural resources to be exploited. This will not be applicable to a great majority of developing countries since their resources are limited. Since heavy industries are capital-intensive and typified by longer gestation period, the economies of these countries will not have the financial, technological and skilled manpower capability to sustain the industries.

In small agricultural countries the appropriate strategy would therefore, be for the development of mini-steel plants catering inputs for small-scale capital goods industries and simpler agricultural tools and implements. This is the way to create a coherent national production system.

Figure 1

Process of Integrated Economic Development with Iron and Steel Industry



Source:- S. Samarg purgaven, "Integrated Development of Steel Industry Particulary Min-Steel, Linked to Capital Good "UNIDO, Austria, June 1986, p.4.

The survey carried out by the UNIDO Secretariat on 74 mini-plants located in 23 developing and in 13 developed countries, revealed the following important features.[9] Their production in general is oriented towards domestic consumption, and hence the integration of the plants with the construction and capital goods sector is stronger.

Mini-plants reveal an important integration with key sectors of the national economy. In countries where there is a considerable development of iron and steel and capital goods industries, the relations between them is stronger than metal industry and the construction sector. However, there are other countries where the iron and steel and the capital goods industries present a low degree of development. In these countries the relations of the iron and steel industry with the construction sector is stronger than with the capital goods industry.

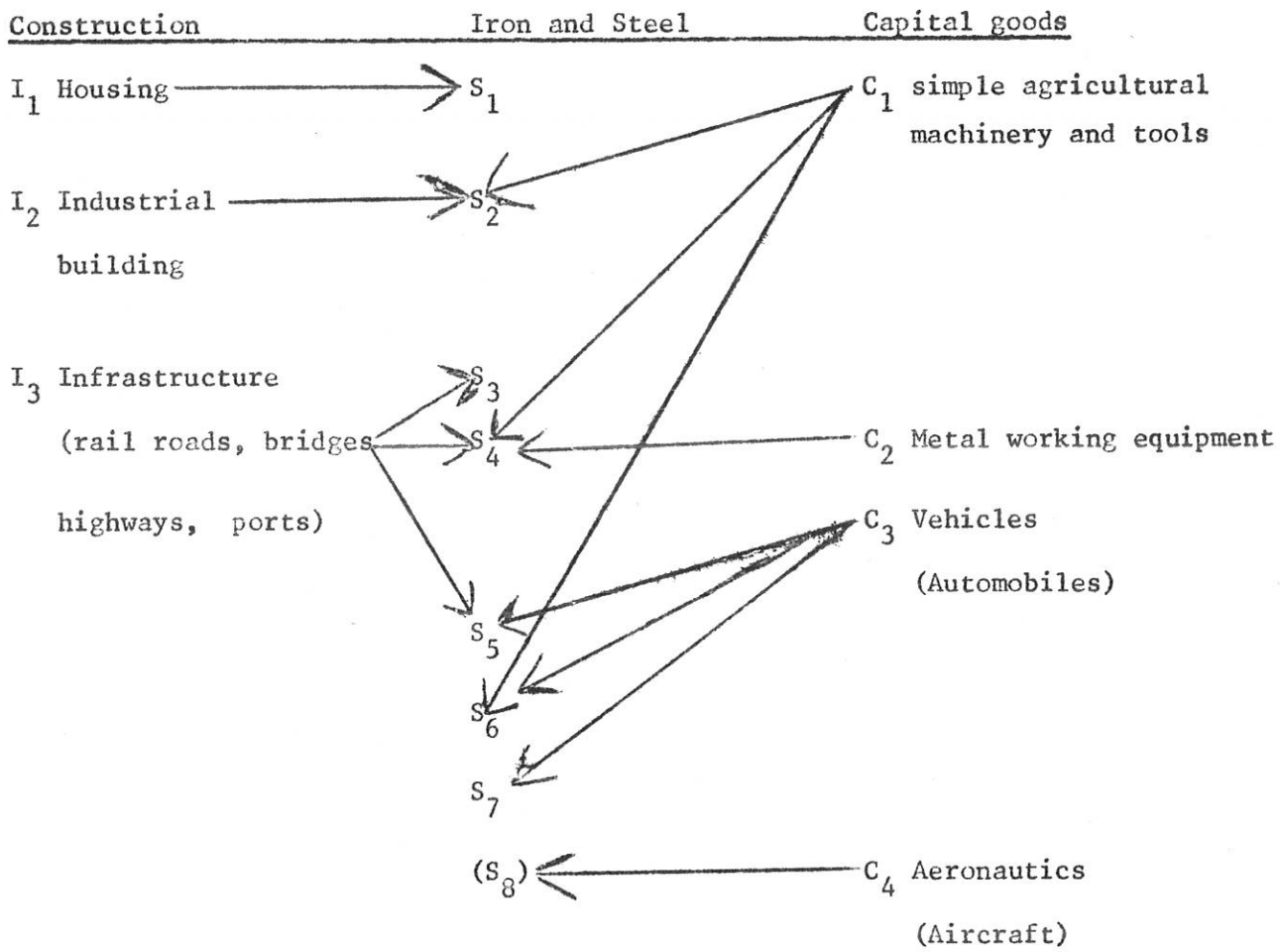
Therefore, from the above historical patterns of linkages, it may be concluded that over successive periods (with possible overlaps), the iron and steel industry is primarily linked to the demand for construction, gradually including metal manufacture, and then to the production of equipment and machinery (capital goods) ranging from the simple to the complex. Fig. 2 shows the dynamics of the relations between the iron and steel, capital goods and the construction sector.

Assuming that iron and steel products are divided roughly into seven categories in accordance with a line of increasing complexity (S_1 to S_7), we find:

a = that simple agricultural machinery and tools production demand the products of S_2, S_4 and S_6 as inputs;

b = S_1, S_2, and S_3, on the other hand, find outlets in the construction of infrastructures of categories I_1, I_2, I_3 etc.

Figure 2. Dynamics of the Relations between Iron and Steel Industry and Capital Goods and Construction Sectors



S_1: ordinary long products; reinforcing bars-small diameters.

S_2: long products: reinforcing bars, light and medium sectors and light welded tubes.

S_3 : long products: heavy sections

S_4 : hot rolled sheet iron heavy (large) welded tubes

S_5 : cold rolled sheet iron, heavy sheets, galvanized sheets

S_6 : high-quality steels of all shapes and seamless tubes

S_7 : high-alloy steels of all shapes.

S_8 : alloys of aluminium, titanium, magensium etc.

Source:- UNIDO Secretariat, ISSUE Paper I, "The Iron and Steel Industry: Present Situation, Prospects and the need for more Integrated Development of the Iron and Steel and Capital Goods", UNIDO, June 1986, p. 12 and Pierre Judet, op. cit, p.34.

The identification of this kind of relationships can establish a basis for the realistic definition of an approach for more integrated development of the iron and steel side of the capital goods industries in the developing countries.

A review of the experiences of a number of industrialized market economies, socialist and developing countries suggests the following considerations:

a) To create a basis for a more independent and self-sustained economic and social development it is necessary to promote more interaction between the sub-sector and other sectors of the economy. The strategy must be based on the specific conditions in the national economies of each country, i.e. the availability of raw materials, the level of technical development and manpower training and the basic needs of the population.

b) There is no single model for the planning of integration between the sub-sector and other sectors of the economy. Among the options that may be relevant in specific cases are planning based on "demand pull" from capital goods sectors of the economy, or on "demand push" from the iron and steel industry leading to expansion and diversification of other sectors.

c) In developed countries, generally speaking, the iron and steel industry and the capital goods industry have followed a progressive and continuous process of development. But in the developing countries, these industries emerge in many instance in their present day form without any prior process of steady transformation of small undertakings into large-scale units. The iron and steel industry is established with modern imported technology.

d) In the developed countries there is considerable interplay between the iron and steel industry and the capital goods industry. But in the developing countries, the interplay is basically at the outset with the construction sector. Therefore, the steel industry has developed right from the start in its modern form.

e) The main motivation for iron and steel development in developed countries is in response to the machinery and equipment requirements of various economic sectors. But in the case of developing countries the motivation stems from the need for rational use of the national resources at their disposal, such as, iron ore, coal, energy, etc.

f) Among the developed countries studied, there are differences between the approach to development by the iron and steel industry and the capital goods industry. In the early days of their development there was integration between these industries in nearly all cases. Subsequent development has however, shown two approaches of development of the sub-sector. Some iron and steel undertakings diversified their production in the manufacturing of capital goods and electrical products, whereas other specialized on the production of steel or capital goods.

g) There are also differences between the developing countries studied in regard to the approach to development adopted by the iron and steel industry. In some cases, iron and steel production has been exclusively for internal development, while in others, exports have played a significant role in the dynamics of their development.

2.3. The Role of the Metal Industry

This section is concerned with the analysis of the role of the metal industry in different economies. It is organized according to the following elements: contribution to output and value added, annual growth rate of production, contribution to employment and annual growth rate of employment, contribution of foreign exchange and Government revenue.

2.3.1. Contribution to Output

Of the contributions to the entire industrial production in 1980 those of the manufacturing industry are the highest throughout the different economies. This is followed by mining and quarrying, electricity, gas and water. The highest contribution of manufacturing was in the centrally planned economies and the lowest in the developing market economies. Over 50 percent of the contribution to the entire industrial output came from heavy manufacturing in all economies except for developing market economies which constituted only 26.6 percent (Table 4).

The contribution of the metal sub-sector to the entire industrial production is the highest of all sub-sectors of the industrial sector. In 1980, for instance, basic metal, metal products, machinery and equipment contributed in total, to the entire industrial production, 35.4, 36.1, 41.3 and 14.1 percent in the world, centrally planned, developed, and developing market economies respectively. Similarly, the contributions of the sub-sector when converted to the manufacturing sector were 45.2, 40.9, 49.6 and 28.4 percent respectively. The contribution of engineering industries is more significant than the basic metal industries in all economies. The contribution of each branch of industry to the entire industry output is presented in the Table 4.

Table 4. The Share of Each Branch in Industrial Production in Different Economies

in percentage (1980)

Branch Activity	World	Centrally Planned Economies	Developed Market Economies	Developing Market Economies
Mining and quarrying	15.2	7.8	8.8	44.9
Manufacturing of which	78.3	88.2	83.2	49.6
Food, Beverage and Tobacco	10.7	16.5	9.2	10.6
Textiles	4.4	7.7	3.3	5.0
Chemical, Petroleum and Plastic Products	11.2	12.4	11.3	10.0
Basic Metal Industries	6.1	5.7	7.1	3.3
Metal Products, Machinery and Equipment	29.3	30.4	34.2	10.8
Light Manufacturing	28.3	36.8	26.9	24.5
Heavy Manufacturing	50.0	51.4	56.3	26.6
Electricity, Gas and Water	6.5	4.0	8.0	4.0
All Industry	100	100	100	100

Source:- UN. Industrial Statistics Year book (Vol.,I,1984) pp.618-622.

2.3.2. Contribution to Value Added

The contributions of the manufacturing sub-sectors to total manufacturing have changed over time in many countries. For instance, in USSR the share of heavy industries was relatively low during the first years of the revolution. It ranged between 27.7 and 33.1 percent between 1912 and 1929. In 1933, the share of heavy industries in the manufacturing value added was 51.2 percent, and thereafter it increased steadily.

On the other hand, the share of light manufacturing industries in the USSR dropped from 71.4 percent in 1912 to 31.4 percent in 1962. (Table 5).

Table 5. Value Added Structure of Manufacturing in the USSR 1912-1962

(in percentage)

Particulares	1912	1925	1927	1928	1929	1933	1937	1955	1960	1962
Heavy Manufacturing	27.7	29.4	31.1	31.3	33.1	51.3	62.7	64.3	67.2	67.6
- Basic metal	7.4	3.9	5.2	4.9	4.9	5.8	7.6	13.5	12.5	12.5
- Metal Products (engineering)	10.3	11.9	14.0	14.0	15.5	30.4	36.9	38.7	38.2	39.3
Light manufacturing	71.4	68.6	68.0	67.6	65.6	47.3	36.4	34.7	31.3	31.4

Source:- Obtained from Paul Gregoy, Socialist and Non Socialist Industrialization Patterns, A Comparative Appraisal, 1970, pp. 28-29 as used in the paper by Yeheyes Assefa, Possibilities and Constraints of Developing Heavy Industries in Ethiopia" A.A. July 1986. p.42.

In the USSR, the contribution of metallurgy to manufacturing value added ranged between 17.7 and over 50 percent from 1912 to 1962. This made the sub-sector the major contributor to the growth in the value added share of heavy manufacturing.

Similar behavior in other socialist countries is reflected by the data in Table 6.

Table 6. The Structure of Manufacturing Value Added of Eastern Europe Countries for Pre-War and Post War Years (as a percentage of total manufacturing value added)

Particulars	Hungary		GDR		Czechosl.		Bulgaria		Romania		Average	
	1937	1963	1936	1963	1928	1965	1936	1963	1930	1958	Pre War	Post War
Heavy Manufacturing	38	61	51	65	40	68	22	53	30	59	36	61
Of which Basic Metals	7	14	6	8	4	17	1	14	3	10	4	12
Metal Products (Engineering)	17	31	27	34	19	34	5	22	8	28	15	30
Light Manufacturing	61	35	46	31	37	31	80	41	64	42	65	35
Manufacturing Value Added to GNP	28.2		52.2		31.7		31.2		20.0			

Source:- Paul Gregory, op.cit, p. 47.

2.3.3. Annual Growth Rate of Production

In terms of production, the entire industry had a positive trend growth rate in all types of economies in the period between 1972 and 1984. The highest growth rate was registered in the centrally planned economies (5.5 percent). This was followed by 2.8, 2.3 and 2.2 percent growth rates for the world as a whole, the developing and developed market economies respectively.[10]

In spite of its high share in the entire industrial production in all economies, the growth rate of manufacturing relative to other activities is not that impressive. From 1972 to 1984, for instance, its annual growth rate for all economies was less than the growth rate of electricity, gas and water production. This is with the exception of centrally planned economies where manufacturing growth rate was greater than that of electricity, and gas and water, which were 5.7 and 4.8 percent respectively.[11]

If we consider the different sub-sectors of the manufacturing industry, of all sub-sectors the annual growth rate of the metal sub-sector is relatively impressive except in the case of the developed market economies (with annual growth rate of 2.8 percent). For instance the rates of growth were 5.6, 10.6 and 12.7 percent for the world, centrally planned and developing market economies.[12]

2.3.4. Contribution to Employment

Similar to the pattern of the share of industrial production, the manufacturing sector is dominant in providing employment opportunities in all types of economies, its share ranging between 91.2 and 93.2 percent (Table 7). The highest contribution to employment during the period considered was in developing market economies while the lowest was in centrally planned economies.

Of the manufacturing industry, the contribution to employment of heavy manufacturing is higher than the light industry in the case of centrally planned economies and developing market economies. The share of heavy industry was over 55 percent in both sets of countries. But in the case of developed market economies light manufacturing is dominant. In 1980, for instance, for developed market economies, the share of light manufacturing in total industrial employment was 64.0 percent as can be seen from Table 7.

Table 7. The Share of Each Branch in Industrial Employment in Different Economies

(in percentage 1980)

Branch Activity	World	Centrally Planned Economies	Developed Market Economies	Developing Market Economies
Mining and Quarring	4.5	6.5	4.3	3.5
Manufacturing	92.5	91.2	92.6	93.2
Food, Beverage and Tobacco	13.9	9.1	22.0	10.0
Textiles	9.9	7.4	15.8	6.4
Chemical, Petroleum, and Plastic Products	8.6	6.6	6.2	8.8
Basic Metal Industry	4.1	3.7	2.7	5.5
Metal Products, Machinery and Equipment	30.0	40.7	13.9	37.4
Light Manufacturing	46.2	34.1	64.0	38.2
Heavy Manufacturing	46.3	57.1	28.6	55.0
Electricity, Gas and Water	3.0	2.3	3.1	3.3
All Industry	100.0	100.0	100.0	100.0

Source:- UN. Industrial Statistics Year Book (Vol.I,1984), pp.618-622.

The metal sub-sector provides the highest level of employment of all other sectors in all economies with the exception of developed market economies. However, the contribution to employment of the

engineering industries is higher than basic metal industries in all economies.

Generally, annual growth rate of employment in the entire industry is not significant in all types of economies. However, between 1972-84, a relatively high growth rate was observed in developing market economies (3.8 percent). This was followed by centrally planned and world economies, 1.1, and 1.0 percent respectively. The annual rate of growth in developed market economies was negative, that is -0.8 percent in the same period. Employment in all branch activities of these economies showed negative growth rates (except electricity, and gas and water which showed the only positive growth rate of 1.5 percent, and metal products which showed zero growth rate).[13]

It can also be observed that in manufacturing, the metal sub-sector is dominant in the annual growth rate of employment compared to other sub-sectors in centrally planned and developing market economies. In these countries, the annual rates of growth between 1972-1984 were 2.4 and 10.0 percent respectively.[14]

2.3.5. Contribution to Foreign Exchange

Out of the total value of exports the manufacturing sector is the major constituent in industrialized countries. For instance, from 1973 to 1984 out of the selected centrally planned economies, the manufacturing sector's contribution in Czechoslovakia ranged from 94.6 to 96.4 percent. In Yugoslavia and Poland it ranged from 91.7 to 94.2 percent and 79.5 to 86.3 percent respectively. In the case of a developed market economy, the United States, the share of exports in manufacturing was between 79.7 and 82.3 percent. In France and

Italy it was over 90 and 96 percent respectively for the same period. Exports of selected countries of different economies are given in Table 8.

From the Table it can be seen that in the industrially developed countries, the metal sub-sector is the major contributor in terms of export earnings. In the period 1978 to 1984, for instance, in Czechoslavakia, the contribution was over 65 percent, in Yugoslavia and Italy over 45 percent, in Poland, United States and France over 50 percent, and in Japan an extraordinarily large share of over 80 percent.

Table 8. Exports of Manufactures of Selected Centrally Planned, Developed Market Economies and Developing Market Economies

(in percentage of total Value)

Activities	1978	1979	1980	1981	1982	1983	1984
				Centrally Planned Economies			
				1) Czechoslavakia			
Total	100	100	100	100	100	100	-
Manufacturing	94.6	94.9	94.8	95.5	96.1	96.4	-
Basic Metal	8.9	9.3	8.3	7.6	7.1	7.0	-
Metal Manufacturing	58.3	56.9	60.3	63.6	61.0	62.4	-
				2) Yugoslavia			
Total	100	100	100	100	100	100	100
Manufacturing	92.0	91.7	93.1	94.0	94.2	92.2	94.1
Basic Metal	8.8	9.0	7.8	6.4	6.5	7.9	8.6

Cont.

Activities	1978	1979	1980	1981	1982	1983	1984
Metal Manufacturing	40.4	38.3	36.4	37.3	40.3	40.2	39.4
		3) Poland					
Total	-	-	100	100	100	100	-
Manufacturing	-	-	84.3	36.3	79.1	79.5	-
Basic Metal	-	-	8.9	8.3	7.8	9.4	-
Metal Manufacturing	-	-	51.0	55.9	51.9	49.1	-
		Developed Market Economies					
		1) U.S.A.					
Total	100	100	100	100	100	100	100
Manufacturing	79.9	79.7	80.2	80.2	81.2	81.6	82.3
Basic Metal	2.3	2.8	4.2	2.7	2.3	2.0	1.8
Metal Manufacturing	50.2	48.1	47.1	49.8	50.5	50.6	50.7
		2) Japan					
Total	100	100	100	100	100	100	100
Manufacturing	99.4	99.2	99.3	99.3	99.5	99.4	99.5
Basic Metal	13.2	14.8	13.4	11.9	12.2	9.8	9.0
Metal Manufacturing	67.9	65.0	66.6	69.6	69.6	71.6	73.8
		3) France					
Total	100	100	100	100	100	100	100
Manufacturing	96.1	96.1	96.4	96.3	96.7	96.7	96.9
Basic Metal	6.7	5.8	6.0	6.5	6.2	5.6	5.7
Metal Manufacturing	42.1	40.4	42.9	41.7	40.8	41.7	40.7
		Developing Market Economies					
		1) India					
Total	100	100	100	-	-	-	-
Manufacturing	58.0	62.4	59.9	-	-	-	-
Basic Metal	0.8	0.7	0.7	-	-	-	-
Metal Manufacturing	11.7	11.1	12.1	-	-	-	-

Cont.

Activities	1978	1979	1980	1981	1982	1983	1984
		2) Ghana					
Total	100	100	100	100	-	-	-
Manufacturing	23.8	20.8	26.1	40.8	-	-	-
Basic Metal	0.0	-	0.0	0.0	-	-	-
Metal Manufacturing	0.2	0.2	0.2	0.2	-	-	-
		3) Kenya					
Total	100	100	100	100	100	100	
Manufacturing	40.2	44.2	54.2	53.6	47.0	39.8	-
Basic Metal	0.6	0.7	0.6	0.5	0.7	0.5	-
Metal Manufacturing	2.5	1.7	1.9	1.7	1.4	1.5	-
		4) Gabon					
Total	100	100	100	100	100	100	100
Manufacturing	1.4	2.5	-	11.7	6.9	10.0	-
Basic Metal	0.0	0.5	-	0.0	-	0.0	-
Metal Manufacturing	0.3	0.2	-	1.4	0.5	3.0	-
		5) Senegal					
Total	100	100	100	100	-	-	-
Manufacturing	64.4	67.0	62.0	72.8	-	-	-
Basic Metal	0.1	0.1	0.1	0.2	-	-	-
Metal Manufacturing	4.9	2.1	4.1	6.4	-	-	-
		6) Somalia					
Total	100	100	100	100	-	-	-
Manufacturing	3.2	10.6	11.9	1.6	-	-	-
Basic Metal	-	0.0	-	0.0	-	-	-
Metal Manufacturing	0.1	0.2	0.3	0.2	-	-	-
		7) Liberia					
Total	100	100	100	100	-	-	-
Manufacturing	4.0	5.3	6.7	4.2	-	-	-
Basic Metal	0.0	0.0	0.0	0.0	-	-	-
Metal Manufacturing	0.5	0.7	1.3	1.0	-	-	-

Source:- UN. International Trade Statistics Yearbook (Vol.I,) 1984, Various Tables.

- not available.

In the case of developing countries, generally, the performance of industry in the export sector is not impressive. However, developing countries which have a good industrial base have performed satisfactorily in recent years. For example, in India the share of manufacturing in export earnings was between 58 and 59.9 percent between 1978 and 1980. In Senegal the share varied between 64.4 to 72.8 percent between 1978 and 1981, in Ghana between 23.8 and 40.8 percent between 1978 and 1981, while in Kenya, the share was over 40 percent. However, in those developing countries with poor industrial base the industry made the least performance in the export sector. For example, the contribution of the sector in Gabon, Somalia and Liberia was less than 12 percent between 1978 and 1983.

One striking feature of the structure of manufacturing sector is that as oppossed to the pattern of industrialized countries, in developing countries the contribution of the metal sub-sector to export earning is insignificant. For example in India it was less than 13 percent in 1978/80, while it was less than 5 percent for the rest of the developing countries.

2.3.6. Contribution to Government Revenue

Industrialization is one of the effective tools of increasing the national income of a country. Among the other benefits, there is the contribution which industry makes by generating a surplus (through indirect taxes and operating surplus). This social surplus provides funds to finance government programmes and development projects. It is, therefore important to assess the relative significance of the contribution of the metal sub-sector in this regard in different countries.

2.3.6.1. Net Operating Surplus[15]

Table 9 presents that net operating surplus of the activity as a percentage of net operating surplus for the industries total and for the economy as a whole for selected countries. As shown in the Table, Manufacturing has the highest percentage share of net operating surplus in the industrial sector in the economy in all countries considered except in Netherlands and Algeria. In the latter countries the manufacturing sector is exceeded by Mining and Quarrying activities. With regard to sub-sectors of manufacturing, conditions varied accross activities and countries. For example, in Japan and the Netherlands the share of metallurgy in both the industries total, and total for the economy were positive (values less than 10 percent for engineering and less than 3 percent for basic metal industries). But, in 1982, in U.S.A., Sweden and West Germany the share of basic metal industries was characterized by negative values of between -0.2 and -9.3, whereas metal products constituted positive values of less than 11 percent. In Algeria, in 1977, the share for both basic metal and metal products combined, both in the industry total and total for the economy was negative i.e., -1.1 and -1.2 percent respectively.

2.3.6.2. Indirect Taxes

The contribution to Government revenue of different economic activities in different countries through the indirect taxes are given in Table 10. For the economy, total industries constituted 92.4, 96.8, 10.8, 32.5, 27.6 and 65.5 percent in Japan, U.S.A., Sweden, W. Germany, the Netherlands and Algeria. Here manufacturing has a

Table 9. Net Operating Surplus of Manufacturing as a Percentage of Net Surplus for Industry and the Economy as a Whole

Activity	Japan 1983		U.S.A. 1982		Sweden 1982		W.Germany 1982		Netherlands 1982		Algeria 1977	
	Industries Total	Total for the Economy	Industries Total	Total for the Economy	Industries Total	Total for the Economy	Industries Total	Total for the Economy	Industries Total	Total for the Economy	Industries Total	Total for the Economy
Agriculture, Hunting Forestry	6.2	7.5	7.1	8.2	10.7	10.5	4.8	5.9	10.2	11.8	11.3	11.9
Mining and Quarrying	0.7	0.8	5.5	6.3	0.5	0.5	0.6	0.7	23.1	26.7	51.5	54.5
Manufacturing	23.2	27.6	9.1	10.4	13.4	13.0	16.6	20.3	6.2	7.2	1.0	1.0
- Basic Metal Industries	2.2	2.6	-0.5	-0.6	-1.1	-1.1	-0.2	-0.2	0.3	0.3		
- Metal Products (Engineering)	8.2	9.8	2.4	2.8	4.1	4.0	8.2	10.2	2.6	3.0	-1.1	-1.2
Total Industries*	100	119.4	100	114.7	100	97.6	100	122.7	100	115.5	100	105.8
Total	-	100.0	-	100.0	-	100.0	-	100.0	-	100.0	-	100.0

Source:- Compiled from UN. National accounts Statistics: Main Aggregates and detailed table (1984), Various pages,

* The net operating surplus as a percentage of industries total may be higher or lower than the total for the economy depending on the adjustment factors between total industry and total for the economy.

notable share of indirect taxes of 52.2, 13.1, 23.5, 14.5 and 12.4 percent for the economy in the same countries except Sweden, respectively.

Out of the manufacturing activities metal product industries had contributed 12 percent in Japan in 1983. For the rest of the countries the share ranged between 0.3 and 2.8 percent, the former figure being for the Netherlands and the latter for U.S.A.. The contribution of basic metal industry also ranged between 0.1 and 2.3 percent of the total collection of indirect taxes in the economies of the countries under consideration in this study.

This Chapter has focused mainly on the role of the metal sub-sector in different socio-economic settings. This wider survey and analysis of the sub-sector is made with the view to open the way for evaluating the relative importance of the Ethiopian metal sub-sector in the forthcoming chapter.

Summary of Main Findings

In an effort to analyse the historical development of the sub-sector in the world, it was found that iron ore extraction has been one of the oldest activities of mankind. However, it began to develop rapidly in the first half of the eighteenth century and continued to grow in the nineteenth and twentieth centuries. Such growth of the sub-sector did not however, continue without interruption. The last decade in particular has been a period characterized by the need to economize on materials and energy. This has resulted in the decline of steel production and consumption in the world. As a result a restructuring process has taken place on the world-wide level to reduce total world demand for steel.

Table 10. Indirect Taxes by Activity as a Percentage of Industries Total Indirect Taxes and Total Indirect Taxes for the Economy

Activity	Japan 1983		U.S.A. 1982		Sweden 1982		W.Germany 1982		Netherlands 1982		Algeria 1977	
	Industries Total	Total for the Economy	Industries Total	Total for the Eco.	Industries Total	Total for the Economy	Industries Total	Total for the Economy	Industries Total	Total for the Economy	Industries Total	Total for the Economy
Agriculture, Hunting Forestry	-0.48	-0.4	1.4	1.4	5.1	0.6	-0.9	-0.3	4.8	1.3	0.1	0.04
Mining and Quarrying	0.1	0.1	10.2	9.9	0.4	0.1	-0.8	-0.6	0.3	0.1	52.1	34.1
Manufacturing	56.5	52.2	13.5	13.1	24.4	2.6	72.2	23.5	56.7	14.5	18.9	12.4
Basic Metal Industries	2.5	2.3	0.9	0.8	1.5	0.2	0.4	0.1	0.2	0.1		
Metal Products (Engineering)	12.9	11.9	3.1	2.8	10.7	1.2	5.1	1.7	1.0	0.3	2.0	1.3
Total Industries	100	92.4	100	96.8	100	10.8	100	32.5	100	27.6	100	65.5
Total	-	100	-	100	-	100	-	100	-	100	-	100

Source:- Compiled fro; UN. National Accounts Statistics: Main Aggregates and Detailed Table (1984), Various pages.

In the development of the metal industry, the need for integration and the approach to integrated development of the sub-sector in the national economy are discussed at length. The discussion was accompanied by a review of the experiences of various countries. The main pertinent questions are the following: Which model is more suitable for a developing country? Should a country start right from heavy steel industry or small-scale steel plants? Should it be planning integration based on "demand pull" from capital goods industries or on "demand push" from the iron and steel industry leading to expansion and diversification of other sectors? The selection of the modality of integration process depends upon the specific characteristics of the developing countries, such as the availability of raw materials, the level of technical development and manpower training, and the basic needs of the population.

With regard to the role of the metal sub-sector in different socio-economic settings, its contribution to the entire industrial production is the highest of all sub-sectors of the industrial sector (i.e. over 35% in the world). Several countries' experiences have shown that, the sub-sector is the major contributor to the growth in the value added share of heavy manufacturing. The annual growth rate of the metal sub-sector in terms of production is also relatively impressive.

In terms of the contribution to employment the metal sub-sector is the highest of all other sub-sectors in all economies with the exception of developed market economies. It is also observed that in manufacturing, the metal sub-sector has the highest annual growth

rate of employment compared to other sub-sectors in centrally planned and developing market economies.

In the case of contribution to foreign exchange, in the industrially developed countries, the metal sub-sector is the major contributor in terms of export earnings. But in the developing countries, generally, the role of the metal industry in the export sector is insignificant.

The contribution of the metal sub-sector to Government revenue, among other ways is through indirect taxes and operating surplus. With respect to the contribution of the sub-sector to indirect taxes, its share is the least in the industry total for all countries considered in this study. With regard to net operating surplus of the sub-sectors of manufacturing, conditions varied across activities and countries. For example, in some countries the shares of metallurgy in both the industry total, and total for the economy were positive whereas it was negative in other countries.

1. UNIDO Secretariate: Issue Paper I, "The Iron and Steel Industry Present Situation, Prospects and the Need for more Integrated.. Development of the Iron and Steel and Capital Goods Industries" June 1986, p.4.

2. Pierre Judet, "The World Crisis of the Iron and Steel Industry and its Impact in the Development of the Industry in Develping Countries". UNIDO, June 1986. p. 10.

3. The Great Soviet Encylopedia, Third ed., Collier Macmillan Publishers London, (Vol.9), 1975, p. 27.

4. UNIDO Secretariat: Issue Paper I, op.cit., pp.5-6.

5. Pierre Judet, "The Integrated Development of the Iron and Steel Industry and Capital Goods Sectors in Developing Countries" UNIDO, June 1986, pp. 13-15.

6. UNIDO Secretariat: Issue Paper I, op.cit., p.3.

7. Ibid, p.4 and UNIDO Secretariat, "Integrated Development between the Iron and Steel and Capital Goods Sectors: Concrete Case Studies" June 1986, p.4.

8. S. Samarag Pungavan, "Integrated Development of the Steel Industry Particularly Mini-Steel, Linked to Capital Goods and Agricultural Machine" UNIDO, p.24.

9. UNIDO Secretariat: Issue Paper 2, "The Mastering of Technology and Development of the Iron and Steel Industry in Developing Countries", June 1986, p.9.

10. UN. Industrial Statistical Yearbook (Vol.II,1984) pp. 618-622.

11. Ibid.

12. Ibid.

13. Ibid.

14. Ibid.

15. According to the UN, National Accounts Statistics, Operating Surplus is defined as the excess of Value Added over the sum of compensation to employees, consumption of fixed capital, and net indirect taxes.

16. Indirect taxes are taxes chargeable to the cost of production or sale of goods and services. They include import and export duties, excise, sales and turnover taxes, lavies on value added and operating surplus etc. Indirect taxes here refer to mean less of subsidies receive.

Chapter 3

This Chapter is concerned with the relative importance of the metal industry in the Ethiopian economy. Its focus is on the structure of the sub-sector i.e. distribution by region and ownership, the contribution to value of production, employment and income generation, Government revenue, foreign exchange, and the linkage effect of the industry.

3.1. The Structure of the Sub-Sector

3.1.1 Geographic Distribution

Metal manufacturing is heavily concentrated in a small number of locations. Only Shoa and Eritrea, in 1983/84 G.C., accounted for 100 percent of the sub-sector in terms of number of establishments, employment, gross value of production and value added (Table 11).

Shoa alone had 63 percent of the establishments, 68.6 percent of persons employed, and more than 84 percent of value added. The rest of the contributions were made by Eritrea Administrative Region.

The concentration of metal firms is also heavy within regions. For instance, in 1985/86 G.C., out of the total value produced by metal manufacturing in Shoa, Menagesha Awraja (Province) produced 77.5 percent, whereas, the rest, 22.5 percent, was produced by Yerer and Kereyu Awraja. In the case of Eritrea the whole value was produced by Hamassen Awraja (Table 12).

This pattern of distribution has been largerly determined by the concentration of the market and the availability of infrastructure. The main urban centers and concentrated sources of demand for the types of goods produced are located in Shoa and Eritrea, where Addis Ababa and Asmara are situated. These two areas are also better endowed with infrastructure, particularly electricity, telecommunications and transport, than other parts of the country.[1]

Table 11: Geographic Distribution of Metal Manufacturing 1983/84 G.C.*

Region	Industrial Groups	No. of Establish-ments	No. of Persons Engaged	Gross Value of Product-ion	Census Value Added at Market Price
Shoa	Iron and Steel basic industries	2 (7.4)	610 (25.5)	73,418 (53.6)	16,857 (41.9)
	Fabricated metal products except machinery and equipment	15 (55.6)	1,032 (43.1)	43,688 (31.9)	17,028 (42.4)
	Sub-Total	17 (53.0)	1,642 (68.6)	117,103 (85.5)	33,885 (84.3)
Eritrea	Iron and steel basic industries	1 (3.0)	142 (5.9)	8,609 (6.3)	2,474 (8.2)
	Fabricated metal products except machinery and equipment	9 (33.0)	611 (25.5)	11,224 (8.2)	3,830 (9.5)
	Sub-Total	10 (37.0)	753 (31.4)	19,833 (34.5)	6,304 (15.7)
Other Regions	Iron and steel basic industries	0	0	0	0
	Fabricated metal products except machinery and equipment	0	0	0	0
Grand Total		27 (100)	2,395 (100)	136,936 (100)	40,189 (100)

Source: Computed from C.S.O. Results of the Survey of Manufacturing Industries, 1983/84, A.A., pp. 22-23.

* Figures in parentheses represent percentage of total.

Table 12. Distribution of Value of Production at Constant 1980/81 Price of Metal Manufacturing by Administrative Regions and Awrajas 1985/86.

Region	Awraja	Value of Production	Share in Percentage of Total
Shoa	Menegasha	84,548,000	69.5 (77.5)
	Yerer and Kereyu	24,554,000	20.2 (22.5)
	Total	109,100,000	99.7 (100)
Eritrea	Hamassen	12,503,000	10.3 (100)
Grand Total		121,603,000	100

Source:- Computed from the Ministry of Industry, Statistical Bulletin IV, Sept., A.A., p.17.

NOTE:- Figures in Parentheses represent Awraja's share in the region.

3.1.2. Distribution by Ownership Type

In terms of number of establishments, the larger proportion was privately owned. According to 1983/84 data, privately owned metal establishments constituted 51.6 percent, whereas the public sector owned 48.4 percent. However, in terms of number of employees, Gross value of production, value added and net book value of fixed assets, the bulk of the sub-sector was publicly owned. Public sector constituted over 99 percent for the last three items and 86.5 percent for the number of employees (Table 13).

Table 13. Distribution of Metal Manufacturing by Type of Ownership 1983/84

Particulars	Social Sector*		
	Public Sector Industries	Private Sector Industries	All Industries
Number of establishments	15 (48.4)	16 (51.6)	31 (100)
Number of Permanent employees	2,878 (56.5)	448 (13.5)	3,326 (100)
Gross value of production	132,103,000 [illegible]	8,022,000 (5.7)	140,125,000 (100)
Value added at market price	34,848,000 (91.1)	3,397,000 (8.9)	38,245,000 (100)
Net book value of fixed assets	31,407,000 (91.3)	3,010,000 (8.8)	34,417,000 (100)

Source:- Computed from same source as in Table 12. p.72.

* Figures in parentheses represent percentage of totals.

In Ethiopia, at present, the public sector is expanding. This can be seen from the pattern of ownership which emerged between 1975/76 and 1984/85 G.C. For instance, publicly owned establishments which accounted for 22.6 percent, increased to 51.4 percent in the ten years period between 1975/76 and 1984/85 G.C. The share of the private sector on the other hand declined from 77.4 percent to 48.6 percent in the same period (Table 14).

Table 14. Pattern of Ownership of Metal and Electrical Establishments in 1975/76 and 1984/85 G.C.* (in percentage of totals)

Industrial Group	1975/76			1984/85		
	Public	Private	Total	Public	Private	Total
Metal and Electrical	7	24	31	18	17	35
	(22.6)	(77.4)	(100)	(51.4)	(48.6)	(100)

Source:- C.S.O., Facts and Figures, 1987, p.50.

* Figures in parentheses represent percentage of totals.

Table 15 provides the structures of ownership of iron and steel production in different economies of the world. From the Table it is possible to see that more than 50 percent of the world iron and steel industry is now state-owned.

Table 15. State Control of Iron and Steel Production

Country	(%) of Total
United States	0
Japan	0
EEC	51.7
Other OECD Countries	57.4
CMEA countries	100.0
Principal developing countries	
Brazil	54.6
Mexico	50.0
India	74.6
Venzuela	87.0
South Korea	60.9
Total	55.4

Source:- Prierre Judet: "The World Crisis of the Iron and Steel Industry and its Impact in the Development of this Industry in Developing Countries" UNIDO, June 1986, p.38.

3.2. The Contribution to Value of Production

As can be seen from Table 16 the value of production of the sub-sector shown an increasing trend throughout the period under consideration. In 1975/76 the total value of production was Birr 38 million. In 1983/84 it rose to the level of Birr 105 million which indicates an increase of 172.4 percent over that of 1975/76. That meant that the average annual growth rate was 12.2 percent over the period covered except for 1981/82 when production declined by 46.3 percent over that of 1975/76 level. The growth rate is by far better than the growth rate of the sub-sector in the different economies of the world.

Table 16. Value of Production at Constant 1971 Prices of National Metal Works Corporation and All Other Corporations Administered by the Ministry of Industry Between 1975/76 and 1983/84.
(in '000 Birr)

Name of Corporation	1975/76	1976/77	1977/78	1978/79	1979/80	1980/81	1981/82	1982/83	1983/84	Growth rate* between 1975/76-1983/84 in percent
National Metal Works	38672	42573	50982	74612	82562	87933	20785	100249	105356	172.4 (19.2)
Total for the Corporations**	753343	773568	787934	1067728	1212728	1301420	136812	1471567		95.3 (10.6)
The share of the metal sub-sector in corporations total (%)	5.1	5.5	6.5	7.0	6.8	1.5	6.8	7.2		

Source:- Ministry of Industry Plan and Programme Office, "The State of the Manufacturing Sector of the Ethiopian Economy after Nationalization" A.A., 1986, p.5.

* Figure in Parentheses are annual growth rates.

** These Corporations include those administered by the Ministry of Industry.

Although the growth rate of the sub-sector in value of production is significant between 1975/76 and 1983/84 G.C., its share in the industry's total has been low. The share varied between 5.1 and 7.2 percent in the period. The period 1981/82 G.C. was exceptional when the share had gone down to 1.5 percent. However, the annual average share had gone down to 1.5 percent. However, the annual average share was about 6 percent. Compared to the share of the industry in different economies of the world the contribution of the sub-sector in the Ethiopian economy is insignificant in spite of the high growth of production. (Table 4).

3.2.1. The Structure of Output

The structure of production in the Ethiopian Manufacturing sector has historically been dominated by consumer goods enterprises. The share of food processing, beverages and textiles in the total industry's value of production ranged between 62.7 and 66.9 percent during 1980/81 and 1985/86 G.C. (Table 17). In the case of value added the same branches of industry contributed as high as 70 percent between 1981/82 and 1985/86 G.C.[2]

From Table 17, it can also be seen that the next sub-sectors in order of importance are chemical, leather and shoes, metal products, wood and wood products and paper and paper products. In particular, the share of the metal products in the value of industrial production had ranged between 5.6 and 7.6 percent from 1980/81 to 1985/86 G.C. Its share in value added also ranged between 3.8 and 5.9 percent in the same period.[3]

Table 17. Percentage* Distribution of Value of Production by Industrial Branch

No.	Industrial Branch**	1980/81	1981/82	1982/83	1983/84	1984/85	1985/86
1.	Food	26.1	24.0	25.7	25.7	25.2	25.5
2.	Beverage	15.8	15.7	15.6	15.5	17.8	17.5
3.	Tobacco	3.9	4.3	4.7	4.2	5.1	5.6
4.	Textile	25.0	24.5	22.6	21.5	20.0	20.1
5.	Leather and shoes	6.8	7.9	7.5	6.0	7.5	7.8
6.	Wood and wood product	-	0.2	0.6	0.7	0.6	0.6
7.	Paper printing and publishing	5.0	5.1	4.8	5.1	5.2	5.3
8.	Chemical	8.0	8.4	9.1	9.3	8.2	7.2
9.	Non-metallic mineral product	2.2	2.8	2.4	2.1	3.2	3.7
10.	Metal products	7.3	7.1	7.6	7.6	7.2	6.6

Source:- Some as in Table 12, p.15.

* Percentages may not add to hundred because of rounding.

** These industrial groups include only manufacturing industry administered by the Ministry of Industry which provide 86 percent of permanent employment and produced 80.3 percent of the value added at market price of the manufacturing sector.

3.2.2. Value Added

The value of production of an industry includes mostly a transformation of products which were produced in some other activities. Therefore, the net contribution of an industry to the economy is

measured by the value added. The newly created value by the metal industry has been increasing during the period under considerations. For instance, the growth of value added at market price between 1978/79 and 1983/84 G.C. was 38%, that means an average annual growth rate of 6.4 percent (Table 18). However, this growth rate is less than the rate of growth for the industry in general.

A look into the share of the sub-sector in the industry total value added at market price shows that it varied between 3.3 and 4.2 percent in the period 1978/79 to 1983/84 G.C. Over these eight years there was significant difference on the ratio of value added to gross value of production. The ratio declined from 0.42 in 1976/77 G.C. to 0.29 in 1983/84 G.C. Thus, the available evidence seems to indicate that the metal sub-sector has increasingly become associated with high costs of production. From 1976/77 to 1983/84 G.C. value added in the sub-sector decreased from 42 to 26 percent of the gross value of production. This implies that the gross value of production attributed to material inputs and utilities (intermediate inputs in general), increased from 58 to 72 percent in the same period. (Table 19).

Table 18. Census Value Added* of Metal and Total Manufacturing Industries at Market Price for 1978/79 - 1983/84 G.C. (in '000 Birr)

	Value Added at Market Price						Percentage growth rate** 1978/79 - 1982/83 G.C.
	1978/79	1979/80	1980/81	1981/82	1982/83	1983/84	
Metal industry	29054	33705	38449	364402	35376	40194	383 (6.4)
Total for manufacturing industry	725844	945381	915959	1017418	1071161	1,962,286	64.8 (10.8)
Percentage share of the sub-sector in the industry	4.0	3.6	4.2	3.6	3.3	3.4	

Source:- Same as in Table 11, Various issue.

* Census value added is the difference between gross value of production and industrial cost.

** Figures in Parentheses represent annual growth rates.

Table 19. Ratio of Value Added at Market Price to Gross Value of Production (in '000 Birr).

Year G.C.	Value Added (VA)	Gross Value of Production (VOP)	Ratio of VA/VOP
1976/77	17,339	41,709	0.42
1977/78	18,127	54,423	0.33
1978/79	29,054	82,723	0.35
1979/80	33,075	106,498	0.32
1980/81	38,449	118,030	0.33
1981/82	36,402	118,834	0.21
1982/83	36,376	124,880	0.28
1983/84	40,194	136,936	0.29

Source:- Same as in Table 18.

3.3. Employment and Income Generation

We consider below the direct employment effect of the sub-sector between 1973/74 and 1983/84 G.C. One should also bear in mind the indirect employment effects of industrial establishments through their linkages.

As can be seen from Table 20, the number of permanent employees of the sub-sector showed an increasing trend over the period under consideration. The number, which was 1,401 in 1973/74, increased by 105 percent, reaching 2,878 in 1983/84 G.C. This implied an average annual growth rate of 9.6 percent for those eleven years (which is equal to the annual growth rate of developing market economies between 1972-1984). These growth rates are significant when compared with those of the industry's growth rates, which were 66 percent during the entire period and 6 percent annually.

Table 20. Number of Permanent Industrial Employees

Name of Corporation	Y E A R S											
	1973/74 G.C.	1974/75 G.C.	1975/76 G.C.	1976/77 G.C.	1977/78 G.C.	1978/79 G.C.	1979/80 G.C.	1980/81 G.C.	1981/82 G.C.	1982/83 G.C.	1983/84 G.C.	Growth rate* 1973/74 1983/84
National Metal Works	1401	1419	1427	1489	1823	1875	1951	2353	2437	2498	2878	105 (9.6)
Total for the Industry	47507	50894	55205	60844	63288	63990	64771	69144	73374	75741	178928	66 (6.0)
The share of the sub-sector in the Industry Total (%)	3.0	2.8	2.6	2.5	2.9	2.9	3.0	3.4	3.3	3.3	3.7	

Source:- Same as in Table 16, p. 20.

* Figures in parentheses are annual growth rates.

Although the growth rate of employment of the sub-sector is significant compared to the industry's growth rate, its share in the industry's total employment is not up to expectation. The share varied between 2.5 and 3.7 percent in the period 1973/74 to 1983/84 G.C. The average share over those eleven years was 3.04 percent the lowest and the highest shares being registered in 1976/77 and 1983/84 respectively. This share was the lowest compared to the share of the metal industry employment in all economies of the world, which is on the average 34.1 percent in 1980 G.C. (Table 7).

The structure of persons engaged by sex and nationality, and by industrial group (public and private) provides the following picture. Of the total persons engaged and employed in the industrial sector in 1983/84 G.C the share of the metal sub-sector was the least i.e. 2.6 percent in both cases. It was textiles manufacturing which had the highest share of employment, i.e. over 40 percent. This was followed by food manufacturing with the share of 18.5 percent (Table 21).

The sub-sector absorbed in total 9.8 percent of foreigners (the highest figure compared to other sub-sectors), and 0.7 and 3.7 percent of females and males engaged in the industrial sector.

In 1983/84 G.C. out of the total wages and salaries of the industrial group, 3.8 percent was paid to workers of the metal sub-sector. For comparison the share of other sub-sectors is also given in Table 22. Textiles and food industries had shares to total payment 31.7 and 13.9 percent respectively.

The metal sub-sector had a share of payment of 15.9 percent of total wages to foreigners, 1.4 percent to female workers and 4.4 percent to male workers in the entire industrial sector. Here it is also observable that 69.5, 19.3 and 0.9 percent of the total wages and salaries payment were for males, females and foreign workers engaged in the entire industrial sector respectively.

Table 21. Percentage Share of Persons Engaged by Sex and Nationality and Industrial Group-Public and Private 1983/84 G.C. (in Percentage)

Industrial Group	Percent of Each Category[1]				Percent of Total Employees[2]
	Ethiopians		Foreigners	Total	
	Male	Female			
Food Manufacturing	22	11.0	8.7	18.5	18.5
Beverage Industries	9.5	4.2	8.7	7.7	7.7
Tobacco Manufacturing	2.4	1.4	-	2.1	2.1
Manufacture of Textiles	20.2	60.4	5.4	40.5	40.6
Iron and Steel Basic Industries	1.2	0.1	1.1	0.8	0.8
Metal Products	2.5	0.6	8.7	1.8	1.8
Unclassified	32.2	22.3	67.4	28.6	28.5
Total for the Industrial Group	100	100	100	100	100
Percent of the Grand Total	65.7	34.2	0.1	100	99.6

Source:- Same as in Table 11, p.3.

1. Persons engaged (category): includes paid employees and working proprietors, active partners, and unpaid family workers.
2. Employees:- include all persons on the payroll whether seasonal or temporary workers.

Table 22. The Structure of Wages and Salaries of Persons Employed by Sex. and Nationality 1983/84 G.C. (in percentage)

Industrial Group	Wages and Salaries			Total
	Ethiopians		Foreigners	
	Male	Female		
Food Manufacturing	21.7	11.9	5.9	18.9
Beverage Industries	9.2	5.3	20.8	9.4
Tobacco Manufacturing	1.9	3.1	-	2.1
Manufacture of Textiles	27.3	51.4	1.7	37.7
Iron and Steel Basic Industries	1.5	0.3	8.1	1.3
Metal Products	2.9	1.1	7.8	2.5
Unclassified	35.5	26.9	55.7	34.1
Total for the Industrial Group	100	100	100	100
Percent of the Grand Total*	69.5	19.3	0.9	100

Source:- Same as in Table 21.

* does not add to hundred because the total includes commission bonuses and allowance for food and lodging.

It is a fact that the sub-sector requires skilled managers, technicians, production planners, designers, programmers, process and quality controllers, skilled operators, skilled maintenance crew, other engineers and technicians.[4]

For example, the employment structure in the iron and steel industries of average performance in the developed countries is said to be as follows.[5]

- Engineers and executive = 3%
- Technicians, foremen and staff = 17%
- Skilled workers = 68%
- Unskilled workers = 12%

On the other hand the structure of highly developed iron and steel industries where automated process is used is said to be:

- Engineers and executive = 3%
- Technicians, foremen and staff = 67%
- Skilled workers = 30%
- Unskilled workers = 0%

In the case of Ethiopia the situation in the metal industry is different. It takes the following structure.[6]

- Professionals	= 2.6%
- Semi-Professionals	= 5.1%
- Skilled (9-12 Grades)	= 26.5%
- Unskilled (below Grade 8)	= 65.8%
Total	= 100%

Therefore, the available evidence reveals that the sub-sector is far below the level of development by the world standard in terms of the skills of employees.

3.4. Contribution to Government Revenue

Industrial public enterprises contribute substantially to central Government revenues. The contributions have taken three forms: capital charge, corporate taxation and residual surplus.[7]

Each year, industrial public enterprises are legally required to transfer an amount equivalent to five percent of the state capital invested in them from pre-tax income. This capital charge which is intended as a return on the Government's equity in each enterprise, is paid to the treasury. The corporate tax rate in Ethiopia is 50 percent and is levied after the capital charge.

By Proclamation 163 of 1979 industrial public enterprises are allowed to keep 10 percent of the after-tax profits as addition to general reserves, until such reserves reach 30 percent of the equity capital. The other 90 percent of profits, called residual surplus, is payable to the national treasury within seven months after the end of relevant fiscal year.

The effect of all these levies is that enterprises are led to experience substantial cash-flow problems. Therefore, they increase their short term borrowing from the Commercial Banks and lengthen the delay in paying their levies to the treasury.

The various forms of the contribution of the metal industry to the Government revenue is given in Table 23. For example from 1984/85 to 1986/87 G.C. the metal industry contributed annually to the Government revenue up to 18 million Birr of which indirect taxes constituted about half of the total, whereas transferred residual surplus and capital charge contributed less than 8 and 2 million Birr respectively.

With regard to the growth of the contribution during 1984/85 and 1986/87 G.C, total contribution had grown by 8.6 percent. Capital charge had increased by 64.2 percent whereas residual surplus and indirect taxes had increased by 5.8 and 4.4 percent respectively.

Table 23. The Various forms of the Contribution of the Metal Industry to the Government Revenue from 1984/85 to 1986/87 G.C.

(in Birr)

Items	1984/85	1985/86	1986/87	Growth between 1984/85-1986/87 in percentage
Capital Charge	1,017.000 (6.1)	1,821,000 (11.4)	1,669,852 (9.2)	64.2
Indirect Taxes	8,295,000 (50)	7,458,000 (4.21)	8,656,000 (48)	4.4
Transferred Residual Surplus	7,297,000 (43.9)	6,758,000 (42.1)	7,717,985 (42.8)	5.8
Total	16,609,000 (100)	16,037,000 (100)	18,044,467 (100)	8.6

Source:- National Metal Works Corporation.

NOTE: Figures in parentheses are shares in percentage of total.

The indirect taxes, which are the main source of Government revenue in the metal sub-sector, however, had a share ranging between 2.8 and 3.3

percent in the industrial total indirect taxes between 1978/79 and 1982/83. Over those five years the growth rate for the metal sub-sector was 62.2 percent, or on the average 12.4 percent annually, whereas, for the entire industry it was 75.6 percent, that is 15 percent annually. (Table 24). This means that, other sub-sectors of the industrial sector had shown faster growth than the metal sub-sector in terms of their contribution to the Government revenue through the indirect taxes.

Table 24. Indirect Taxes for 1978/79 - 1982/83 G.C.

(in '000 Birr)

Name	1978/79 G.C.	1979/80 G.C.	1980/81 G.C.	1981/82 G.C.	1982/83 G.C.	Percentage Growth rate* 1978/79 - 1982/83
Metalic Products	5,760	8,578	9,715	9,349	9,342	62.2 (12.4)
Total for the Industry	187,944	272,230	296,594	312,635	330,006	75.2 (15)
The share of the sub-sector in the Industry Total (%)	3.1	3.2	2.2	2.0	2.8	

Source:- Same as in Table 20, p.20.

*Figures in parentheses are annual growth rates.

3.5. The Contribution to Foreign Exchange

The contribution to foreign exchange is measured by the amount of foreign exchange earned, by the export of the sub-sector's output and the amount of foreign exchange saved because of producing formerly imported goods.

The contribution of the sub-sector to foreign exchange through export is almost nil. For instance, between 1978 and 1982, the share of basic metal and metal manufacturing in the total foreign exchange earnings was zero, except for the 1979 metal manufacturing share of 0.1 percent. Moreover, the sub-sector compared with other sub-sectors is the highest dependent on imported input singularly requiring over 80 percent of its total inputs. This in fact has made the sub-sector a net importer.[8]

Several calculations have indicated that the attempt to save foreign exchange through producing formerly imported goods also was negative. The sub-sector did not help save foreign exchange in general as indicated by Domestic Resource cost (DRC) estimation of 1972, 1980, 1983, and 1986.[9]

Based on the DRC calculations by Guisinger (1972) and World Bank (1983) for iron and steel industry, negative value added to production was obtained. This meant that the industry was 'absolutely inefficient' in that it used tradeable inputs whose value (at world prices) was higher than the value of the output it produced.[10] However, this author's calculation of DRC (1.02) for all metal factories under the National Metal Works Corporation (NMWC) for the year 1986/87, classified the sub-sector as marginally inefficient. It is also observed that the sub-sector shows a positive private profitability whereas the economic profitability is negative. This is due to the protection provided to the sub-sector by the Government. The rates of protection are 1.33 (nominal protection) and 1.36 (effective protection).[11]

The inefficiency of the metal sub-sector to save foreign exchange may not hold true if detailed product by product analysis is made. There are metal products which are efficient in saving foreign exchange.[12]

On Melisachew's product specific DRC calculations of 1980/81, the variations from product to product can easily be noticed. For instance, two products i.e. structural metal products and sickles were categorised as 'extremely efficient', hand tools as very efficient, iron and steel efficient and cork very inefficient.

3.6. The Linkage Effects of the Industry

The linkage effects within the sub-sector and different sectors of the economy will be measured by the extent to which the sub-sector purchases domestically produced inputs and produces inputs for other sectors.

If we look at the total sales of metal products to different sectors, it is possible to evaluate the strength of the relationship. The highest relationship was registered with the construction sector, followed by agriculture and consumption sectors. In 1986/87 G.C, of the total sales 58 percent was sold to the construction sector. Agriculture constituted 13.8 percent, household and office furniture 10.7 percent, household utensils 8.4 percent and other products 9.1 percent (Table 25).

In 1985/86 out of the total establishments administered by the Ministry of Industry, consumer durables were produced only by National Metal Works establishments (those establishments constituting 100 percent of value added and of number of establishments). Engineering goods producing establishments under the Metal Corporation constituted 67 percent of the total establishments and 91 percent of the value added.

In terms of intermediate goods and light consumer goods producing establishments, their share both in the number of establishment

Table 25. Sales of Metal Products * to Different Sectors of the Economy 1986/87 G.C. (in percentage of total)

	Construction materials	Agricultural equipment	Household utensil	Household and office furniture	Other products	Total
Sales	58.0	13.8	8.4	10.7	9.1	100

Source:- Computed from Consolidated Financial Statements of National Metal Works Corporation.

* Produced in establishments administered by the Ministry of Industry.

and value added were 17.1 and 10.7 percent, and 1.0 and 0.3 percent respectively. However, the service rendering establishments were non existent in the sub-sector (Table 26).

If we observe the internal structure of the sub-sector in terms of establishments by type of goods produced and value added, the following can be said. Light consumer, consumer durables, intermediate, and engineering goods producing establishments constituted 4.8 and 6.1 percent, 57.1 and 38.8 percent, 28.6 and 37.3 percent, and 9.5 and 17.8 percent of total establishments and value added respectively (Table 26). Therefore, consumer durable production takes the highest share in terms of number of establishments and value added followed by intermediate goods production. However, there are no service rendering establihsments in the Corporation. For comparison the percentage total for the corporations in the manufacturing sector is provided in Table 26.

The percentage share of establishments and value added on the basis of industrial resource inputs for 1985/86 G.C. is given in Table 27. Import based industries were dominant within the sub-sector both in the number of establishments and value added. i.e.

Table 26. Value Added* of Metal Establishments by Corporation and by Types of Goods Produced for 1985/86 (in percentage)

Name of Corporation	Particulars	Light Consumer goods	Consumer Durables	Intermediate Goods	Engineering Goods	Service Rendering	Total
National Metal	No. of Establishment	4.8	57.1	28.6	9.5	0	100
Works	Value Added	6.1	38.8	37.3	17.8	0	100
Total for Corporations	No. of establishments	63.0	7.4	21.6	1.9	6.1	100
in the industrial sector	Value Added	78.9	1.7	15.1	0.9	3.4	100
Metal Works in the	No.of establishments	1.0	100	17.1	66.7	0	13
Total	Value Added	0.3	100	10.7	90.6	0	4.4

Source:- Same as in Table, 12. p. 59.

* Value Added at Market Price.

76.2 and 88.5 percent respectively. This was followed by domestic forest resources based industries. The share of the metal establishments in the total manufacturing sector is also contained in the Table. For instance, import based industries, of Metal Corporation constituted 32 percent of the manufacturing establishments and 13.7 percent of the value added.

It can also be seen that the import dependence of the National Metal Works Corporation is the highest of the other corporations of the industrial sector. That is, 80.4 percent of the total inputs was imported in 1981/82. The share of imported inputs for other corporations ranged between 7.8 and 70 percent.[13]

If we look at the internal structure of imported inputs consumption of the sub-sector in 1980/81, we find the following situation. The share of imported inputs was 100 percent for structural metal products and corrugated iron sheets, whereas for hand tools it was 95 percent, cork 94 percent, iron and steel 79 percent and stickle 76 percent.[14] Therefore the detailed product by product analysis of input consumption would provide the different degree of dependence of each product on imported inputs.

From the above discussion it is possible to conclude that the forward linkage effect of the sub-sector is relatively strong and important whereas the backward linkage effect is weak, demanding for appropriate measures to be taken.

Table 27. Value Added* of Metal Establishments by Corporation on the Basis of Industrial Input Resource for 1985/86.
(in percentage)

Name of Corporation	Particulars	Domestic Agricultural Based Industries	Domestic Livestock Based Industries	Domestic Forest Resources Industries	Domestic Mineral Resources Industries	Import Based Industries	Total
National Metal Workers	No. of establishments	0	0	14.3	9.5	76.2	100
	Value Added	0	0	8.6	2.9	88.5	100
Total for the Corporations in the Industrial sector	No. of establishments	48.2	7.4	4.9	8.6	30.9	100
	Value added	60.2	3.4	1.6	6.4	28.1	100
Percentage of Metal Corporation in the Total	No.of establishments	0	0	37.5	14.3	32.0	13
	Value added	0	0	23.2	2.0	13.7	4.4

Source:- Same as in Table 12 p. 58.

* Value Added is at market price.

NOTE:- Establishments are grouped ad "domestic based", if more than 50% of their input is local resources and "import based", if more than 50% of their total input is imported. (Input includes raw materials, indirect materials and utilities used, excluding labour input).

Summary of Main Findings

This Chapter has analysed the relative importance of the metal industry in the Ethiopian economy. In the study of the structure, it was found that the sub-sector is heavily concentrated in a small number of locations and in the hands of the private individuals. However, in terms of number of employees, gross value of production, and value added the bulk of the sub-sector is publicly owned.

In the case of contribution to value of production, it was observed that the sub-sector has shown an increasing pattern between the years 1975/76 and 1983/84 G.C. Although the annual growth rate of the sub-sector in value of production (19.2%) between 1975/76 and 1983/84 G.C. is significant relative to the growth rate of the total of all corporations (10.6%), its share in the industry's total has been low. The share varied between 5.1 and 7.2 percent in the same period. This share in value of production is by far less than the share of the sub-sector in all industries of the World (35.4%), Centrally Planned (36.1%), Developed Market (41.3%) and Developing Marked (14.1%) Economies in 1980 (Table 4).

The contribution of the sub-sector in terms of value added to the total industry also varied between 3.3 and 4.2 percent at market price in the period 1978/79 to 1983/84. The metal sub-sector is increasingly becoming associated with high cost of production because value added declined from 42 to 28 percent of the gross value of production in the same period.

In terms of employment and income generation, it was found that the sub-sector's employment showed an increasing trend over the period between 1973/74 and 1983/84 G.C. However, its share in the industry's total employment has been low compared with the share in all other economies (refer to Table 7). The level of income generated by the sub-sector is also the least when assessed on the basis of the industry's total. The available evidence reveals that the sub-sector is also far below the level of development by the World standard in terms of the skills of employees.

In the case of Government revenue contribution, the sub-sector has shown a positive growth between 1984/85 and 1986/87 G.C. Among the components of the total revenue collected, indirect taxes were the most important followed by residual surplus and capital charge respectively. With regards to the contribution to foreign exchange some calculations indicated that the sub-sector did not help obtain and save foreign exchange.

In terms of the linkage effects both within the sub-sector and the sub-sector with other sectors of the economy, it is observed that the forward linkage effect of the sub-sector is relatively strong and important whereas the backward linkage effect is weak, demanding for appropriate policy measures to be taken.

Notes to Chapter 3

1. World Bank, Ethiopia: Industrial Sector Review Dec. 16, 1985, p.12.
2. Ministry of Industry, Statistical Bulletin IV, September 1987 A.A., pp. 55-56.
3. Ibid. This contribution of metal sub-sector is by far less than the contribution that the same industry makes in different economies. That is the share in industrial production was 35.4, 36.1, 41.3 and 14.1 percent in the World, Centrally Planned, Developed Market and Developing Market economies respectively (Table 4).
4. Yeheyes Assefa, "Possibilities and Constraints of Developing Heavy Industry in Ethiopia", A.A. July 1986, p.19.
5. Ibid. p. 20.
6. National Metal Works Corporation.
7. World Bank, op.cit., pp. 40-41.
8. UN. 1984 Industrial Trade Statistics Yearbook Vol, I., p. 524 and World Bank, op.cit., p. 96.
9. Melisachew Mesfin, "Industrialization and Tariff Protection in Ethiopia", M.Sc., Thesis Unpublished A.A.U. May 1984, p.64, World Bank, op.cit., p. 120 and the author's calculation of DRC for the Sub-Sector for 1986.
10. World Bank, op.cit., p. 120.

11. Technical Derivation of DRC for National Metal Works Corporation 1986/87 G.C.

(Value in '000 Birr)

Item	Value	Shadow Price	Economic Price
Total Sales Revenue (R)	144,578	0.75	108,434
Electricity	1,923	1	1,923
Wood and Charcoal	204	0.75	153
Fuels Consumed	1,494	0.95*	1,419
Total Imported Materials Consumed	60,497	0.75	45,373
Total Local Materials Consumed	32,371	0.75	24,278
Traded Input Costs (TIC)	96,489	-	73,146
Repair and Maintenance work	451	0.86*	388
Water	18	0.75	14
Stationary and Telephone	154	0.75	116
Transport Cost	130	0.80*	104
Insurance Premiums	871	0.75	653
Other expenses	14,064	1	14,064
Total Wages	11,583	0.75	8,687
Other Labour Costs	1,958	0.75	1,469
Total Capital Costs	10,023	1.05	10,550
Domestic Factor Costs (DFC)	39,252	-	36,045
Market Value of Fixed Assets	37,004		

(Value in '000 Birr)

Item	Value	Shadow Price	Economic Price
Working Capital	68,502		
Discount Rate Private	0.095		
Return on Fixed Assets (37004XO.095)	3,515	1.05	3,700
Return on Working Capital (68502 X 0.095)	6,508	1.05	6,850
Total Capital Costs 3515 + 6508	10,023	1.05	10,550
Total Wages	11,583	0.75	8,687
Total No. of Employees	3,337	-	-
Skilled	1,070	-	-
Unskilled	2,267	-	-
Average Wage	3.47		2.6
Value Added (144578 + 96489)	48,089		35,288
Gross Output	144,578		108,434
Total Labour Costs (11,583 + 1,958)	13,541		10,156

* World Bank Conversion factors. Others are the standard conversion factors (SCF)

(Value in '000 Birr)

Private/Social Indicators

R(P)	= Gross Output in Private Prices	= 144,578
TIC(P)	= Traded Input Costs in Private Prices	= 96,489
DFC(P)	= Domestic Factor Costs in Private Prices	= 39,252
	Private Profitability	8,837
R(E)	= Gross Output in Economic Prices	= 108,434
TIC(E)	= Traded Input Costs in Economic Prices	= 73,146
DFC(E)	= Domestic Factor Costs in Economic Prices	= 36,045
	Economic Profitability	(757)

NPC = Nominal Protection Coefficient $= \frac{R(P)}{R(E)} = \frac{144,578}{108,434} = 1.33$

EPC = Effective Protection Coefficient $= \frac{R(P) - TIC(P)}{R(E) - TIC(E)} = \frac{48089}{35288} = 1.3$

DRC = Domestic Resource Cost $= \frac{DFC(E)}{R(E) - TIC(E)} = \frac{36045}{35288} = 1.02$

12. Melisachew Mesfin, op.cit., p.64.

13. World Bank, op.cit., p.96.

14. Melisachew Mesfin, op.cit.

Chapter 4

Factors that Influence the Productivity of the Metal Sub-Sector.

4.1. Introduction

This chapter analyses the determinants of productivity of metal factories in the country with a view to suggesting measures which could improve financial and economic efficiency in the sub-sector. We shall begin with a brief description of the management structure of the sub-sector by way of introduction.

The industrial sector is organized into three hierarchically structured levels of management. At the top is the Ministry of Industry which exercises overall control in accordance with the policies and directives of the Council of Ministers and the Office of National Committee for Central Planning (ONCCP). Management is excercised through the corporations organised along product lines which in turn control industrial enterprises.[1]

In what follows, we will examine briefly the organization and management structure of the Ministry of Industry, the National Metal Works Corporation (NMWC) and the metal enterprises.

The Ministry of Industry was established in 1979 to control and manage the nationalized and newly established enterprises.[2] The Ministry is organized into two main divisions, i.e. Operations, and Development and planning. Each of these divisions is headed by a Vice-Minister and is responsible to the Minister. The Operations division is divided into three parallel departments,namely finance, production, sales and technical, and manpower and labour affairs. All of these departments report to the Vice Minister for Operation. The Development and planning

division is again divided into three parallel departments, i.e. planning and programming, technology selection, and organisation and method departments. Each of these departments is responsible to the Vice-Minister heading the Development Division. Below these departments are the corporations. Also included are branch offices of industrial share companies (in which the Government owns a majority share holding) which report directly to the Minister.

There are two main standing management committees in the Ministry. One is an executive committee, comprising the Minister, Vice-Ministers, all department heads and the heads of other sections. The other is a management committee which comprises members of the Excutive Committee plus all corporation general managers and deputy general managers.

The functions of both committees are essentially to review the existing situation and to discuss problems rather than to make decisions over operational matters. The Office of National Committee for Central Planning (ONCCP) retains control over most operational matters such as establishment of annual production targets, overall limits for capital expenditures, foreign currency allocations for import purchases, and changes in selling prices.[3] Therefore, the opportunity of the Ministry to properely manage the industrial sector enterprises is severely limited. In fact, its role up to now has largely been to supervise the implementation of the directives of the ONCCP and other higher bodies.

The Corporation is not involved in direct production. Its role is to provide an intermediate level of authority and control between the Ministry and the factories. It also provides management assistance to plants.

The organization structure of the Corporation follows that of the Ministry.[4] There are two main divisions, Operation and Development, each headed by deputy General Manager reporting to the General Manager. The Operation and Development divisions are divided into four and three parallel departments respectively. Under Operation, there are administration, finance, production, and commercial departments and under Development Division, there are industrial engineering, planning and project departments. Below each department there are main sections fulfilling specialized functions. There are 22 plants currently operating under the Metal Works Corporation reporting directly to the General Manager of the Corporation. However, five of them are engaged in wood works while one is in chemical products.

The Corporation holds monthly management meetings which consist of the corporation General and Deputy Managers, all corporation department heads and plant managers. As with meetings at the Ministry, this management meeting is essentially for discussion of problems and not for decision making over operational matters.

The management structure at the level of the plants is broadly similar to that of the Corporation.[5] There are four departments below the General Manager, headed by their respective managers. The departments are administrative, technical, financial and commercial although they may be known by different names at different plants. Below each department there are different sections with specialized functions.

Plant managers have overall responsibility for the day-to-day management of their plants. Although managers have responsibility for plants, they have almost no authority. All operational decisions are taken at higher level. For example, plant managers have no control over the quality and type of goods to be produced and sold, selling prices, recruitment, promotion or dismissal of employees, capital expenditure, etc., and thus are practically unable to play a direct role in improving plant efficiency. Because they can only make suggestions, this results, as some one observed, in frustration and indifference on the part of managers. There is need for decentralisation of authority to plant managers since these are the people who, being on the spot, are knowledgeable of prevailing conditions and what actions need to be taken. This should contribute to much improved industrial performance.[6]

4.2 Factors that Determine Productivity of the Metal Sub-Sector

Economic and non-economic factors have been considered to determine the productivity situation in the industry. Sixteen plants administered by the Metal Corporation have been surveyed. The survey required the cooperation of several departments both at the Corporation and plant levels. The personnel involved in completing the required information in the questionnaire were plant managers, and heads of administration, technical, financial and commercial departments of the Corporation and plants as well as members of staff. All of the respondents are holders of first degree or above. The factors considered in the study are the following: the nature and quality of the raw materials used; production process employed; efficiency of plant; the continuity of production and

the extent of effective utilization of manpower; the supply of skilled manpower in all job categories; finance; sources and costs of imported and domestic raw materials. Other factors include the managerial and administration system, wage and job promotion policy and employees relations; and the demand pressure and transport facilities and distribution systems.

4.2.1. The Nature and Quality of the Raw Materials Used.

The level of quality of raw materials used in production has a strong bearing on the quality of finished products and thereby affects the competitiveness of the enterprise in the market. The use of high quality raw materials increases the quality and strength of products. This in turn affects the productivity and profitability of enterprises.

The majority of the enterprises of the Metal sub-sector surveyed reported that they use medium quality raw materials. Out of the sixteen enterprises surveyed, 25 percent indicated that they have been using the highest quality of raw materials and 69 percent the medium quality. The rest of the enterprises indicated that the quality level of raw materials is not known.

4.2.2. Production Process Employed

The arrangement of industrial plants can be one of the main factors affecting the productivity of an enterprise. The arrangement is different from factory to factory depending on the type of production process adopted. Those enterprises which have adopted process layout were only 13 percent, whereas those which applied line, product and flexible layouts constitute 31 percent each. However, the following fundamental constraints were reported by several enterprises:

i) mislocation of machines. (This is particularly true in the case of sickles factories where hardening is taking place before notching. With notching the hardened part reduces the strength of the sickles);

ii) the type of line layout that some factories adopted does not allow one operator to perform two or more short operations; and

iii) the existence of a considerable amount of distance between machines along the line has led to additional costs of transporting materials and to operate at less than full capacity.

4.2.3. The Efficiency of Plant

4.2.3.1. Frequent Machine and Equipment Breakdown

The frequent machine and equipment breakdown causes disruption of production process and serious production cutdowns. The experiences of the surveyed enterprises in the metal industry indicated that all of them have faced disruption of the production process due to machine and equipment breakdown. However, the frequency of the breakdown varies from factory to factory. For example, among the reporting enterprises those which faced the problem often, sometimes and rarely were 6,69 and 25 percent respectively.

It is a disturbing factor to observe that 75 percent of the enterprises complained about the absence of timely maintenance of broken machines. The factors responsible for the delay of maintenance are summarized in Table 28.

Table 28. Factors Indicated by Respondents by Rank Matrix for the Absence of Timely Repair of Machinery

Rank / Factor	Number						Percent				
	1	2	3	4	5	Total	%*	1	2	3	4	5
Problem of getting spare parts	9	1	1	0	0	11	69	81.8	9.1	9.1	0	0
Bureaucratic Procedure	1	2	1	1	1	6	38	16.7	33.3	16.7	16.7	16.7
Lack of skilled technicians	1	1	3	1	0	6	38	16.7	16.7	50	16.7	0
Machinery too old to permit quick maintenance	3	6	0	0	0	9	56	33.3	66.7	0	0	0

* Percentage of total enterprises surveyed.

Most of the enterprises responded that the problem of getting spare parts, and the fact that machinery were too old to permit quick maintenance, have been the outstanding factors responsible for the delay of maintenance. Bureaucratic procedures, and lack of skilled technicians, are also indicated as factors for the delay of maintenance by some enterprises; several of the enterprises ranked these factors as the first and second most important maintenance problems as is evident from Table 28.

As the frequency of the machine and equipment breakdown is different from factory to factory, the causes for the delay of maintenance are also different in gravity from one group of factories to another. For example, the problem of getting spare parts affected agricultural equipment and tools enterprises and household utensils enterprises more than any other group of enterprises; the fact that

machinery is to old to permit quick maintenance affected household utensils followed by construction and agricultural tools plants more than any other groups of enterprises; lack of skilled technicians affected more the construction and household utensils enteprises, and bureaucratic procedure affected construction materials more than any other group of enterprises (see Table 29). However, although different levels of importance are attached to problem factors by different enterprises, the fact remains that many of the problems are in common to many of the enterprises and contribute to the lowering of productivity.

The recommendations of reporting enterprises to minimize machine breakdown are given in Table 30.

As shown in table 30, the majority of the enterprises surveyed recommended similar methods to minimize breakdowns and provide timely maintenance. For instance, the enterprises that have recommended to provide them with workshop facilities to produce spare parts and replace old equipment as rapidly as possible constituted 81 percnt respectively. Similarly, those which have recommended the methods such as giving training to the work force, introducing individual and group incentive schemes, strengthening shop floor supervision, and practicing preventive maintenance constitute 75 percent, 63 percent, 50 percent, and 6 percent respectively.

It is observed also that several enterprises have applied some of their recommendation to minimize machine breakdown. For example, to strengthening shop floor supervision has been used by 88 percent of the recomending enterprises; training to the work force has been applied by

Table 29. Classification of Problems by Types of Products

Group of Enterprises / Factor	Construction Materials		Agricultural Equipment and Tools		Household Utensils and Furniture		Household and Office Furniture		Other Products		Total	
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%*
Problem of getting spare parts	2	18	3	27	3	27	2	18	1	9	11	69
Bureaucratic procedure	2	33	1	17	1	17	1	17	1	17	6	38
Lack of skilled technicians	2	33	0	0	2	33	1	17	1	17	6	38
Machinery too old to permit quick maintenance	2	22	2	22	3	33	1	11	1	11	9	56

* Percentage of total enterprises surveyed.

Table 30. Recommendations of Enterprises to Minimize Machine Breakdown

Recommendation	Number of Response	Percentage of Total Enterprises Surveyed
Give training to the work froce to enhance their competence in using the machine	12	75
Introduce individual and group incentive schemes to reward diligent operators individualy and in group for minimizing breakdowns due to negligence	10	63
Strengthen shop floor supervision to ensure that every worker handles machines with appropriate care	8	50
Provide workshop facilities to produce spare parts	13	81
Replace old equipment as rapidly as possible	13	81
Practice preventive maintenance	1	6

50 percent; providing workshop facilities to produce spare parts by 46 percent; introducing individual and group incentive schemes by 30 percent; replacing old equipment by 23 percent; and practicing preventive maintenance by 100 percent.

4.2.3.2. Enterprise Capacity Utilization

According to the responses of enterprises all of them have been operating below their capacity for over five years now. Capacity utilization ranged between 33 and 80 percent according to the respondents. The problems summerized in Table 31 were reported as causes of working less than full capacity.

The majority of the enterprises reported that constraints resulting from raw materials shortages, reduction in the number of shifts or the impossibility of increasing the shifts and poor communications (in the form of malfunctioning telephone system, inefficient postal services and poor transportation) as the most common and the strongest constraints to capacity utilization. The failure to develop or evolve the technology to produce spare parts locally, lack of motivation to work on the part of workers, and frequent machine breakdown have been the other outstanding causes of underutilization of capacity during the period 1983 to 1988 (Table 31). Most of the enterprises considered these factors as primary causes of the underutilization. The examination of problems by types of enterprises indicates that the importance of problem factors varies from one group of enterprises to another. This is because of specific conditions of enterprises. For example, most of the factors listed affected plants of construction materials and household utensils more than any other group of enterprises (Table 32).

Table 31. Number and Percentage of Enterprises by Degree of Causes of Under Utilization

Cause	Primary		Secondary		Minor		Total	
	Number	%	Number	%	Number	%	Number	%
Shortage of supply of electricity and water	2	15.4	1	7.7	10	76.4	13	81.0
Frequent machine breakdown	2	14.3	6	42.9	6	42.9	14	88.0
The failure to develop or evolve the technology to produce spare parts locally	5	35.7	5	35.7	4	28.6	14	88.0
Reduction in the number of shifts or the impossibility of increasing the shifts	9	60.0	2	13.3	4	26.7	15	94.0
Poor Communications	8	57.0	1	7.1	5	35.7	14	88.0
Constraints resulting from raw materials shortages	9	60.0	6	40.0	0	0	15	94
Delays experienced due to unnecessary bureaucracy	2	15.4	2	15.4	9	69.2	13	81
Shortage of specialized labour	3	25.0	4	33.3	5	38.5	12	75
Competition from legally importe substitutes	3	33.3	3	33.3	3	33.3	9	56
Competition from smuggled substitutes	2	28.6	3	42.9	2	28.6	7	44
Security reasons	2	66.7	0	0	1	33.3	3	19
Lack of motivation to work on the part of workers	4	33.3	5	41.7	3	25	12	75.0

* Percentage of total enterprises surveyed.

Table 32. Classification of Problems by Types of Enterprise End use Products

Group of Enterprises	Construction Materials		Agriculture Equipment and Tools		Household Utensils		Household and office Furniture		Other Products		Total	
	Number	%	Number	%	Number	%	Number	%	Number	%	No.	%*
Frequent machine breakdown	4	29	2	14	4	29	3	21	1	7	14	88
The failure to develop or evolve the technology to produce spare parts locally	4	29	2	14	4	29	3	21	1	7	14	88
Reduction in the number of shifts or the impossibility of increasing the shifts	4	27	3	20	4	27	3	20	1	7	15	94
Poor communications	4	29	3	21	4	29	3	21	0	0	14	88
Constraints resulting from raw materials shortages	4	27	3	20	4	27	3	20	1	7	15	94
Shortage of specialized labour	4	33	2	17	3	25	3	25	0	0	12	79
Lack of motivation to work on the part of workers	4	33	2	17	4	33	2	17	0	0	12	79

* Percentage of total enterprises surveyed.

Therefore, the policy measures to correct the situation will vary in enterprises depending on the gravity of the problems, despite the fact that some general problems applicable to most enterprises exist.

4.2.4. The Continuity of Production

The continuity of production are important for effective utilization of manpower. Based on the responses of the sixteen enterprises, it is observed that 44 percent of them had experienced a complete closure. The range is between 1 month and 1 year in majority of the cases. However, three enterprises had the experience of 8 to 13 years closure. Partial closure of factories (i.e. closure of certain departments) is a frequent phenomenon in many of the enterprises.

The reasons for the complete or partial closure of factories are given as follows:

i) market deficiency resulting mainly from the competition of legally imported and smuggled substitutes. This is particularly true for the sickles, pipe, household utensils, and tractor assembly plants.

ii) shortage of raw materials. This is the case of sheet metal factory and iron and steel foundry.

iii) security problem. This is particularly true for factories located in Asmara.

The number of products produced by a factory ranged between one and fifty. There has been changes in the types of these products in the 13 percent of the surveyed enterprises based on market demand. For some enterprises a quick shift from one to another product was difficult, because among other things, the production process is rigid to allow such

a shift or it takes a long period to get approval from higher authorities. It is also observed that production of several types of products is advantageous for an enterprise, it permits enterprises to concentrate on the products with favourable demand condition.

4.2.5. The Supply of Skilled Manpower in All Job Categories

The problem of hiring new employees at the right time to fill open vacancies is one of the factors playing a major role in production. According to the responses of the surveyed enterprises, all reported that there is a problem of hiring new employees at the right time.

There are many vacancies in enterprises. However, the number varies from enterprise to enterprises. Out of 130 average number of workers the range is between less than 5 and more than 26 vacancies per plant. For instance, 25 percent of the enterprises have more than 26 vacancies whereas 19, 31 and 19 percent of them have between 21-25, 5-10 and less than 5 vacancies respectively. Therefore, 94 percent of the enterprises have some level of vacancies (i.e. always less than 100 percent staffing).

Similarly the average length of time of these vacancies varies from enterprise to enterprise, i.e. between less than one month to over a year. For example, in 50 percent of the enterprises the vacancies remained open on the average over 12 months, whereas, in 44 percent of the enterprises between 1-6 months. The longer a place stays vacant, the more the negative effect of it on production.

Several reasons have been reported by the enterprises for the prolonged vacancies. As shown in Table 33 most of the enterprises indicated that length of hiring process and shortage of candidates

with the required skills are reasons for the prolonged vacancies. A good many of the enterprises have also indicated that excessive stocks of finished goods due to sales problem and unreliable supply of raw materials (which discouraged enterprises to push on prompt employment), and unattractive salaries and wages are reasons which have made it difficult to fill vacancies at the right time. The majority of these enterprises have ranked the above as the main reasons of prolonged vacancies. However, the reasons did not have the same degree of relevance to all groups of enterprises. This can be observed from examination of reasones across the groups of enterprises (Table (34). For example, construction plants are highly affected by many of the reasons

Table 33. Number/Percentage of Enterprises by Rank of Reasons for the Prolonged Vacancies.

Reasons \ Rank												
	No.	%	No.	%	No.	%	No.	%	No.	%	No	%*
Shortage of personnel with the required skill	3	30	7	70	0	0	0	0	0	0	10	6
Problem of obtaining release of personnel from other sectors	3	75	0	0	0	0	0	0	1	25	4	2
Unattractive salaries and wages	3	42.9	1	14.3	3	42.9	0	0	0	0	7	4
Unconducive work enviroment	4	66.7	0	0	0	0	2	33.3	0	0	6	3
Length of employment process	10	83.3	1	8.3	1	8.3	0	0	0	0	12	7
Excessive stocks of finished goods due to sales problem and unreliable supply of raw materials	7	100	0	0	0	0	0	0	0	0	7	4

* Percentage of total enterprises surveyed.

Table 34. Classification of Problems by Types of Enterprises

Reasons \ Groups of Enterprises	Construction Materials		Agricultural Equipment & tools		Household Utensils		Household & Office Furniture		Other Products		Total	
	Number	%	Number	%	No.	%	No.	%	No.	%	No.	%*
Shortage of personnel with the required skill	4	40	2	20	2	20	2	20	0	0	10	62
Unattractive salaries and wages	2	29	1	14	2	29	2	29	0	0	7	44
Length of employment process	4	33	2	17	2	17	3	25	1	0	12	75
Excessive stocks of finished goods due to sales problem and unreliable supply of raw materials	0	0	2	29	3	43	1	14	1	14	7	44

* Percentage of total enterprises surveyed.

than any other group of plants, but they are not affected by excessive stock of finished goods. This implies that different policy measures must be prescribed to improve the situation in different enterprises and group of enterprises.

Enterprises have managed to overcome the problems of filling vacancies in several ways including the use of temporary and overtime workers, as indicated by 81.3 percent of the enterprises.

Training improves the skill of workers and thereby improves productivity. It was found that 88 percent of the enterprises have provided training for their workers during the last five years. However, the proportion of workers which obtained training differed from one enterprise to another, ranging between 1.7 and 15 percent of the total workers of a factory. The analysis of relationships of number of vacancies with the number of personnel trained in each enterprise indicated that the enterprises with the least number of vacancies generally tended to be those with high level of training of workers. (Table 35).

Table 35. Relationships of Number of Vacancies With Number of Personnel Trained.

Number of Vacancies	Number of Enterprises	Percentage of Total Enterprises	Average Percentage of Trained Persons
Less than 5	3	19	13.4
5 - 10	6	31	4.5
21 - 25	3	19	4.5
More than 26	4	25	9.7

4.2.6. The Supply of Finance

Many enterprises have indicated that they usually face financial shortage in order to fulfill their objectives. As indicated by enterprises there are a variety of reasons for the financial problem. These are summarized in Table 36.

Table 36. Number/Percentage of Enterprises by Rank of Reasons for Financial Shortage

Reasons \ Rank	1		2		3		4		Total	
	Number	%	Number	%	Number	%	Number	%	Number	%*
Unreliable supply of raw materials causing under utilization and unrecoverable costs	7	53.9	3	23.1	3	23.1	0	0	13	81
Ageing Machinery and equipment, frequent breakdowns and high maintenance costs	2	20	6	60	2	20	0	0	10	63
Constraints related to Proclamation No. 163/79	8	53.3	4	26.6	3	20	0	0	15	94
Failure or delay of payment for interfactory credit sales	2	33.3	1	16.6	3	50	0	0	6	38
Excessive stocks of finished goods	5	38.5	5	38.5	3	23.1	0	0	13	81
Rising cost of raw materials	8	72.8	2	18.2	1	9.1	0	0	11	69
High-cost of bureaucracy	1	20	0	0	4	80	0	0	5	31
Heavy reliance on quantity of production than cost of production as measure of enterprise performance	2	28.6	2	28.6	0	0	3	42.9	7	44

* The percentage is the percentage of total enterprise surveyed.

The Majority of the enterprises (i.e. over 80 percent) indicated that the constraints related to Proclamation No. 163/79[7] ("A Proclamation to Provide for the Regulation and Coordination of Public Financial Operation"), unreliable supply of raw materials (causing under utilization and unrecoverable costs), excessive stocks of finished goods, and rising cost of raw materials as the outstanding reasons causing financial problems. Ageing machinery and frequent equipment breakdown, and high maintenance costs are also reasons of the financial problems of most of the enterprises. With some of the enterprises heavy reliance on quantity of production rather than cost of production as a measure of enterprise performance, failure or delay of payment for interfactory credit sales, and hight-cost of bureaucracy are causes of declining financial position.

However, the examination of the reasons among groups of enterprises indicated that their significance differed from one group of enterprises to another (Table 37). On the other hand, there are groups of enterprises which are severely affected by all factors. This included construction materials, household utensils and household and office furniture. This implies that the policy measures required should of necessary vary from enterprises to enterprise and from one group of enterprise to another..

Selling on credit is a common activity of many enterprises. For instance, 81.3 percent of the enterprises sell products on credit, but only 61 percent of them collect receivables on time. About 38.5 percent do not collect on time on account of several reasons. The reasons are the incapacity of the organizations to collect and the reluctance of the debtors to pay. All of the enterprises which faced these problems

Table 37. Classification of Problems by Types of Enterprises

Group of Enterprises / Reason	Construction Materials		Agri.Equip. & Tools		Household Utensils		Household & Office Furniture		Other Products		Total	
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%*
Unreliable supply of raw materials causing under utilization and uncoverable costs	4	31	2	15	4	31	3	23	0	0	13	81
Ageing machinery and frequent equipment breakdown and high maintenance costs	3	30	2	20	2	20	2	20	1	10	10	63
Constraints related to Proclamation No. 163/79	4	27	3	20	4	27	3	20	1	7	15	94
Excessive stocks of finished goods	3	23	3	23	4	31	3	23	0	0	13	81
Rising cost of raw materials	3	27	0	0	4	36	3	27	1	9	11	69

* Percentage of the total enterprises surveyed.

ranked them as the first and second most important reasons for not collecting the receivables on time. This situation therefore results in financial difficulty.

As observed, stocks of finished goods and of raw materials have the tendency to increase over time in some cases. The enterprises indicated the reasons which are summarized in Table 38.

Table 38. Number/Percentage of Enterprises by Rank of Reasons for Increasing Stocks of Finished Goods and Raw Materials

Rank / Reason	1		2		3		4		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%*
The poor quality of production	2	50	0	0	0	0	2	50	4	25
The high prices of products	0	0	0	0	2	100	0	0	2	13
The low purchasing capacity of distribution organization	10	100	0	0	0	0	0	0	10	63
The low purchasing capacity of consumers	0	0	4	100	0	0	0	0	4	25

* Percentage of total enterprises surveyed.

As can be observed from Table 38, the low purchasing capacity of distributing organizations is the most outstanding reason for the increasing tendency of stocks. However, a few enterprises indicated the poor quality of production, and low purchasing capacity of consumers as reasons for increasing stocks of finished goods and raw materials resulting in financial problems.

In general the enterprises recommended and ranked the measures summarized in table 39 to overcome their financial problems arising from the various conditions discussed above.

Table 39. Number/Percentage of Enterprises by Rank of Recommendations to Improve the Financial Position of the Enterprises.

Rank / Recommendation	1		2		3		4		5		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%*
Replacement of ageing machinery	2	20	1	10	6	60	0	0	0	0	10	63
Introduction of Planned maintenance	3	27.3	3	27.3	4	45.5	0	0	0	0	11	69
Search for reliable supply of raw materials	8	72.7	2	18.2	1	9.1	0	0	0	0	11	69
Improve inter-organization financial descipline	3	33.3	0	0	0	0	0	0	6	66.7	9	58
Production of spare parts to reduce cost and training of personnel	4	40	5	50	0	0	0	0	1	10	10	63
Better use of labour	1	33.3	1	33.1	0	0	1	33.3	0	0	3	19
Increasing the range of products, revision of proclamation 163/79 and incentive policy	3	100	0	0	0	0	0	0	0	0	0	0

*Percentage of Total enterprises surveyed.

The majority of the enterprises (i.e. over 60 percent) suggested that the search for reliable supply of raw materials, production of spare parts locally, training of personnel, and introduction of planned maintenance are needed to improve the financial conditions of enterprises. Other recommendations include the improvement of inter-organizational financial discipline, replacement of ageing machinery, better use of labour, increasing the range of products, as well as revision of proclamation 163/79 and incentive policy, and reduction of labour cost. Most of the enterprises ranked these recommendations as the most important to improve the financial positions of the enterprises (Table 39).

4.2.7. Sources and Costs of Raw Materials

All of the enterprises surveyed use raw materials obtained from foreign sources. However, 69 percent of them also use raw materials obtained from domestic sources. Among those which make use of local sources, only 18.2 percent ranked these sources as the major ones whereas 81.8 percent considered the major sources as being foreign.

In terms of raw materials acquisition all foreign purchases are handled by the Corporation, whereas local purchases are handled by the respective factories.

Most of the enterprises (75 percent) reported that they usually face rising costs of raw materials, and several reasons were given for this situation. The reasons given are price rises in international market (which 75 percent of the enterprises indicated, out of which 83 percent considered this as the major factor), and the problem of transport to move imported inputs from the ports (keeping import at the port

for extended periods which is indicated by 69 percent of the enterprises, out of which 64 percent considered as the most important reason). Other reasons include, problems of storage facilities (which is indicated by 31 percent of the enterprises), and the rise in price in the local market (which is experienced by 19 percent of the enterprises).

The normal reaction of enterprises to a rise in the cost of raw materials takes different forms. Reducing controllable costs to absorb the rising cost is one way (practised by 69 percent of the reporting enterprises, out of which 82 percent considered it as the most important measure). Other reactions are to use substitute raw materials (undertaken by 31 percent of the enterprises) or raising selling prices of the products if demand conditions permit (indicated by 31 percent of the enterprises). However, since selling prices are fixed by higher bodies, reporting the matter and getting responses from the authorities take time.

4.2.8. Managerial and Administration System, Wage and Job Promotion Policy and Employees Relations.

4.2.8.1. Corporation-Plant Relationship and Performance Evaluation and Incentive Systems.

Many enterprises (38 percent) reported that the Corporation does not given close attention to them; the relationship is mostly by formal reporting. This is a result of large number of the factories and the incapacity of the Corporation. This was indicated by 38 and 31 percent of the enterprises respectively. What is more striking is that the number of factories threatens to be even more in the future if and when

the projects in the Ten-Year Perspective Plan are realized. Physical (geographic) distance is reported by several enterprises as a factor which has made close managerial attention very difficult.

Many enterprises have suggested a number of measures to improve the situation. This included, reorganization to give intermediate level management assistance to plants, or unification of the management of factories where physical proximity allow in order to reduce labour and management cost. Other suggestions include reorganization of the Corporation so that it only manages enterprises producing metal products (enterprises of wood products being assigned to the relevant corporation), and to conduct research over time to improve the organization of the corporation and to strengthen its management.

A system of performance evaluation exists in all enterprises conducted twice a year for department heads and once a year for other workers. All of the enterprises do not have the tradition of disclosing the evaluation to the evaluated workers.

The use of an incentive system is important to encourage workers. It was found that 94 percent of enterprises use some kind of incentive system, and the rest did not because of market deficiencies in their product (if demand is defficient for the product then this does not encourage enterprises to produce more of the product).

Different types of incentive systems are used by different enterprises to encourage workers to produce more. For example, a 5:1:1 system (which is an increase in wages and salaries by five percent when sales increase, one percent when profit increases, and one percent when

productivity increases) is applied by 94 percent of the enterprises. However all enterprises are complaining against the incentive system becuase it does not reflect the individual performance of the workers. Out of the 7 percent increase in wages and salaries those who are low income earners are allotted a greater share (because of the concept of equity and the Government's attempt to reduce income differentials among workers). Employees earning up to 650 Birr per month are included in incentive system, but those earning 650 per month or more are not included. Therefore, the system does not serve as an effective incentive to individual workers, and in fact has served as a major source of dissatisfaction on the part of diligent workers.

Salary increments and bonus systems are applied by 38 percent of the enterprises (when profit of over 250,000 Birr is made by the factory). The piece rate system and a system of giving annual awards are methods used by 13 and 25 percent of the enterprises respectively. Other benefits to employees (including provision of free education, medical and insurance services, sales of products at reduced price and provision of uniforms and of other safety services) are also given even if not adequately by the majority of the enterprises.

4.2.8.2. Measurement of Performance of Enterprise and Authority of Enterprises to Sign Cheques and Loan Contracts

Enterprises give little attention to cost accounting. This is because all enterprises adopted quantity of production (the fulfilment of plan target) as the measure of enterprise performance. This, in fact, has a negative impact on efficiency of enterprises. Auditing of books of accounts is not up to date for 31 percent of the enterprises.

The level of authority of the enterprise for signing cheques is up to a maximum of 500,000 Birr if the enterprises is located in Asmara and 50,000 Birr otherwise. This amount is said to be small relative to the magnitude of operations of the enterprises.

Signing loan contracts with the banks and renewal of existing credit facilities are tasks of the Corporation, with the collaboration of the Ministry.

About 70 percent of the enterprises reported that they have experienced delays in the flow of information. The flow of information is somewhat slow both from the Ministry to corporation and from factory to corporation and then to the Ministry. The delays are said to be too long by 15 percent, moderate by 56 percent and acceptable by 6 percent of the enterprises.

There are also inadequancies in physical facilities to generate the required data on time in over 50 percent of the enterprises. The inadequacies in physical facilities take the following forms: poor transport and means of communications, shortage of duplicating, type writing, adding and photocopying machines, lack of adequate offices, filing cabinets and stationary materials. Many of the problems were ranked by enterprises as being serious.

4.2.8.3. Organized Formal Groups at Enterprises Level

According to the responses a number of formal groups are organized in 88 percent of the enterprises. These include an organ of the Workers' Party of Ethiopia (WPE), Workers' Control Committee (WCC) and Trade Unions. However, Revolutionary Ethiopia Women's Association (REWA),

and Revolutionary Ethiopia Youth Association (REYA) have also been organized in 57.1 and 11 percent of the enterprises respectively. It is also found that managers of 64 percent of the enterprises are executive members of WPE. The majority (91 percent) of the enterprises have indicated that participation in the groups takes too much of the time available for regular work. A number of managers have also complained against some workers for their regular absence on every Tuesday and Thursday afternoons to participate in the activities of urban dwellers associations.

As is ovserved, there has been a lack of clarity or, probably misunderstanding about the role of the organized bodies and those of managers in running enterprise operations. This problem is more serious in enterprises where the majority of the staff of the management group are not party members. People in the production group sometimes attempt to us the formally organized bodies as an instrument to threaten or intimidiate the management.

4.2.8.4. Policies Affecting Factory Operations

Several policies of the Government have been bottlenecks in factory operation according to 88 percent of the surveyed enterprises. The following policies were cited: financial policies (particularly related to Proclamation No. 163/79 as discussed above), incentive policies as discussed above, price policies (for some factories are still selling their products at prices fixed ten to fourteen years ago, although the costs of production have been increasing over time), production policies, and frequent change of government policies.[8] (See Table 40).

Table 40. Number/Percentage of Enterprises Responding to Government Overall Policies as Bottlenecks of Operations

	Number of Factories Affected	Percentage of the Responding Factories
Incentive Policies	13	92.9
Price Policies	13	92.9
Financial Policies	14	100.0
Production Policies	12	85.7
Frequent review of Government Policies	7	50
Total factories responding*	14	100 (88)

*The figure in parenthesis is percentage from the total enterprises surveyed.

4.2.9. The Demand Pressure Transport Facilities, Distribution System, and Market Research and Development

There are no foreign sales of factory products. However, for local sales all enterprises use the Government retail and wholesale organizations under the Ministry of Trade such as Ethiopian Domestic Distribution Corporation (EDDC) or Ethiopian Household and Office Furnitures Enterprises (ETHOF), and the Ministry of Construction. These are the major distribution outlets of the products except for the metal tools factories which recently started to use their wholesale and retail outlets and private traders.

The problems associated with using EDDC and ETHOF as outlets of factories products are:

i) according to those enterprises which face market deficiency, that not enough effort is made to sell the enterprises' products by the organizations:

ii) the state organizations particularly EDDC, instead of serving the customers by using their own warehouses rather send them to collect the products from the factories with letters of purchase and this in fact results in net additions to the factories' costs;

iii) the distribution involves - malpractices (because of the corruption of distribution employees);

iv) transport difficulties for the delivery of products from the factory, which are more applicable to factories in Asmara;

v) delays of the distribution organizations to settle debts;

vi) the impossibility of obtaining first hand information regarding consumers' reactions to the products due to the creation of state distribution organizations between enterprises and consumers;and

vii) inadequqcy of warehouse facilities both at factory and market levels.

Many institutions are involved in the setting of the prices of factories' products. They are the Corporation, the Ministry, the ONCCP and the Council of Ministers. Initial prices are decided based on cost of production. However, as indicated above in many enterprises revision of prices has not been made for the last ten to

fourteen years. However, there is a need to make revisions of prices because of the rise in the cost of raw materials, labour, energy (like electricity, fuel and oil), spare parts, and taxes on scrap and other purchases.

It is identified also that none of the enterprises devote any part of their annual investment expenditure to market research and development to improve the quality of products and efficiency of enterprises.

SUMMARY

In this Chapter an attempt has been made to make an empirical study of factors influencing productivity of metal factories administered by the National Metal Works Corporation. It is found that the sub-sector is organized into three hierarchically structured levels of management. These are the Ministry of Industry, the National Metal Works Corporation and the plants. Several committees exist at each level essentially for reviewing and discussing problems of production processes in the enterprises rather than for decision making. Decisions relevant to products are made at still higher level (i.e. the ONCCP and Council of Ministers).

With regard to the factors influencing the productivity of the metal sub-sector, a host of economic and non-economic factors has been considered. It is found that several factors seriously impair the productivity of enterprises. However, it is also observed that different problems have affected productivity to different degrees in different enterprises and groups of enterprises. Therefore, the policy measures required to correct the situations in the enterprises must necessarily vary.

The empirical findings of the study showed several major problem factors (attributed to particular causes and reasons) that impaired productivity of the metal sub-sector. However, the most common and the strongest factors which lower productivity are summarized below:

i) The use of less than high quality raw materials. The experiences of the majority of enterprises have indicated that they use medium quality of raw materials. This has to some degree reduced the quality and strength of products;

ii) The types of production processes adopted by some enterprises which result in mislocation of machines, the difficulty of using one operator to perform two or more short operations and the existence of a considerable amount of distance between machines;

iii) The frequent machine and equipment breakdown which is accompanied by the absence of timely repair. The factors responsible for the delay of maintenance are the problem of getting spare parts, too old machinery to permit quick maintenance, bureaucratic procedure and lack of skilled technicians. The first two of these factors constitute the most outstanding constraints to timely maintenance;

iv) The problem related to enterprises working less than full capacity. The most important causes of this condition are raw materials shortages, reduction in the number of shifts or the impossibility of increasing the shifts, poor communication, failure to develop or evolve the technology to produce spare parts locally, machine breakdowns, lack of motivation to work on the part of workers, and shortage of specialized labour;

v) The complete or partial closure of enterprises due to market defficiency, shortage of raw materials and security reasons;

vi) The difficulty of making quick shift of some enterprises to produce products according to market demand;

vii) The problem of hiring new employees at the right time to fill open vacancies. This is caused by length of employment process, shortage of qualified candidates, excessive stocks of finished goods, wages, and unconducive work environment;

viii) The financial shortages caused by the requirement of Proclamation No. 163/79, unreliable supply of raw materials, excessive stocks of finished goods (due to low purchasing capacity of distribution organizations and consumers, and poor quality of production), ageing machinery, rising cost of raw materials, heavy reliance on quantity rather than cost of production as a measure of enterprise performance, failure or delay of payment for interfactory credit sales, and high cost of bureaucracy.

ix) The high dependence on imported inputs and rising costs.

x) Poor management relationship between the Corporation and plants, delay in the flow of information, and lack of using alternative channels of sale by plants in time of excessive stocks of products;

xi) The absence of appropriate incentive system which reflects the performance of individual workers and the adoption of quantity of production (the fulfillment of plan target) as the measure of enterprise performance

xii) The sharing of organized formal groups of too much of the time of workers and the problems resulting from overall Government policies related to incentive, price, finance, and production;

xiii) Problems associated with the factories use of Government distribution outlets;and

xiv) The non-availability of funds and organizational units for market and development research at factory level.

Notes to Chapter 4

1. D.H.J. Siviter, "Financial Management and Information System in Public Enterprises in Ethiopia", A.A. June 1986, p.2.
2. Ibid, pp. 11-15.
3. Ibid, pp. 6-10.
4. Ibid, pp. 11-15.
5. Ibid, pp. 17-18.
6. For the detail see Ibid., pp. 2-18.
7. The proclamation has caused financial detrioration because it allowed payment of capital charge up to 5 percent of the gross profit and of indirect taxes 50 percent of enterprise profit. Again 90 percent from the remaining profit is paid as residual surplus to the Government Coffer. Thus enterprises will remain only with 10 percent of that small amount of enterprise profit. This amount of profit is so small that it does not allow the enterprise to move as required. The same proclamation also prevented inter-factory borrowing for urgent use.
8. i.e. the fast changing of Government policies causing instability of enterprises environment, which is quite related to the periodic campaign nature of production which increases the enthusiasm to work at one time and slowdown it at another and the impossibility of maintaining the enthusiasm at a higher level all time.

Chapter 5

Summary and Recommendation

5.1. Summary

In spite of the potential dynamic role that the metal sub-sector can play in various economies, it is a sub-sector which is not well understood or provided with adequate support in Ethiopia. Therefore, the focus of this study has been to analyse the relative importance of the metal industry in the Ethiopian economy and productivity situation in the metal factories. To be able achieve the former objective, the historical development and the role of the metal industry in different socio-economic setting vis-a-vis the Ethiopian reality were analysed. Simple analytic techniques such as averages, percentages, trend analysis and figures as well as qualitative approach have been used in the analysis of the information available. In the pursuit of the latter objective, economic and non-economic factors influencing productivity have been analysed. Data were mainly obtained from the questionnaire that was distributed to sixteen factories operating under National Metal Works Corporation. Simple analytic techniques are used to analyse the data. To reinforce these analyses a case study was also conducted on Kotebe Metal Tools Factory.

The review of the historical development of the metal sub-sector in the world showed, that iron ore extraction has been one of the oldest activities of mankind. However, it began to develop rapidly since the first half of the eighteenth century as noted in the text. Such growth of the sub-sector did not however continue without interruption. The last decade in particular has been a period characterized by the need to economize on materials and energy. This has resulted in decline in steel

production and consumption in the world. As a result a restructuring process has taken place on a world wide level to reduce total world demand for steel.

In spite of the recent overall decline of production in the metal industry it is universally recognized that the successful development of the sub-sector plays a key role in the economic and social progress of a country. Thus in the development of the metal industry, the need for integration and the approach to integrated development of the sub-sector in the nationl economy are widely discussed in this study. The alternative approaches of development observed from the experiences of various countries were to start right from heavy steel industry or small-scale steel plants and plan integration based on "demand pull" from capital goods industries or on "demand push" from the iron and steel industry leading to expansion and diversification of other sectors. However, the selection of the modality of integration process depends upon the specific characteristics of the developing countries such as the availability of raw materials, the level of technical development and manpower training and the basic needs of the population.

In countries where agriculture is the main economic activity the appropriate strategy would be to promote small and moderate-sized steel and capital goods industries. However, at a later stage of development, the drive would need to be in favour of larger industries in the search of economies of scale as well as better quality products. Therefore, in the context of Ethiopia (where agriculture is the main economic activity, market is limited and mineral prospecting is at a very low stage of development), the appropriate current policy appears to be that of strengthening the existing small-scale basic and engineering works and establishing new

ones, until the pre-conditions for large scale production are fulfilled. This is the proper approach for the effective promotion of the development of this sub-sector.

With regard to the role of the metal sub-sector in different socio-economic settings, its contribution to the entire industry is the highest of all sub-sectors of the industrial sector in terms of production (in all types of economies), employment (with the exception of developed market economies), and export earnings (in industrially developed countries). Several countries' experiences have also shown that, the sub-sector is the major contributor to the growth in the value added share of heavy manufacturing. Its annual growth rates is found to be the highest in employment compared to other sub-sectors whereas, the annual growth rate is relatively impressive in terms of production in both centrally planned (10.8%) and developing market economies (12.7%) (Tables 4,5,6,7, and 8).

However, the contribution of the metal sub-sector in terms of Government revenue through indirect taxes is the least in the industry total compared to other sub-sectors for all countries considered in this study, whereas the degree of contribution through the net operating surplus varied across activities and countries. In some countries the shares of metallurgy in both the industry total, and total for the economy were positive whereas, it was negative in other countries (Tables 9 and 10).

In the case of Ethiopia, the study of the structure has indicated that, the sub-sector is heavily concentrated in a small number of locations and in the hands of the private individuals. In terms of location, in 1983/84 G.C. Shoa alone had 63 percent of the establishments, 68.6 percent of persons employed, and more than 84 percent of value added. The rest of the contributions were made by Eritrea Administrative Region (Tables

11 and 12). This pattern of distribution has been largely determined by two obvious factors, namely concentration of the market and the availability of infrastructure in the two areas not found in other parts of the country. This distribution pattern has therefore significantly added to the regional imbalance of industrial development in the country.

In terms of number of establishments, the larger proportion was privately owned. As noted in the text in 1983/84 G.C. privately owned metal establishments constituted 51.6 percent, whereas the public sector owned 48.4 percent. However, in terms of a number of employees, gross value of production, value added and net book value of fixed assets, the bulk of the sub-sector was publicly owned. Public sector constituted over 90 percent for the last three items and 87 percent for the number of employees (Table 13). It is also noted that, in Ethiopia, at present, the public sector is expanding (Table 14).

The study of the role of the metal sub-sector in the Ethiopian economy, in terms of contributions to value of production, value added, employment and income generation and Government revenue indicates that the sub-sector in the Ethiopian economy is at an early stage of development compared to development of the industry in different economies of the world. Although the potential role of the sub-sector is important in the Ethiopian economy, it is still by far lower than the role of the sub-sector in different economic settings. This implies, that there is great potential for this sub-sector to develop and further play an important role in the economy of the country.

The linkage effects within the sub-sector and different sectors of the economy can be measured by the extent to which the sub-sector purchases domestically produced input and produces inputs for other sectors.

If we observe the internal structure of the sub-sector, import based industries were dominant within the sub-sector both in the number of establishments and value added i.e., 76.2 and 88.5 percent respectively. This was followed by domestic forest resources based industries. It is also observed that the import dependence of the National Metal Wroks Corporation is the highest of the other corporations of the industrial sector as noted in the text.

If we look at the total sales of metal products to different sectors, it is possible to evaluate the strength of the relationship. In 1986/87 G.C. the highest relationship was with the construction sector (with 58 percent of sales) followed by agriculture (with 13.8 percent of sales) and consumption sector (with 28.2 percent of sales) (Table 25).

In terms of the linkage effects both within the sub-sector and the sub-sector with other sectors of the economy, the available evidence showed that the foreward linkage effect of the sub-sector is stronger and important whereas the backward linkage effect is weak, demanding for appropriate policy measures to be taken such as production of inputs by the domestic activities.

The second focus of this study was to analyse factors influencing productivity of metal factories administered by the National Metal Works Corporation. It is found that the sub-sector is organized into three hierarchically structured levels of management. These are the Ministry of Industry, the National Metal Works Corporation and the plants. Several committees exist at each level essentially for reviewing and discussing problems than for decision making. Decisions relevant to production are made at still higher levels (i.e. at the level of ONCCP and Council of Ministers).

With regard to the factors influencing the productivity of the metal sub-sector, a set of economic and non-economic factors has been considered. It is found that several factors seriously impair the productivity of enterprises. However, it is also observed that different problems have affected productivity to different degrees in different enterprises and groups of enterprises. Therefore, the policy measures required to correct the situations in the various enterprises must necessarily vary.

The empirical findings of the study showed several major problem factors (attributed to particular causes and reasons) that impaired productivity of the metal sub-sector. The most common and the strongest factors which lower productivity are listed below.

i) The use of less than high quality raw materials;

ii) the types of production process adopted by some enterprises;

iii) the frequent machine and equipment breakdown which is accompanied by the absence of timely repair;

iv) the problem related to enterprises working less than full capacity;

v) the complete or partial closure of enterprises;

vi) the difficulty of making quick shift of some enterprises to produce products according to market demand;

vii) the problem of hiring new employees at the right time to fill open vacancies;

viii) the financial shortages;

ix) the high dependence on imported inputs and rising costs;

x) poor management relationship between the corporation and plants, delay in the flow of information, and lack of using alternative channels of sale by plants in times of excessive stocks of products;

xi) the absence of appropriate incentive system which reflects the performance of individual workers and the adoption of quantity of production (the fulfilment of plan target) as the measure of enterprises' performance;

xii) the share of organized formal groups of too much of the time of workers and the problems resulting from overall Government policies relating to incentive, price, financial and production;

xiii) problems associated with the factories use of Government distribution outlets;and

xiv) the non-availability of funds and organizational units for market and development research at factory level.

5.2. Recommendations

Some of the recommendations which follow emanate from the findings of the study whereas the rest were proposed by the enterprises themselves. The following two groups of policy recommendations are made pertaining to the appropriate strategy for the development of the sub-sector, and the improvement of the factor use efficiency of the sub-sector.

A. Strategy for the Development of the Sub-sector.

1. In the context of Ethiopia (where agriculture is the main economic activity, market is limited, and mineral prospecting is at a very low stage of development), the appropriate current policy appears to be that of strengthening the existing small-scale basic and engineering works and establishing new ones which have more link with agricultural and construction materials sectors.

2. To reduce the concentration of the sub-sector in a small number of locations in the future planning of metal project, appropriate regional development elements should be introduced as the criteria for project appraisal.

3. The metal sub-sector has weak backward linkage effect. This is because of the insufficient level of production of inputs for the sub-sector by domestic activities. This has led the sub-sector to be highly import dependent. Therefore, to reduce the import dependence of the sub-sector significant emphasis should be made to augument and diversify productive activities aiming to produce inputs for the sub-sector.

B. Improvement of the Factor Use Efficiency of the Sub-Sector

The metal sub-sector is one of the smallest sub-sectors in the Ethiopian economy. This sub-sector to develop and play its expected role is one of a stage by stage, long term consideration. In the priority of the long term development plan, emphasis should be given to progressively improve and make the industry more profitable. For example, issues such as replacement of ageing machinery, production of spare parts, training of highly qualified personnel, and increasing the range of products, although very important to improve the performance of the sub-sector, can not be realised in the short period of time, as they are the major constraints of the economy as a whole.

Therefore, here under attempt is made to recommend the most practical ones in the short run period to reduce financial shortages' to improve production process; to remove frequent machine and equipment breakdown; to remove complete and partial closure of enterprises, and to improve employment procedure and management.

1. The search for reliable supply of raw materials, introduction of planned maintenance, improvement of inter-organizational financial descipline, revision of proclamation 103/79 and of incentive policy to reduce financial shortages.
2. The types of production processes adopted in some enterprises should be altered by rearrangement of machines in order to allow one operator to perform two or more short operations, and to reduce the distance between machines.
3. To minimize machine breakdown, it is recommended to give training to the work force to enhance their competence in using machines, introduce individual and group incentive schems to reward diligent operators individually and in group, strengthen shop floor supervision to ensure that every worker handles machines with appropriate care, and practice preventive maintenance.
4. To prevent complete or partial closure of enterprises the following are recommended: removing market deficiency by curbing the competition of legally imported and amuggled substitutes. This is particularly true for the sickles, pipe, household utensils, and tractor assembly plants; removing shortage of raw materials, this being more applicable to sheet metal factory and iron and steel foundry; and reducing security problems, this is particularly relevant to factories located in Asmara.

5. To improve and strengthen the employment procedure and management the following are suggested: reducing the length of employment process; making salaries and wages attractive; greater decentralization and delegation of authority to lower levels so that plant management can take certain operational decisions; improvement of the management relationship between the corporation and plants, the flow of information; allowing enterprises to use alternative channels of sale in time of excessive stocks of products; reducing the share of organized formal groups of the time of workers; and the institution of the function of market and development research at the factory level.

Appendix I

Empirical Study of Factors Determing Productivity Situation of Kotebe Metal Tools Factory

The empirical findings reported in the preceeding section depend entirely on the perception of respondents, those responsible for the day-to-day operation of public enterprises of the metal sub-sector of Ethiopian industry. The question arises whether those results can be corroborated by objective measurement and econometric analyses.

An attempt has therefore been made to (a) explore the problems that can be encountered (b) suggest hypotheses that should be entertained, should such a project be undertaken in the future.

The exercise consists of regressing the output of one of the factories' covered by the study, namely the Kotebe Metal Tools Factory, on the more important variables affecting productivity as reported by survey respondents. These include labour supply and utilization, capital shortage, raw material availability, energy supply and plant maintenance capability.

An attempt was made to fit linear, per-capita and double log functional relations between the factory's output and the following variables at 1983 prices for the quarters of the period 1981 to 1988:

L = Labour

K = Capital

R = Raw Materials

O_1 = Production Workers

O_2 = Professional and Technical Workers

E = Energy

X_1 = Bottlenecks in Raw Materials

X_2 = Bottlenecks in Spare Parts

X_3 = Bottlenecks in Miscellaneous Inputs

X_4 = Bottlenecks in Machine Breakdown.

All possible considerations in selection among those variables gave rise to a substantial multicollinearity problem including the one with the best possible fit (R^2 = 0.61, F = 3.234) reported in Table 42.

The model used as indicated in the introductory part of this work is in the form of

$$Y = B_1L + B_2K + B_3R + B_4O_1 + B_5O_2 + B_6E + B_7X_1 + B_8X_2 + B_9X_3 + B_{10}X_4 + U \quad \ldots 1$$

B_1, B_2, ..., B_{10} are parameters estimated and U stands for the random disturbance term.

Table 41.

Year/Quarter		Y	L	K	R	O_1	O_2	E	X_1	X_2	X_3	X_4
1981	1st	565,362.76	152	7,602,000	280,551.2	80	27	28,044	0	0	0	255
	2nd	939,529.14	151	7,602,000	429,327.05	79	28	53,566	143	0	0	0
	3rd	750,529.14	153	7,602,000	409,336.95	80	28	33,566	171	0	0	125
	4th	576,342.76	154	7,602,000	278,541.3	81	29	30,044	156	0	0	480
1982	1st	488,289.5	157	6,573,000	534,115.48	80	28	61,728.8	0	0	490	255
	2nd	722,439.25	156	6,573,000	801,173.22	79	28	76,618.1	0	250	385	140
	3rd	731,459.25	158	6,573,000	811,073.32	81	28	78,608.4	0	0	410	80
	4th	499,309.5	157	6,573,000	524,215.58	80	28	41,738.7	0	0	0	20
1983	1st	529,053.08	159	7,620,000	281,088.4	81	28	35,146	0	63	0	274.85
	2nd	803,579.62	162	7,620,000	432,623.2	83	28	52,888	0	0	0	191.2
	3rd	783,579.62	161	7.620,000	441,623.3	82	28	51,849	0	0	0	246.05
	4th	529,053.08	159	7.620,000	280,088.5	81	28	36,347	0	0	0	252.45
1984	1st	540,320	158	10,279,000	252,902.18	71	30	22,232.172	0	63	0	135.5
	2nd	926,480	162	10,279,000	389,353.27	72	31	48,218.238	0	0	0	124.3
	3rd	724,480	160	10,279,000	379,343.37	71	30	48,348.278	0	0	0	184.1
	4th	560,320	160	10,279,000	242,912.08	71	30	42,242.172	0	0	0	139.6

Table 41 (Cont'd.)

Year/Quarter		Y	L	K	R	O_1	O_2	E	X_1	X_2	X_3	X_4
1985	1st	584,489.9	158	12,584,000	418,655.86	69	37	35,328.352	0	0	0	137.7
	2nd	1,243,384.8	158	12,584,000	628,983.79	69	37	52,982.388	0	0	0	110.3
	3rd	1,843,384.8	160	12,584,000	627,993.78	70	37	53,992.368	0	0	0	250
	4th	706,689.9	160	12,584,000	417,645.87	70	37	34,428.152	0	0	0	132
1986	1st	1,102,312	167	17,892,000	514,254.38	65	50	40,487.244	0	0	0	496
	2nd	1,567,813	171	17,892,000	781,381.57	65	53	60,783.706	0	0	0	496
	3rd	1,496,015	172	17,892,000	771,391.67	66	53	60,980.726	0	0	0	78
	4th	940,540	172	17,892,000	524,244.28	66	53	40,687.044	0	0	0	102
1987	1st	771,691	175	10,642,000	376,325.4	65	50	30,457.35	0	0	80	80
	2nd	1,100,511	177	10,642,000	574,488.1	65	50	45,686.165	0	0	0	275
	3rd	950,273	177	10,642,000	564,498.2	62	50	46,696.185	0	0	0	82
	4th	1,025,073	172	10,642,000	366,315.3	65	50	29,447.55	0	212	0	72
1988	1st	795,449	182	7,386,000	372,762.54	66	52	40.747.8	0	332	0	84
	2nd	713,787	187	7,386,000	539,058.88	66	52	62,110.7	0	0	0	261
	3rd	844,508	189	7,386,000	579,268.80	67	54	60,132.7	0	0	0	299

Table 42. Estimated Coefficients of the Model 1, Kotebe Metal Tools Factory, 1981-1988.

Variable	Slope Coefficient of the Model	Elasticity Coefficient
Labour	-1157.2 (—)	-1.693
Capital	+0.178314 (1.555)	1.613
Raw Materials	-4.43264 (1.016)	-1.883
Production Workers	+140476.9 (—)	9.46
Professional and Technical Workers	+218579.7 (—)	7.36
Energy	+36.3013 (0.768)	1.5
Bottlenecks in Raw Materials	-2969.49 (0.414)	-0.04
Bottlenecks in Spare Parts	-2050.42 (0.557)	-0.054
Bottlenecks in miscellaneous Inputs	+794.795 (0.26)	0.031
Bottlenecks in Machine Breakdown	-3715.52 (1.60)	-0.64

Note: 1) R^2 = 0.61, number of observation = 31. F-ratio = 3.234.

2) t-ratios in parentheses.

With due allowance for the multicollinerity problem the magnitude and sign of the coefficients reported in Table 42 confirm some of the results of the preceeding section, suggesting the possible fruitfulness of efforts at measurements of greater scope than the one attempted here. It is worth noting the following from the findings.

1) As expected the slope coefficient of capital is positive although statistically significant at 20 percent. The coefficient of 0.178314 on capital can be interpreted to mean that a 1 million birr value increase in capital would lead to a 0.178314 million birr value increase in output. This is consistent with the capital shortage compliant so often reported by respondents.

2) The slope coefficients of labour (L) and raw materials (R) are negative parameters but are not significant even at 20 percent. The negativity of the coefficients for labour is consistent with the underemployment of labour through the wrong skill mix and/or lack of control over hiring at the enterprise level, as reported earlier. This appears all the more a plausible interpretation as production and technical workers have positive coefficients, with positive effects on production, even if not significant at 40 percent level. The negativity of the raw material coefficient could be due to overstocking of materials peculiar to the plant.

3) In the case of Energy (E), its use and production are positively related, since the more the use of energy means the more the level of output. As expected, the energy coefficient is positive although not significant even at 40 percent level, possible due to the multicollinearity problem.

4) The negative value of coefficients and calculated elasticities of the bottleneck variables confirms the importance of the effect of these explanatory variables on output as reported in the survey. As expected, the machine breakdown coefficient is negative and statistically significant at the 20 percent level. The coefficient of -3715.52 on machine breakdown

can be interprated to mean that a unit increase in the hours of stoppages due to machine breakdown will lead to a 3715.52 units decrease in output. The elasticity of the factor on output is (-0.64) the highest compared to the other bottlenecks (Table 41). Therefore, output is more responsive to machine breakdown as is the case in the general survey study.

Also as expected bottlenecks in spare parts (X_2) and raw materials (X_1) have negative coefficients and elasticities. However, they are not statistically significant even at 40 percent level.

In short we are justified to expect the following results of this study to be confirmed by more extensive and formal measurement:

a) Capital shortage is a serious handicap to the development of metal industry in the country;

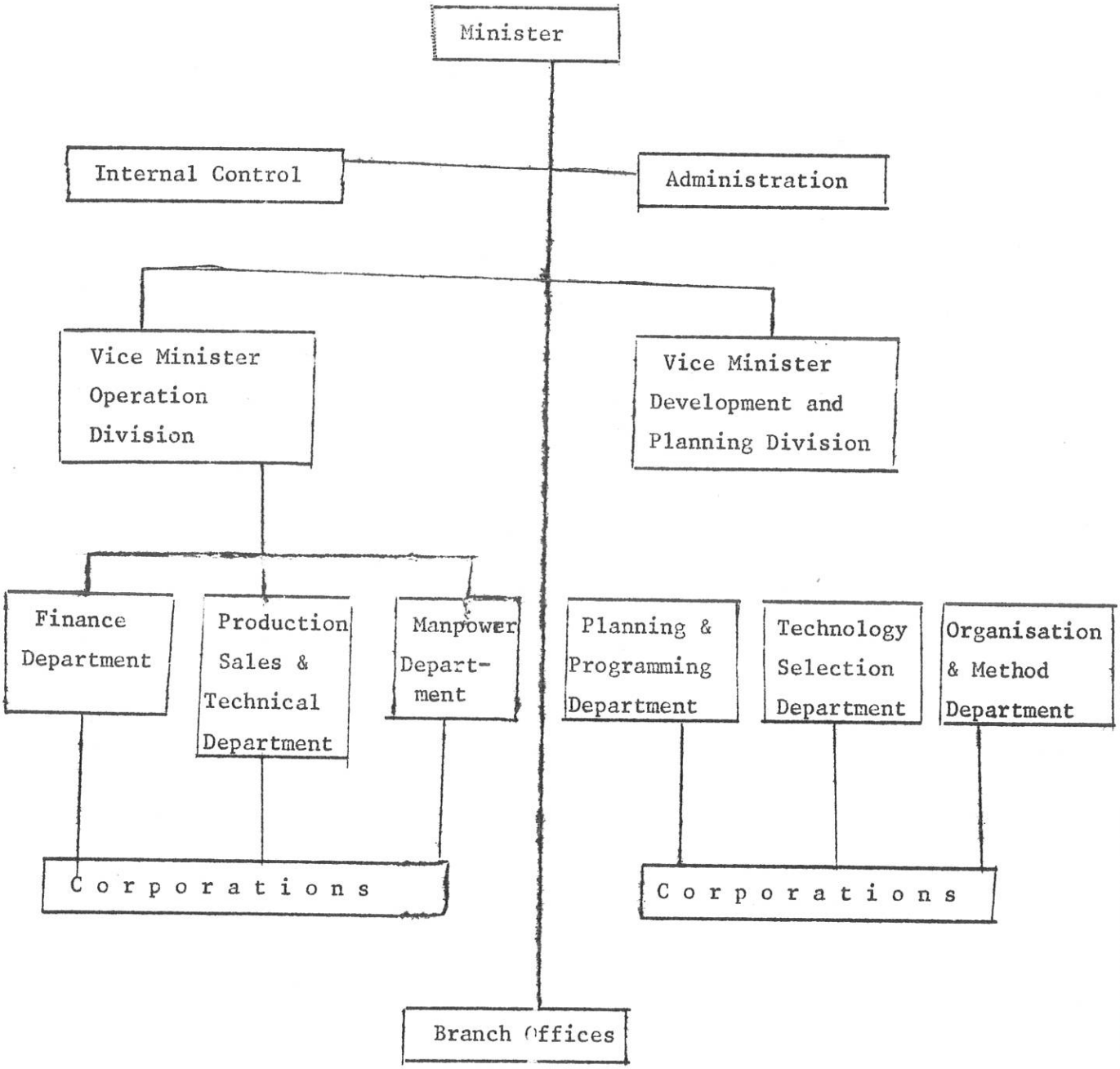
b) Labour underemployment through the wrong skill mix or the wrong hiring contracts or the wrong pay policies, significantly contributes to poor performance of existing enterprises; and

c) Poor maintenance and replacement capabilities and inefficient raw material supplies negatively affect the performance of the metal industry in the country.

Appendix II

Chart I

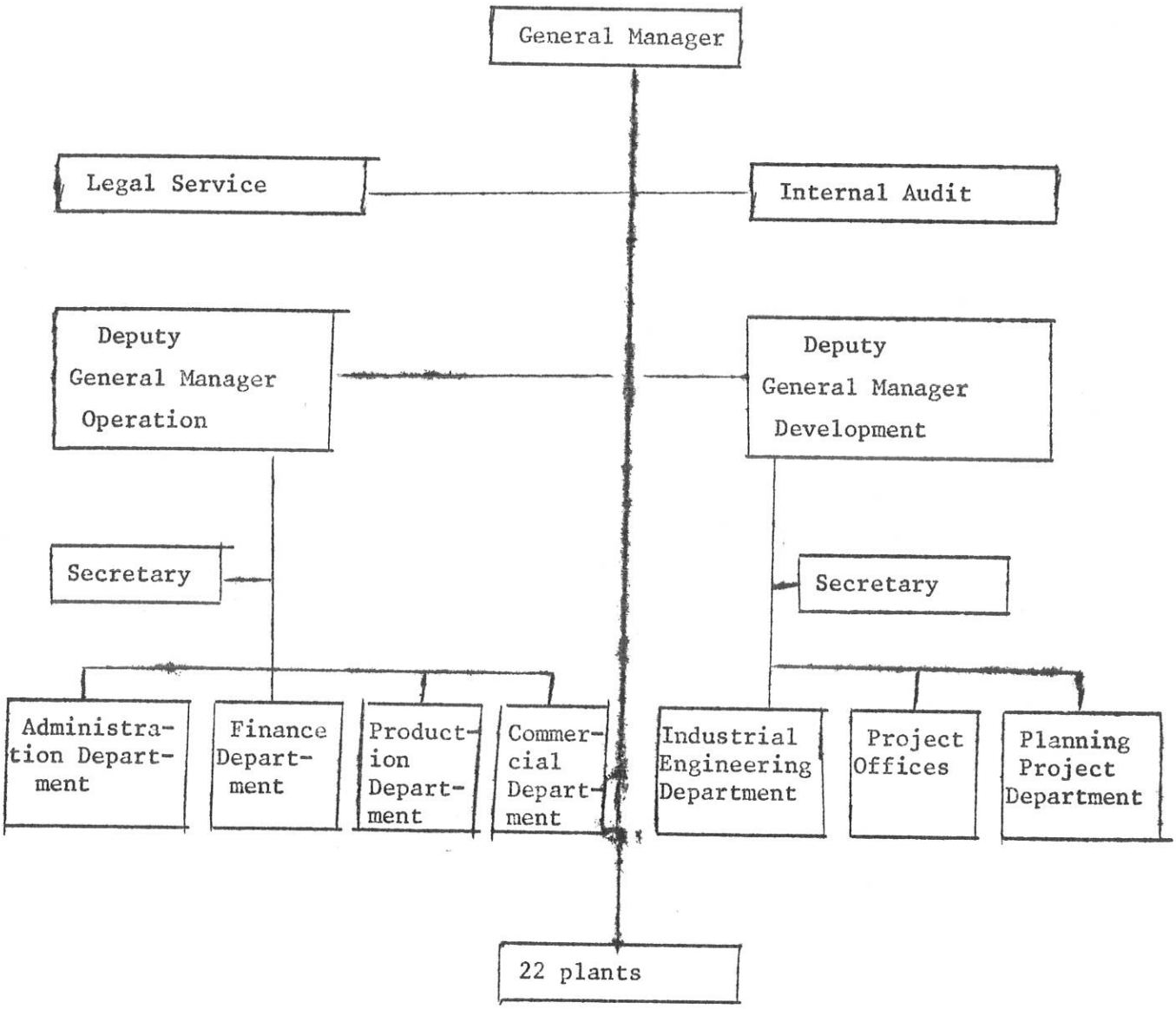
The Ministry of Industry Organisation Structure



Source:- D.H. J. Siviter, "Financial Management and Information Systems in Public Enterprises in E[illegible]iopia", A.A. June 1986, p.2.

Chart 2

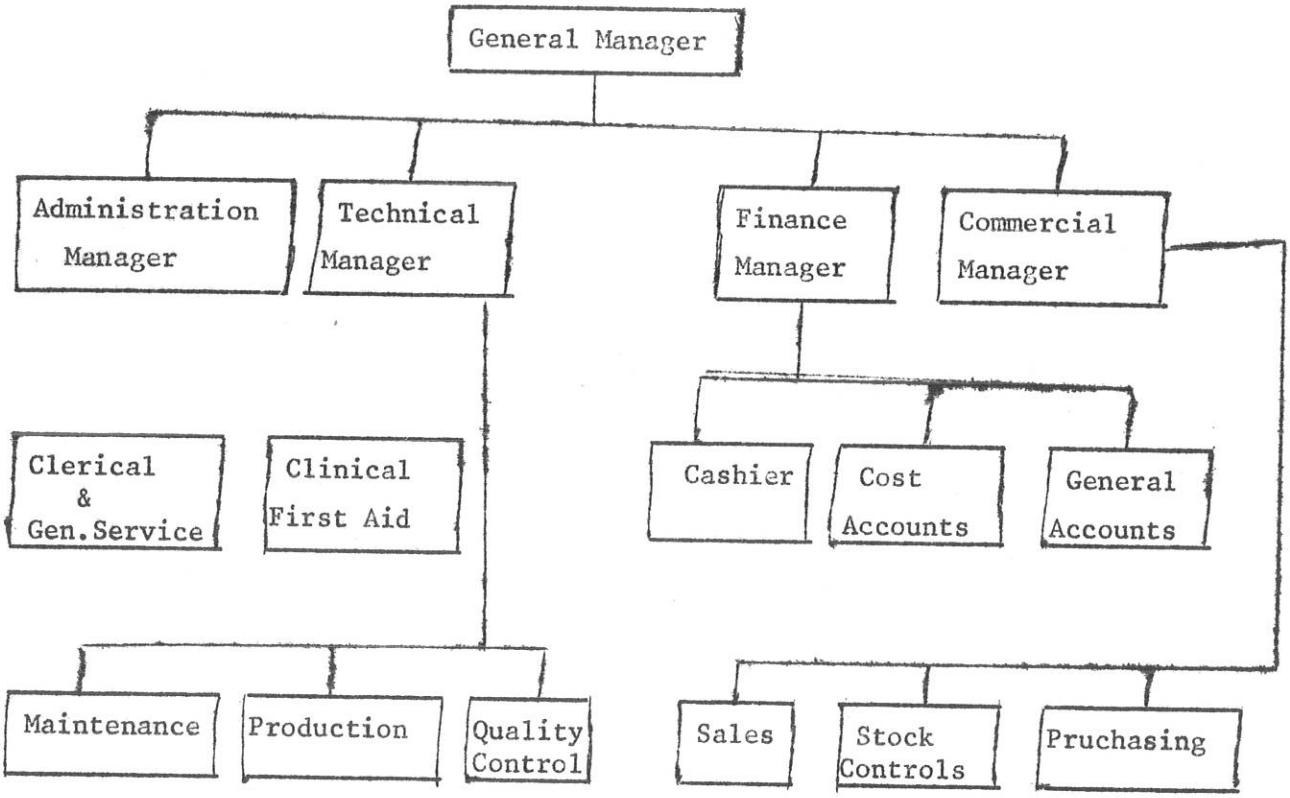
National Metal Workers Corporation (NMWC) Organisational and Management Structure.



Source:- National Metal Workers Corporation.

Chart 3

Organizational Structure of Metal Plants



Source:- National Metal Works Corporation.

Appendix III

ETHIOPIA'S METAL INDUSTRIES PRODUCTIVITY STUDY QUESTIONNAIRE

Objective

The purpose of this questionnaire is to obtain information which will be used to measure the productivity of Ethiopia's Metal Industry. The use of the information will be limited to the academic circle. Therefore, respondents are kindly requisted to fill in the required information. as accurately as possible. The information required is for the period 1975 E.C. to the present.

General Information

Name and mailing address of firm _____

_____

Location _____

Position title of the respondent _____

Qualification of the respondent (indicate highest educational level attained) _____

Dates of accounting year:- From: _____

to _____

1. The nature and quality of the raw materials and production process employed

1.1 What level of quality of raw materials has your enterprise been using?

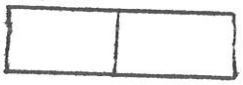
01 high quality

02 medium quality

03 low standard

04 not known

05



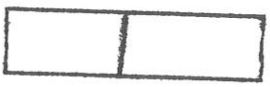
1.2 How is the arrangement of industrial plants in your factory?

01 Line layout

02 Process layout

03 Product layout

04 Flexible layout



Please enumerate briefly the advantages and disadvantages of the layout applicable in your factory.

(a) _____

(b) _____

(c) _____

(d) _____

(e) _____

2. The size and efficiency of plant

2.1 Is there disruption of production process due to machine and equipment breakdown?

01 Often

02 Sometimes

03 Rarely

2.2 Is there a timely maintenance of broken machines?

01 Yes

02 No

2.3 If there is no timely repair of machinery what are the reasons? Please rank them in order of importance as 01 for the most important 02 for the second and so on.

	Rank
01 Problem of getting spare parts	
02 Bureaucratic procedure	
03 Lack of skilled technicians	
04 Machinery too old to permit quick maintenance	
05 Other (specify) and rank	

_____

_____

2.4 To minimize the break-downs of machines what do you recommend? And which one of the methods was used in your enterprise - please indicate by asterisk (*) next to the boxes applicalbe.

01 Giving training to the working force to enhance their competence in using the machine

02 introduce individual and group incentive schemes to reward diligent operators individualy and group for minimizing break-downs due to neglegency. [|]

03 Strengthen shop floor supervision to ensure that every worker handles machines with appropriate care. [|]

04 Provide workshop facilities to produce spare-parts and for timely maintenance [|]

05. Replace old equipment as rapidly as possible [|]

06. Other (specify) [|]

2.5 What is the approximate rate of your capacity utilization in the last five years?

Year (E.C)	Capacity %
1979	
1978	
1977	
1976	
1975	

2.6 If your enterprise had been working less than full capacity, which of the following are the primary causes?
(please check the appropriate degree of cause)

		Primary	Secondary	Minor
01	Shortage of supply of electricity and water	( )	( )	( )
02	Frequent machine break-down	( )	( )	( )
03	The failure to develop or evolve the technology to produce spare-parts locally	( )	( )	( )
04	Reduction in the number of shifts or the impossibility of increasing the shifts	( )	( )	( )

		Primary	Secondary	Minor
05.	Poor communications in the form of malfunctioning telephone system, inefficient postal services and poor transportation	( )	( )	( )
06.	Constraints resulting from raw-materials shortages	( )	( )	( )
07.	Delays experienced due to unnecessary bureaucracy (red tapesm)	( )	( )	( )
08.	Shortage of specialized skills	( )	( )	( )
09.	Competition from legally imported substitutes	( )	( )	( )
10.	Competition from smuggled sub-stitutes	( )	( )	( )
11.	Security reasons	( )	( )	( )
12.	Lack of motivation to work on the part of workers	( )	( )	( )
13.	Other specify	( )	( )	( )

3. The volume, continuity and uniformity of production

3.1 Has the factory experienced a complete close down one time in the past

01. Yes

02. No.

3.2. If yes, for how long _____(days, weaks months, years) [|]

3.3 Please, enumerate the reasons for the closure of the factory.

01. _____

02. _____

03. _____

04. _____

05. _____

3.4 How many types of products the factory produces? (range of products) _____

3.5 Has there been a change in the type of products of the factory for the last five years?

01. Yes

02. No _____

3.6. If yes, what are the reasons for the change in the type of products? please enumerate them. _____

01. _____

02. _____

03. _____

04. _____

05. _____

4. The supply of imported and domestic raw materials and skilled manpower in all job categories and finance

4.1. Is there a problem of hiring new employees at the right time to fill an open vacancy?

01. Yes

02. No

[ ]

4.2 If yes, what are the reasons? Please, rank them as 1,2 etc. in order of importance in front of the applicable box.

	Rank
01. Length of employment process	[ ]
02. Shortage of qualified candidate	[ ]
03. Unattractive salaries and wages	[ ]
04. Unconducive work environment	[ ]
05. Others (specify) _____	[ ]
_____	[ ]

4.3 How many vacancies are there in your organization at present?

01. Less than 5

02. 5 - 10

03. 11 - 15

04. 16 - 20

05. 21 - 25

06. More than 26

[ ]

4.4 What has been the average length of time of these vacancies?

01. Less than 1 month

02. 1 - 3 months

03. 4 - 6 months

04. 7 - 9 months

05. 10 - 12 months

06. Over 12 months

[ ]

4.5 What are the reasons for prolonged vacancies? Please rank them in order of importance as 1,2, etc. in front of the applicable box.

Rank

01. Due to shortage of personnel with the required skill ☐☐

02. Due to the problem of obtaining release personnel from other sectors ☐☐

03. Un attractive salaries and wages ☐☐

04. Un conducive work environment ☐☐

05. Length of employment process ☐☐

06. Other (specify) _____ ☐☐

_____

4.6 How did you manage to overcome the problems of filling vacancies?

01. by employing partime workers ☐☐

02. by employing temporary workers

03. by working overtime

04. 01 and 02

05. 01 and 03

06. 02 and 03.

4.7 Did you provide training for the workers for the last five years?

01. Yes

02. No ☐☐

4.8 If yes, what percentage of the total employees were trained?

☐☐ %

4.9 What is the proportional distribution of your technical staff who by training are

Engineers (B.A. or above) ☐☐ %

Scientists (B.A., or above) ☐☐ %

University trained technicians [ ][ ] %

On - the job trained technicians [ ][ ] %

4.10 What is the proportion of employees at your establishment, who are?

Skilled [ ] %

Unskilled [ ] %

Administrative workers [ ] %

Technical workers [ ] %

4.11 Does the factory face financial shortages in order to fulfill its main objectives?

01. Yes
02. No [ ][ ]

4.12 If the factory has faced financial shortages, what are the most important reasons for the problem? Please rank them in order of importance as 1,2,3, etc. infront of the appropriate box

Rank

01. Unreliable supply of raw materials causing under utilization and unrecoverable costs [ ][ ]
02. Ageing machinery and equipment frequent breakdowns and high maintenance costs [ ][ ]
03. Constraints related to proclamation No.163/79 which allowed [ ][ ]
    - annual payment of capital change
    - payment of residual surplus
    - prevention of inter-factory borrowing for urgent use.
04. Failure or delay of payment for inter-factory credit sales [ ][ ]
05. Excessive stock of finished goods and raw materials [ ][ ]
06. Rising cost of raw materials [ ][ ]

07. High-cost bureaucracy

08. Heavy reliance on quantity of production than cost of production as a measure of enterprise performance

09. Other (specify) and rank

10.

11.

4.13 Does your enterprise usually sell on credit?

01. Yes

02. No

4.14 Do you collect receivables on time?

01. Yes

02. No

4.15 If you don't collect on time what are the reasons?

Ranks

01. The incapacity of the organisation to collect

02. The reluctance of the debtors to pay

03. Both of the above

04. Other (specify)

05.

06.

4.16 Please fill the following table

Year E.C.	Annual Sales in Br. 1	Annual average A/C receivable 2	(2) as% of (1)	Annual interest payment	Estimated interest on (2)
1979					
1978					
1977					
1976					
1975					

4.17. Stock of finished goods and raw materials at year end ('000 birr)

Year	Finished goods		Raw materials	
	Total Product	Year end stock	Estimated requirement	Year end stock
1979				
1978				
1977				
1976				
1975				

4.18 If stocks have the tendency to increase overtime, what do you think are the reasons?

Rank

01. Of poor quality of production

02. Of high prices of products

03. The low off-take capacity of distribution organisation

04. The low off-take capacity of consumer

05.

06.

07.

4.19 What are the sources of the raw materials in your enterprise.

Rank

01. Foreign

02. Domestic

03. Both

4.20 What is the percentage of the raw materials used in your enterprise from each sources?

01. Foreign

02. Domestic

4.21 Does your enterprise face usually rising cost of raw materials?

01. Yes

02. No

4.22 If it faced a rise in cost of raw materials what are the reasons for the rise?

Rank

01. Rise of price in international market

02. The problem of transport to move imported inputs from the ports (keeping imports at the port for extended periods)

03. Problems related to storage facilities

04. Other (specify)

05.

4.23 What is the normal reaction of the enterprise management to such conditions? Rank as 1,2,3, etc. in order of importance in front of applicable box

Rank

01. Raising selling prices of the products if demand conditions permit

02. The use of available substitute raw materials to offset costs.

03. Generating sufficient reduction in other controllable costs to absorb the rising costs.

04. Other (specify)

05.

4.24. What do you recommend to improve the financial position of the enterprise? Please rank as before.

Rank

01. The replacement of ageing machines

02. The introduction of planned maintenance

03. To look for reliable supply of raw materials

04. To improve inter-organizational financial discipline.

05. Reclamation of spare parts to reduce cost and training of personnel

06. Better use of labour

07. Reduction of labour cost

08. Other (specify)

09.

10.

5.1 Wage and job promotion policy, managerial and administrative systems and employee relation

5.1 Does the corporation give close attention to your factory?

01. Yes

02. No

5.2 If no, why? give reasons

Rank

01. Due to the large number of the factories

02. Due to the incapacity of the corporation

03.

04.

05.

5.3 What do you suggest to ensure close managerial attention to the factory

Rank

01. Arrangement of alternative organization

02. Unifying the management of factories engaged in similar lines of production under the same corporation whose physical proximity allows to reduce cost and the number of factories and save scarce managerial personnel.

03.

04.

05.

5.4 Whose tasks are purchasing and supply of raw materials both imported and local

01. The Ministry concerned
02. The corporation concerned
03. The factory
04. Other (specify)
05.

5.5 Whose task is conducting foreign and local sales of factory products?

01. The Government
02. The ONCCP
03. The Ministry concerned
04. The corporation
05. The factory
06. Other (specify)
07.

5.6 Whose task is ensuring optimal utilization of resources in the factory?

01. The Government
02. The ONCCP
03. The Ministry
04. The Corporation
05. The Factory
06.
07.

5.7 Who appoints the manager?

01. The Government
02. The ONCCP

03. The Ministry
04. The Corporation
05. The Factory

5.8 Whose authority is to process fresh employment?

01. The ONCCP
02. The Ministry
03. The Corporation
04. The Factory
05. Other specify
06.

5.9 If it is the enterprise which process new employment what is the selection mechanism?

5.10 Is there any system of performance evaluation?

01. Yes
02. No

5.11 If yes, when is it used?

01. Every week
02. Every month
03. Every year
04. During staff promotion
05.

5.12 Do you disclose the evaluation to the evaluated workers?

01. Yes
02. No

5.13 Do you use any incentive system to encourage workers to produce more?

01. Yes
02. No

5.14 If yes, which incentive system

01. Piece rate system
02. General salary increments
03. A system of giving annual awards
04. Bonus payments
05. Other benefits to employees
06. Other (specify)
07.

5.15 Does your enterprise give sufficient attention to cost accounting?

01. Yes
02. No

5.16 How do you measure the enterprise performance?

Rank

01. By quantity of production that is by the fulfillment of plan target
02. By the cost of producing the unit of production
03. By measuring capacity utilization
04. Other (specify)

5.17 Is auditing of the books of accounts up to date in your enterprise?

01. Yes
02. No

5.18 What is the level of authority of the enterprise for signing check? Up to a maximum of _____birr?

5.19 Whose task is to sign loan contracts with the Banks and for renewal of existing credit facilities?

01. The ONCCP
02. The Minsitry
03. The Corporation
04. The Enterprise
05.

5.20 Did you experience delay in the flow of information both from industry to corporation and to the factory and factory to corporation and then to industry?

01. Yes
02. No

5.21 What is your assessment of these delays involved?

01. Too long
02. Moderate
03. Acceptable

5.22 Are there inadequacies in physical facilities to generate the required data in time?

01. Yes
02. No

5.23 If there are inadequcies in physical facilities what are they? Please rank

	Rank
01. Shortage of adding machines	
02. Shortage of typewriters	
03. Shortage of duplicating machines	
04. Poor transport and means of communication	
05. Other (specify) and rank	
06.	
07.	
08.	

5.24 Which of the following formal groups are organized at your enterprise. Please indicate by circling the corresponding number

01. An organ of the workers party of Ethiopia (WPE)
02. Workers control committee (WCC)
03. Revolutionary Ethiopian Women's Association (REWA)
04. Revolutionary Ethiopia Youth Association (REYA)
05. Trade Union
06. Other (specify)

5.25 In which of the group you are participating as a chairman, or, secretary or executive member? (Pleas " ✓ " where appropriate)

	Chairman	Secretary	Exec.Member
01. An organ of the workers party of Ethiopia (WPA)			
02. Workers control committee			
03. REWA			
04. REYA			

Chairman Secretary Ex.Member

05. Trade Unions

06. Other (specify)

07.

08.

5.26 Do you think that participation in these groups takes too much of the time available for regular work?

01. Yes

02. No

5.27 In your opinion do you think that the executive members of the organized groups spent too little time on their regular work?

01. Yes

02. No

5.28 Does your observation indicate that there has been a lack of clarity or probably, mis-understanding about the roles of some of the above organizations and those of the managers in running enterprise operations (i.e. the question of authority in managerial tasks so to speak)?

01. Yes

02. No

5.29 Which of the overall policies of the Government have been bottlenecks of factory's operation? Indicate by circling the appropriate number.

01. Incentive policies

02. Price policies

03. Financial policies

04. Production policies

05. Frequent review of government policies (ie. the fast changing of government policies)

06. Other (specify)

6. The demand pressure, the transport facilities and distribution systems

6.1 Which of the following distribution outlets used by the factory? Please rank as 1,2,3 and so on in order of importance in front of the applicable box

Rank

02. The retail and wholesale organization under the Ministry of Trade

02. Industry's own retail outlets

03. Factory's own wholesale and retail outlets

04. Farm's service co-operatives

05. Private traders

06. Other (specify) and rank

07.

6.2 What are some of the problems associated with using those channels of distribution? Please write them below under each heading and rank them.

The retail and wholesale organization udner the Ministry of trade.

Rank

01.

02.

03.

04.

05.

Industry's own retail outlets

01.

02.

03.

04.

05.

Factory's own outlets

Rank

01.

02.

03.

04.

05.

Private Traders

01.

02.

03.

04.

05.

6.3 At times, if there exists disparity between the purchasing capacity of the distribution organizations and the pace of production has resulted in building up of stock of products at factory level, are you allowed to use other alternative channels of sale?

01. Yes
02. No
03. Do not know because this problem has not yet appeared.

6.4 Do/Does the distribution organization(s) promptly take delivery of products from the factory?

01. Yes
02. No

6.5 Do the organizations pay for goods on the spot?

01. Yes
02. No

6.6 Is transportation a problem to curtail the timely distribution of industrial production?

01. Yes
02. No.

6.7 Do you think that there is inadequacy of warehouse facilities

01. Yes
02. No

6.8 If yes, at what level

01. At factory level
02. At market level
03. Both of the above

6.9 Whose task is to transport products of the factory to the market area?

01. Ministry of transport
02. The Ministry of Industry
03. The Corporation
04. The Enterprise itself using its fleet
05. Other (specify)

6.10 Is it a one way load or do you make arrangement to avoid empty haulage?

01. It is one way load
02. Make arrangement to avoid empty haulage?

6.11 Whose task is to set the price of products per unit

01. ONCCP
02. The Minsitry
03. The Corporation
04. The enterprise
05.

6.12 How are the prices decided?

01. Based on cost of production
02. Based on demand conditions
03. Other (specify)
04.

6.13 Is revision made of prices usually depending on circumstances?

01. Yes
02. No

6.14 Please indicate the circumstances responsible for the revision of prices in the past.

Rank

01. The rise of the cost of raw materials

02. The rise in the cost of labour

03. Other (specify)

04.

6.15 Do you export the factory's production

01 Yes

02 No

6.16 If yes, please write the annual average value contribution of exports to the total sales for the last five years in birr _____ and in % of total _____

6.17 Do you devote any part of your annual investment expenditure to market research and development?

01. Yes

02. No

6.18 Please give your approximate average annual expenditure for market research and development of total expenditure in the space provided.

less than 1% _____ 1% to 5% _____

6% to 10% _____ 11% to 15% _____

over 15% _____

THANK YOU VERY MUCH FOR YOUR COOPERATION.

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D E C L A R A T I O N

I, the undersigned declare that the thesis is my original work and has not been presented for a degree in any other University.

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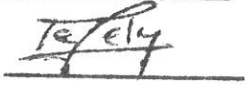
Signature: 

Date: June, 1989.