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Third Interregional Symposium
on the Iron and Steel Industry

Brasilia, Brazil, 14 - 21 October 1973

Agenda item 2

ASSISTANCE BY THE UNITED NATIONS TO THE IRON AND STEEL INDUSTRIES OF THE DEVELOPING COUNTRIES 1/

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Organisation des Nations Unies pour le développement industriel

Troisième Colloque interrégional
sur la sidérurgie
Brasilia (Brésil), 14-21 octobre 1973
Point 2 de l'ordre du jour

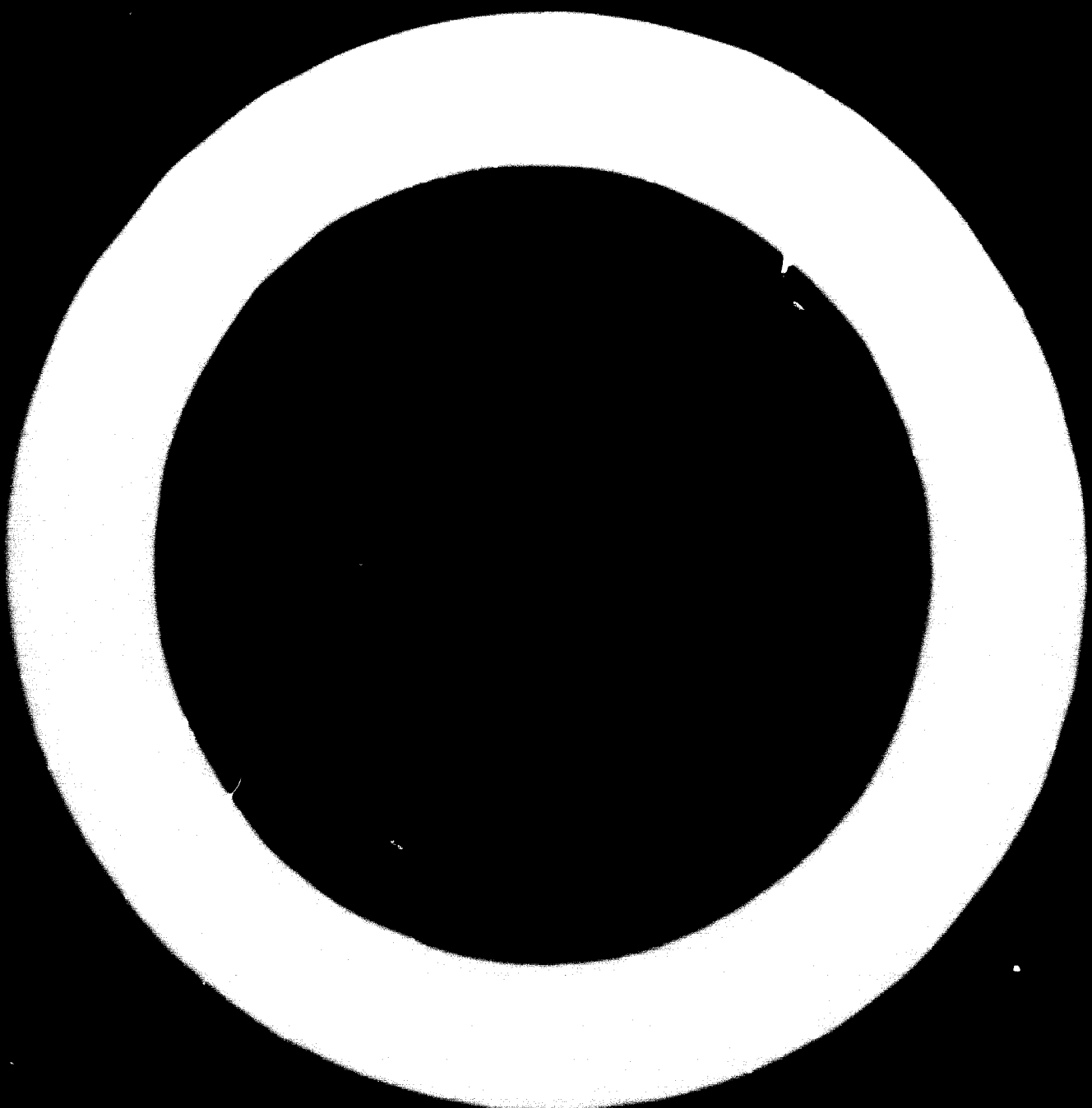
RESUME

AIDE FOURNIE PAR LES ORGANISMES DES NATIONS UNIES AUX INDUSTRIES SIDERURGIQUES DES PAYS EN VOIE DE DEVELOPPEMENT

Document rédigé par le Secrétariat de l'ONUDI

Le document décrit les activités menées par les organismes des Nations Unies - institutions spécialisées, autres organisations et commissions économiques régionales - dans le domaine de l'assistance technique aux industries sidérurgiques des pays en voie de développement.

La première partie est consacrée aux trois principaux objectifs visés par l'Organisation des Nations Unies pour le développement industriel (ONUDI) dans le domaine de la sidérurgie, à savoir l'exploitation des ressources locales en minerais, le lancement ou l'expansion de la production locale de métaux, et la création de centres de technologie des métaux. Ces objectifs sont atteints grâce à des activités opérationnelles - projets d'assistance technique directe exécutés dans les différents pays en voie de développement - et à des activités de soutien - réunions d'experts, séminaires, colloques et études. Certaines de ces activités sont décrites en détail à titre d'exemple, et en annexe figure la liste des projets d'assistance technique que



l'ONUDI a déjà exécutés ou exécute actuellement dans le domaine de l'industrie sidérurgique et qui relèvent, du point de vue administratif, de la Section des industries métallurgiques de la Division de la technologie industrielle.

Les activités de la Commission économique pour l'Europe (CEE) dans le domaine de la sidérurgie sont examinées dans la deuxième partie du document. Elles comprennent des analyses de marché et des études sur des sujets divers : matières premières, aspects économiques de la technologie de l'acier, demande d'acier dans les différents secteurs économiques, concurrence d'autres matériaux, automation, productivité et statistiques. La CEE organise en outre des visites d'études.

La dernière partie porte sur les activités menées dans le domaine de l'industrie sidérurgique par d'autres organismes des Nations Unies : Commission économique pour l'Afrique (CEA), Commission économique pour l'Asie et l'Extrême-Orient (CEAEO), Commission économique pour l'Amérique latine (CEPAL), Organisation des Nations Unies pour l'éducation, la science et la culture (UNESCO), Organisation mondiale de la santé (OMS) et Organisation internationale du Travail (OIT).

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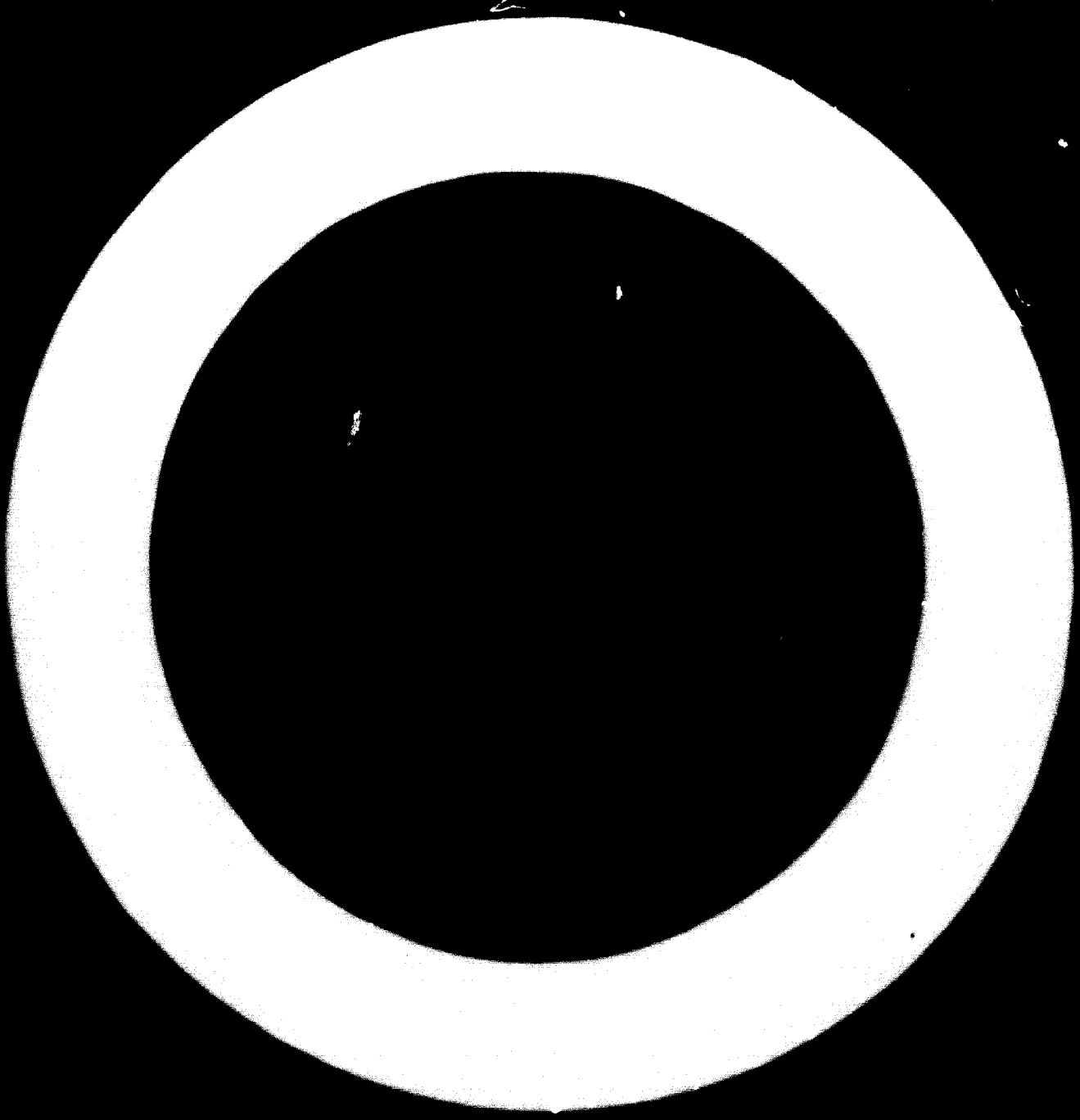

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SUMMARY

The paper describes the activities of the United Nations, through its specialized and other agencies and the Regional Commissions, in the field of technical assistance to the iron and steel industries of the developing countries.

The first section covers the work of UNIDO in three main areas: the promotion of the utilization of the existing resources of promising metallurgical indigenous raw materials, the establishment or expansion of local production of required metallurgical products, and the establishment of centres for metallurgical technology. These aims are achieved by operational activities, which are direct technical assistance projects in specific developing countries, and supporting activities, represented by expert group meetings, seminars, symposia, and studies. Examples of both types of activity are described in some detail, and an annex lists completed and current UNIDO technical assistance projects, backstopped by the Metallurgical Industries Section of the Industrial Technology Division, in the field of the iron and steel industry.

The activities of the Economic Commission for Europe (ECE) are dealt with in the second section. These cover market analysis and reviews; studies on raw materials, economic aspects of steel technology, specialized producer and user sectors, competition from other materials, automation, productivity, and statistics; and study tours.

The final section covers the activities in the iron and steel industry sector of other UN family organizations: ECA, ECAFE, ECLA, UNESCO, WHO and ILO.

By reason of its key role in industrial development in the developing countries, the iron and steel industry has received considerable attention and assistance from the United Nations through its specialized and other agencies. A paper prepared for the Second Interregional Symposium (ID/WG.14/66) detailed the activities of UNIDO and UN agencies in the fields of iron and steel industry up to 1968; the present survey which this paper covers is intended to supplement and update the information given in that paper.

This paper is divided into three sections. The first covers the activities of the United Nations Industrial Development Organization (UNIDO), which plays a central role in the promotion of industrialization in the developing countries. The second section deals with the work of the Economic Commission for Europe (ECE), through its Steel Committee, in the field of the iron and steel industry, with special reference to the developing countries. The third section covers the activities of other UN family organizations, such as UNESCO, WHO, and the Regional Economic Commissions for Africa (ECA), Asia and the Far East (ECAFE), and Latin America (ECLA/CEPAL).

I. THE ACTIVITIES OF UNIDO

1. Introduction

The United Nations Industrial Development Organization (UNIDO) was established in January 1967, based on Resolution 2152 (XXI) of the General Assembly of the United Nations.

The purpose of the Organization is to promote the industrial development of developing countries and, by encouraging the mobilization of national and international resources, to accelerate their industrialization with particular emphasis on the manufacturing sector.

UNIDO is called upon to play the central role in co-ordinating the activities of the UN family of organizations in the field of industrial development.

The activities of the Metallurgical Industries Section of the Industrial Technology Division of UNIDO follow the pattern described in the United Nations General Assembly Resolution 2152 and cover projects falling within the pre-investment stage.

2. Scope of work of the Metallurgical Industries Section of UNIDO

The technical assistance that is provided to developing countries in the field of the metallurgical industries in general, and in the field of the iron and steel industry in particular, has the following main goals:

- Promotion of industrial utilization of existing resources of promising metallurgical indigenous raw materials;
- Establishment or expansion of local production of required metallurgical products;
- Establishment of indigenous nuclei of metallurgical expertise.

These goals have emerged from the pattern of requests for technical assistance received from developing countries. Although the requests cover a variety of specific local problems, certain priority areas have been identified, and to these UNIDO has directed its efforts and available human and financial resources. These are: planning for the establishment and/or development of the iron and steel industry and improvement of its performance; creation and transfer of metallurgical know-how; establishment or improvement of foundry facilities; industrialization of iron-titanium bearing black beach sands or ores with production of pig iron and a slag rich in titanium dioxide.

As a result of the experience that UNIDO is gradually accumulating in this field of industry, programmes are being related to actual and specific conditions of the developing countries, leading to significant technical assistance projects of multiple effect.

In fulfilling the task, the Metallurgical Industries Section carries out two types of activity, which are referred to as "operational" and "supporting".

Operational activities represent direct technical assistance projects, in specific developing countries.

Supporting activities are expert group meetings, seminars, symposia, and studies designed to deliver to the appropriate organizations, institutions, and enterprises in developing countries up-to-date information and data on specific problems of interest to these countries. The present Third Interregional Symposium on the Iron and Steel Industry is a typical supporting activity.

During the 1972 financial year, a total of 102 technical assistance operational projects were under implementation. The value of this assistance amounted to US$ 1,588,000.

It is planned that the value of technical assistance provided will amount to US$ 3,400,000 in 1974 and US$ 4,000,000 in 1975. During the 1974-75 biennium, a total of about 1350 nationals will upgrade their knowledge through various training programmes.

Technical assistance projects may be small-scale (up to US$ 100,000 of UN contribution), which may involve as low as one man-month of expertise, and they may be large-scale projects (up to US$ 1,5 - 2,0 million), involving provision of a team of experts for several years, supply of equipment (for demonstration and training purposes), and arrangements for training of nationals abroad.

3. Types of project

The following are some typical examples of operational technical assistance activities that are being carried out by UNIDO in the field of the iron and steel industry:

- Preparation of pre-investment, pre-feasibility and techno-economic feasibility studies for the creation and/or development of iron and steel industries on regional, national, works and shop level;
- Long- and medium-range planning for the creation and development of iron and steel industries on a country level;
- Techno-economic evaluation of projects prepared by a third party;
- Techno-economic evaluation of available metallurgical raw materials and their processing to valuable products for the local market and possibly for export;
- Market surveys;
- Arrangements for selection and testing abroad of promising local metallurgical raw materials;
- Advice and consultation related to improving operations of existing iron and steel plants and their modernization;
- Establishment of centres or laboratories for metallurgical technology;
- Advice on the selection of processes, materials, and equipment;

- Preparation of technical project reports with layouts, lists of equipment, technological alternatives, etc;
- Provision of training through specialized courses, individual fellowship programmes, and on-the-job training;
- Provision of a variety of types of information to organizations, institutions, plants, and persons.

4. Some operational technical assistance projects [1]

The following are some examples of technical assistance projects of the Metallurgical Industries Section of UNIDO already completed or under implementation.

A. Projects related to establishment and development of local production of metallurgical products

i) In Iran, there are high-grade iron-ore deposits and abundant resources of natural gas. UNIDO assisted this country in evaluating the techno-economic possibilities for creating a steel works based on gaseous direct reduction. Further to this evaluation, UNIDO sponsored detailed investigations and pilot-scale tests with the Iranian raw materials with the purpose of examining their applicability for direct reduction based on natural gas for the production of sponge iron. The results of these pilot plant tests were positive. Recently, it has been reported in the press that the Iranian Government is entering into collaboration with a firm from a developed country for the establishment of a HyL direct-reduction plant with a capacity of 1,0 million tons/year sponge capacity in two phases.

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[1] Attachment 1 includes the majority of projects of UNIDO carried or being carried out in the field of iron and steel industry.

ii) The implementation of a large-scale project for the production of sponge iron using Indian iron ores and non-coking coals is expected to start shortly under the Indian country programme based on a demonstration plant of 100 tons daily sponge production capacity. The UNDP/UNIDO P.A.C. mission earlier prepared a comprehensive report on this large-scale project, the project document for which has accordingly been prepared giving the full programming and phasing of the operational activities, covering a trial period of four years. Indian iron ores from different States of India (Andhra Pradesh, Orissa, and Maharashtra) will be investigated in the 100 tons/day demonstration sponge-iron plant to be set up for the purpose. The results of this demonstration plant will be of considerable value and technical significance, not only to India, but also to other countries possessing identical raw-materials resources for the iron and steel industry.

iii) Other projects concerning diverse aspects of the iron and steel industry are in the pipeline. In the case of some other developing countries, test investigations relating to gaseous direct reduction for sponge production based on natural gas and high-grade local/imported iron ores/pellets have been completed with good results.

iv) A number of technical assistance projects have been completed whilst others are under implementation in the field of the iron and steel industry in the Arab Republic of Egypt, such as:

- Pilot-plant scale investigations on the Asswan iron ores, to be followed by a feasibility study for the establishment of an integrated steel plant at Asswan. These pilot-scale investigations on Asswan iron ores were carried out through a UNIDO contract to study the pre-reduction and electric smelting of highly phosphoric Asswan iron ores using hydro-electric power from the High Asswan Dam in Egypt. Highly significant possibilities have emerged as a result of these comprehensive investigations which are being followed up.

- Pilot-plant scale tests on Bahariya iron ores. This project covered a comprehensive testing programme on Bahariya iron ores to determine their reducibility characteristics in relation to gaseous direct reduction using natural gas; Bahariya iron ores were used in the run-of-mine condition and after prior beneficiation and pelletization.

- Establishment and operation of [illegible] project for Technical Data Processing and Inspection Maintenance Services at the Egyptian Iron and Steel Works, Helwan.

- Revamping and modernizing the basic Bessemer (Thomas) steelmaking shop of the Egyptian Iron and Steel Works at Helwan.

v) A UNIDO mission visited Mexico and its report on the "Hyl Direct Reduction Process for the Production of Sponge Iron" (UNIDO/ITD.4) evoked considerable interest in developing countries which have abundant resources of natural gas and in some cases of high-grade iron ores as well.

vi) In 1971, a long-range pre-investment study for the development of the iron and steel industry in Peru was completed. As a follow-up, two technical assistance projects will be carried out both to assist the iron and steel industry in Peru under the Country Programme by UNIDO.

vii) UNIDO sponsored the preparation of a detailed study for Brazil, related to the implications of technological innovations for the long-range planning of the rapidly developing iron and steel industry of the country.

viii) Preliminary assistance for long-range planning of the iron and steel industry in Thailand was provided in 1971 and further assistance will be projected.

ix) Studies on sponge-iron production and the expansion plans of the Inchon Iron and Steel Company of South Korea and on iron-ore processing and sponge-iron production in Malaysia were prepared in 1972 and 1973.

x) Regional feasibility studies for the establishment of ferro-alloy production and iron and steel industries in the countries of the Mekong delta in co-operation with ECAFE were carried out in 1971 and detailed recommendations have been made.

xi) Comprehensive reports have been prepared on the projection of the iron and steel industry in South Korea, which led to the establishment of an integrated iron and steel plant at Pohang in South Korea.

xii) A detailed study was made on the Tjilegon Steel Plant in Indonesia; the report formed the basis of the completion of the wire-rod mill of the Tjilegon steel complex under UNIDO's technical assistance programme.

xiii) Pre-feasibility studies for the creation of small re-rolling mills in Mali and Togo have been completed in 1973 and 1972 respectively.

xiv) Technical assistance was provided for planning the development of the iron and steel industry of the Syrian Arab Republic.

xv) UNIDO prepared a rehabilitation and expansion plan for the steel plant of the Ghana Industrial Holding Company.

xvi) A feasibility study for the establishment of an integrated iron and steel works has been prepared for Iraq. A semi-integrated iron and steel plant with the capacity of approximately half a million tons of crude steel annually has now been projected. It is also proposed to establish a sponge-iron plant of an optimum size based on imported iron ores and/or pellets and the abundant resources of natural gas in Iraq to feed the integrated steel plant, whose annual capacity will then be raised to over a million tons.

xvii) A number of individual technical experts and consultants have been sent to assist the iron and steel industries in Chile, Jordan, Peru, Romania, Colombia, Yugoslavia, Greece, etc., to advise them on improvements in existing steel-plant operations in each specific case with a view to raising their economic productivity and upgrading the quality of the product-mix.

xviii) Laboratory and pilot-plant tests and/or feasibility studies for the utilization of iron-titanium bearing beach sands and ores for India, Sri Lanka, Egypt, and other African countries have been undertaken with highly significant and valuable results for producing high-titania slags and by-product pig irons.

xix) Pilot-plant scale tests were carried out on Indian ores and pellets from Goa to determine their reducibility characteristics for direct reduction to produce sponge by the HyL gaseous direct reduction process.

xx) Pilot-plant scale tests were carried out on Iranian iron ores (run-of-mine ore and ores after prior beneficiation and pelletization) to determine their reducibility characteristics for direct reduction to produce sponge by the HyL gaseous direct reduction process.

B. Projects related to the establishment of industrial centres for the creation and transfer of metallurgical know-how

UNIDO is actively assisting a number of developing countries in the creation of Centres for Metallurgical Technology, such as in the Arab Republic of Egypt (Central Metallurgical Research and Development Institute), Chile, and India (establishment of Central Creep Research Laboratory and a new Hydrostatic Extrusion Pilot and Demonstration Plant). The establishment of similar Centres of Metallurgical Technology in other countries such as in Turkey (Marmara Scientific and Industrial Research Institute), Mexico, Pakistan, and Iran is under consideration. Further efforts will be directed in these and related fields of UNIDO's technical assistance programme.

C. Projects related to foundry industry

Countries in the first stages of industrialization require the establishment of foundries as basic units of an industrial infrastructure. Although foundry products comprise only a portion of the metal consumed in a developed country, the importance and flexibility of this branch of the metallurgical industry is much greater than its tonnage would indicate.

During the last three years, developing countries have shown increasing interest in projects related to the foundry industry sector. Assistance has been and is being provided for both the establishment and the operation of foundries.

UNIDO sponsored the creation of a small foundry in Senegal which now produces castings for the local market. Small amounts are being exported. This foundry is being used as a pattern by other neighbouring countries.

In Sudan and Somalia, small grey-iron foundries coupled with mechanical workshops are being installed. The foundry/mechanical workshop in Sudan will be operative in 1973.

A Foundry Development Centre in Senegal will be established with the purpose of demonstrating more modern foundry operations, to provide extension services to other foundries, and to upgrade the technical knowledge of foundrymen.

In Malaysia, UNIDO is assisting in establishing the Malaysian Metal Industries Development Centre, to be composed of one foundry unit, one tool room, and a design office; a similar centre in the Philippines is on the active list of UNIDO projects.

During the last three years, a number of foundries in developing countries such as the Arab Republic of Egypt, Argentina, Ecuador, Haiti, Lebanon, Iran, Iraq, Mali, Thailand, Togo, etc., received specialized expertise for the improvement of their operations and modernization of existing equipment. A report on "Guidelines on the Establishment of a Demonstration Foundry in a Developing Country" is at present in print.

5. Supporting activities

The Metallurgical Industries Section of UNIDO has in the last six years organized ten expert group meetings, seminars, and symposia, including those in the field of iron and steel. The latter were:

- A Monograph on the Iron and Steel Industry was published in 1969 (ID/40/5; Sales Number: E.69.II.B.39, Vol.5);
- Second Interregional Symposium on the Iron and Steel Industry (Moscow) in 1968 (ID/WG.14/82; Sales Number: E.69.II.B.36);
- Seminar on Tinplate Production (Chile) held in 1970 in co-operation with ECLA (ID/WG.73/17);
- Workshop on the Creation and Transfer of Metallurgical Know-How (Jamshedpur, India) in 1971 (ID/WG.110/17);
- Promotion of Metallurgical Technology Transfer to the Metal Transforming Industries of Developing Countries in Latin America (UNIDO/ID.110). During 1972, UNIDO selected a large spectrum of available technologies in the metal transformation field and prepared a portfolio of data sheets describing

their applications and resultant advantages and end-products. This portfolio is being distributed and promoted among interested organizations, works, and individuals in Latin America.

- The organization and holding of the Third Interregional Symposium on the Iron and Steel Industry in Developing Countries represents one of the major activities of the Metallurgical Industries Section during 1973.

A large number of developing and developed countries have assigned a high priority to the development of their iron and steel industries. It is recognized as essential that in the course of the next decade the developing countries should make great efforts to increase their consumption of iron and steel and their own participation in the production of these essential materials. The volume and variety of iron and steel products that will be needed for consumption in the developing regions by the end of the 1970s will be such that establishment and/or expansion of local production will have to be undertaken whenever this proves feasible. This feasibility should be judged not in terms of conventional techno-economic analysis alone but also in terms of the urgent necessity for industrial development. Macro-economic as well as micro-economic considerations play an important role in this field.

The main purpose is to examine progress made thus far, as well as to evaluate the economic, technical, and financial problems, confronting the iron and steel industry of developing countries discussing the appropriate solutions and examining the opportunities open to those countries in this branch of industry. The emphasis is being placed on the exchange of essential up-to-date information and on discussions of these problems and possibilities. However, the promotion of contacts between, on the one hand, organizations and individuals capable of supplying know-how, equipment, and financing, and on the other hand, decision-making executives and technical managers of the iron and steel industry in developing countries is another goal of the Symposium.

By identifying the most favourable criteria for economically viable operations in terms of raw materials and other natural resources, marketing outlets, and techno-economic considerations, the Symposium will provide valuable data and information for planners and executives from the iron and steel industries in the developing countries to make use of in their work.

6. Financing of technical assistance projects

The following are the sources of financing for carrying out technical assistance activities of the Metallurgical Industries Section of UNIDO.

- From country programmes. This is a long-term programme (normally five years) of technical assistance from the United Nations Development Programme to a given developing country, implemented by an executing or specialized agency of the UN family of organizations such as UNIDO, UNESCO, WHO, etc. The priorities of this programme are being established by the recipient developing countries. Each individual project is implemented by the appropriate specialized UN organization.

- From the Special Industrial Services fund (SIS). Assistance from SIS normally covers short-term expertise (up to 6 man-months).

- Regular budget. This source is used mainly for supporting activities.

- UN regular programme. This source is rather limited and is normally used for provision of experts and arrangements for fellowship programmes.

- Voluntary Contributions. A number of countries pledge voluntary contributions to UNIDO in their local currencies. This fund is used for a variety of purposes (provision of experts, supply of equipment, organization of training programmes, etc.).

II. THE ACTIVITIES OF ECE

A. Introduction

The Steel Committee of the Economic Commission for Europe (ECE) and the ECE Secretariat have devoted, since the Committee's creation in Autumn 1947, a good part of their activities to the problems confronting the iron and steel industry of the developing countries. In fact, this wish to assist these countries is reflected in the Committee's terms of reference, where point 3 states that it is the aim of the work to be carried out under the Committee's auspices "to examine ways and means of increasing steel production and consumption, particularly in the under-developed countries". For this reason, most of the studies prepared over the twenty-five years of the Steel Committee's existence either contain specific analyses of development problems or, at least, have a direct bearing on such problems, through the material presented and the conclusions reached. Since the ECE Steel Committee represents through its regular membership and delegations participating in its work as observers (under paragraph 11 of the terms of reference of the Economic Commission for Europe) over 90% of world crude steel production, it is to be expected that its work should cover all countries of the world. Furthermore, it should be borne in mind that the iron and steel industry is a truly international industry, owing to the economic geography of both its raw material basis and its markets, as well as to the rapid and universal spread of the technology it uses.

To provide here an exhaustive description of all projects and studies undertaken under the auspices of the Committee would exceed the scope of the present paper; a review will, therefore, be made only of those projects carried out over the last fifteen years or so, which have a closer bearing on and are believed to be of direct usefulness to solving the problems of the steel industry in the developing countries. The review is by subject matter rather than chronological.

3. Market analysis and reviews

The mainstay of ECE's work in this field is the preparation and issuance of an annual market review since 1953. This study provides analyses of short-term and medium-term trends in the production and consumption of iron and steel products, in international trade, in iron and steel-making raw materials and energy, and in prices of steel products and raw materials. Its outline, which has been modified and expanded in coverage over the last twenty years, comprises at present the following main points: Summary and outlook; Part One - International Developments (Trends in steel demand, supply and prices; Trends in demand for and prices of iron and steel-making raw materials); Part Two - National Developments (a series of country reports, drawn up in tabular form, providing data on macro-economic indicators, iron and steel production, foreign trade in steel, trends in demand by principal sectors, steel deliveries, steel consumption, employment, domestic base prices, investment expenditure, new plants and expansion of existing capacity, changes in raw materials and labour costs, and current trends and outlook); and an Annex - Statistical Tables (a series of 23 standard tables on steel production, consumption and trade, activities of main steel-using sectors, domestic and export prices, raw-materials production, consumption, and trade). The review is world-wide in coverage; a special section is devoted each year to developments in the developing countries. Furthermore, the study contains from time to time a "special feature"; thus, in "The Steel Market in 1970" a short study of "Mini-steel plants" was included. Twenty reviews of this type have been published. The secretariat prepares, in the first half of each year, a provisional version, on the basis of information submitted by Governments and other published information. After consideration by the Steel Committee's Working Party on the Steel Market, the review is published by the secretariat, in August/September of each year. The titles, document symbols, and sales numbers of the most recent issues are as follows:

The Steel Market in 1969 (ST/ECE/STEEL/30; Sales Number: E.69.II.E/Mim.31)

The Steel Market in 1970 (ST/ECE/STEEL/34; Sales Number: E.70.II.E/Mim.45)

The Steel Market in 1970 (ST/ECE/STEEL/36; Sales Number: E.71.II.E/Mim.18)

The Steel Market in 1971 (ST/ECE/STEEL/40; Sales Number: E.72.II.E/Mim.14)

An important contribution to the analysis of long-term trends in the world iron and steel market was made by the ECE in its study "Long-term Trends and Problems of the European Steel Industry" (ST/ECE/STEEL/1; Sales Number: 1960.II.E.3, 1959). This report, published in 1959, provided forecasts for steel production, consumption, and trade, as well as for raw-materials requirements for the years 1972-1975; these were based on a detailed analysis of past trends in steel supply and production and contained an assessment of technological change, past and future. The forecasts themselves have proved to be of reasonable accuracy, the chapter on the methodological framework of the forecasts is, therefore, still of interest. Furthermore, this study covered the whole world and contained analyses of the situation in and forecasts for individual developing countries.

In 1969, a study was published on "World Trade in Steel and Steel Demand in Developing Countries" (ST/ECE/STEEL/22; Sales Number: E.68.II.E.4). The study provided a comprehensive analysis of the disturbances which had in the late 1950s and through the 1960s characterized the international steel market, and of price developments, price formation, and competition in the world market; it also gave a full picture of trends in international steel trade and the supply of and demand for steel in the industrialized countries. A substantial part of the study is devoted to the problems of the developing world. A detailed analysis was made of the factors which influence steel demand and its product pattern in developing countries (Chapter V), and a description was given of the situation and prospects of steel supply in these countries; in an Annex, a description is provided of iron and steel production facilities in the developing countries.

Although it does not deal specifically with the situation in the developing countries, a recent ECE study on "Distribution and Marketing of Steel Products" (ECE/STEEL/1), provides detailed information on the organization of steel supply in a large number of countries; this may not only assist the developing countries to establish or expand their own distribution network, but it also improves market transparency for exporters.

It should be noted that a fresh attempt is being made by the ECE Steel Committee to assess long-term trends for the steel industry the world over in the study of "Long-term Prospects for Steel Production, Consumption and Trade until 1985 and Outlook for 1990". This is likely to be published in several parts; the first part dealing with trends in consumption may be issued in the course of 1974.

3. Raw materials

In addition to the regular analysis of the raw-materials situation in the annual reviews of the steel market, ECE has undertaken a number of special studies, of which only the most recent will be mentioned here. Thus, in 1966, a study on "Economic Aspects of Iron Ore Preparation" (ST/ECE/STEEL/14; Sales Number: 66.II.E.6) was published; it contained an analysis of reasons for iron-ore preparation, the properties and qualities of iron ore, methods of iron-ore preparation, and the economic efficiency of various methods of preparing iron ores for smelting. A review was also made of iron-ore preparation in twenty-seven countries and regions, including India and a number of Latin American countries.

This was followed, in 1968, by a report on "The World Market for Iron Ore" (ST/ECE/STEEL/24; Sales Number: E.69.II.E.10), covering the following main subjects: consumption of iron ore in individual sectors of the iron and steel industry; supplies of iron ores; production and reserves; international trade in iron ore and development of prices; constituents of iron-ore costs; trends in ocean, inland waterway, and coastal transport; a forecast of iron-ore requirements in 1970, 1975, and 1980; trends in iron-ore production 1964-1 iron-ore trade and consumption in 1970; prospects for iron-ore production in 1975 and 1980; aspects of international iron-ore trade and consumption in 1975-1980; and an analysis of possible international trade flows in 1975. This last subject was treated with the aid of an econometric model of trade prospects. The study dealt with the whole world; since a large part of iron-ore reserves is located in developing countries, the analysis provides a detailed insight into the problems arising there.

The ECE Steel Committee has always been particularly interested in questions concerning consumption and supply of scrap. In 1971, a study on "Problems Relating to Iron and Steel Scrap" (ST/ECE/STEEL/33; Sales Number: E.71.II, E/Mim.12) was published. In its first part, the study deals with the consumption of scrap in the individual sectors of the iron and steel industry and its relation to pig-iron use, and with economic and technical factors influencing the volume and quality requirements of scrap consumed. The second part analyses developments in scrap supply, dealing with quantity and quality aspects and with methods of scrap preparation, and with trends in international scrap trade. In an annex, a number of national classifications of scrap are produced. Given the increasing importance of scrap as a steel-making raw material in the developing countries, the information presented and the conclusions reached are of immediate interest to those countries.

Recently, a Symposium on Developments in European and World Markets for Coking Coal and Coke was organized in Rome (Italy), 26-30 March 1973, at which a paper was presented, prepared by the ECE Secretariat on the basis of information submitted by Governments at the request of the ECE Steel Committee, dealing with "Past and Future Trends in Coke Demand Arising in the Iron and Steel Industry" (COAL/WP.1/SEM.1/R.19; the paper can be obtained, on request, from the ECE Secretariat). This short study deals with the economic and technical factors influencing coke consumption in the iron and steel industry, and it contains an analysis of future trends in pig-iron output and coke requirements in 1980 and 1985; the analysis is world-wide. Given the shortage of coking coal in many developing countries, the paper should be of a certain interest to them.

4. Economic aspects of steel technology

During all of its existence, the ECE Steel Committee has devoted a great deal of attention to subjects coming under this heading, and a number of reviews on the progress made were published in the course of the 1950s. In 1962, a study making a "Comparison of Steel-making Processes" (ST/ECE/STEEL/4; Sales Number: 62.II.E.14) was published, dealing with the development of steel production methods, the role of oxygen and electricity, properties and qualities of steel, flexibility and specific input consumption, and investment and production costs.

Another study in this series was issued in 1968, on "Economic Aspects of Continuous Casting" (ST/ECE/STEEL/23; Sales Number: 68.II.E/Mim.19). It provided a review of the present state of continuous casting of steel and it gave examples of the economic efficiency of this new process in comparison with conventional ingot casting. An assessment was also made of likely development trends in continuous casting of steel. In 1970, a report on "Development of Production Technology and New Properties of Steel Products" (ST/ECE/STEEL/35; Sales Number: E.70.II.E.7) was published, giving an assessment of the situation for structural sections, wire products, flat products, coated steel products, steel tubes and cast-iron pipes, and high-quality and special steels.

In the series of studies made by the ECE on economic aspects of steel technology, mention must be made of a report on "Problems of Air and Water Pollution Arising in the Iron and Steel Industry" (ST/ECE/STEEL/32; Sales Number: E.70.II.E.6), although its scope exceeded the mere economic aspects of technology by dealing with its environmental implications. The study provides information and analysis of sources of pollution in the iron and steel industry, air and water cleaning installations used in the iron and steel industry, cost aspects of cleaning devices, and an evaluation of future trends. In an annex, a brief review is made of legal regulations in different countries. A further and more detailed treatment was made of these problems in a Seminar on Air and Water Pollution Arising in the Iron and Steel Industry, organized under the auspices of the ECE Steel Committee in Leningrad and Cherepovets (USSR) from 23-28 August 1971. The Seminar was attended by about 250 experts from 29 countries, among which were participants from Brazil, India, Mexico, the Philippines, and the United Arab Republic, attending under the auspices of the United Nations Industrial Development Organization (UNIDO). A total of 36 papers was presented in a General Session, a Session on Purificati of Waste Gases, and a Session on Purification of Effluents. The final report on this Seminar, as well as copies of the papers presented, can be obtained from the ECE Secretariat.

In 1972, the ECE Steel Committee, together with the Romanian authorities, organized a Seminar on Direct Reduction of Iron Ore: Economic and Technical Aspects. Over 300 experts from 33 countries attended the meetings, at which 41 papers were presented and discussed; among the participants there were experts from Brazil, Cuba, the Arab Republic of Egypt, India, Iran, Mexico, and Nigeria. The final report on this seminar is being distributed for the present Symposium as Paper ID/WG.146/3; it contains a list of the papers presented, which can be obtained from the ECE Secretariat.

5. Sector studies

The individual economic sectors in which steel demand arises have been the subject of a series of studies undertaken within the framework of the ECE Steel Committee. Among the more recent ones, mention should be made of "Railways and Steel" (E/ECE/STEEL/115; Sales Number: 57.II.E.3), which was published in 1957. The study provides data on production of railway material and rolling-stock; it deals also with factors determining the demand for steel by railways, with official programmes in the railway field, and with overseas export prospects. The period covered is mainly from 1950 to 1955. The part of the study devoted to the overseas situation gives a considerable amount of information on developing countries, and represented, thus, a useful contribution to their own efforts in this field.

The construction sector, the most important outlet for steel products, particularly in developing countries, was investigated in the study on "The Use of Steel in Construction" (ST/ECE/STEEL/10; Sales Number: 64.II.E/Mim.25), published in 1964. Analysis is made of technological trends in the use of steel as a building material, the construction sector as a market for finished steel products, and the last chapter is devoted to showing the problems which arise in international comparison of steel use in construction. Recently a study was prepared on "Production and Use of Steel Tubes" (ECE/STEEL/2). In this study an attempt is made to provide a comprehensive review of the technology of production of tubes and of quality requirements, and to analyse the related economic aspects. The study also surveys demand for and supply of steel tubes, by sectors, and trends in international trade; it concludes with an attempt to evaluate trends in production up to 1975 and 1980. The study is world-wide in coverage; its significance for the developing countries is self-evident.

6. Competition of steel with other materials

Although in countries, particularly the developing countries, where steel is a scarce material, competition of steel with other materials presents itself often rather as a possibility for using other materials instead of steel, the work of the ECE Steel Committee on this subject is of interest to the developing world. After the publication of two studies ("Competition between Steel and Aluminium", in 1954, and "Steel and its Alternatives", in 1956), a third study was undertaken and published in 1966, entitled "Aspects of Competition between Steel and Other Materials" (ST/ECE/STEEL/17; Sales Number: 66.II.E.11, 1966). A description is given of the structure and the development of industries engaged in the competition between steel and other materials (aluminium, plastics, timber, glass, paper and paperboard, fibreboard and particle board, asbestos-cement, concrete). Furthermore, an assessment of technical and economic factors of competition is made of the present state of competition in industrial sectors (building, packaging and containers, motor vehicle manufacture, shipbuilding, railway rolling stock, tubes and pipes, machinery manufacture). Estimates on the rate of substitution of other materials for steel are also made, and an indication is given of future trends in this competition and substitution.

7. Automation in the iron and steel industry

The Steel Committee of the ECE has been concerned with the economic aspect of automation since about 1960. A first report was published in 1965, entitle "Automation in the Iron and Steel Industry" (ST/ECE/STEEL/13; Sales Number: 65.II.E/Mim.13), dealing rather more with the general aspects of application of automation or computers to the different processes. In 1969, a comprehensi study on the "Economic Aspects of Computer Control of the Oxygen Steelmaking Process" (ST/ECE/STEEL/28; Sales Number: E.69.II.E (Mim.13)) was published; it provided detailed information on cost considerations for the computer-controlled process, and it showed the influence of some main operating variabl on the economies of computer control of the oxygen steelmaking process. The study concludes with an analysis of the economic benefits achieved from comput process control in oxygen steelmaking.

. Productivity in the iron and steel industry

This subject is, of course, of importance for both industrialized and developing countries. An attempt was made in 1967 at "International Comparisons of Labour Productivity in the Iron and Steel Industry" (ST/ECE/STEEL/20; Sales Number: 67.II.E/Mim.9), and this was followed by a more comprehensive study of "Principal Factors Affecting Labour Productivity Trends in the Iron and Steel Industry" (ST/ECE/STEEL/29; Sales Number: 69.II.E/Mim.14). Apart from an analysis of the human, technical and economic factors at work, major developments in the principal sections of iron and steelmaking are reviewed; a series of monographs describes the situation in individual countries.

In 1970, a Seminar on "Factors Affecting Labour Productivity in Rolling Mills" was held in Budapest (Hungary), under the auspices of the ECE Steel Committee. A total of 32 papers was presented and discussed in five sessions (A: General; B: Technical; C: Economic factors; D: Organizational factors; E: Social factors). The Seminar was attended by about 140 experts; copies of the papers presented can be obtained from the ECE Secretariat.

9. Statistical publications

There is, first of all, the Quarterly Bulletin of Steel Statistics for Europe, which was first issued in 1950; it contains statistics on production of raw materials for iron and steelmaking as well as for production of finished steel products, consumption of raw materials in the iron and steel industry, foreign trade in iron and steel, movements of scrap, consumption of energy in the steel industry, and steel deliveries, by-products and consuming groups. These data are given regularly for most European countries; the United States and Japan were added in 1962 and 1964 respectively. As from 1973, a reduced version of the quarterly issue will be published; the annual issue will have the same coverage as the former quarterly issue. Although these data are mainly for the industrialized countries, the wealth of statistical information available from these bulletins permits experts in developing countries to make comparative studies; the questionnaires on which the information for the Bulletin is furnished by Governments have also been adopted by the Latin American Iron and Steel Institute (ILAFA).

The other statistical publication established under the auspices of the ECE Steel Committee is entitled "Statistics of World Trade in Steel". A first volume, covering the years 1913, 1925, 1929, 1936 to 1938, and 1950 to 1959, was published in 1961 (Sales Number: 61.XVII.5); it contained export data for steel products for seventeen exporting countries, by 115 countries and regions of destination for eleven steel products. Since, twelve further annual issues of "Statistics of World Trade in Steel" have been published;[1/] the number of exporting countries for which data are shown has been increased to 27.

10. Study tours

For a number of years, the ECE Steel Committee has been organizing study tours, during which plants and research institutes are visited, and discussions are being held among experts on concrete economic and technical problems arising in the operation of iron and steel plants. The following tours have taken place so far: 1966: USSR; 1967: Italy; 1968: Poland; 1969: United States and Canada; 1970: Japan; 1971: Romania; 1972: Czechoslovakia. A further study tour is scheduled to take place from 23-24 September 1973 in the Federal Republic of Germany. Experts from developing countries have participated in most of the tours; they have thus had a possibility to familiarize themselves with the most recent steelmaking technologies operating in plants, and to discuss their specific problems with experts from industrialized countries.

11. Studies on hand

Among the projects inscribed in the Steel Committee's programme of work there are two which would seem to deserve the special interest of the developing countries. One study is to deal with "Changing Pattern of Energy Use in the Iron and Steel Industry", and the other will analyse "Structural Changes in the Iron and Steel Industry". Both will be world-wide in coverage and are likely to treat problems concerning the developing countries.

1/ Sales Numbers: 1960: 62.II.E.5; 1961: 63.II.E.3; 1962: 64.II.E.5; 1963: 65.II.E.5; 1964: 65.II.E.10; 1965: 66.II.E.8; 1966: 67.II.E.7; 1967: E.69.II.E.6; 1968: E.69.II.E.17; 1969: E.70.II.E.12; 1970: E.71.II.E.12; 1971: E.72.II.E.8.

... Conclusion

Apart from the numerous studies and projects described above, which have a direct or at least an indirect importance for governmental or industrial circles in the developing countries, it should be recalled that the ECE Steel Committee and its Secretariat have also assisted in the preparation of and contributed to the two preceding Symposia which were held under the auspices of the United Nations Centre for Industrial Development (CID) and by UNIDO, in Prague and Geneva (November 1963) and in Moscow (September 1967). For the Symposium in Prague, the ECE Secretariat contributed four papers[1], members of the ECE Secretariat assisted in the holding of the session and acted as tour leaders for the ensuing plant visit in different countries. For the Symposium in Moscow, the ECE Secretariat prepared six papers[2]; ECE staff members served also as tour leaders for the plant visits to Czechoslovakia and Poland.

Further to this direct participation in the work of UNIDO, the ECE Steel Committee and the ECE Secretariat have always been in close contact with the UNIDO staff and have co-operated in the preparation of other projects UNIDO has carried out in the field of the iron and steel industry. The ECE Steel Committee continues to take a keen interest in UNIDO's work and in questions concerning the operation and further expansion of iron and steel industries in the developing countries.

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[1] "Raw materials and their preparation"; "Trends in production and consumption of iron and steelmaking raw materials in Europe and in the United States"; "Problems arising in the establishment and development of the iron and steel industry in the developing countries"; "Present and future trends of production and consumption of pig-iron and crude steel in Europe and the United States".

[2] "World production, trade and prices of iron and steel"; "Availability of iron ore and resources for iron and steelmaking"; "Automation in the iron and steel industry"; "Factors affecting steel demand and its product pattern in developing countries"; "The supply of steel in the developing countries"; "Economic aspects of computer control of the oxygen steelmaking process".

III. THE WORK OF OTHER UN FAMILY ORGANIZATIONS

1. Economic Commission for Africa (ECA)

ECA has carried out a number of surveys concerned with the development of iron and steel industries in African countries. A series of documents refer to the industry in West Africa:

- Iron and steel in West Africa (E/CN.14/IS/2)
- Problems involved in establishing and managing iron and steel plants in West African countries (WAC/IRON/7)
- Proposed terms of an agreement on a West African Iron and Steel Authority (WAISA) (WAC/IRON/9)
- Report of the West African Interim Expert Committee on Iron and Steel (Abidjan) (WAC/IRON/10)
- Proposed agreement establishing a West African Iron and Steel Commission (WAC/IRON/13)

Consideration has also been given to the problems of the industry in other parts of the region: for example, The development of the steel industry in East and Central Africa (E/CN.14/INR/87 and Add.1 and 2).

More general studies carried out by ECA cover Iron and steel and the first stage of transformation (E/CN.14/INR/72 - vols. I and II), Expected trends in rolled steel consumption from the point of view of product-mix in developing countries (E/CN.14/AS/II/2/a/1), and Type, size and location of re-rolling mill (WAC/IRON/7).

2. Economic Commission for Asia and the Far East (ECAFE)

ECAFE's activities have been directed towards assisting the developing countries of the region in expanding their steel production, on the basis of national projects as well as regional co-operation.

Typical studies undertaken since 1968 are indicated below:

Symbol	Title	Date	Pages
AIDC (4)/14	Japanese-AIDC Iron and Steel Survey Mission on Development and Expansion of the Iron and Steel Industry in South East Asia	27.01.69	433
AIDC (4)/9	AIDC Fact-finding Team on Iron and Steel Industry in Pakistan, Iran and India	20.01.69	98
AIDC (7)/1	AIDC Survey Mission on the Iron and Steel Industry in India, Iran, Pakistan, and Nepal	21.06.71	141
	ECAFE/UNIDO Iron and Steel Industry Survey Mission to four countries of the Lower Mekong Basin	25.05.71	199
AIDC (8)/10	Report of the Expert Team on Regional Co-operation for Stee. Billet Production	02.01.73	95
AIDC (7)/2	Investigation of Pulehoki Iron Ore Deposits in Nepal	16.06.71	24
	Pre-investment Feasibility Study on Singapore Steel Project	00.07.69	
E/CN.11/IRNR/ Ind. Conf.2/L.33	Problems of Iron and Steel Industry in the Region	13.06.70	10
AIDC (5)/10	Possibilities of Developing an Iron and Steel Industry in the Riparian Countries of the Lower Mekong Basin	12.12.69	22
MKDS 35	Mining Developments in Asia and the Far East	00.00.70	93

In addition, the ECAFE/UNIDO Regional Advisers on Metallurgical Industries have been providing technical assistance on specific steel industry problems. Some recent studies are:

	Engineering and Iron and Steel Industry in the Republic of Vietnam	00.10.68
	Development of the Thai Iron and Steel Industry	00.06.72
	Sponge Iron Production Plans in the Republic of Korea	00.12.72

3. Economic Commission for Latin America (ECLA)

ECLA has been carrying out studies designed to increase the efficiency and productivity of the iron and steel industry in the region. Studies have been carried out on national and regional bases: the more important of these, carried out since 1968, are as follows:

Symbol	Title and Author	Date	Pages
	Multinational programme for iron and steel research. Document prepared for the Organization of American States on the possibilities of obtaining financial support from the regional steel industry for establishment of a regional steel research system, by Georges Urbain (IRSID, France), Miguel Bohomoletz (ILAFA, Chile), and Bruno Leuschner (ECLA).	11.03.69	34
	Possibilities for the iron and steel industry in the relatively less developed countries. (With the collaboration of the consulting engineer Armando P. Martijena).		
E/CN.12/843/Add.2	I. Central America	14.08.69	22
E/CN.12/855	III. Ecuador	24.04.70	176
E/CN.12/854	II. Bolivia and Paraguay	06.05.70	319
	For the Seminar on Possibilities for the instalment of iron and steel plants in relatively less developed countries.		
	Economies of scale in the iron and steel industry.	02.06.70	
	Possibilities for the development of the iron and steel industry in some of the relatively less developed countries of Latin America	10.06.70	
	For the Andean Group		
	The integration of the iron and steel sector in the Andean Group	00.05.71	
	For the Seminar on the interchange of iron and steel products in Latin America		
	The impact of the mechanisms of integration on the interchange of the iron and steel products in the Andean Group	00.07.71	

Symbol	Title and author	Date	Pages
E/CN.12/[illegible]	Transfer of technical know-how in the Steel Industry in Brazil. Document prepared for a joint programme of ECLA, the InterAmerican Development Bank, and the Division for Public Finance and Financial Institutions of the UN, by Bruno Leuschner	00.10.71	
E/CN.12/[illegible]-Summary	Summary: The transfer of Technical Know-how in the Steel Industry in Brazil. Document prepared for the Symposium on transfer of technology in the Steel Industry held at Jamshedpur, India, in December 1971.	00.10.71	
	For the Latin American Seminar on Coal and Coke for the Iron and Steel Industry		
	Problems and prospects of the supply of carbon and coke for the Latin American iron and steel industry	00.05.72	

4. United Nations Educational, Scientific, and Cultural Organization (UNESCO)

The technical assistance rendered by UNESCO to the iron and steel industries has mainly been made through provision of metallurgy experts to UNDP projects for the establishment of scientific and technological research and development centres and a higher technical institute, and through provision of lectures and travel grants to participants in seminars of interest for the iron and steel industries.

The work by the following UNESCO experts is of particular interest:

- At the Central Scientific Instruments Organization (CSIO) in Chandigarh, India (UNDP Project IND.13), a UNESCO expert in metallurgy assisted in setting up its foundry and metallurgy division, which is rendering services to the country's industry. A report on the expert's work has been issued by UNESCO. The same expert later joined the Mechanical Engineering Research and Development Organization (MERADO), Durgapur, India (UNDP project IND/67/553), where he assisted in the development of its welding and foundry sections. MERADO is a new organization complementary to the Central Mechanical Engineering Research Institute (CMERI), Durgapur, concentrating on assistance to local industries. MERADO has besides its headquarters in Durgapur, three regional centres in Bombay, Kanpur, and Madras.

- In the Latin American region, a UNESCO expert in Mechanical Metallurgy and Material Science at the Faculty of Engineering, University of El Salvador (UNDP Project ELS/71/513), contributed to a significant advancement of studies and research in the field of iron and steel metallurgy, which was accomplished in close co-operation with the local iron and steel industry through advice, training of staff, and joint research. With the help of the expert, the Faculty of Engineering has co-operated with the Institute of Industrial Development of El Salvador (INSAFI) in a joint research project for the development of suitable processing of iron ore from the Metapán region in the country. A pilot plant for the production of 150 tons/year of steel bars will be jointly built and operated.

UNESCO has in the period 1968-1972 given financial support from its Regular Programme funds to the following courses and seminars:

1. Pan American Course on Metallurgy, Buenos Aires, Argentina. This course was initiated in 1962 and has since 1967 been held yearly. UNESCO is providing financial support for 10 - 12 participants from the region at each course for payment of their travel and subsistence allowances.
2. Seminar on Processing of Low-grade Mineral Ores, Concepción, Chile, December 1968. A UNESCO expert lectured at this course.
3. Physical Metallurgy Course, Ouro Preto, Brazil, May - June 1970. UNESCO provided travel grants to 6 Latin American professors participating in the course.
4. Seminar on Hot Air Melting Furnaces, University of Buenos Aires, August 1970.

The last three activities were organized under the programme of co-operation between UNESCO and the Latin American Centre for the Application of Science and Technology to Development (CECTAL), São Paulo, Brazil.

The following is a complete list of the UNESCO experts who gave assistance to the metallurgical industries of the developing countries during the period 1968-1972:

ASIA AND THE FAR EAST

Country	Subject	Expert	Year
India	Metallurgy (UNDP project IND-13, Central Scientific Instruments Organization - CSIO - Chandigarh)	UNESCO Expert	1968-1969
India	Applied Metallurgy (UNDP project TA/69/30, Central Scientific Instruments Organization, Chandigarh)	UNESCO Expert	1970-1971
India	Metallurgy (UNDP project IND/67/553, Mechanical Engineering Research and Development Organization - MERADO - Durgapur)	UNESCO Expert	1972-1973

EUROPE AND THE MIDDLE EAST

Cyprus	Foundry and Heat Treatment (UNDP project CYP/005, Higher Technical Institute, Nicosia, Cyprus)	UNESCO Expert	1971-1972

LATIN AMERICA

Latin American Region (Chile)	Seminar on processing of low-grade mineral ores, Concepción, Chile	UNESCO Expert	1968
Latin American Region (Argentina)	Seminar on Hot Air Melting Furnaces, University of Buenos Aires	UNESCO Expert	1970
El Salvador	Mechanical Metallurgy and Material Science (UNDP project ELS/71/512, Faculty of Engineering, University of El Salvador)	UNESCO Expert	1970-1973
Ecuador	Metallurgical Engineering (UNDP project TA/ECU/71/06, National Polytechnic School, Quito)	UNESCO Expert	1969-1972

During the period under review, two reports have been published by UNESCO concerned with the iron and steel industries of the developing countries:

Symbol	Title and Author	Date	Pages
UNESCO Issues			
FR/TA/INDIS 62 Serial No. 2569/ RMO.RD/SCT	Report by a UNESCO Expert on Applied Metallurgy in India	Jan.1972	13
UNDP project TA/ECU/71/06	"Reducción Directa de Oxido de Fierro mediante Carbón Vegetal" (Direct Reduction of iron oxide by vegetal carbon) by David Fuller and Jorge Vela. Paper presented by two UNESCO experts to the 2nd Latin-American Mineralogy Congress, Alami, Ecuador, April 1972.	April 1972	28

5. World Health Organization

Advice on specific problems related to environmental pollution arising from the iron and steel industry is given to the governments of member countries through WHO regional offices, by way of consultants and UNDP-assisted projects.

The WHO headquarters programme in environmental pollution does not consider pollution arising from the iron and steel industry as an individual project item in its on-going activities. (It is pointed out, however, that in the Inter-Regional Activities for 1974 a meeting is planned on the effects on health of specific air pollutants from industrial emissions. This will review the extent and nature of atmospheric pollutants resulting from industrial emissions and their possible harmful effects on health and on the environment.) Nevertheless, many aspects of pollution arising from industrial emissions generally are contained within the on-going programme.

The main objectives of this programme are:

(i) Establishment of criteria, exposure levels and standards

The establishment of levels of exposure to ensure the protection of man is one of the essential elements in the design and implementation of practical programmes for the control of air, water and food as well as in other areas of environmental health.

The following are considered to be priority areas:

(a) the evaluation and assessment of the available scientific information on health effects of environmental agents and guidance on environmental health criteria and standards;

(b) promotion and co-ordination of the relevant national research or related activities;

(c) the identification of environmental health hazards and the allocation of priorities with respect to their treatment.

(ii) Environmental monitoring and surveillance

The design, development, and operation of practical environmental pollution monitoring schemes are another major objective of the programme. These include such aspects as the promotion of uniform and comparable methods of measurement, the introduction of reliable and effective procedures for the calibration of routine sampling and analytical methods, and the development of acceptable procedures for recording, handling, and statistically analysing data. These schemes also help in generating international comparable information on levels and trends of environmental pollution in areas where they may be a hazard to health, in identifying patterns of exposures, in facilitating the planning and evaluation of health effects studies carried out in different countries, and in the comparative evaluation of the effectiveness of national environmental pollution control programmes.

(iii) Environmental control

Under this activity, WHO will continue to collect and assess information on pollution existing in various regions of the world, provide direct assistance to governments in the planning and evaluation of programmes in environmental pollution and develop guidelines for control and environmental quality management.

The provision of the latter guidelines will be of considerable value to member governments, particularly in developing countries. The control of environmental pollution is fundamentally a technological problem but these guidelines will also help to identify other important aspects of pollution control, for example, town planning and transportation policies, legal action and administrative procedures.

(iv) Guidelines on Industrial Wastes Control

In order to help ministries of health and other regulatory bodies in developing countries to assess the extent of the problem and to introduce efficient measures of control of industrial wastes, WHO has been issuing in the WHO/WD series several guidelines on industrial wastes control, which cover the following aspects: description of the process, raw materials and products, quantity and characteristics of wastes, reclamation and recycling practices, and methods of treatment and disposal.

Guideline No. 1, "The Planning and Organization of Industrial Wastes Control Programmes" outlines the problem and its solution in general terms. This guideline was followed up by a series of documents dealing with the control of wastes from specific industries, and the most recent (WHO/WD/73.12) deals with metal finishing wastes. The document briefly discusses quantity and characteristics of waste-waters, pollutional impact of waste-waters, in-plant controls, methods of treatment and disposal, and advises on surveys and evaluations.

6. International Labour Organization (ILO)

(a) The ILO Iron and Steel Committee

Labour and social problems arising in the iron and steel industry constitute the special field of activity of the Iron and Steel Committee of the International Labour Organization. This Committee is one of eight Industrial Committees which have been set up by the Organization to deal with the problems arising in some of the industries of greatest international importance, and its work takes place within the framework of the ILO's Programme of Industrial Activities. The following paragraphs give an updated version of the work done by the ILO in the field of the iron and steel industry.

The Iron and Steel Committee is composed of representatives of governments, and of employers and workers in the iron and steel industry. The membership of the Committee consists of the following countries: Argentina, Australia, Austria, Belgium, Brazil, Canada, Colombia, France, Federal Republic of Germany, Hungary, India, Italy, Japan, Luxembourg, Mexico, Netherlands, Spain, Sweden, Turkey, Ukraine, USSR, United Kingdom, United States, Venezuela.

The Eighth Session of the Committee, held in 1969, adopted detailed conclusions on the following subjects: role of employers' and workers' organizations in programming and planning in the iron and steel industry; and wage protection and income security for workers. It also adopted a number of resolutions dealing inter alia with shiftwork; collection of statistics and other relevant data and documents on legislative and contractual measures protecting workers in the iron and steel industry against the effects of technical change as well as data on any beneficial effects of technical data; studies and information on employment and redundancy; and future activities of the ILO concerning the iron and steel industry. During the period covered by this paper the ILO has continued the follow-up action on the suggestions made by the Committee in its conclusions and resolutions referred to above. Some aspects of this work are indicated below.

(b) Safety and Health

In its Conclusions concerning technological developments and their influence on the structure of remuneration, organization of work and safety in iron and steel plants, the ILO was requested to devote particular attention to the hazards which may arise out of increased speed of work, wider use of electricity, oxygen, pneumatic controls, higher pressure, and the use of ionizing radiations. The ILO was also requested, in co-operation with experts and with employers' and workers' organizations, to make technical assistance available, on request, for the preparation of occupational safety and health measures, labour inspection and the establishment of safety bodies. Under the auspices of the ILO, the International Occupational Safety and Health Information Centre (CIS) has, since 1970, published in English, French, and German, and disseminated throughout the world, 150 abstracts of articles dealing with numerous specific aspects of occupational safety and health in the iron and steel industry such as respiratory diseases affecting workers engaged in making and repairing furnace linings in iron and steel works, and among foundrymen; atmospheric pollution in and around oxygen-blown steelworks; health hazards of scarfers, fettlers, and grinders in the iron industry; dust collecting in foundries; protective clothing for foundry workers exposed to the risks of burns or of impact; safety measures in blast furnaces; the evaluation of vibrations and the cost of accidents in iron and steel works. These abstracts have also been published in four other languages, by national centres in Italy, Romania, Spain and the USSR, affiliated to the CIS.

ATTACHMENT 1

UNIDO Projects in the Iron and Steel Industry

EUROPE AND THE MIDDLE EAST

Country	Project
Greece	- Assistance to Greek iron and steel industry
Iceland	- Pre-feasibility study on electro-smelting of ilmenite concentrates for the production of rutile slag and pig iron
Iraq	- "Evaluation of the offers for semi-integrated steel plant and preparation of a feasibility study for the production of sponge iron"
Jordan	- Assistance to steel rolling mill industry in Jordan
Syrian Arab Republic	- "Assistance in the utilization of steel scrap for local steel production" - "Assistance in the heat treatment of special steels" - "Advice on installation and operation of steel rolling mill" (completed)
Turkey	- "Ferro-chromium production expert" - "Assistance to the Marmara Scientific and Industrial Research Institute"
Yugoslavia	- "Steel vacuum degassing expert" - "Expert in vacuum spectroscopic and X-ray fluorescence analysis of minerals, iron and steel" - "Assistance to Metallurgical Institute 'Hasan Brkić', Zenica"

AFRICA

Arab Republic of Egypt	- "Expert in the production of steel rolls" - "Central Metallurgical Research and Development Institute" - "Application of modern data system to the metallurgical industry" - "Quality control of longitudinal and spiral welded steel pipe" (completed)

Country	Project
	- "Pilot-plant scale investigations and trials on beneficiation, pre-reduction and electric smelting of the Aswan iron ore" (completed)
	- "Feasibility study of Aswan steel project" (completed)
	- "Pilot-plant scale tests on Bahariya iron ore for the production of sponge iron" (completed)
	- "Assistance to the Iron and Steel Company (Helwan)" (completed)
	- Laboratory-scale tests on ilmenite samples and feasibility study of industrialization of ilmenite ore deposits for production of titanium-rich slag and pig iron
Ghana	- "Assistance to the Ghana Industrial Holding Corporation" (completed)
Madagascar	- "Pre-feasibility study for creation of small iron and steel plant based on charcoal"
Mali	- "Pre-feasibility study of the iron and steel industry" (completed)
Senegal	- "Foundry Development Centre"
	- Feasibility study with laboratory-scale investigations on processing titanium - iron bearing heavy black sands
Somalia	- "Establishment of a foundry and a mechanical workshop"
Sudan	- "Establishment of a foundry and a mechanical workshop"
LATIN AMERICA	
Argentina	- "Low-grade iron ore beneficiation technologist" (completed)
	- "Iron foundry expert" (completed)
	- "Industrial development of the North West Region (Steel-based industries)"
	- "Foundry laboratory testing and quality control"
Brazil	- "Study of the possibilities for the development of metallurgical industries in the State of Bahia" (completed)
	- "Post-graduate courses in ferrous metallurgy"
	- "Technological innovation and its implications for long-range planning of the iron and steel industry" (completed)
	- "Technical assistance to the iron and steel industry" (new small-scale project)

Country	Project
Chile	- "Expert on quality control of rolled steel plate"
	- "Mineral and Metallurgical Research Centre"
	- "Assistance to the Compañía de Acero del Pacifico"
Colombia	- "Centre for Development of Metallurgical and Mechanical Sector"
	- Project for the establishment of Foundry Pig Iron Plant (completed)
Cuba	- "Lecture course in the theory and practice of hot and cold rolling for engineers"
	- "Courses for engineers on ferrous metallurgy" (completed)
Ecuador	- "Metal foundry expert" (completed)
Mexico	- "Iron and steel industry adviser"
Peru	- "Expert in the assessment of tenders for an electrolytic tinning line" (completed)
	- "Industrial cost accountant in the iron and steel industry" (completed)
	- "Flat product rolling mill expert"
	- Assistance to SIDERPERU (expansion of the Chimbote)
	- Assistance to INDUPERU (Nazca)
	- Pre-investment study on the iron and steel industry development (completed)
Venezuela	- "Adviser on planning and development of the iron and steel industry"

ASIA AND THE FAR EAST

India	- "Establishment of a Central Creep Testing Research facility at the National Metallurgical Laboratory"
	- "Establishment of a pilot and demonstration plant for the production of pig iron using non-coking coal in Andhra Pradesh"
	- "Assistance in the establishment of a sponge iron plant in Orissa"
	- "Tests on iron ore deposits from Goa and Mysore for the production of sponge iron" (completed)
	- "Pilot-plant scale investigations on vanadiferous magnetites for the production of ferro-vanadium" (completed)

Country	Project
	- Feasibility study including laboratory-scale investigations of processing ilmenite concentrates to titania and iron bearing products (completed)
	- "Establishment of a hydrostatic extrusion pilot and demonstration plant at the National Physical Laboratory, New Delhi"
Indonesia	- "Assistance to the Tjilegon Steel Plant" (completed)
Iran	- Pilot-plant scale tests on direct reduction of iron ore by HyL process for the production of sponge iron (completed)
	- "Capacity study for foundry and forges" (completed)
Malaysia	- "Metal Industries Development Centre"
Philippines	- "Steel industry adviser" (completed)
Thailand	- "Expert in the quality control of hot-dipped tinplate production" (completed)
	- "Assistance for the establishment of an integrated iron and steel industry"
South Korea	- Technical assistance for the feasibility of the establishment of an integrated iron and steel plant in South Korea

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The above list covers most of the technical assistance projects handled by UNIDO and generally illustrates the operational activities of UNIDO; the list itself may not be necessarily complete in every way.

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