



**TOGETHER**  
*for a sustainable future*

## OCCASION

This publication has been made available to the public on the occasion of the 50<sup>th</sup> anniversary of the United Nations Industrial Development Organisation.



**TOGETHER**  
*for a sustainable future*

## DISCLAIMER

This document has been produced without formal United Nations editing. The designations employed and the presentation of the material in this document do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations Industrial Development Organization (UNIDO) concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries, or its economic system or degree of development. Designations such as “developed”, “industrialized” and “developing” are intended for statistical convenience and do not necessarily express a judgment about the stage reached by a particular country or area in the development process. Mention of firm names or commercial products does not constitute an endorsement by UNIDO.

## FAIR USE POLICY

Any part of this publication may be quoted and referenced for educational and research purposes without additional permission from UNIDO. However, those who make use of quoting and referencing this publication are requested to follow the Fair Use Policy of giving due credit to UNIDO.

## CONTACT

Please contact [publications@unido.org](mailto:publications@unido.org) for further information concerning UNIDO publications.

For more information about UNIDO, please visit us at [www.unido.org](http://www.unido.org)



05275



United Nations Industrial Development Organization

---

Distr.  
LIMITED

ID/WG.146/103  
26 July 1973

ORIGINAL: ENGLISH

Third Interregional Symposium  
on the Iron and Steel Industry  
Brasilia, Brazil, 14 - 21 October 1973  
  
Agenda item 8

FOLLOW-UP REPORT ON THE UNIDO WORKSHOP ON  
THE CREATION AND TRANSFER OF METALLURGICAL KNOW-HOW  
HELD AT  
THE NATIONAL METALLURGICAL LABORATORY,  
JAMSHEDPUR, INDIA  
7 - 11 DECEMBER 1971

prepared by  
the secretariat of UNIDO

We regret that some of the pages in the microfiche copy of this report may not be up to the proper legibility standards, even though the best possible copy was used for preparing the master fiche.

SUMMARY

The report on the UNIDO Workshop on the Creation and Transfer of Metallurgical Know-How held at Jamshedpur (INDIA), 7-11 December 1971 (ID/103), sets forth summaries of the expert papers prepared for the Workshop and gives a brief account of the discussions in the Workshop. It outlines the conclusions of the Workshop and its recommendations to UNIDO, to Governments of developing countries, and to the industry. This paper sets forth the follow-up action needed in each case, based on the deliberations of the UNIDO Workshop.

## CURRENT STATUS AND PROBLEMS

We still know remarkably little about the international transfer of metallurgical know-how and much less still about the status of development and creation of metallurgical know-how in the developing world. There are several ways through which technical knowledge and metallurgical know-how find their way from the advanced to the developing countries, but the overriding and often unanswered questions are whether and to what extent such "transfer of metallurgical know-how" does take place, at what cost and speed, and how far the cost of such transfer qualitatively and quantitatively is commensurate with the actual results achieved. There is no unified way to judge these results qualitatively and still much less quantitatively. There can be no uniform or rigid pattern for the transfer of technology from the developed to developing countries since conditions differ in the developing countries and each country has to decide its own policies and modes of the transfer of metallurgical know-how and technology. In the course of the next decade, developing countries will have to invest an estimated \$20 billion (including infrastructure investment), if not more, for the development of their metallurgical industries. Most of this investment will correspond to plant installations and related facilities. A sizable portion of the investment, perhaps one fourth, will correspond to the acquisition of direct and indirect know-how. Since many developing countries (for example, Argentina, Brazil, India, Mexico etc.) feel that they cannot continue to depend primarily on imported equipment and technical know-how, on a commercial basis, UNIDO plans to assist in the establishment of local sources and systems for know-how creation and transfer. This would ensure that a substantial amount of the total investments required is applied locally in the acquisition of services (planning, engineering, design, research and development) or of equipment. In other instances, the need for autochthonous metallurgical know-how arises from special conditions, as when the national economy depends markedly on certain metallurgical products (for example, Bolivia, Chile, Malaysia, Zaire, Zambia). Still in other cases (many countries in Latin America, Asia and Africa could be listed as examples) it is the need to maintain or accelerate a process of industrialization which requires ready availability of local expertise for planning, design, and operation of plant installations, adaptive research, and development etc. The problem is directly related to the development of a sound metallurgical industry, essential for sustained economic growth.

Some of the developing countries (Brazil and India, for example) have established nuclei of metallurgical know-how, technical consultancy services, research, and development but these need expansion, diversification, and specialization in certain specific areas and advanced fields. In most other developing countries such nuclei have yet to be established on an effective basis. The methods of transfer of technology between one advanced country to the other and from advanced countries to the developing countries vary widely, depending upon the economic and political conditions of the countries involved. One of the ways the transfer of technology takes place from a foreign enterprise to its branch or its subsidiary firm in the developing country is often based on direct foreign investment as an adjunct to the transfer of technology; some developing countries do not favour the latter, since they do not actively or financially participate in such enterprises and often have little management or policy control over the foreign enterprises' operations.

The transfer of technology in another form is based on licensing the use of a process by a foreign firm to the indigenous producer in a developing country. This mode of technology transfer does not provide full safeguards that the specialized process will not be utilized by a third party in the same developing country or even in another country. For the licensee, it means a continuous payment of royalties.

Another method often used is the "turn-key" package deal in which the foreign firm or a consortium of foreign firms undertakes to set up the entire plant and related ancillary units and also is supposed to give performance guarantees over a certain period for integrated plant's operations based on specific norms of productivity, production costs, and quality of the product. However, in practice these guarantee clauses, hedged as they often unobtrusively are by so many subtle and indiscernible clauses, not infrequently fail to provide the required safeguards, thereby entailing to the developing country additional financial expenditure. The "turn-key" and package deals are considered by many to be not wholly satisfactory in the long run or in their ultimate analysis, tending as they do to repetitive import of technology and at times continuous dependence by the developing countries on foreign technology.

In order to discuss the complex subject of the "Creation and Transfer of Metallurgical Know-How" on a broad perspective and in depth and furthermore to make specific recommendations thereon and formulate requisite follow-up action, UNIDO organized a Workshop on the Creation and Transfer of Metallurgical Know-How which was held at the National Metallurgical Laboratory, Jamshedpur, India, from 7 - 11 December 1971. The full report of the Workshop is given in document ID/103.<sup>1/</sup>

---

<sup>1/</sup> Copy attached for participants.

### FOLLOW-UP ACTION

Although the Workshop on the Creation and Transfer of Metallurgical Know-How was held about one and a half year's ago, some of its recommendations are under continuous implementation by UNIDO, in collaboration with the developing countries and the government organizations concerned.

Illustrations of the implementation of these recommendations by UNIDO are provided by the following Centres for Metallurgical Technology and Research and Development set up through UNIDO/UNDP technical assistance programmes through Large-Scale Projects:

- (a) Central Metallurgical Research and Development Institute  
Egypt, DP/EGY/70/563
- (b) Mineral and Metallurgical Research Centre, Chile, DP/CHI/71/542
- (c) Creep Testing Facilities at the National Metallurgical  
Laboratory, Jamshedpur, India, DP/IND/71/611

Other such Centres for Metallurgical Technology are currently under formulation/establishment through the Country Programmes, such as the Harzara Industrial and Technological Research Centre, Gabse, Turkey, the Centre for Metallurgical Technology in Mexico, a Metal Advisory Centre in Pakistan, and the Centre for Metallurgical Technology in Iran.

### Technical Consultancy and Design Services in metallurgical fields

The Technical Consultancy and Design Services in a developing country should bring out the operational deficiencies and the techno-economic shortcomings in the metallurgical expertise developed at the local research centres and assist the latter in rectifying them. Such feedback and co-operation between the two specialized services would lead to self-sufficiency in the technical fields instead of the permanent borrowing of costly technology. The Technical Consultancy and Design Services will additionally prevent waste of capital funds on commercially improved processes developed at metallurgical research centres in the developing countries. At the same time, such Technical Consultancy Services will evaluate and critically analyse the technological processes sought to be imported with a view to minimize, if not eliminate, the import of unproved and unsound technological processes and plants to developing countries, examples of which are by no means lacking.

In line with this recommendation of the Commission, metallurgical design and consultancy facilities are sought to be established through UNIDO technical assistance programmes in Egypt in the form of a full-fledged, comprehensive, and self-contained Metallurgical Design and Technical Consultancy Center, which will be able to provide high-level technical consultancy and design services to the burgeoning metallurgical industries in Egypt.

In related fields, follow-up action has been planned by UNIDO/UNDP such as in India through the establishment of a Demonstration Plant for the production of sponge iron using non-coking coal with a daily rated capacity of 50 tons of sponge output. Likewise, foundry demonstration plants are under establishment in some of the African countries through UNIDO/UNDP technical assistance programmes.

In the case of Latin America, concerning Metals Technology Transfer, UNIDO has collected a wealth of data on metal-transforming technologies suitable for Latin American metallurgical industries.

The data consist of 250 specific items of metal-transforming know-how from 67 institutes, organizations and companies from 14 developed countries. UNIDO compiled the data after contacting some 3,000 major organizations in the developed world carrying out metal-transforming activities. The acquired know-how, which is for sale through joint venture, licence and royalty agreements, will be made available through various UNIDO programmes, in collaboration with Governments concerned, to some 1,500 firms in Latin America.

UNIDO's goals in promoting this technology transfer are: the application of selected new processes in the developing countries; the conclusion of technical assistance agreements leading to new or improved operations; the establishment of contacts between firms and organizations in developing countries with consulting firms in developed countries for the solution of specific problems; and the establishment of institution-to-institution agreements.

Latin America was selected as the initial target area because the demand for an increasing variety of manufactured products there has created a need for more advanced fabrication techniques in the metal-transforming industries.

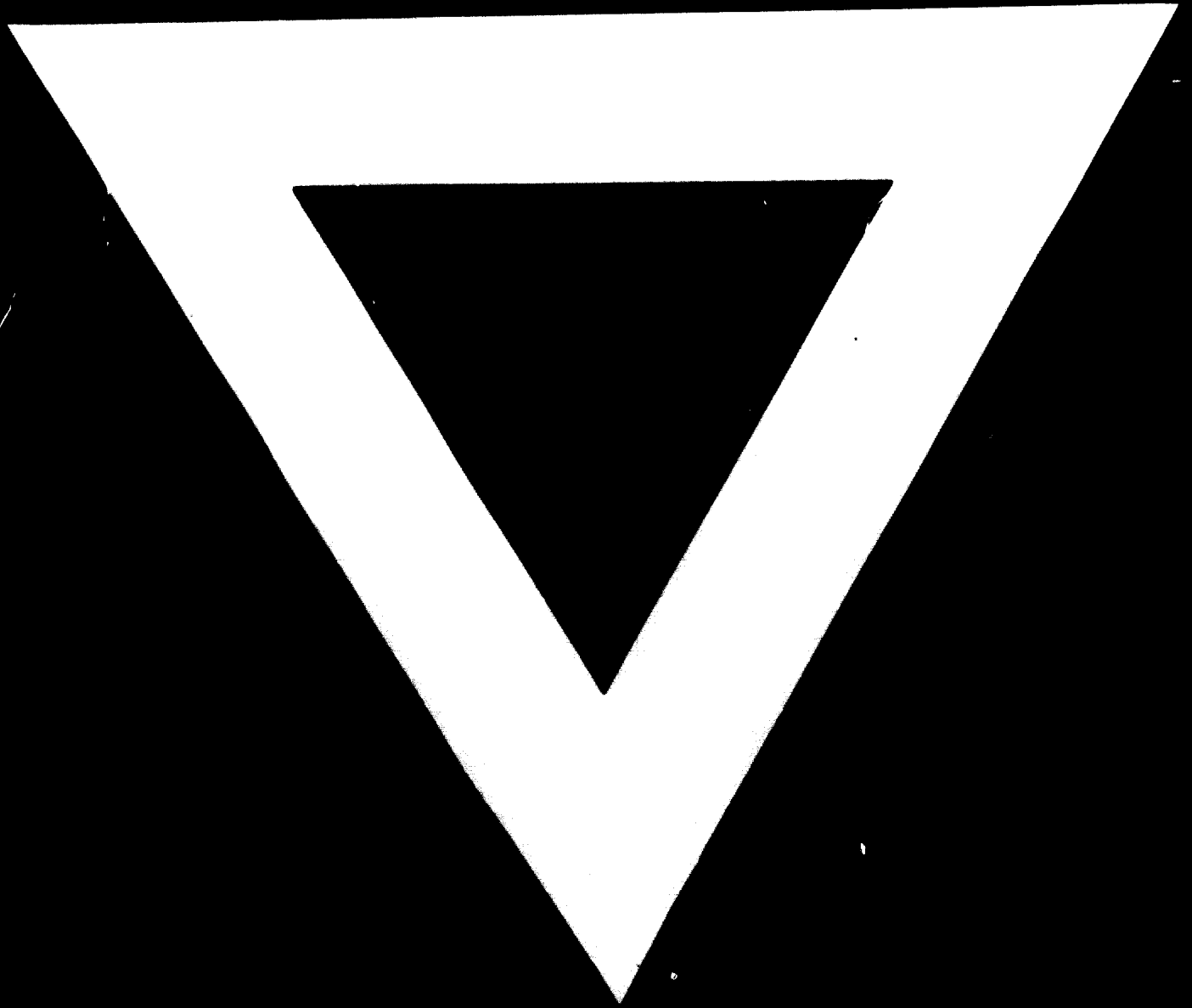


At the same time, lack of information and contacts in many cases have prevented these industries from taking advantage of know-how on processes, equipment or products available in other countries.

The techno-economic sheets, in which the data are contained, are classified into the main branches of metal-transforming: rolling, forging, casting, welding, extrusion, pressing and stamping, drawing, powder metallurgy, explosive forming etc.

These cases could be multiplied and are illustrative of the follow-up action which UNIDO is systematically and painstakingly pursuing in the multiple fields of the Creation and Transfer of Metallurgical Know-How.





**2 . 9 . 7 4**