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UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

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# FOURTH CONSULTATION ON THE IRON AND STEEL INDUSTRY

Vienna, Austria, 9–13 June 1986

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## REPORT

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## PREFACE

The Second General Conference of the United Nations Industrial Development Organization (UNIDO), held at Lima, Peru, in March 1975, recommended that UNIDO should include among its activities a system of continuing consultations between developed and developing countries with the object of raising the share of developing countries in world industrial output through increased international co-operation.<sup>1/</sup> The General Assembly, at its seventh special session in September 1975, endorsed the recommendation and requested UNIDO to implement it under the guidance of the Industrial Development Board.

In May 1980, the Industrial Development Board decided to establish the System of Consultations on a permanent basis, and in May 1982 it adopted the rules of procedure<sup>2/</sup> according to which the System of Consultations was to operate, including its principles, objectives and characteristics, notably:

(a) The System of Consultations should be an instrument through which UNIDO would serve as a forum for developed and developing countries in their contacts and consultations directed towards the industrialization of developing countries; <sup>3/</sup>

(b) Consultations would also permit negotiations among interested parties at their request, at the same time as or after consultations; <sup>4/</sup>

(c) Participants of each member country should include officials of Governments as well as representatives of industry, labour, consumer groups and other, as deemed appropriate by each Government; <sup>5/</sup>

(d) Final reports of the Consultations should include such conclusions and recommendations as were agreed upon by consensus by the participants; the reports should also include other significant views expressed during the discussions. <sup>6/</sup>

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<sup>1/</sup> Report of the Second General Conference of the United Nations Industrial Development Organization (ID/CONF.3/31), chap. IV, "The Lima Declaration and Plan of Action on Industrial Development and Co-operation", para. 66.

<sup>2/</sup> See Draft rules of procedure for the System of Consultations (ID/B/258), annex.

<sup>3/</sup> Official Records of the General Assembly, Thirty-fifth Session, Supplement No. 16 (A/35/16), vol. II, para. 151(a).

<sup>4/</sup> Ibid., para. 151(b).

<sup>5/</sup> Ibid., para. 152.

<sup>6/</sup> Ibid., Thirty-second Session, Supplement No. 16 (A/32/16), para. 163.

The First Consultation on the Iron and Steel Industry was convened at Vienna, Austria, in February 1977;<sup>7/</sup> the Second Consultation on the Iron and Steel Industry was held at New Delhi, India, in January 1979;<sup>8/</sup> and the Third Consultation on the Iron and Steel Industry took place at Caracas, Venezuela, in September 1982.<sup>9/</sup> The Industrial Development Board, at its seventeenth session in May 1983,<sup>10/</sup> took note of the conclusions and recommendations of the Third Consultation and decided at its nineteenth session in May 1985 that a consultation on the iron and steel industry should be held during the biennium 1986-1987.<sup>11/</sup>

Twenty-seven Consultations have been convened since 1977 covering the following industries and topics: capital goods, agricultural machinery, iron and steel, fertilizers, petrochemicals, pharmaceuticals, leather and leather products, vegetable oils and fats, food-processing, industrial financing, training of industrial manpower, wood and wood products and building materials.

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7/ Report of the First Consultation Meeting on the Iron and Steel Industry, Vienna, Austria, 7-11 February 1977 (ID/WG.243/6/Rev.1).

8/ Report of the Second Consultation Meeting on the Iron and Steel Industry, New Delhi, India, 15-19 January 1979 (ID/224).

9/ Report of the Third Consultation on the Iron and Steel Industry, Caracas, Venezuela, 12-17 September 1982 (ID/291).

10/ Report of the Industrial Development Board on the work of its seventeenth session (Official Records of the General Assembly, Thirty-eighth Session, Supplement No. 16 (A/38/16)), para. 76 (1).

11/ Report of the Industrial Development Board on the work of its nineteenth session (Official Records of the General Assembly, Fortieth Session, Supplement No. 16 (A/40/16)), para. 89 (3).

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## INTRODUCTION

1. The Fourth Consultation on the Iron and Steel Industry was held at Vienna from 9 to 13 June 1986. The Fourth Consultation was attended by 164 participants from 52 countries and 13 international and other organizations (see annex I).

### Background to the Fourth Consultation

2. The reports of the three previous Consultations on the iron and steel industry<sup>1/\*</sup> and the progress reports on the follow-up action taken on the recommendations of those Consultations<sup>2/</sup> record the way in which the consideration of the iron and steel sector by the System of Consultations has progressed. The First Consultation concentrated on issues related to the long-term prospects for the development of the iron and steel industry and its requirements in terms of raw materials, fuel, technology and financing. UNIDO was requested to promote actively a continuous exchange of information on the sector and to identify obstacles to the development of the world steel industry and ways to overcome them and thus promote international co-operation in the development of the industry.

3. The Second Consultation focused on the changing pattern of world steel production and problems connected with financing. The Consultation called for a medium-term development programme; international co-operation on the supply of iron ore and coking coal; assistance to developing countries establishing a steel industry, particularly in relation to technical and economic information and advice as well as training; and an examination of the social and human aspects of the development of the iron and steel industry.

4. The Third Consultation discussed issues related to manpower training, financing iron and steel projects and the entry of newcomers into the steel sector, and adopted recommendations for action in those areas. Recommendations were oriented towards an increase of information and co-operation between developing countries on training as well as the development of comprehensive guidelines on training methods; special emphasis was placed on the evaluation of existing systems for financing infrastructure and training; and measures were recommended for assisting newcomers in the establishment of new projects, particularly those using mini-steel technology.

### Preparations for the Fourth Consultation

5. In preparing for the Fourth Consultation, special emphasis was given to the analysis of the present situation of the iron and steel industry and the restructuring process taking place at the global level (ID/WG.458/3). In that context, alternative development strategies for the iron and steel industry in developing countries were analysed. Special emphasis was given to the study of the linkages between the iron and steel industry and other sectors of the economy, particularly the capital goods industry. The analysis was carried out at the global level (ID/WG.458/5 and ID/WG.458/7) and in selected

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\* See Annex II for a complete list of documents.

1/ See ID/WG.243/6/Rev.1, ID/224 and ID/291.

2/ See ID/WG.286/1, ID/WG.374/5 and ID/WG.458/14.

developing countries (ID/WG.458/6, ID/WG.458/9 and ID/WG.458/8). The main findings of these studies were discussed in an ad hoc Expert Group Meeting held at Vienna, Austria, from 16 to 18 October 1985 (UNDIO/PC.127). In one of its main recommendations, the Meeting emphasized the importance for developing countries to develop an integrated approach between the iron and steel industry and the capital goods sectors as a basis for more independent and self-reliant economic and social development that takes into account the specific conditions and possibilities of each region and country relating to the availability of raw materials, levels of technical development and training of manpower and the satisfaction of basic development needs.

6. A symposium was held at Stockholm, Sweden, from 25 May to 4 June 1983, organized exclusively for newcomer countries. At that symposium, special emphasis was given to the analysis of the mini-plant technological route. As follow-up to the symposium, an international seminar on iron and steel was held at Karachi, Pakistan, from 19 to 29 May 1984, where the following topics were discussed: appropriate technology for steel production in developing countries; financing the development of the steel industry, particularly for infrastructure and training, with special emphasis on the use of mini-steel technology; the integrated development of the steel industry, linking it with the agricultural machinery and capital goods industries; operational problems of steel plants in developing countries: the role of the UNIDO technical assistance programme; and training and manpower for the steel industry in developing countries.

7. In order to compile relevant information that could be of help to newcomers to the steel industry in implementing their mini-plant projects, the UNIDO secretariat carried out a survey of 74 mini-plants of a wide range of sizes and types located in 23 developing and 13 developed countries. The findings of this survey are detailed in ID/WG.458/4.

8. An expert group meeting was held at Vienna, Austria, from 2 to 5 December 1985, to assist African countries in the establishment and operation of mini-plants for producing iron and steel (UNIDO/PC.132). The meeting was attended by many of the directors of mini-steel plants in Africa, and guidelines were discussed and recommendations were made on ways to improve the establishment and operation of mini-plants in developing countries, particularly in Africa. It was also recommended that a regional association of African producers should be created in order to co-ordinate actions directed towards solving problems in the areas of technology and training, information, production and commercialization.

9. A project was undertaken to formulate guidelines for methodologies in training directed towards achieving greater domestic capacity for mastering the technical and socio-economic complexities of the iron and steel industry. In the implementation of that project, the experience of developing countries was taken into account, and the results were thoroughly discussed with experts from selected developing countries. The main findings of the project are given in ID/WG.458/1 and ID/WG.458/1/Add.1.

10. A study was undertaken to identify both the main financial problems and potential financial resources for the implementation of iron and steel projects in developing countries. Studies were also carried out on existing systems for financing infrastructure and training (ID/WG.458/10, UNIDO/PC.104, UNIDO/PC.130, and ID/WG.458/2).



11. In the light of the conclusions and recommendations reached by the first three Consultations and the follow-up activities carried out by the secretariat, as well as world economic developments in general and the development of the steel industry in particular, the following three issues were presented to the Consultation for its consideration:

Issue 1: The iron and steel industry: Present situation, prospects and the need for more integrated development of the iron and steel and capital goods industries

This issue is based on an analysis of the present situation of the iron and steel industry and its future prospects. It is focused on the need for developing countries to develop their iron and steel industry integrated with the other sectors of the economy, particularly the capital goods sector, taking into consideration each country's needs and resources and the current levels of production of iron and steel and capital goods.

Issue 2: The mastering of the technology and development of the iron and steel industry in developing countries

This issue is closely linked to the first one, as mastering the process of selecting and implementing appropriate technologies is important for a more integrated development of the iron and steel industry in developing countries. The importance of training is highlighted and mini-steel technology is discussed as representing a valuable option for developing countries.

Issue 3: Financial situation and perspectives of the iron and steel industry

In this issue, some of the financial problems affecting the iron and steel industry are examined, with special emphasis on the identification of the main financial constraints to the development of new capacities in developing countries and on ways of improving both internal and external systems of financing.

## AGREED CONCLUSIONS AND RECOMMENDATIONS

### Issue 1: The iron and steel industry: Present situation, prospects and the need for more integrated development of the iron and steel and capital goods industries

#### Conclusions

1. The current world economic situation and the difficulties experienced by the iron and steel industry in some countries lead to the necessity of establishing in developing countries a strategy of integrated development, taking into account the relationships between the iron and steel sector and other sectors of the national economy, such as infrastructure, the capital goods sector including agricultural machinery and transportation. Such integration would lead to more balanced development and foster the conditions necessary for a dynamic industrialization.
2. It is also recognized that integration between this sector and other sectors could lead to the strengthening of linkages, in particular at the national level and also to increased co-operation at the subregional, regional and interregional levels. Such co-operation, between developed and developing countries as well as developing countries themselves, would take due account of existing production capacities and structures in these countries, due regard having been taken of the need for rational exploitation of raw material resources in the concerned developing country.
3. It could be an advantageous option to install production facilities from a finishing level, which would allow for backward integration in the future. Production through the mini-steel mill route gives more operational flexibility, which may often be of great advantage for developing countries. It would be an advantageous option to install production facilities beginning from the finished products stage, which could offer advantages for co-operation at the subregional, regional, interregional and international level. Further prospects for this type of collaboration between developed and developing countries as well as among developing countries themselves are considerable and should be actively promoted by UNIDO.
4. Modernization of existing production processes and equipment in the iron and steel industry offers considerable economic, financial and social advantages, particularly considering domestic conditions in both developed and developing countries, keeping in view the crisis in the industry in many countries. Such modernization, based upon existing manpower, skills and infrastructure, could limit the amount of new financial resources required to achieve higher output and cost benefits.
5. The Consultation emphasized the necessity of ensuring effective training at all levels of the iron and steel industry and furthermore recognized that such training would need to encompass a clear understanding of policy measures and the linkages between the industry and other sectors of the economy. Such policy measures should ensure effective linkage and integration of the industry with other priority sectors of the economy.

6. The Consultation recognized the wide scope for co-operation between developed and developing countries and among developing countries themselves in such areas as research and development, training, engineering design, the construction, operation and maintenance of plants. Furthermore, existing research and development facilities could promote co-operation with developing countries by being responsive to their technological needs.

7. In the process of selecting technological options, it was recognized that due account would need to be taken of the consequences of those options in view of the need to protect the environment.

### Recommendations

#### Policy recommendations

1. It is recommended that Governments and/or those concerned, where appropriate, should:

(a) Formulate appropriate policy incentives and/or make planning provisions that would facilitate integrated development between their iron and steel sector and other key economic sectors and in particular the capital goods sector;

(b) In pursuit of such integrated development, consider technological options that are appropriate to the needs, resources and technological capabilities of their countries, taking into account the long-term economic viability;

(c) While planning to rationalize and modernize their existing capacities and/or add new capacities, formulate policies that are socially and economically compatible with the main needs of other sectors of their economies.

#### Co-operation among developing countries

2. It is recommended that developing countries should aim towards promoting close interaction at the subregional and regional levels, as well as at the interregional level, so as to exchange raw materials, energy resources, products, technological capabilities and engineering skills; to facilitate joint investment; and to promote optimal utilization of capacities.

#### Co-operation between developed and developing countries

3. It is recommended that developed countries should try to facilitate the transfer of technology, knowledge and training to developing countries in order to increase the technological capabilities of the latter and in order to achieve a balanced development of the iron and steel and capital goods industries and joint investment.

#### UNIDO technical assistance

4. Within the framework of the integrated development of iron and steel with capital goods and other priority sectors, UNIDO should strengthen its technical assistance programmes, which would contribute to reinforcing the capability of developing countries in:

(a) The collection, compilation and dissemination of information as well as in negotiations with regard to transfer of technology, investment, training and policies of industrial restructuring that are taking place in some countries;

(b) The preparation of domestic policies, plans, programmes and training arrangements;

(c) The preparation of feasibility studies that take due account of technical, social and economic linkages and relationships between iron and steel and other industrial and economic sectors.

5. In addition, UNIDO should promote through technical assistance programmes, including seminars, workshops and expert group meetings, integrated development between the iron and steel sector and the rest of the economy. In all these activities emphasis should be given to co-operation between developing countries.

#### Protection of the environment

6. All parties concerned should recognize the imperative need to protect the environment in designing and operating plants where the risk of pollution is high. To this effect, UNIDO and UNRP are called upon to strengthen their co-operation.

#### Issue 2: The mastering of the technology and development of the iron and steel industry in developing countries

#### Conclusions

1. Training is a key aspect in the mastery of technology in developing countries. However, in order to be effective, training must address itself not only to operational aspects but also to management and engineering as well as to linkages between the plant and the socio-economic environment. For these reasons, it is essential to make use of the experience accumulated in developing countries, owing to the similarities in these countries in terms of resources, infrastructure, relative costs and socio-cultural factors.

2. It is of particular importance for regions establishing their own technological base, to develop basic and detailed engineering capacity, which would permit the adaptation and manufacture of capital goods for both the iron and steel industry and other sectors of the economy. It was agreed that on the basis of the positive experience gained, the creation and operation of regional institutions and projects should be further encouraged.

3. The possibility of phased development in the iron and steel industry in countries that do not yet have one should be borne in mind. Such development, starting usually with the rolling of semi-finished products that have been imported or produced under regional agreements, allows for the establishment of a domestic iron and steel industry that is compatible at every stage with domestic requirements, financial capacity and available resources.

4. It should be recognized that the technological option of mini-steel plants will influence the training requirements for efficient operation and maintenance.

5. There is no adequate substitute for local in-plant training, and therefore overseas training, in view of its high cost and other considerations, should normally be reserved for specific purposes and key personnel. The effectiveness of external training can be seen in the subsequent ability of those trained to transmit skills to others and supervise larger numbers of personnel. Therefore, the selection of participants for overseas training should be limited to and based on management development needs.

6. The crucial importance of appropriate training is recognized. One way to achieve this would be by offering real incentives, such as career development opportunities, and introducing regular refresher courses to enable staff to keep abreast of technological change and innovations. Due attention should be paid to the particular training requirements for the maintenance of mechanical, electrical and electronic components.

7. In many developing countries there is a pressing need for intensive training at the managerial and organizational level; the mastery of technology must be accompanied by corresponding supervisory and managerial abilities. On occasion, the expectations of an enterprise and those of trainees differ significantly and, therefore, adequate safeguards should be introduced to ensure that the benefits of training programmes accrue to the sponsors.

8. The production of iron and steel using charcoal is another field in which some developing countries already have sufficient experience to promote its industrial application on a broad scale, with the intensive utilization of local resources. In addition to iron and steel production aspects, the development of this technology would also involve further training in forest management, charcoal production and the utilization of by-products. In this context, attention should be paid to the environmental aspects involved.

9. With regard to pre-reduced products, ample scope can be identified for the development of joint projects involving developing and developed countries for producing pellets, briquettes and sponge iron, to supply the needs for metal and non-metal inputs.

10. It is also considered necessary to promote the development of projects for research, experimental development and industrial tests in some developing countries that have resources for direct reduction, in order to bring about greater adaptation to the nature of the resources of each country.

11. The varied experience gained in some developing countries has shown that mini-plants are a valuable technological option for many developing countries. This experience has also shown that the conventional option, based on the blast-furnace, is still an important method owing to its greater capacity for diversification of production.

## Recommendations

### Policy recommendations

1. It is recommended that Governments, and/or those concerned, where appropriate, should:

- (a) Formulate policies for the creation of an environment conducive to the attainment of the objective of practical training required by the industry, and this at all levels of qualification;
- (b) Provide the framework of policy incentives for effective external training, including adequate safeguards to ensure national returns on training investments;
- (c) Actively promote regional and interregional efforts in research and development, the creation of specialized discipline-oriented technical institutions, technological associations, training centres etc.;
- (d) Create and/or expand domestic identification and evaluation systems for the selection of appropriate technological routes, equipment and integration with other sectors.

### Co-operation among developing countries

2. It is recommended that:

- (a) In view of the fact that a vast body of experience has already accumulated in some developing countries in the iron and steel industry, an increasing number of training requirements should be secured through technical co-operation among developing countries;
- (b) Such co-operative arrangements should not only aim at operational and technical training but should also include training at the managerial, organizational and engineering levels;
- (c) These co-operative arrangements should also include adequate transfer of technology and research and development.

### Co-operation between developed and developing countries

3. It is recommended that:

- (a) Contracts for plants, technology and equipment should include, to the extent feasible, adequate provisions for training. This also applies to contracts between partners from developing countries;
- (b) The developed countries should expand the scope of their training programmes for trainees from developing countries with particular emphasis on engineering, management and research and development.

UNIDO technical assistance

4. It is recommended that UNIDO should:

(a) Strengthen its intermediary role as a clearing-house for information relevant to the iron and steel industry through appropriate mechanisms. To this effect, UNIDO should follow up on the offers received during the Consultation meeting and also explore other potential sources;

(b) Undertake feasibility studies regarding the creation or strengthening of regional centres for research and development and training in the field of metallurgy, with particular emphasis on current projects in Africa, and take appropriate action;

(c) Expand its programmes of training activities at all levels and related target groups for the personnel of developing countries in co-operation with developed and developing countries;

(d) Review the existing and suggest innovative concepts for new co-operative arrangements for the mastering of technology between developed and developing countries and among developing countries themselves;

(e) Make special efforts to promote co-operation between the developing countries in all of the above areas.

Issue 3: Financial situation  
and perspectives of the iron and steel industry

Conclusions

1. The iron and steel industry is considered indispensable for the industrialization of developing countries. The industry has been subject to a structural crisis characterized by a severe fall in demand, which generated over-capacities, particularly in some developed countries. The world situation in the industry has necessitated the restructuring or closing of some plants as well as the postponement, freezing or cancellation of projects. The financial constraints to the developed and the developing countries have severely affected particularly integrated iron and steel projects owing to their high investment cost.

2. Despite this situation, needs exist to create capacities in some developing countries, either by establishing new plants or by rehabilitating, modernizing or expanding existing units. The creation of additional capacities has to be based on national, subregional and regional market and social needs and must ensure closer integration with local economies, taking into account long-term economic perspectives and the viability of projects.

3. It is recognized that there is a need, when designing iron and steel projects world-wide, to select the most appropriate technologies, based on a realistic and comprehensive evaluation of the needs of the country or region and with the aim of reducing investment and operating costs.

4. To alleviate financing problems, it is necessary for financial institutions to consider separately, the cost components relating to the following items:

Machinery and equipment  
Training and transfer of technology  
Infrastructure

5. Opportunities exist for developing and developed countries to assist developing countries, especially least developed countries, in training and the transfer of technology, as a contribution towards mastering technology and lowering the investment costs of projects.

### Recommendations

#### Policy recommendations

1. In the light of the existing global over-capacity and financial constraints facing this industry in some countries, it is recommended that Governments and/or those concerned, where appropriate, should:

(a) Formulate investment plans that give due consideration to the financial possibilities at the national, regional and international levels;

(b) Take into account, in implementing iron and steel projects, their impact on national value added as well as the investment cost.

#### Co-operation between developed and developing countries

2. It is recommended that:

(a) Considering the importance of the iron and steel sector for industrial development, financial flows in support of the development of the sector in developing countries should be maintained so as to facilitate the capacity for growth and reduce the gap between supply and demand for steel in these countries. In this context, consideration should be given to alternative forms of financing, with a view to preparing the most beneficial package possible;

(b) To offset the financial burden on projects, developing countries should devise new forms of financing that will minimize the use of foreign exchange through the unpackaging of technology;

(c) In granting financial support, potential investors and development finance institutions should seek to give priority to projects in developing countries aimed at implementing an integrated approach to development and also to projects in least developed countries aimed at improving the utilization of natural resources, satisfying their development needs and improving the quality of life of their people. Furthermore, investors and development finance institutions should take full account of the financial viability and technological appropriateness of such projects.



Co-operation among developing countries

3. It is recommended that developing countries should:

(a) Aim towards the establishment of financial procedures at the national and regional levels to facilitate financial transactions;

(b) Promote joint investment projects to foster complementarities in production and trade.

UNIDO technical assistance

4. It is felt that UNIDO technical assistance is highly necessary to help in the formulation and evaluation of the projects to be implemented for optimal utilization of financial resources, special attention being given to the identification of projects which have real prospects of viability and which therefore could attract the appropriate resources.

5. UNIDO should, on a priority basis, assist developing countries in the preparation of feasibility studies for projects that can be developed as a joint venture by two or more countries.

6. UNIDO may develop appropriate training programmes and provide assistance in the establishment of centres in some developing countries in order to minimize the cost of training in the development of the iron and steel industry.

## I. ORGANIZATION OF THE CONSULTATION

### Opening of the Consultation

#### Statement by the Minister for Public Economy and Transport of Austria

12. The Minister for Public Economy and Transport of Austria drew attention to the importance of the iron and steel industry, which had triggered off the process of industrialization and which provided inputs for so many other sectors. Austria's particular contribution to that industry, he noted, had been the development of the Linz-Donawitz (LD) process. He stressed the need for new strategies to link the development of the iron and steel industry with other sectors, such as capital goods and agricultural machinery. It was important for developing countries, he said, to increase their self-reliance and to improve their terms of trade. The Minister assured the Consultation of the continuing efforts of Austria in development co-operation and in strengthening its relationships to the developing countries.

#### Statement on behalf of the Director-General of UNIDO

13. The Officer-in-Charge of the Department of Administration of UNIDO presented a statement on behalf of the Director-General. He noted that the deliberations of the three previous Consultations on the iron and steel industry had led to an analysis of the constraints faced by the developing countries and to the identification of some appropriate courses of action for those countries. Mini-steel technology, he said, was an example of an option that had been suggested as a viable production route for many developing countries. The representative of the Director-General drew attention to the impact of the global economic recession on the iron and steel industry and the subsequent restructuring of that industry. Future growth in consumption of iron and steel was expected to be concentrated in the developing countries, and while some of those countries were endeavouring to meet that demand, they could not do so without international co-operation, particularly in industrial financing. He hoped that the Consultation would be able to propose recommendations on industrial financing, mastering new technologies and ensuring the effective development of human resources.

#### Statement by the Officer-in-Charge, System of Consultations

14. The Officer-in-Charge of the System of Consultations briefly presented the issues before the Consultation. Referring to the first issue, he emphasized the need for developing countries to adopt an approach to the development of the iron and steel industries that would lead to closer integration with other sectors of the economy, especially the capital goods sector, taking into account the specific conditions of each developing country in terms of its current level of production of iron and steel and capital goods, its natural resource base, its technological development etc. He noted that the second issue, which focused on mastering of technology, was closely linked to the first and included the identification of ways for better selection and implementation of technology as well as the development of adequate training programmes. He also noted the importance for developing countries of the third issue, the financial aspects of the iron and steel industry. Finally he requested the Consultation to make proposals on means of promoting co-operation at the subregional, regional and global levels.

Election of officers

15. The following officers were elected:

- Chairman:** Juan de Dios Román Pineda (Mexico), Director de Operaciones de Sidermex
- Rapporteur:** S. Chatterjee (India), Resident Director, M.N. Dastur and Company
- Vice-Chairmen:** A.T. Abe (Nigeria), Deputy General Manager (Steel Production), Delta Steel Company
- Wolfgang Janke (Federal Republic of Germany), Managing Director, LURGI GmbH
- R. Wusatowski (Poland), Deputy Director for Research, Institute of Ferrous Metallurgy

16. It was agreed that the Vice-Chairmen would serve as Chairmen of the working groups.

Adoption of the agenda

17. The Consultation adopted the following agenda:

1. Opening of the Consultation
2. Election of the Chairman, Vice-Chairmen and Rapporteur
3. Adoption of the agenda and organization of work
4. Presentation of the issues by the secretariat
5. Discussion of the issues:
  - Issue 1: The iron and steel industry: present situation, prospects and the need for more integrated development of the iron and steel and capital goods industries
  - Issue 2: The mastering of the technology and development of the iron and steel industry in developing countries
  - Issue 3: Financial situation and perspectives of the iron and steel industry
6. Other matters
7. Conclusions and recommendations for further action
8. Adoption of the report of the meeting

Establishment of a programme of work and working groups

18. Following the adoption of its programme of work, the Consultation established three working groups to discuss the issues and to propose conclusions and recommendations for consideration at the plenary session. The working group on issue 1 was chaired by A.T. Abe (Nigeria); André Signora (France) served as Vice-Chairman. The working group on issue 2 was chaired by Wolfgang Janke (Federal Republic of Germany); Miguel de Lima Bohovoletz (Brazil) served as Vice-Chairman. The working group on issue 3 was chaired by R. Wusatowski (Poland); Guangbo Xie (China) served as Vice-Chairman.

Documentation

19. Documents issued prior to the Consultation are listed in annex II below.

Adoption of the report

20. The report of the Fourth Consultation was adopted by consensus at the final plenary on 13 June 1986.

## II. REPORT OF THE PLENARY SESSIONS

### Statement by the representative of the United Nations Environment Programme

21. The representative of the United Nations Environment Programme (UNEP), speaking on behalf of the Executive Director of that Organization, stated that industrialization was essential in order to create economic growth, fulfil basic needs and improve the quality of life for the population of developing countries, and that UNEP believed that industrialization could be made compatible with the protection of the environment. With that in mind, UNEP promoted "sustainable development". He pointed out that UNEP emphasized that prevention had proved to be less costly than the reduction of existing pollution. Pollution control technologies were well developed and only needed to be properly selected and transferred to those who needed them. Standards for environmental control, he said, should be developed by the Government or control authority together with senior management before the design of a facility was undertaken. The key to effective environmental management, however, was for government officials and industrial management to be aware of the potential risks and problems in each industry and of the need to protect the environment.

### Closing plenary

22. At the closing plenary, participants took note of the fruitful outcome of the meeting and the productive and co-operative spirit that prevailed. One participant praised UNIDO for the high quality and timely dispatch of documents for the Consultation. She also stressed the importance of continuing work on the sector as a follow-up of the Consultation.

23. Statements were made by the Chairman of the Task Force on the Iron and Steel Industry, who summarized the action that would be necessary as a result of the Consultation, and by the former Chairman of the Task Force, who highlighted the results of that Consultation.

24. The Chairman of the Consultation expressed appreciation for the links between the System of Consultations and technical assistance and noted in particular, offers of technical assistance by participants from developing countries. The Officer-in-Charge of the System of Consultations, in thanking participants for their active and effective involvement, noted that the high professional level of participants had been an important factor contributing to the success of the meeting and thanked the former Chairman of the Task Force for his important contribution to the success of the Consultation.

III. REPORT OF THE WORKING GROUP ON ISSUE 1:  
THE IRON AND STEEL INDUSTRY: PRESENT SITUATION, PROSPECTS AND THE NEED  
FOR MORE INTEGRATED DEVELOPMENT OF THE IRON AND STEEL  
AND CAPITAL GOODS INDUSTRIES

25. In introducing issue paper I (ID/WG.458/11), a UNIDO representative noted that the development of the capital goods industry could play a major role in the industrialization of developing countries, because that industry demanded large quantities of iron and steel. Owing to market size, however, local production of capital goods was often concentrated in larger countries. Examples were given of developing countries that had been successful in integrating the iron and steel industry with other sectors of the economy, thus increasing industrial activity to the point where excess production could be exported.

Integrated development

26. Many participants expressed their agreement with the concept of a more integrated development between the iron and steel industry and the capital goods industry and other sectors of the economy, as described in the document prepared by UNIDO. Such integration fostered the development of a coherent national productive system and industrial infrastructure that could contribute to the fulfilment of the economic and social needs of the population. The more integrated approach to national economic development would permit the establishment of improved subregional and regional linkages in the development of the steel industry and other economic sectors.

27. It was considered important for the steel industry to respond to the needs of the country's priority sectors, for example, by providing inputs for the manufacture of agricultural implements and machinery to support the development of the agricultural sector.

28. The two-way linkages between the capital goods and steel industries were described. The growing capital goods industry created more demand for the output of the steel industry and, as countries improved their technological capabilities, provided increasing quantities of equipment and machinery for the steel industry.

29. Many participants expressed the view that because steel was such a basic input for the capital goods, building materials, transport, communication and other sectors necessary for building up a national infrastructure, countries could not develop without steel. Further, several participants reviewed the development of their countries' steel industries.

30. Many participants said that the development of a steel industry in developing countries should be based on an analysis of domestic needs. Some took this to mean that capacity development should be based solely on present and future projections of domestic demand; some emphasized the possibilities for subregional and regional co-operation in production and trade; and some considered the possibility of exporting production that was in excess of domestic demand to be important for economic viability.

31. Part of the discussion on the integrated approach focused on technological options available for steel production, some starting from iron ore, others using sponge iron ore, scrap steel, etc. as inputs, and other plants, such as rolling mills, carrying out only the final processing of semi-finished products. The advantages of mini-steel technology for developing countries, particularly newcomers, in developing a steel industry integrated with other sectors of the economy were discussed. Small-scale plants were described as permitting more flexibility in the development of the iron and steel sector and as being better able to adapt to changes in demand and in economic conditions. Also the lower capital investment required for mini-steel plants was mentioned as an important factor in making that route an attractive option.

#### Co-operation among developing countries

32. Co-operation among developing countries was seen as a means by which developing countries could overcome national constraints and achieve self-sustaining growth. Some developing countries had technological experience in the iron and steel industry, which could be a source of regional and interregional co-operation, especially since technologies from developing countries were often more suited to the characteristics and resources of other developing countries. Other areas for co-operation between developing countries were training, research and development, joint investment and trade.

#### Co-operation between developed and developing countries

33. Participants from some developing countries noted that, owing to the general economic crisis, certain developing countries were in need of assistance in procuring raw materials and in acquiring technology and training. While participants reported on bilateral and multilateral aid received and provided, there was still seen to be a need to intensify contacts and further promote mutual co-operation in investment, technological development and the transfer of technology between the developed and developing countries. A problem noted by one participant was that certain aid packages required the importation of equipment and other inputs that might be available locally. Other participants maintained that heavily subsidized exports of steel from some developing countries led to unfair competition.

#### UNIDO assistance

34. UNIDO could play a catalytic role in the development of iron and steel industries in developing countries by supplying research and technical assistance, preparing market studies, helping countries to establish priorities and encouraging infrastructural development. UNIDO could also act as a link between countries and as a clearing-house for experts and training.

#### Costs

35. The cost of installing new production capacity was discussed at length. While there was agreement that installation costs varied considerably, participants presented differing views on the reasons for those variations. While some participants cited factors including differences in equipment,

construction and civil engineering costs as well as differences in infrastructure requirements, others maintained that differences in installation costs depended solely on the bargaining skills of the purchasers and that an important function of technical assistance would be to assist developing countries in increasing those skills. One participant said that cost estimates in feasibility studies were sometimes deliberately understated.

36. While a few participants thought that the high cost of installing new capacities might be a reason for developing countries to import rather than produce steel, other participants felt that, in the long run, the cost of continuing to import was greater than the investment cost. It was also pointed out that, while imports generally had to be paid for immediately and in cash, often long-term credits were available to pay for the installation of steel-producing plants. Several participants thought that the high cost of new construction meant that it was more economical to modernize existing capacity.

#### Environmental considerations

37. The necessity of considering the impact of the iron and steel industry on the environment was pointed out, while at the same time it was noted that the increasing costs of enforced pollution control in some countries could have an adverse effect on the international competitiveness of the industry.

#### IV. REPORT OF THE WORKING GROUP ON ISSUE 2: THE MASTERING OF THE TECHNOLOGY AND DEVELOPMENT OF THE IRON AND STEEL INDUSTRY IN DEVELOPING COUNTRIES

38. Following an introduction by a representative of UNIDO on the technical assistance activities of UNIDO in the iron and steel industry related to planning new metallurgical plants or expanding or improving the operations of existing ones, participants were invited to discuss the mastering of the technology in the sector concentrating on:

(a) Measures and policies aimed at facilitating local absorption of technology;

(b) Ways and means of designing more effective schemes for technical training;

(c) Innovative concepts for international co-operation to optimize available resources, including technological capabilities.

39. A major difficulty in the process of mastering technology arose from the inadequacies of conventional training. Many participants pointed out that the chronic shortage of facilities in many developing countries had rendered impossible systematic on-the-job training. Special skills were required for giving technical training in developing countries, and the experience of expatriate technicians was not always adequately imparted. One participant felt that the developing countries often did not recognize the crucial



importance of training requirements when negotiating contracts with suppliers of plant and equipment. It was agreed that training should be considered at all stages of plant and equipment design, construction and operation. Some participants thought that training should be viewed in the larger context of the educational system and standards of a country: the improvement of technical competence depended on the educational background of the manpower involved. One participant pointed out the importance of organizational, managerial and financial matters within the long-term process of training.

40. Many participants agreed that the availability of adequately trained personnel should be considered not only when constructing new capacity but also when rehabilitating or modernizing existing plants.

41. Some participants advocated the establishment of close links between the industry and institutions of higher learning, which would also expand national capabilities for assimilating and adapting technology.

42. One participant suggested that UNIDO should compile a list of all technical assistance available, including various facilities for training, and disseminate that information to all developing countries in order to enhance the awareness of opportunities and contribute to more selective and economic resource allocation for the industry.

43. The crucial importance of appropriate training was emphasized. That could be achieved, inter alia, through incentives for manpower development, such as refresher courses on pertinent technological change, innovations etc.

44. One participant identified returning migrant workers as a potential source of skills which could be used through suitable policies. Another offered assistance in the evaluation of such potential.

45. Participants agreed that in many developing countries intensive training at the managerial and other levels was required. Some participants noted the importance of matching the expectations of enterprises and trainees.

46. Many participants felt that there were no substitutes for local in-plant training and that overseas training should be provided only for key personnel and special purposes.

47. A representative of the secretariat made a comprehensive statement on the problems of training industrial manpower in the iron and steel sector, outlining ways and means for identifying and implementing policies for building up a skilled and specialized labour force. Far more attention was often paid to finance and budgetary requirements than to training; however, public authorities should recognize the importance of developing human resources and skills.

48. One participant emphasized the urgent need for the creation of a regional technology and training centre in Africa, where existing facilities were inadequate for the needs of the region.

49. Many participants described recent industrial experience in the sector and highlighted successful training programmes conducted for the benefit of trainees from developing countries. There was general agreement that such efforts should be continued and intensified. It was agreed that UNIDO should

strengthen its role in providing information on the needs and opportunities existing in the global iron and steel industry.

50. Many participants recognized the contribution UNIDO could make in assisting in the creation of an African iron and steel association. That association could serve as a forum for the exchange of experience and information among its members on raw materials, semi-finished products, capital goods, technical know-how and training facilities. It would provide a modality to identify subregional and regional opportunities for co-operation and also facilitate bilateral arrangements.

V. REPORT OF THE WORKING GROUP ON ISSUE 3:  
FINANCIAL SITUATION AND PERSPECTIVES  
OF THE IRON AND STEEL INDUSTRY

51. In introducing issue paper 3 (ID.WG.458/13), a representative of UNIDO gave an account of the structural crisis faced by the iron and steel industries in some countries, which had become particularly severe since the beginning of the 1980s. A major cause of the crisis was the financial difficulties experienced by many countries, both developed and developing, which had resulted in the cancellation or postponing of major projects. The major sources of international finance for the sector had tended to be very selective, limiting their participation to only a few countries. However, since foreign exchange costs were generally of the order of 50 per cent of total project cost, there was ample opportunity for national financing institutions to increase their participation in the sector. Recently compensation agreements had been concluded between some developed and developing countries in the iron and steel sector, but they had been mainly for trade in steel products rather than for new production facilities. Financing for infrastructure and training, which constituted a major portion of the total investment, had, with a few exceptions, been subject to the same conditions as financing for the supply of machinery.

Financial sources and constraints

52. Many participants expressed the need for the resumption of financial flows to facilitate the growth of the iron and steel industry in developing countries. Whereas in global terms there was over-capacity in the iron and steel industry, the gap between supply and demand in steel products in some developing countries was widening. Considering the strategic nature of the iron and steel industry in industrialization, several participants expressed the view that assistance should be given to those countries wishing to develop their own iron and steel industries to satisfy their national and/or regional markets.

53. Some participants expressed concern about the apparent policies of some international financing institutions to limit their participation in the promotion of iron and steel industry to only a few selected countries. Those participants called upon the relevant financial institutions to broaden their geographical involvement in the sector and in particular to include countries in Africa south of the Sahara.

54. Several participants felt that the financial crisis of the iron and steel industry was a global one, involving industries in both developing and developed countries. In developed countries, as a result of over-capacity and a decline in prices of steel products, many facilities had been closed at immense financial and social costs.

55. Many participants expressed the need for preferential financing of infrastructure, training and technical assistance. Financing institutions should view those elements as contributing not only to an iron and steel project but also to the overall development of a country. In some respects, an iron and steel project could be viewed as promoting infrastructure and human resource development for the countries concerned. The multiplier effects of the iron and steel industry were stressed, and financing institutions were called upon to consider that aspect when evaluating projects.

56. National financing institutions could play a major role in alleviating the foreign exchange burden of iron and steel projects through technology unpackaging. Many participants called upon those institutions to be more active in the sector so as to facilitate the industrialization process.

57. Some participants expressed the willingness of their countries to assist in the areas of training and technology transfer as a way of reducing the financial burden of developing countries in carrying out iron and steel projects.

#### International trade

58. Several participants called upon Governments to refrain from protectionist tendencies and to dismantle tariff and non-tariff barriers in the sector so as to stimulate international trade. Those participants viewed such barriers as hindering the ability of developing countries to repay their debts for supplies of machinery and equipment and depriving them of the opportunity to participate in the international market. However, that view was not shared by some other participants, who felt that their Governments had to protect local industries from unfair trade practices that were detrimental to the national economy. Those participants emphasized that steel plants whose viability was based on the subsidized export of products should not be supported.

#### Financing for new capacities

59. There was general agreement that there were still possibilities for financing properly designed iron and steel projects, notwithstanding the current financial constraints on the sector. The creation of new capacities, either through new projects or by refurbishing existing units, should satisfy at least three criteria. First, projects should be designed to satisfy a realistic estimate of national, subregional or regional market demand; projects whose viability was dependent on international export markets should not be encouraged. Secondly, they should be based on an appropriate choice of technology. Thirdly, they should be adequately integrated with the other sectors of the economy. Before commencing the implementation of those projects, financing for the entire project should be assured so as to avoid costly delays.

60. UNIDO was requested by many participants to assist developing countries in reviewing planned investment projects in iron and steel so as to select those that satisfied the above criteria and thereafter to assist in arranging for financial packages to implement them.

61. A participant from one developing country briefly described a project under consideration in that country which would create capacity sufficient to satisfy the domestic market demand in the early 1990s. Owing to financial constraints, the Government had decided to implement the project in phases. That country sought international co-operation in implementing the project, which was considered to be fundamental to its industrialization.

62. Some participants expressed the need for UNIDO to review in depth the status of projects under implementation world-wide so as to assist countries in identifying further action necessary for the completion of those projects.

Annex I

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Annex II

**LIST OF DOCUMENTS**

Issue papers

- Issue 1: The Iron and Steel Industry: present situation, prospects, and the need for more integrated development of the iron and steel and capital goods industries** ID/WG.458/11
- Issue 2: The Mastering of the Technology and development of the iron and steel industry in developing countries** ID/WG.458/12
- Issue 3: Financial situation and perspectives of the iron and steel industry** ID/WG.458/13

Background documents

- Normative guidelines for the mastering of technology in iron and steel through training** ID/WG.458/1
- Importance and possibilities of financing of infrastructure and personnel training in the iron and steel projects** ID/WG.458/2
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- Prospects of an integrated development of the iron and steel industry and capital goods: East and Southern African countries** ID/WG.458/8
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- Financial problems and the development of the iron and steel industry** ID/WG.458/10
- Progress report on the implementation of the recommendations of the Third Consultation on the iron and steel industry** ID/WG.458/14
- Global iron and steel industry: some reflections and projections** ID/WG.458/15
- Study of an integrated development of the iron and steel and capital goods industries** ID/WG.458/16

Information documents

- Report of the First Consultation Meeting on the Iron and Steel Industry, Vienna, Austria, 7-11 February 1977** ID/WG.243/6/Rev.1
- Report of the Second Consultation Meeting on the Iron and Steel Industry, New Delhi, India 15-19 January 1979** ID/WG.224
- Report of the Third Consultation on the Iron and Steel Industry, Caracas, Venezuela. 13-17 September 1982** ID/WG.291
- Progress report (on the implementation of the recommendations of the First Consultation Meeting on the Iron and Steel Industry)** ID/WG.286/1
- Progress report on the implementation of the recommendations of the Second Consultation Meeting on the Iron and Steel Industry** ID/WG.374/5
- International financial flows to industry: some sectoral trends** UNIDO/PC.104
- The use of mixed credits in the United Kingdom for the financing of industrial training and infrastructure** UNIDO/PC.130
- Report of the Expert Group Meeting on the Preparation of Guidelines for the Establishment of Mini-Plants on Iron and Steel with Special Emphasis on Africa, Vienna, Austria 2-5 December 1985** UNIDO/PC.132
- Ad-Hoc Expert Group Meeting on Strategies for more Integrated Development between the Iron and Steel and Capital Goods Sectors, Vienna, 16-18 October 1985. Report** UNIDO/PC.127



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