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UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

SECOND CONSULTATION ON THE CAPITAL GOODS INDUSTRY WITH SPECIAL EMPHASIS ON ENERGY-RELATED TECHNOLOGY AND EQUIPMENT

Stockholm, Sweden, 10–14 June 1985

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.[1/] 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[2/] according to which the System of Consultations was to operate, including its principles, objectives and characteristics, notably:

> The System of Consulations shall be an instrument through which the United Nations Industrial Development Organization (UNIDO) is to serve as a forum for developed and developing countries in their contacts and consultations directed towards the industrialization of developing countries;[3/]
>
> Consultations would also permit negotiations among interested parties at their request, at the same time as or after consultations;[4/]
>
> Participants of each member country should include officials of governments as well as representatives of industry, labour, consumer groups and others, as deemed appropriate by each Government;[5/]
>
> Final reports of consultations should include such conclusions and recommendations agreed upon by consensus among the participants; the report should also include other views expressed during the discussion[6/].

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

2/ The System of Consultations (PI/84).

3/ Ibid., para. 1.

4 Ibid., para. 3.

5 Ibid., para. 23.

6/ Ibid., para. 46.

The First Consultation on the Capital Goods Industry was convened at Brussels, Belgium, in September 1981.[7] The Industrial Development Board, at its sixteenth session in May 1982, took note of the conclusions and recommendations of the First Consultation[8] and decided at its seventeenth session in May 1983 that a consultation on the capital goods industry with special emphasis on energy-related technology and equipment should be held during the biennium 1984-1985.[9]

Twenty-five 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.

7/ Report of the First Consultation on the Capital Goods Industry, Brussels, Belgium, 21-25 September 1981 (ID/276).

8/ Report of the Industrial Development Board on the work of its sixteenth session (Official Records of the General Assembly, thirty-seventh session, supplement No.16 (A 137/16)).

9/ 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)).

CONTENTS

INTRODUCTION

1. The Second Consultation on the Capital Goods Industry with Special Emphasis on Energy-related Technology and Equipment was held at Stockholm, Sweden, from 10 to 14 June 1985. The Second Consultation was attended by 147 participants from 49 countries and 19 international and other organizations (see annex I).

Background to the Second Consultation

2. The First Consultation on the Capital Goods Industry, held at Brussels, Belgium, from 21 to 25 September 1981,[1/] drew attention to a fundamental disequilibrium between the developed and developing countries' production of capital goods.[2/]

3. Furthermore, the Consultation recognized that approximately 74 per cent of the developing countries' production of capital goods was concentrated in six or seven newly industrializing countries. That situation indicated that there were imbalances among the developing countries themselves.

4. The First Consultation therefore recommended that UNIDO should, among other things:

Carry out studies to identify the barriers hindering the entry of developing countries into the capital goods sector and formulate possible strategies to remove those constraints;

Assist developing countries that aim at entering into or developing their capital goods industries.

The First Consultation also recommended that priority should be given to assisting developing countries with an embryonic or no capital goods industry.

1/ Report of the First Consultation on the Capital Goods Industry, Brussels, Belgium, 21-25 September 1981 (ID/276).

2/ In 1980, the shares of developed and developing countries in the total world manufacturing value added in capital goods of $US 760 billion (in constant 1975 dollars) were 94.7 and 5.3 per cent, respectively. "The second world-wide study on capital goods: The sector in figures"' Sectoral Studies Papers No. 14, Vol.II (UNIDO/IS.505).

5. Other related UNIDO studies and discussions at meetings on the agricultural machinery industry[3/], [4/], [5/] identified yet another structural imbalance with regard to the geographical distribution of the capital goods industry within the individual developing countries. It was observed that in most developing countries the capital goods industry, if existent, had been concentrated in and around urban centres. The correction of that imbalance, which brought along additional social problems, would require the implementation of rural development programmes.

6. The Second Consultation on the Agricultural Machinery Industry[6/] dealt with the same issue from the perspective of food self-sufficiency and rural development. Within that concept, the integrated manufacture of agricultural machinery and rural equipment was identified as a possible route for entry into the capital goods sector. The Consultation also recognized the validity and applicability of multi-purpose manufacturing units for the production of agricultural machinery and other capital goods and for the development of industrial infrastructure.

7. The work of the secretariat, therefore, focused on the problems of entry into the capital goods sector. The identification of barriers to entry, the formulation of possible strategies to remove those barriers and the assessment of the role of and possibilities for international co-operation in assisting developing countries wishing to establish capital goods industries were the main areas of study.

8. Full use was made of the experience gained through the UNIDO programme of technical assistance in the capital goods sector, particularly in the planning of the sector, in preparations for this issue.

3/ Report of the First Regional Consultation Meeting on the Agricultural Machinery Industry, Addis Ababa, Ethiopia, 5-9 April 1982 (ID/285).

4/ "Report of the Workshop on Design and Development of Agricultural Equipment in Africa, Cairo, Egypt, 17-28, October 1982" (UNIDO/PC.85).

5/ "Agricultural machinery and rural equipment in Africa: A new approach to a growing crisis", Sectoral Studies Series, No.1 (UNIDO/IS.377).

6/ Report of the Second Consultation on the Agricultural Machinery Industry, Vienna, Austria, 17-21 October 1983 (ID/307).

The electric power equipment industry

9. The wide scope of the energy-related technologies and equipment made it necessary to review the subject in order to identify the limited number of areas that could be discussed at the Second Consultation. The review was made at an expert group meeting held at Vienna, Austria, from 10-12 October 1983. After considering several alternatives that meeting recommended that the electric power equipment industry should be selected for further study. Furthermore, the meeting observed the lack of information on the electric power equipment sector in developing countries and recommended that a set of country case studies should be carried out by UNIDO.

10. Important developmental issues related to the electric power and power equipment sectors and the terms of reference of the country case studies were discussed at an expert group meeting, held at Vienna, Austria, from 19 to 21 December 1983.[7/]

11. UNIDO carried out the activities recommended by the expert group meetings held in October and December 1983, the results of which were discussed at a meeting held at Vienna, Austria, from 12 to 14 November 1984.[8/]

12. The meeting held in November endorsed in general the preparatory work carried out by the secretariat and recommended that the unpackaging of technology in the electric power sector should be one of the issues to be discussed at the Second Consultation.

13. The following issues, therefore, were selected for consideration at the Second Consultation:

Issue 1:	Conditions of entry into the capital goods sector and strategies for integrated manufacture
Issue 2:	Development of the electric power equipment sector and technology unpackaging

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7/ "Report on the Expert Group Meeting on the Energy-related Equipment and Technology" (UNIDO/PC/87).

8/ "Report of the Expert Group Meeting on the Electric Power Equipment Industry, Vienna, Austria, 12-14 November 1984" (UNIDO/PC/107).

AGREED CONCLUSIONS AND RECOMMENDATIONS

Issue 1: Conditions of entry into the capital goods sector and strategies for integrated manufacture

Conclusions

14. The Working Group took note of the documents submitted by the UNIDO secretariat, and considered that they constituted a useful and valuable basis for the work of the Consultation. The Working Group concluded that:

1. The introduction and diffusion of modern technologies would influence the international division of labour and, consequently, the capital goods industry in developing countries, even if it was not possible to indicate to what extent or even in which direction. It was therefore of the greatest importance that developing countries strengthen their capacity for monitoring and evaluating the development of new technologies and for formulating adequate strategic responses;

2. Political will to develop the sector and to direct available resources towards national goals and according to national priorities was a basic condition. In their strategic choices, with a view to establishing capital goods industries, the developing countries should take into account the various factors brought out in the methodological document ID/WG.442/3 and notably their resources, their stage of development, the trigger effect of this industry on all the various sectors of the economy, the comparative advantages of the production factors, the size of markets and potential capacities to master the technology. The possibilities of regional co-operation must also be taken into account both for the development of markets and for production capacities and infrastructures. Training at all levels constituted a priority, together with the establishment of appropriate socio-professional structures;

3. In view of the extreme diversity of situations, the identification of requirements in the light of the needs of the populations was of the greatest importance. The methodology package of UNIDO had proved to be a valuable tool for planning the development of the capital goods industry in developing countries. The package consisted of the methodology for the classification and codification of capital goods (CCCG); the system of analysis of technological complexity (ATC), which, according to the recommendation of the First Consultation, had been developed and tested in two countries; and the ad hoc typology of developing countries as presented to the Consultation;

4. International co-operation should be encouraged in all fields together with formulae for co-operation between enterprises, notably in the form of industrial arrangements. The participation of small and medium-sized enterprises represented an important but underutilized resource in the context of international co-operation;

5. The UNIDO technical assistance projects and programmes had been instrumental in shaping and promoting the capital goods sector in some developing countries and as such were found to be useful for application in other developing countries;

6. Among the obstacles encountered by the developing countries in seeking to enter the capital goods sector, the financial constraint continued to be a very serious handicap.

Recommendations

15. The Working Group, also taking into account the conclusions and recommendations adopted by the First Consultation on the Capital Goods Industry,[9/] recommended that UNIDO should, within its available resources:

1. Continue to study the impact of the introduction of new technologies on the industrialization process in developing countries and appropriate strategic responses and international co-operation measures that would promote the capital goods industry in those countries;

2. (a) Continue to utilize the general methodological package that it has developed, including the typology of countries, as a framework for guiding the various countries in their strategic choices, adapted to their situation, their economic and social priorities and their needs;

   (b) Disseminate this methodological package widely in various languages and assist in its concrete utilization in the developing countries, placing emphasis on its explanation in the countries of "group C";[10/]

9/ Report of the First Consultation on the Capital Goods Industry, Brussels, Belgium, 21-25 September 1981 (ID/276), paras. 1-9.

10/ For details, see the typology introduced in ID/WG.442/3. The country groups used in the UNIDO typology are as follows: group A, newly industrializing countries with well-developed capital goods industries (7 countries); group B, countries that have started to establish their industrial base with some capital goods industries and technological capabilities (about 30 countries); and group C, countries without or with very small capital goods industries.

(c) Develop the stock of data available for the ATC methodology, inter alia with the assistance of interested enterprises in the industrialized countries, through the organization of visits to plants by UNIDO experts to collect the necessary information with the agreement of Governments where required;

(d) Promote the operational applications of the methodology in the developing countries concerned at the national or regional level;

3. Apply the relevant recommendations formulated in other sectoral Consultations as well as the relevant recommendations of the various resolutions adopted by consensus at the Fourth General Conference of UNIDO and as adopted by the General Assembly to its work programmes and activities on the capital goods industry;

4. Organize expert group meetings on the capital goods industry in the developing countries for countries at similar levels of industrial development or for regions in order to find common policies and strategies;

5. Promote the dissemination of information on experience gained by developing countries in general and in particular those that are recipients of UNIDO technical assistance in the capital goods industry;

6. Call attention to the problem of underutilization of capacity in the field of capital goods in some developing countries and explore ways and means to resolve that problem;

7. Develop, with the assistance of the international community and regional and international financial institutions, financing formulas adapted to the development of capital goods industries in the developing countries.

Issue 2: Development of the electric power equipment sector and technology unpackaging

Conclusions

16. The following conclusions were reached:

1. It was important for developing countries to enter or to expand their current production in the electrical power equipment sector. The wide scope of the electric power equipment industry made it possible for developing countries to enter into manufacturing at a complexity level that was compatible with their development stage;

2. Rural electrification was one of the most important contributors to rural development. It was agreed that, in many developing countries, there was room for local industries and skills to participate in rural electrification programmes. It was also agreed that the development of mini-power projects and projects using new and renewable sources of energy should be pursued further;

3. Technology unpackaging was a major instrument through which developing countries could increase the domestic content of their electric power projects. The creation of local engineering and consultancy services and the acquisition of experience by such services in projects at various stages of execution were prerequisites for the gradual disaggregation of technology packages. Unpackaging was related to the capabilities of the respective contractual partners and the corresponding allocation and assessment of responsibilities was of particular importance;

4. The meeting also concluded that strategies conducive to enhanced co-operation between developing countries were highly important. There was room for co-operation in technology areas and the sharing of regional markets. Complementary opportunites for co-operation between developed and developing countries in both trade and finance also existed. There was also scope for co-operation between small and medium-scale enterprises from industrialized countries and firms from developing countries.

Recommendations

17. The Second Consultation recommended that, in its work on the electric power equipment industry, UNIDO should, within its available resources:

1. Include, in its Industrial and Technological Information Bank (INTIB), information on electric power equipment manufacturing technologies that are now in the public domain, on marketing opportunities for the developing countries and on possibilities available for assistance to the developing countries from the developed and other developing countries;

2. Prepare regional directories of firms manufacturing electric power equipment and their products;

3. Promote regional co-operation in the field of electric power equipment manufacturing;

4. Organize interregional expert group meetings on new and renewable sources of energy for rural development adapted to each region's conditions with participation of both developing and developed countries;

5. Analyse the costs and benefits of and limits to technology unpackaging in the electric power industry while recognizing the advantages thereof;

6. Upon request, carry out missions to individual developing countries with experts from countries with relevant experience to identify existing production opportunities in the electric power industry sector. On the basis of these missions, to undertake feasibility studies with the aim of assessing investment opportunities in specific priority industries;

7. Encourage financial institutions to participate actively in the search for adequate solutions to the problems of financing the activities of electric power equipment manufacturers;

8. Give advice to all interested parties in order to further technological unpackaging and try to clarify the responsibilities of different parties;

9. Support the Andean Pact countries in their efforts to pool their experience and capacity in capital goods projects, particularly in the field of electrical energy, as an example of co-operation between developing countries.

I. ORGANIZATION OF THE CONSULTATION

Opening of the Consultation

Statement on behalf of the Executive Director of UNIDO

18. The Second Consultation was addressed by the Director, Division for Industrial Studies, on behalf of the Executive Director of UNIDO, who regrettably could not attend. He expressed gratitude to the Government of Sweden for hosting the Consultation and for the personal interest of the Minister of Energy in attending the Consultation, which was indicative of the important role that Sweden was playing in promoting the development of developing countries and international co-operation between all countries.

19. He said that when the First Consultation on the Capital Goods Industry had been held at Brussels in 1981 the world economy had been passing through difficult times. That situation had not changed much and was further complicated by the fact that all industry, and the capital goods industry in particular, was influenced by the rapid diffusion of highly sophisticated technologies mainly based on microelectronics and informatics. Those technological developments might erode the labour-based comparative advantage of developing countries. Industrial sectors that had been previously redeployed to developing countries seemed to be affected by the increased automation of production processes in industrialized countries, and it was therefore of crucial importance for developing countries to evaluate the impact of technological developments on their industrialization efforts.

20. The capital goods industry was of paramount importance since it provided the means of production of the machines to make machines. The creation of a capital goods industry enabled a country to develop its own innovative genius rather than depend on imitating others. The First Consultation, he said, had drawn attention to the large number of developing countries without capital goods industries. He also pointed out that the large number of developing countries, as well as the experience of UNIDO in many developing countries, indicated that entry into the sector was the most difficult stage. He drew attention to the problems faced by newcomer countries and said that UNIDO had found both developed and developed countries that were prepared to make special efforts to assist those newcomers.

21. Commenting further upon the issues to be discussed, he recognized that electricity was one of the most important contributors to the industrialization and overall growth of a developing country. All developing countries had, therefore, given high priority to electrification in their economic and social policies. The question to be asked was how a developing country could increase its domestic participation in electrification programmes and hence attain higher growth rates in electrification and capital goods output. Without the support of the international community it would be very difficult for national Governments to be successful in that area. He concluded by wishing the meeting every success in its endeavours.

Statement by the Minister of Energy of the Government of Sweden

22. The Ministry of Energy of Sweden welcomed the participants on behalf of her Government. She stressed the importance of the topic energy-related technology and equipment because a safe, inexpensive, pro-environmental system of energy supply was a key to development in every society. She noted that her country had access to an energy system that was not only unusually reliable and inexpensive but also preserved the environment, namely hydroelectric power. In addition, development was currently in progress in a number of areas, such as rationalization and savings of energy in industry, heat exchangers, heat pumps, pro-environmental methods of combusion and purification of solid fuels and methods of dealing with nuclear wastes.

23. The need for investment and new technology in energy was great, and all countries needed to renew their energy systems. She hoped that the developing countries that were facing the task of building up energy systems necessary for development would not repeat the mistakes that had been made as regards the environment.

24. She said that attention should not be concentrated solely on the production of equipment for large hydropower projects or transmission lines, however. For the majority of the population living in the developing countries, rural electrification was equally important. Therefore, the manufacture of equipment for new and renewable sources of energy, not only mini-hydropower stations but also biomass power gasifiers, and improvements in solar photovoltaic and wind power technology and the production and use of peat were of great interest. Several projects in those areas were under way in the developing countries.

25. Because the building up of an industrial base in the developing countries was not a challenge that would end at the Second Consultation, she pointed to the need for the meeting to devote some of its attention to follow-up activities. She expressed the hope that the meeting would result in increased consciousness of the benefits of international co-operation in helping the developing countries enter to a greater extent into the capital goods industry and the electric power equipment sector by technology unpackaging or other means. Finally, she wished the Second Consultation success in its deliberations.

Statement by the Head of the Negotiations branch of UNIDO

26. The Head of the Negotiations Branch opened his statement by referring to a telex received that day from Mr. Calmell del Solar, Director-Secretary of the Commission of the Cartegena Agreement. The representatives of the public and private entrepreneurial sectors of the Andean Pact countries (Bolivia, Colombia, Ecuador, Peru and Venezuela), at their recently concluded meeting on the promotion of capital goods, wished to inform the Consultation of: the establishment of a subregional programme for capital goods, identifying the electrical, petroleum, mining and telecommunications sectors as priority sectors for joint action; their decision to form an Andean producers' association for capital goods; and their request for UNIDO co-operation in the subregional programme.

27. The Head of the Negotiations Branch emphasized that the purpose of the Consultation was to identify the problems faced by developing countries in the development of the sector, so that concrete measures could be taken to overcome those problems. Those measures could include strategy and policy changes in developing countries and in developed countries where appropriate. In addition, the Consultation provided an opportunity for participants to have various informal contacts on matters of mutual interest.

Election of officers

28. The following officers were elected:

Chairman: Sten Niklasson (Sweden), Under-Secretary for Negotiations, Ministry of Industry, Stockholm

Rapporteur: G.E. Mariki (United Republic of Tanzania), Director, Industrial Development, National Development Corporation

Vice-Chairmen: Luis Pérez Aceves (Mexico), Director, Industria Básica y de Bienes y de Capital, Nácional Financiera, S.A.

Milan Roch (Czechoslovakia), Head of Department, Skodaexport

S.A. Subramanian (India), Member (THERMAL), Central Electricity Authority of India

Volker Thuernau (Federal Republic of Germany), Representative, German Machine Manufacturers' Association (VDMA)

Adoption of the agenda

29. The Consultation adopted the following agenda:

1. Opening of the Consultation
2. Election of Chairman, Vice-Chairmen and Rapporteur
3. Adoption of the agenda and organization of the work
4. Presentation of the issues by the secretariat
5. Discussion of the issues

   Issue 1: Conditions of entry into the capital goods sector and strategies for integrated manufacture.

   Issue 2: Development of the electric power equipment sector and technology unpackaging.

6. Conclusions and recommendations for further action
7. Adoption of the report of the meeting

Establishment of a programme of work and working groups

30. The Consultation adopted the programme of work as shown in annex II.

31. The Consultation established two working groups to discuss the issues and to propose conclusions and recommendations for consideration at the plenary session:

Working group 1 to consider issue 1: Conditions of entry into the capital goods sector and strategies for integrated manufacture

Working group 2 to consider issue 2: Development of the electric power equipment sector and technology unpackaging

32. Carlos Vargas (Venezuela), Secretario Ejecutivo, Consejo Nácional para el Desarollo de la Industria de Bienes de Capital (CONDIBIECA), was elected Chairman of working group 1.

33. Eric Bernhardt (Switzerland), Delegate for Special Assignments, Electrowatt Ingénieurs-Conseils S.A., was elected Chairman of working group 2.

Documentation

34. Documents issued prior to the Consultation are listed in annex III.

Adoption of the report

35. The report of the Second Consultation was adopted by consensus at the final plenary on 14 June 1985.

II. REPORT OF THE PLENARY SESSIONS

Presentation of the issues by the UNIDO secretariat

Issue No. 1: Conditions of entry into the capital goods sector and strategies for integrated manufacture

36. A representative of the UNIDO secretariat stressed the central role of the capital goods sector in the industrialization process of developing countries and the economic and social implications of mastering technologies associated with manufacture. The main characteristics of the capital goods sector and its diversified and multisectoral nature was stressed, as was the importance of small and medium-scale enterprises for the development of the sector. Particular mention was made of the technological changes that affected the strategies of developing countries for entry into and future development of the sector. Training and financing were important, as were the evolution and growth of consultancy and engineering services in developing countries. Various global strategies, policies and tools were identified, such as integrated planning, ATC and the approach based on multi-purpose production. Finally, both internal and external strategies of Governments were recognized in a framework of mutually beneficial international co-operation.

Issue No.2: Development of the electric power equipment sector and technology unpackaging

37. In introducing issue 2 a representative of the secretariat underscored the priority of electrification in the overall development strategy of the developing countries, pointing out that the value of total annual investment by those countries in the sector was some $US 60 billion. By spending US 15 billion annually for electric power equipment imports, the developing countries also accounted for one third of the total world market for such equipment. That situation led to an optimistic assessment of the possibilities for expanded mutually beneficial industrial co-operation between the developed and the developing countries.

38. It was stressed that it was necessary to elaborate practical recommendations on ways and means to overcome the obstacles hindering the development of electric power systems and power equipment industries in the developing countries and to promote co-operation between the developed and the developing countries as well as between the developing countries themselves.

39. Expressing their appreciation to the United Nations Conference on Trade and Development (UNCTAD) and other international and regional agencies for their assistance in preparing the background documentation, the representative of the secretariat also stressed the importance of the distinction between electric power systems and the electric power equipment industry as well as the necessity to include in the discussion of electric power systems all of the hardware and software activities involved.

40. The representative of the secretariat drew attention to technology unpackaging as one approach to overcoming some of the obstacles faced by the developing countries in expanding their electric power systems, technology unpackaging in turn being directly affected by, among other factors, the conditions of financing and the presence of engineering and consultancy services.

Summary of the discussion

41. There was general acceptance of the importance of the capital goods industry in the industrialization process and the desirability for developing countries to establish and develop that industrial sector so as to attain social and economic objectives. The specific role of the electric power equipment industry in promoting local industry and its linkage with other sectors of the economy was identified.

42. Emphasis was given to the need for proper planning for the development of the capital goods sector with appropriate studies conducted to establish realistic demand projections and an assessment of available resources, both in terms of manpower skills and material requirements. Participants noted that there could be no uniform planning model: each country had to consider its own unique characteristics. In planning the development of the sector, due attention should be paid to the special features involved, including the wide diversity of products, the complex manufacturing process, high level of technological skills required, high investments and long gestation periods. Manpower planning was stressed, and it should involve effective training at all levels including production planning, repair and maintenance, the design of products and manufacturing technologies, management and industrial development in general. The sectoral development plan should indicate products to be locally manufactured under an appropriate time plan.

43. Proper feasibility studies should be undertaken for each project and the financial and economic viabilities clearly established before investment was committed.

44. Various methods of entry into the capital goods sector were identified, the suitability and applicability of which should depend on a country's specific circumstances. Among those were:

(a) The establishment of effective repair and maintenance services to build up local skills required for the development of the sector;

(b) The importation of reconditioned machinery and equipment as a means of reducing the investment cost. In that respect UNIDO was called upon to conduct a survey on the availability of reconditioned machinery and equipment in the industrialized countries and the demand for them in the developing countries;

(c) In recognizing the importance of rural electrification and the applicable technologies for electricity generation in micro and mini plants, local manufacturing capacity could be developed to produce machinery and equipment for that specific purpose. In that connection due consideration should be given to new and renewable energy sources where those were found to be environmentally and economically effective.

The potential of small and medium-scale enterprises to provide a base for entry into the sector was also recognized. In that regard, it would be beneficial for such enterprises in developing countries to produce products based on simple processes as a means of entry into the sector.

45. The unpackaging of technology was considered extremely important in providing a means of entry and progress within the capital goods and electrical technology sectors. The unpackaging of electrical systems had the potential for the concrete redeployment of specific production to developing countries. Financing institutions and technology suppliers would need to adopt measures that would facilitate such arrangements.

46. The role of co-operation between developing countries in the capital goods sector was recognized, and attention was called to the recent decisions of the Andean Pact countries in that regard. Constraints on market size could be overcome through such co-operation. The potential for trade in capital goods between developing countries was considerable and had grown recently. With

regard to co-operation with developed countries, both the role of large enterprises as well as the structure of the industry were of particular importance in the sector.

47. The representative of the UNCTAD secretariat emphasized the dynamic role of the capital goods sector through capital formation and technological development and diffusion in developing countries. He noted that capital goods exports from some developing countries to developed countries, and in particular to other developing countries, could contribute to the restructuring of the world economy and to more balanced North-South economic relations. The work of UNCTAD on technology complemented that of UNIDO including technical co-operation. Studies carried out by UNCTAD with the financial support of the Government of Japan had resulted in the publication of The Capital Goods Sector in Developing Countries: Technology Issues and Policy Options (UNCTAD/TT/78).

48. The representative of the International Labour Organisation (ILO) emphasized the importance of training in the development of the capital goods sector and made reference to the studies and mandates of ILO in that area. Training on a long-term basis should be consistent with a Government's social and economic policies. Resolutions on training and the social implications of technological change had been adopted by the International Labour Conference and the ILO Metal Trades Committee.

49. One participant described the work of his organizations with regard to standardization in general and standardization in electric energy systems, in particular, noting its great relevance to the capital goods and electrical sectors in developing countries.

50. The work of UNIDO on the multi-purpose approach to the production of agricultural machinery might be usefully expanded to the whole capital goods sector. It was considered that the studies and issue papers presented by the secretariat constituted a sound basis for further work by UNIDO.

III. REPORT OF THE WORKING GROUP ON ISSUE 1: CONDITIONS OF ENTRY INTO THE CAPITAL GOODS SECTOR AND STRATEGIES FOR INTEGRATED MANUFACTURE 11/

The impact of modern technologies on the capital goods industry

51. A representative of the secretariat introduced the topic on the impact of modern technologies on the capital goods industry in developing countries. He drew attention to questions contained in the issue paper on the impact of modern technologies on the international division of labour, national choices of technologies and international co-operation.12/

52. Some participants pointed to the impact that the diffusion of modern technologies could have on the capital goods industry in developing countries and highlighted its effect on international industrial restructuring and redeployment. The impact on international restructuring of a reduction of the cost differential in manufacturing in developing countries was referred to by the representative of the Economic Commission for Western Asia (ECWA).

53. While one participant felt that developing countries should take a very cautious attitude towards new technologies, another gave detailed examples of the successful introduction of computers in different applications in his country. The possibility of the co-existence of traditional and advanced technologies within and between countries was mentioned by some participants. Some participants pointed out that in the industrialized countries the percentage of enterprises usually utilizing new technologies was not very large. In addition, one participant emphasized that a long period of time was required to introduce and master modern technologies, also in industrialized countries, and that developing countries should not underestimate that difficulty. One participant pointed out that the introduction of new technologies widened the gap between very qualified personnel using those new technologies and unskilled labour, and many participants stressed the importance of training.

11/ ID/WG.442/1.
12/ Ibid., paras. 49-50.

54. Several participants felt that the impact of new technologies was only one factor affecting the conditions of entry into the sector, other factors were of equal importance. One participant stated that other barriers such as access to markets, financing etc., could be greater obstacles to developing the capital goods sector than the introduction of new technologies. Several participants pointed out that the size of markets in developing countries was often an obstacle to the production of capital goods and stressed the importance of co-operation in that field.

55. The role of UNIDO was stressed by many participants, for example in connection with monitoring and carrying out studies on the impact of new technologies, the role of small- and medium-scale enterprises and technical assistance. One participant encouraged UNIDO to convene a panel of experts to analyse the impact of modern technologies and the implementation of relevant projects in the capital goods sector of developing countries.

Constraints to entry into the capital goods sector

56. The discussion of strategies centred around exploring various problems connected with entry into the capital goods sector, the criteria that should be used in determining sectoral and product structures, technological routes of entry, the role of regional co-operation and various aspects of the multi-purpose approach. A representative of the secretariat presented the topic and stressed the need for a comprehensive approach to all related questions and the potential of the ATC method in that respect.

57. With respect to national choices for the development of the capital goods industry, some participants stressed that there were no universal criteria that were valid for all developing countries owing to the great differences between countries and between sectors.

58. The importance of skilled manpower and training was stressed by many participants. A number of participants emphasized the need for the establishment of social and professional structures that would deal with job-related problems and training. One participant stressed the need for increased labour representation in the UNIDO consultation mechanism. The impact of market conditions on national strategies and choices of technology was underlined by several participants. The importance of political factors

was stressed by one participant. Another participant pointed to the role of direct investment as a vehicle for the transfer of technology. One participant indicated that developing countries, when employing external consultants, should pay due account to conditions of service of the consultants's home country.

59. One participant pointed out that the criteria would have to depend on a careful assessment of the situation and available resources in each developing country, another participant referring to the problem of raw material and intermediate product supply, in particular in the steel industry, for the development of the sector, whereas another participant strongly underlined that the decisions must rest with the enterprises themselves. Several participants recognized the importance of the ATC method in that context. The role of the Government or State in guiding available domestic or external resources towards national goals and in accordance with national criteria was stressed by one participant. Some participants suggested that repair and maintenance might be a route for entry into the capital goods industry. One participant referred in particular to the need for product adaptation and standardization efforts. Another participant said that such decisions should remain with the countries themselves and that UNIDO should provide guidance in that respect.

60. After clarifications given by the secretariat concerning possible difficulties that could occur in applying the multi-purpose approach, it was recognized by certain participants that the approach constituted a valuable component of development strategies for capital goods.

61. A number of participants noted that financial constraints continued to have a limiting effect on the development of capital goods in developing countries and suggested that UNIDO, in co-operation with the competent international financing institutions, further examine the problem with the aim of identifying new approaches or formulas that would respond to the specific needs of the sector.

62. Some participants pointed out that the size of markets in developing countries was often an obstacle to the production of capital goods and stressed the importance of regional co-operation in that field.

The experience of UNIDO in planning and promoting the capital goods industry

63. A representative of the secretariat introduced the topic on the experience of UNIDO in planning and promoting the capital goods industry in a number of developing countries. Technical assistance activities were implemented in those countries under a similar methodological approach in terms of policy instruments and incentives, the CCCG system to assess market potential and ATC to define technical levels and prepare investment profiles.

64. A number of participants illustrated the positive experiences they had in developing a capital goods programme with the technical assistance of UNIDO. The role of the Government and of the public sector was considered to be a crucial element in the economical and political decision-making process. Particularly effective were the consultation groups between the producers and purchasers of certain types of machinery and equipment, which promoted the purchasing of national products on the part of public enterprises. Those participants stressed the positive role of UNIDO assistance in applying planning and technological methodologies, resulting in the identification of development targets in a coherent and rapid way.

65. Several participants agreed that public institutions and enterprises played an essential role as they represented a large segment of the purchasing power of a given country and that it was important to gain their support in granting preference to local production.

66. A number of participants stressed the question of help required for less developed countries, mainly those included in category C of the UNIDO typology. It was suggested that specific assistance programmes should be implemented for countries that aimed at the creation of capital goods manufacturing units linked to sectors such as agricultural or mining which represented the main natural resources. They agreed to the approach suggested by UNIDO that the route for entry into the capital goods industry for group C countries should essentially be the production of equipment for sectors that satisfied fundamental needs such as food, building and infrastructure as well as those connected with national resources such as mining, mineral processing and agricultural products. One participant suggested that UNIDO should not limit itself to the proposed solution for entry into the capital goods sector by group C countries but it should keep the problem under review for alternative solutions.

The planning methodology as designed by UNIDO

67. The secretariat introduced the methodologies for CCCG and ATC. Those methodologies had been developed for analysing the demand for capital goods and assessing technology levels and requirements for both existing industries and for new investment opportunities.

68. Several participants expressed their appreciation of the methodologies; both appeared to be effective and complementary to each other. They were considered to be valuable instruments to assist planners in designing investment programmes based on detailed analyses of demand for and supply of capital goods in order to create a coherent technological base. Mention was made by some participants of the use of similar methodologies for manpower development. In that connection, the need for accurate statistical data was expressed.

Other UNIDO approaches in technical assistance

69. The secretariat introduced the topic on the technical assistance programmes of UNIDO that covered the specific requirements of group A and C countries.

70. A number of participants agreed that such programmes would allow less developed countries to initiate capital goods production by promoting a specific nucleus of industries.

71. A number of participants pointed out that the planning methodology should focus as a priority on the development of products for national markets. However, the subregional, regional and international markets should not be neglected, as in the long term greater competitiveness could be secured. One participant pointed out that there was a risk that tariff protection schemes, designed to be temporary and diminishing, would become permanent sources of government income, thus perpetuating the risk of high costs and low competitiveness.

72. One participant invited UNIDO to continue to increase technical assistance in the field of regional co-operation and factory management.

73. The representative of ECWA suggested the need to develop technological infrastructure in terms of foundries, forges, research and engineering institutes. He pointed out the need for South-South co-operation.

74. A number of participants stressed the problems of countries of group A, which suffered from market and economic crises with large manufacturing capacities unutilized in the capital goods sector. One participant suggested that greater attention should be given to mechanisms for public debt relief, the opening of markets of developed countries and the transfer of new technologies as tools to meet the impact of the unfavourable situation faced currently by countries of group A. Another participant suggested that UNIDO should organize special meetings between countries at similar levels of development.

75. Regional and international co-operation was mentioned by several participants as a way to enrich the CCCG and the ATC methodologies, especially with the contribution of industrialized countries.

76. The participant from China suggested that UNIDO should pay attention to the economic reform in the machine-building industry of his country.

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The electric power industry in developing countries

77. Because of the key role of electricity generation in economic and social development, the participants generally agreed that it was important that the developing countries enter or expand current production in the electric power equipment sector. At the same time some participants stressed the constraints to the production of electric power equipment in those countries: the small domestic markets which made large production runs impossible and did not justify the cost of designing and pattern-making; the inability of even economically and technically well-established local firms to match the financial conditions offered by international corporations; and the difficulty for countries that were relatively inexperienced and at the early stages of production to compete internationally in terms of price and quality. The need for skilled workers and the necessary know-how was recognized.

78. One participant noted that market factors could only be ignored where strategic considerations had been deemed to be of overriding importance, and another spoke of the need for the Government to subsidize strategic enterprises. The inability to meet international financing conditions was seen by some participants as prohibiting producers in developing countries from winning internationally tendered contracts for their own public utilities. Two participants reported on "buy national" legislation that required domestic utilities to purchase from local producers, even when their prices were higher, and others reported on regulations designed to foster the development of domestic enterprises. The latter, however, were labelled a form of "pseudo-transfer of technology" by one participant, since suppliers only met the minimum requirements and then only supplied the simplest technology.

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79. Support was expressed by some participants for expanded assembly operations of electric power equipment, one participant stressing the importance to the developing countries of the on-the-job training thus acquired. Several other participants, in turn, moved beyond such individual policies and called for the development of an overall strategy for the sector.

80. Two participants expressed their belief in the virtues of modern technology as a mechanism for overcoming the constraining effect of market requirements. Several others, including some participants from least developed countries, embraced the introduction of modern technologies in electric energy generation for their economies. Some participants, however, noted that such technologies were too expensive and reported that they had been successful in retrofitting, i.e., rehabilitating and modernizing, older equipment.

81. The local technical environment was considered by many participants to be basic to the ability of developing countries to produce equipment for the electric power industry, repair and maintenance workshops being labelled by one participant as a future source of knowledge for the developing countries. Several participants also pointed out that cheap labour was often held to be another crucial factor, but they emphasized that although labour was indeed abundant in the developing countries, it was not cheap when adjusted for productivity. Moreover, the output from automated production lines was often more internationally competitive. One participant stated that the developed countries that were carrying out a developing country project should train personnel from that country and the representative of ILO stressed the important mediating role to be played in that area by international organizations.

82. At the enterprise level, some participants underscored the appropriateness of small- and medium-scale enterprises for the electric power industry in the developing countries.

83. One participant stressed the importance of planning techniques, while another challenged the claims made for integrated planning in the entire capital goods sector.

84. Several participants emphasized subregional and regional co-operation as well as requests for greater assistance from international organizations. One participant requested increased assistance from the developed countries, while another participant noted the critical role of the investment climate in developing countries in that regard.

85. Several participants indicated the importance of rural electrification in their countries. Some participants from least developed countries stated that such programmes were not meeting targets and that national participation in those programmes was very low and sometimes limited only to the manufacture of wooden poles. Micro- and mini-hydro plants, as well as plants employing non-conventional or new or renewable forms of energy, were identified as suitable alternative decentralized electricity generation options. Owing to the relatively simple equipment requirement of such plants, the involvement of small- and medium-scale enterprises could be effective.

The manufacture of electric power equipment and the classification of developing countries

86. In introducing its conceptualization of a typology of developing countries for the electric power equipment industry, the secretariat emphasized that the concept represented an attempt to identify common problems and formulate common strategies in the electric power sector in developing countries at similar levels of industrialization. In the brief discussion that followed one participant stressed the difficulties of using such a typology owing to the complex problems in developing countries, and two participants pointed out the usefulness of such typologies and metholologies as a means to obtain a better knowledge of the crucial problems facing a particular group of countries.

Technology unpackaging and the role of engineering and consultancy services

87. Representatives of the secretariat introduced the concept of technology unpackaging as reflected in the issue paper (ID/WG.442/2, paras. 13-14) and the role of engineering and consultancy services.

88. There was general agreement that unpackaging was a major route to increase the local content in electric power projects. It was stressed, however, that unpackaging was not an easy task and that the creation of local engineering and consultancy services and training in several turnkey and semi-turnkey projects were among the prerequisites for gradual unpackaging. The existence and involvement of those services, particularly in the first stages in which technology and equipment are defined, was of vital importance in increasing local purchases.

89. Several participants stated that the urgent demand for electricity, the need for reliability and the very large scale of some projects often forced utilities to prefer turnkey arrangements to unpackaging. Furthermore, management capacity was not always sufficiently developed to cope with the demands of unpackaged projects. Several participants pointed out that policies pursued by financing agencies, for example the requirements for international tenders, were responsible for countries opting for turnkey operations. A number of participants felt that turnkey arrangements were necessary at least in some sectors for most countries, particularly for projects that were not likely to be repeated, and that some countries would need such arrangements for some time to come.

90. One participant drew attention to the conflict of interest between utility companies and local manufacturers in developing countries. Utility companies were often interested in increasing their generating capacity within the shortest possible time and operating with maximum reliability, while domestic industry needed a "learning period", which utilities were reluctant to accept. Furthermore, it was necessary for utilities to identify and prepare technical specifications for components that could be produced domestically and to carry out acceptance tests and quality control of locally manufactured equipment. Such capabilities were not always available, however.

91. The appropriate degree of technological unpackaging was considered by several participants to be a function of the cost, the time available for the project as well as the technological capacity of the specific country. It was argued that a new enterprise in a developing country could not be expected to perform overnight at a standard equal to that of an established international corporation. One participant summarized the discussion in his argument that technological unpackaging should be understood as a development process rather than as a set of individual projects viewed in isolation.

92. Several participants felt that in all unpackaging efforts the question of responsibility was a critical factor and that responsibility also had to be unpackaged in accordance with the capabilities of the contractual partners. One participant felt that the total sum of individual responsibilities was often less than the total risk involved and that there were sometimes grey areas for which no one could be held responsible. Some participants stressed then the necessity for adequate contractual agreements, including provisions for rapid international arbitration, with a free choice of applicable law by the contracting partners.

International trade in electric power equipment

93. A representative of the secretariat emphasized the importance of the close relationship between industrialization and trade. In that connection, modern forms of South-South co-operation had significant potential for removing or reducing the obstacles to capital goods production in the South.

94. One participant stressed that, while trade and trade-related aspects of development per se fell under the mandate of UNCTAD and GATT, it would be appropriate that an organization devoted to fostering industrialization in the developing countries also investigated those problems. Some participants emphasized that constraints in the areas of trade, finance and standardization represented a fundamental hindrance to expanded intra- and interregional trade. While the importance given in the previous discussion to financial constraints was reiterated, several participants gave particular emphasis to the need for increasing the degree of standardization in manufacturing as a precondition for enhancing intraregional co-operation.

95. Several participants reported on the experience of their countries in regional co-operation in the electric power equipment industry, and one participant implored the developing countries to pursue that strategy as the only way for many developing countries to increase the size of their markets and thus to reap the benefits of scale. At the same time, another participant stressed that the complementarity of South-South trade with North-South trade flows should not be ignored.

96. Finally, several participants raised the question of tariff and non-tariff barriers to trade in the electric power equipment industry and noted the

different standards in different countries as well as "buy national" policies for public utilities in both the developing and developed countries.

The financing of electric power projects

97. A representative of the secretariat drew attention both to the very large financial requirement as well as to the high ratio of external to domestic funds necessary for the development of the electrical power projects (usually of the order of one third). That would further strain the availability of external capital over the medium term owing to the difficulties of the developing countries in servicing their external debts. He also stressed that financial engineering was essential in optimizing the allocation of scarce resources, and technology unpackaging could help reduce foreign currency requirements. Although international multilateral and bilateral financing agencies would continue to play an important role in the sector, other means of financing should be considered.

98 Another problem of international financing was identified by some participants as the fluctuation in foreign exchange rates. That resulted in an increase in the foreign exchange risk borne by both the borrower and the lender. Several participants also stressed the handicap faced by developing countries in the export of equipment owing to the lack of appropriate financing. One participant suggested that regional development banks should contribute to the solution of this problem by extending appropriate guarantees.

99. Some participants considered that a negative effect was exercised through the requirements imposed by some international financing agencies on the smaller countries, directly or indirectly, with regard to the purchase of foreign equipment. In particular, they considered the 15 per cent margin between the c.i.f. prices for products from the industrialized countries and local prices in the developing countries to be inadequate.

Annex I

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Annex II

PROGRAMME OF WORK

Monday 10 June	9:00 - 10:00	Registration at the Stockholm International Fairs and Congress Centre	
		Plenary	
	10:00 - 13:00	Opening session; election of officers; adoption of the agenda	
	15:00 - 16:30	Adoption of a work programme and presentation of the issues and discussions	
	17:00 - 18:00	Discussions	
		Working group 1[a/]	Working group 2[b/]
Tuesday 11 June	9:30 - 11:00	Impact of modern technologies	Electric power industry in developing countries
	11:30 - 13:00	Discussions	Discussions
	15:00 - 16:30	Entry into the capital goods sector	Typology of developing countries
	17:00 - 18:00	Discussions	Technology unpackaging and the role of engineering and consultancy services
Wednesday 12 June	9:30 - 11:00	UNIDO experience in planning and promoting the capital goods industry	Technology unpackaging
	11:30 - 13:00	Discussions	Discussions
	15:00 - 16:30	Planning of the capital goods sector	International trade in electric power equipment
	17:00 - 18:00	Discussions	Financing of electric power projects
Thursday 13 June	9:00 - 10:30	Discussion of the report of 1	Discussion of the report of 2
	11:00 - 12:00	Adoption of the report of 1	Adoption of the report of 2
	13:00 -	Departure for Vasteras (technical visit to ASEA)	
		Plenary	
Friday 14 June	9:30 - 11:00	Discussion of the report of the Consultation	
	11:30 - 13:00	Adoption of the report of the Consultation and closing session	

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a/ ID/WG.442/1.
b/ ID/WG.442/2.

Annex III

LIST OF DOCUMENTS

Issue papers

Issue paper I: Conditions of entry into the capital goods sector and strategies for integrated manufacture	ID/WG.442/1	A/C/E/F/R/S
Issue paper II: Development of electric power equipment sector and technology unpackaging	ID/WG.442/2	A/C/E/F/R/S

Background documents

Conditions of entry into the capital goods and integrated manufacture: Background document to issue I	ID/WG.442/3	E/F/S
Development of electric power equipment sector and technology unpackaging	ID/WG.442/4	E/F/S

Information documents

Report of the First Consultation on the Capital Goods Industry, Brussels, Belgium, 21-25 September 1981	ID/276	C/E/F/R/S
Capital goods in perspective: Definition, importance and analysis of factors affecting demand with special reference to Arab countries	UNIDO/IS.420	E
Arab trade in capital goods	UNIDO/IS.421	E
Arab demand for capital goods in the short, medium and long term	UNIDO/IS.451	E
The capital goods industry in Latin America: Present situation and prospects	UNIDO/IS.478	E
The capital goods industry in Africa: A general review and elements for further analysis	UNIDO/IS.502	E
Second world-wide study on capital goods: The sector in figures	UNIDO/IS.505	E
Electric power equipment production in developing countries: Options and strategies - An analysis of eleven country case studies	UNIDO/IS.507	E/S
Electric power equipment production in developing countries: A typology and elements of strategy	UNIDO/IS.509	E/F/S
Capital goods industry in developing countries: A second world-wide study	UNIDO/IS.530	E
Regional co-operation in development of capital goods and engineering industries in ECWA	ECWA/ID/85/1	E

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