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UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Vienna International Centre, P.O. Box 300, 1400 Vienna, Austria
Tel: (+43-1) 26026-0 · www.unido.org · unido@unido.org

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Consultative Group on Appropriate
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CONTENTS

INTRODUCTION

1. The first meeting of the Consultative Group on Appropriate Industrial Technology was held in Vienna, Austria, from 14 to 16 November 1977. The list of participants is contained in annex I. The list of documents circulated at the meeting appears in annex II.

2. The Second General Conference of the United Nations Industrial Development Organization (UNIDO) held at Lima, Peru, in March 1975, adopted a resolution (ID/CONF.3/Res.2) on the selection of appropriate industrial technology, and requested the Executive Director of UNIDO to prepare a co-operative programme of action to promote the creation, transfer and use of appropriate industrial technology for developing countries. An initial report outlining a programme of action on appropriate industrial technology (ID/B/183) was submitted by the Executive Director to the Industrial Development Board (IDB) of UNIDO in April 1977. The first meeting of the Consultative Group is a follow-up of the decision taken by the IDB on the report (ID/B/Dec. IV(XI)). Apart from periodic meetings of this Group, UNIDO also plans to initiate necessary action for monitoring developments in the field.

3. On behalf of Dr. Abd-El Rahman Khane, the Executive Director of UNIDO, G.P. Veliky, Director of the Industrial Operations Division, UNIDO, welcomed the participants and delivered the opening statement. Dr. Khane stressed that the concept of appropriate technology was a means and not an end in itself, and that policies and programmes that had been initiated covering various aspects of appropriate industrial technology should be integrated into overall industrial strategy and development programmes. In order to gain a practical and meaningful view of the concept of appropriate technology, and to work out equally practical and meaningful programmes of action, it would be necessary to focus attention on basic industrial development strategies and derive from them the appropriate technology path that should be undertaken. The industrial development strategies generally followed in the developing countries so far no doubt indicated a substantial growth of industrial production in several developing countries, but at the same time the benefits of such industrial growth had not been sufficiently widespread. One of the reasons for this was that the present pattern of technology flow was inadequate to ensure the broadly based industrialization that it would be desirable to achieve. It was therefore necessary to be clear first about the industrial development strategy before an appropriate technology strategy could be defined.

4. In the Lima Declaration and Plan of Action not only had a quantitative target been established for industrial production, but qualitative aspects of industrial growth had also been stressed. The essential elements were greater fulfilment of basic socio-economic needs, maximum development of human resources and greater social justice through more equitable income distribution. Consequently, it was imperative to review the structure of industrial growth and the corresponding pattern of technology flows and development.

5. In order to fulfil basic needs and to provide basic products in certain sectors of industry advanced or improved technology was clearly necessary. A situation could not be envisaged in which dynamic influence of modern industry would no longer be available for industrial growth and development in general. But an examination of basic aims of industrial development had revealed that there had to be greater decentralization of industry and a reorientation of the structure of production. Industrial growth as a whole should be more broadly based and rural areas should get more attention, not only as consumers of products but also as producers. It was therefore necessary to consider the role and implication of industrial decentralization. While industrial decentralization was currently regarded as an ancillary pursuit, it should become an integral and vital element in the strategy for industral growth. The concept of appropriate technology could be channelled into the mainstream of industrial development strategy principally as a critical element in this process instead of its being viewed as a worthwhile but somewhat peripheral activity.

6. As part of the implementation of the programme of action, Dr. Khane stated, UNIDO would be convening an international conference in November 1978, which would be called the International Forum for Appropriate Industrial Technology. Such a conference was intended to establish close and direct links among official and non-official institutions and individuals involved in the practice and application of technology. While the Forum would promote greater co-operation in this field, the deliberations of the Consultative Group would highlight the conceptual aspects and implications of appropriate technology within the framework of a comprehensive industrial strategy. It was intended to convene the Consultative Group periodically and for this purpose to draw upon as wide an expertise relating to development as possible.

7. The members of the Group designated C.S. Couri, Deputy Director of the Industrial Operations Division, as Chairman of the meeting.

I. TOWARDS A STRATEGY FOR INDUSTRIAL GROWTH AND APPROPRIATE TECHNOLOGY

8. The deliberations of the Consultative Group centred largely on the background paper circulated by the UNIDO secretariat entitled "Towards a strategy for industrial growth and appropriate technology" (ID/WG.264/1).

Concept of appropriate technology

9. The term "appropriate technology" as discussed by the Consultative Group and used in this report is broadly defined as technology that contributes the most to the economic and social objectives of development. In general, three sets of factors may be considered in determining whether a technology is appropriate, namely, development goals, resource endowments and conditions of application (ID/B/188, page 4). The Group viewed appropriate industrial technology as a derivative of an industrial growth strategy encompassing the above sets of factors. It was recognized that the concept was dynamic. Appropriate industrial technology should not necessarily be conceived as labour-intensive or related only to small-scale production. Depending on conditions, it could well be capital-intensive, sophisticated and used for large-scale production.

Industrial growth pattern in developing countries

10. The Consultative Group held the view that the existing industrial growth pattern in most developing countries posed issues of considerable concern. With the growing accumulation of foreign debts and continued dependence on foreign technology, capital goods and technical services, most developing countries had not been able to meet the rapidly increasing pressure of population growth, unemployment and illiteracy. At the same time there was a world-wide depletion of resources. Viewed historically, the problems of technology transfer remained in essence the same as they were several decades ago, when some of the developing countries attempted to "westernize" and "modernize". Such attempts had resulted generally in an inability to control the accumulation of foreign debts and to build up sufficient indigenous technological capacity.

11. The developed countries, on the other hand, controlled the finance and technology needed by the developing countries as well as the access of the products of such countries to their markets. Furthermore, their technologies were developed on the basis of considerations that were not always relevant to the situation in developing countries, such as high consumption, potential military application etc.

12. It was recognized that the pattern of growth in the developing countries could not simply imitate that of the developed countries. Emphasis needed to be placed on long-term measures and, in particular, on education and the development of human resources. Political commitments were needed on the part of Governments. The developing countries could benefit considerably through collective self-reliance and global co-operation. Multilateral aid, in particular from the United Nations, could be an important means of helping the developing countries.

13. The Consultative Group noted that there was growing disenchantment in several developing countries with the present pattern of industrial growth and of development in general. While the results in terms of sectoral industrial growth had been quite significant in many developing countries and had resulted in the emergence of an expanding modern industrial sector, based on the structural pattern of industrialized economies, the total impact of industrialization and technology inflow had fallen considerably short of the socio-economic needs in most of these countries. The economic benefits of industrial progress had not seeped down to the poorer segments in these countries, which resided mostly in rural areas and which had remained largely unaffected by industrial development which had been concentrated largely in urban areas. Industrial growth based on traditional western production and consumption patterns had not been oriented to meet the legitimate needs and aspirations of the larger rural community in these countries in terms of employment, income and basic socio-economic needs. Poverty and unemployment had, in fact, become intensified, both in rural areas and in the urban sector. Income disparities had tended to grow, instead of being reduced as they should as an essential facet of the development process. Above all, certain basic needs of the community remained unfulfilled, creating and accentuating a critical dichotomy in the development process.

14. It was agreed that industrialization had a particularly significant role to play in the amelioration of poverty and unemployment. It could provide a dynamic motive force whose effects should extend considerably beyond the industrial sector. Industrial development should be viewed as the means not only of producing a large variety of goods and services, but also of providing adequate employment opportunities, greater income generation and distribution for the poorer section, and improvement in the conditions of life for the larger community in these countries.

15. In such a context, the goals of industrial growth, as those of overall development, must include fulfilling basic socio-economic needs, eradicating poverty, achieving greater social justice through more equitable income distribution, ensuring maximum development of human resources, and encouraging self-reliant and participatory development. These aspects were complementary to one another and to the overall aim of extending the benefits of industrialization in terms of generation of income and employment and of the development of the human resources of as wide a strata of society as possible. The Consultative Group considered that there would be no basic contradiction between the fulfilment of basic needs and the targets of quantitative industrial growth envisaged by the Lima Declaration and Plan of Action. It would, however, be necessary to work towards some restructuring of future industrial growth, in particular, through greater decentralization and dispersal of industry.

16. The Consultative Group recognized the great diversity among developing countries in their stage of development and in their natural and human resources. While it was therefore impracticable to adopt a uniform model of industrial growth for all developing countries, a pattern of industrial growth needed to be conceived along with appropriate lines of technological development that could be adapted to the specific needs of individual countries.

The role of the modern and decentralized sectors

17. The Group endorsed the view suggested in the paper presented by the UNIDO secretariat (ID/WG.264/1) that, to ensure more broad-based industrial growth, it was necessary to develop a rapidly growing modern industrial sector side by side with a sound and efficient decentralized sector. On the one hand, the modern sector in developing countries must continue to receive major impetus through the allocation of resources for the manufacture of products that must necessarily be produced in the large-scale sector and that would provide basic production inputs for the internal market and products for exports. On the other hand, a wide range of goods and services could be produced by a decentralized industrial sector, which should be extended as far as practicable in the rural areas and in which the manufacturing process would be directly related to meeting the basic socio-economic needs of the rural and semi-urban community. It was imperative, however, that close links be ensured between the modern and the decentralized sectors, and that these be viewed as essential parts of an integrated industrial growth process.

18. It was noted that such duality only reflected the real conditions and needs of developing countries. Development itself was a decentralized process. Even in most developed countries, there were two broadly identifiable sectors of this type. The dividing line between the two was often thin and one could talk even of three sectors, such as the modern sector, the decentralized sector and the rural sector, and of a plurality of technologies applied in each country. What was essential, however, was that industrial growth patterns of developing countries should not continue to be confined to small enclaves of industrial concentration, located in increasingly industrialized urban centres and having only limited relevance for the large rural community in these countries.

19. The application of appropriate technology should not be viewed as confined to the decentralized sector alone, since such processes and technologies were relevant to all sectors of the economy. Similarly, the fulfilment of basic socio-economic needs was not the task of the decentralized sector alone. To fulfil such needs it might be necessary to manufacture a number of commodities in the modern sector. At the same time, several products relevant to basic needs could be manufactured in the decentralized sector. These included food products, agricultural items, agro-industries, agricultural implements, pesticides and mixed fertilizers, building materials, pharmaceuticals, and a wide range of consumer items, such as clothing, shoes and household goods apart from maintenance and repair of agricultural transport and irrigation equipment.

20. The Consultative Group emphasized the importance of effective linkages between the decentralized and the modern sectors. Such linkages could take several forms. Certain products directly related to rural consumer needs or for agricultural processes and operations, and lending themselves to production on a relatively small scale, could be located outside the principal urban centres and, as far as practicable, in close proximity to centres of consumption in the rural areas. For certain products, the finishing operations could be located in rural areas, while the principal inputs such as steel, aluminium, chemicals and fertilizers could be produced through large-scale units located on the basis of purely economic and technological considerations. For assembly products, ancillary units could be located in rural or semi-urban areas and be closely linked with the final assembly units, which could ensure supply of basic inputs and expertise. There could thus be linkages in terms of inputs, markets and technology. Such linkages could be more easily

identified on a sectoral basis. This should study such sectoral linkages in greater depth. The public sector could also help in the provision of such linkages, for example in the construction industry.

21. The Group considered, in this connection, the question of the efficiency of decentralized production, so that the resultant goods and services could be available at competitive prices. The extent to which such decentralized production should meet the criteria of efficiency would vary, depending, inter alia, on the extent to which the demand for any particular commodity was met from large-scale enterprises, on the distribution system for products, both of the modern and decentralized sectors, and on the extent of the difference in product designs and related aspects between urban and rural consumption. In certain cases, markets for the products of the modern and decentralized sectors could be non-competing. It would be inappropriate to underestimate the efficiency of the decentralized sector; in any case, low efficiency should be corrected wherever it existed. In the decentralized sector, this might necessitate improvement of production techniques and increasing the availability of viable alternative technologies coupled with appropriate government policies. In fact, a comprehensive programme of incentives for such decentralization, including financial assistance, provision of infrastructure facilities, supply of raw materials, equipment and expert guidance, would be necessary as an integrated package. This package should be adequately supported by appropriate policy measures, so that the production and marketing of goods and services through such industrial units could be efficient.

22. It was also recognized, however, that the concept of economic efficiency, in certain cases or for a period of time, might have to be subordinated to basic social objectives such as greater employment and better income distribution. The infant-industry argument could, with justification, be applied to the decentralized sector. Besides, urban industry itself received hidden subsidies in terms of better access to finance, foreign exchange etc. There were also the costs of urban conglomeration to consider such as urban housing, amenities, transportation and the like.

23. A related and important aspect was the question of purchasing power. The sound functioning of the decentralized sector would depend, in many cases, on the availability of rural purchasing power. In certain countries, even the implements produced by intermediate technology were found to be beyond the reach of the rural population. This in turn pointed to the need

for increasing the income of the rural population through agricultural development and allied activities.

24. Questions of rural purchasing power and rural consumption also brought into focus the need for designing products appropriate to local conditions. No strategy for the decentralized sector could overlook this aspect. The dissemination of information by the Industrial Technological Information Bank (INTIB) of UNIDO, for instance, should include not only information on alternative technologies but also on alternative product designs. Besides, in the regulation of industrial production or of imported technologies by the Governments of developing countries, attention needed to be given as much to product designs as to the technologies themselves.

25. Experience also showed that the encouragement of the decentralized sector could often result in conflicts between groups within the society; for example, the encouragement of rural industries might conflict with the interest of large-scale producers. In any strategy for decentralized industrial growth, attention should be paid to the resolution of such conflicts.

26. It was noted, however, that efforts at rural industrialization had not always been successful. There was therefore need for a further examination of the effective linkages between the modern and the decentralized sectors. In view of the great possibilities offered by the decentralized sector, there might well be a case for structural and policy changes such as the reservation of certain products for manufacture in small scale and in the decentralized sector.

Appropriate technology and the reorientation of industrial strategy

27. The Consultative Group considered the role of technology in relation to a reoriented strategy for industrial growth. In the first place it was considered essential that developing countries should not cut themselves off from the mainstream of technological development. They should have access to the latest achievements in technology and should be enabled to compete as equal partners in the export markets. They should be able to select technologies from the immense range of technologies available in the world. It should also be borne in mind that technology was being applied in the developing countries in circumstances different from those that obtained at the time of the industrialization of the developed countries.

28. It should be recognized that the developing countries would continue to rely on the import of technologies from the developed countries for some period of time in several production sectors. There was also a glaring disparity in the extent to which R and D had been undertaken by the developed and developing countries. The bargaining capacity of the developing countries was very weak and they were unequal partners in technology trade. Their capacity for the commercialization of domestic research was quite inadequate. They were also deficient in the technological services needed for the application of technologies. The tendency to acquire inappropriate products and technologies had continued in several developing countries. The costs of adaptation might be heavy in certain cases and might not be in others, but sufficient efforts at adaptation had not so far been made.[1/] The patterns of demand for technologies in the developing countries were based on the patterns of consumption which had been borrowed from the West. One of the primary tasks in any new effort to promote the technological development of developing countries should be to plan consumption and to design products accordingly. The application of technology should not be viewed as an isolated exercise since it occurred as part of the establishment or expansion of an industrial enterprise. Related factors, such as skills, management and capital, also had to be taken into account in working out technological strategies.

29. The financial aspects of technology transfer were also stressed by the Consultative Group. Such costs included not only the payments for patents, licences and trade marks, charges for technical know-how, repatriated profits etc., but also costs arising from over-pricing of equipment and intermediate products, payments under national technical assistance agreements and individual employment contracts with foreign expatriates. These costs were expected to increase significantly in the future for the developing countries. It was suggested that the industrialization process in developing countries, which involved transfer of technological hardware and granting concessions to or establishing joint ventures with transnational firms, had contributed to the accumulation of foreign debts. The problem was further compounded by a reverse transfer of technology or brain drain. Large-sized projects also had an inflationary impact on the local economy of certain countries owing to the inadequate local supply of building materials, transportation facilities and

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1/ The Consultative Group appreciated in this context the presentation made by Johan van den Brink, Director of the Philips Pilot Plant, Utrecht, the Netherlands, on the practical approach of his company to appropriate technology and the work done in this regard by the company's pilot plant.

skilled manpower. This led to a heavy annual rate of inflation and distortion of internal wage, rent and price structures.

30. International co-operation in development assistance had operated in such a manner that finance for industrialization and related infrastructure was easily available to buy complex technological packages while finance was lacking for unsophisticated, small-sized, but yet vital projects and for the improvement of existing industrial or agricultural activities. Several factors including the practice of tying aid had contributed to this situation. In addition, the trend was evident that developing countries were being obliged to repay debts on shorter and shorter maturities and at increasing costs.

31. It was in such a context that the question of reorienting the technology to suit a reoriented pattern of industrial growth had to be viewed. For the modern industrial sector in developing countries, where by and large imported technology would be needed at least in the short run, technological choice should be extended as far as possible and a significant measure of selectivity should be introduced. While developing countries must ensure the adequate inflow of appropriate techniques and processes, it was equally necessary that the inflow of foreign technology should take place in identified sectors of growth, that it should be appropriate to local conditions and factor endowments, consistent with and complementary to domestic technological development, and made available on acceptable terms and conditions.

32. The technological needs of and appropriate technology for the decentralized sector could differ significantly from those of the modern sector. Not only would the production scales be different and unit investment outlays considerably reduced, but much greater adjustment would be required to local factor situations, including human skills. Technologies for the decentralized sector would need to be systematically identified from among the existing technologies and new technologies might need to be developed where necessary.

33. Such considerations pertaining to a reorientation of technology had implications for technology policies and called for a fresh approach to the question of development of indigenous technological capabilities of human resources.

[illegible]

34. The Consultative Group stressed that, in view of the wide variation in factor endowments and levels of development among developing countries, it would not be practicable to prescribe one model for all developing countries. The starting point of any examination of policies would be to pose the question why developing countries were not using appropriate industrial technology.

35. Experience so far showed that developing countries had sometimes adopted inappropriate policies which had resulted in the adoption of inappropriate technologies. On the other hand, it had also been found that where special incentives had been given by developing countries, these had not necessarily led to the adoption of appropriate technology. What would appear to be needed was a package of measures that would encompass such matters as correction of factor price distortions, physical controls, decentralized industry, incentives and extension services.

36. So far as the enterprises were concerned they thought and planned on a short-term basis. Hence, in a package of measures to be taken, a balance had to be struck between short- and long-term measures, the short-term measures focusing on the action to be taken by the enterprises and the long-term measures concentrating on building up skills and capabilities in the country.

37. In working out these measures it should be borne in mind that the question could often be one of making hard choices and of effecting structural changes in the industrial pattern. For example, the reservation of certain industries for the small-scale sector would automatically ensure that technology more or less appropriate to developing countries would be adopted in those sectors. It would also enable the growth of the decentralized sector.

38. A policy for the selection, acquisition and adaptation of imported technology, including exercising a degree of selectivity in this process, needed to be developed by most developing countries. It was equally necessary to emphasize the horizontal transfer of technologies within each country. This would in turn require the improvement of existing technologies, in particular the traditional ones. An assessment of the experience in the use of such technologies would also be needed for this purpose.

39. The application of appropriate technology in developing countries warranted an enlargement of the technological options available to them. This would entail a systematic search and identification of existing technologies suitable to developing countries and the development of new technologies. It would be necessary to multiply the R and D efforts of the developing countries significantly. R and D was underfinanced in developing countries. Policy actions were needed in this respect which would include not only the development of research but also its commercialization. In other words, a policy was needed for indigenous technological development.

Indigenous technological development

40. Attempts at technological development by the developing countries should in the view of the Consultative Group be based on the recognition that technology was a resource that had to be developed and utilized like any other resource. Viewed in this way, technology could be the spearhead of development, attracting matching resources such as labour and capital. Such a view was different from the traditional approach that technology merely needed to be combined with capital and labour.

41. Related to the concept of technology as a resource, the development of human capabilities became a significant element in any basic long-term strategy for indigenous technological development. The traditional approach was to adjust technology and capital to the relatively low level of skills in developing countries. This approach could be changed if the skills were upgraded.

42. Consequently, the Consultative Group placed heavy emphasis on the development of human resources and skills which would necessitate long-term programmes of a comprehensive nature ranging from the provision of sound educational facilities and the reorientation of curricula to vocational training, the creation of specialized cadres of technicians, scientists and managers and specific training related to the selection, acquisition, adaptation and development of technology. Such programmes should, in addition, take note of the requirements of the decentralized sector and of the need for engaging women in households in productive work.

43. The human being was indeed the centre of the innovation process. Experience had shown that innovations often sprang from groups of individuals, working closely together and developing skills and experience in a specialized area.

44. Apart from the development of human resources, the problem of technological development of both the modern and decentralized sectors needed to be tackled on a comprehensive basis, beginning with an assessment of technological needs and proceeding to the creation of the necessary technological infrastructure and institutional mechanisms, in order that technological objectives could be adequately fulfilled in accordance with a well-defined technology plan. The essential ingredients of such a technology plan should comprise:

(a) The identification of technological needs and objectives;

(b) The development of an adequate technological infrastructure, including a comprehensive information system, and of technological service capability and specialized manpower skills;

(c) The creation of institutional mechanisms for the evaluation, selection and requisition of technology considered most appropriate in a given set of circumstances;

(d) The establishment and development of appropriate institutional mechanisms for monitoring the impact, absorption and adaptation of various processes and techniques;

(e) The growth of R and D activities in significant industrial sectors and in basic infrastructural fields, such as energy, closely linked with industrial activities;

(f) The definition of policies and guidelines to be applied through fiscal or regulatory instruments to encourage indigenous technological development and to ensure the adequate flow of appropriate foreign processes and techniques into critical and priority sectors.

These aspects were closely interlinked, and it would only be through an integrated approach covering these issues that the development of technological capabilities for the selection, requisition, adaptation and absorption of appropriate technology could be effectively achieved in developing countries.

45. It was noted in this connection that inadequate technological services were a major constraint in most developing countries and needed as much, if not more, attention as the development of new technologies. Such services ranged from macro-level industrial planning to micro-level project identification, feasibility studies, plant specifications, detailed engineering designs, civil constructions and machinery installation, and the commissioning, start-up and operations of plants. The most significant gap, even in fairly industrialized developing countries, was in detailed engineering and designing and sectoral consultancy services through nationally owned units. This made the disaggregation of imported technology packages extremely difficult and created a critical infrastructure lack, thus resulting in undue dependence on foreign design and engineering services with their consequential impact on the

pattern of investment [illegible] projects, [illegible] the requirements of capital [illegible] and engineering and [illegible] plant operation and management. In the longer-term perspective, the gaps in consultancy services were even more marked and extended to almost the entire range of services indicated above. Gaps in service capabilities had to be identified country wide and the critical and priority sectors in each economy.

46. An appropriate methodology was developed for the evaluation and selection of technology in various production sectors and for the negotiation and acquisition of selected technology on suitable terms and conditions. The selection and acquisition of technology had hitherto been left largely to the initiative of individual enterprises, though in several developing countries national regulatory institutions were exercising screening-and-check functions to ensure that restrictive and one-sided contractual provisions in favour of technology licensors should be reduced as far as possible. The Group stressed the need for enhancing the capabilities of enterprises as well as of government officials in the negotiation and acquisition of technology.

Work of other international organizations

47. The Consultative Group took note of the work done by the International Labour Organisation (ILO), United Nations Conference on Trade and Development (UNCTAD) and United Nations Environment Programme (UNEP) in the field of transfer of technology.

48. It was observed that the Basic Needs Strategy that evolved out of the World Employment Conference of ILO in 1976 contained a number of implications for appropriate technology. As a contribution to the reappraisal of prevailing technological policies, the World Employment Programme of ILO had sought to provide planners, policy makers and investors with objective, factual data on which to base an independent assessment. It had undertaken a series of studies on several economic sectors and groups of products and services. The investigations had been carried out mainly in developing countries. Particular emphasis had been placed on estimates of the effects of alternative technologies on employment and income distribution in actual operating conditions without neglecting the aspects of economic efficiency.

49. It was noted that UNCTAD was engaged in two main areas of work relating to the appropriate choice of technology. One area was the restructuring of the existing legal and juridical environment for the transfer of technology involving two interrelated issues, namely the revision of industrial property

[illegible] and the [illegible] of a code of conduct on transfer of technology. Another area of work was the strengthening of the technological capacity of the developing countries. An advisory service on transfer of technology had been established in UNCTAD. In addition, sectoral studies on fertilizers, pharmaceuticals, petrochemicals, electronics and machinery were being developed. The programme of UNCTAD also included a study of the impact of the brain drain on development and of its implications for policy, and a study of the relationship between technological development and environmental concerns. It was noted that UNCTAD was ready to collaborate fully with UNIDO in pursuing the goals set by the Lima Declaration and Plan of Action in the area of transfer and development of technology.

50. The Consultative Group noted that the concern of UNEP related to three issues: (a) the conceptual framework for environmentally sound and appropriate technologies; (b) the problems and methodology of generation of these technologies; and (c) the criteria and methodology for selection of such technologies. These issues had been discussed and elaborated in expert group meetings held by UNEP and in papers contributed by it. In addition, UNEP was envisaging a programme for the establishment of an institution-based network of pilot projects on environmentally sound and appropriate technologies. This programme would be completely operational by the end of 1980. The main objectives of the network were to demonstrate through practical projects, and to encourage institutions to choose and develop, environmentally sound and appropriate technologies.

Lines of further action

51. While the approach of the paper prepared by the UNIDO secretariat was generally endorsed, several suggestions for action were made in the course of the discussions. It was pointed out that UNIDO was the most appropriate agency, on the one hand, for integrating industrial technology with a strategy for industrial growth and, on the other, for harmonizing a strategy for industrial growth with the goals of development. It was suggested that UNIDO should actively help the developing countries in planning their technological development and in formulating priorities and policies in this respect. It would be useful if UNIDO were to prepare guidelines and check-lists for national action. The role of UNIDO in providing the necessary institutional support for technology transfer was stressed.

. It was considered that a wealth of technological experience existed in the world both in the market economy countries and in the centrally planned economies. UNIDO could play a significant role in the transfer of this experience to developing countries. UNIDO also had an important part to play in the field of training and in the development of technological capabilities of developing countries. The question of international co-operation in appropriate technology could be usefully brought up by UNIDO before the United Nations Conference on Technical Co-operation among Developing Countries.

53. It was important that interest in research in appropriate technology should be stimulated among students. In this respect, the potential available in developed countries' research institutions, which had the spare capacity to undertake such work, should also be utilized. Organizations concerned with appropriate technology both in developed and developing countries were generally too small to be effective and UNIDO could play a valuable role in mobilizing their efforts.

54. It was suggested that because of the many-sided nature of development, it would be necessary in future for the United Nations system to engage in multidisciplinary projects involving all relevant agencies, in order to bring an integrated approach to bear in assisting countries in solving specific national problems.

55. It was reported that the National Science Foundation of the United States had issued documents on appropriate technology in the United States and a directory of activities and projects in the field of appropriate technology. It was suggested that UNIDO could encourage other countries to survey their own activities. It was also pointed out that, as a result of funding by the Agency for International Development, Appropriate Technology International, a non-profit institution, had been established. This institution and UNIDO could work together in matters concerning appropriate industrial technology.

56. At the end of the discussion on the subject of industrial growth and appropriate technology, certain proposals were put forward for further action by UNIDO. These were endorsed by the Group along with some additions. They are summarised in the following section.

57. First, the interrelationship between technology and development should be studied in depth by UNIDO. The influence of development patterns on technology and the influence of technology patterns on development should be

examined from the short-term and long-term points of view and both within and among countries. For this purpose, it would be necessary, inter alia, to survey the literature on development as well as on science and technology policies.

58. Secondly, UNIDO should take the initiative of inviting concerned United Nations agencies to state their views on the question of transfer and development of industrial technology in relation to their own activities. Such views could be solicited according to a common format. The agencies to be invited to provide information should include the World Bank. UNIDO could bring the views together so that a total picture of integrating industrial technology and development could be evolved.

59. Thirdly, UNIDO should study systematically the possibilities of exchange of experience and co-operation among developing countries themselves. Such a study should be made with particular reference to industrial technology and preferably before the United Nations Conference on Technical Co-operation among Developing Countries. The industry aspects of the deliberations of this Conference could be elaborated by UNIDO with particular reference to exchange of experience in industrial technology.

60. Fourthly, it was necessary to devote more attention to the institutional support for transfer of technology. Different types of institutions for development and transfer of industrial technology existed both for purposes of monitoring and regulation and for technology development. UNIDO should study and analyse the function of a number of national and regional institutions for technology and work out a general design and a check-list which could be used in the establishment of such institutions in future.

61. It was suggested in addition that in the study of exchange of experience among developing countries there was need to point out success and failure stories. Countries could also submit information on their experience which could be compiled by UNIDO together with its own substantive comments. UNIDO should give attention to assisting and using industry research associations. The research institutes in developed countries which had potentialities for working on the problems of developing countries could be utilized.

62. The proposals summarized above were found acceptable by the Consultative Group. It was agreed that UNIDO should study, amplify and implement these proposals and seek further consultations with the Group when required.

[illegible] ORGANIZATION OF A GLOBAL FORUM FOR CONSULTATION ON APPROPRIATE INDUSTRIAL TECHNOLOGY

63. The Group considered the paper presented by the UNIDO secretariat on this subject (ID/WG.[illegible]). It was in general agreement that an international forum for appropriate industrial technology should be organized. With respect to the organizational aspects outlined in the paper, it was noted that offers to host such a meeting had already been received from more than one developing country.

64. As regards the date for the meeting of the Forum, it was observed that enough time had to be allowed for the preparation of documents and for securing as wide a representation as possible. Note also had to be taken of other international events and conferences. It was pointed out that the Conference on Technical Co-operation among Developing Countries was expected to take place in September 1978 and inasmuch as the Forum had the potential for stimulating co-operation among developing countries in the field of appropriate industrial technology, it might be useful to hold it soon after the Conference. The Conference would have set the political tone, so to speak, for co-operation among developing countries, and the Forum could translate the political commitments into specific areas of action.

65. The question was also raised whether one and a half weeks would be necessary for the meeting. As regards the funds for the meeting, it was noted that the Industrial Development Board had already endorsed the proposal for the organization of such meetings. Therefore there was a commitment of funds for this purpose. However, only the travel expenses of consultants or experts and of participants from developing countries could be borne by UNIDO.

66. The relationship between the Forum and the Consultative Group was discussed. It was agreed that these were two separate entities though there should be a close interaction between the two. It was considered useful that the Consultative Group should be associated with the activities of the Forum and that a meeting of the Group could take place before the Forum to review some of the policy aspects to be considered. It could also meet after the Forum in order to consolidate the results, draw up the lines of further action and prepare the basis for the contribution of UNIDO to the United Nations Conference on Science and Technology for Development and to the Third General Conference of UNIDO.

67. A number of comments were made on the organization of the Forum into three working groups. The working group on substantive and policy aspects outlined in paragraph 4(a) of the document ID/WG.264/2 should not be too large, since

effective discussions would not then be possible. The Consultative Group, it was considered, should provide a substantial input to the Forum in this respect.

68. As regards the working group of representatives of institutions of developing and developed countries, outlined in paragraph 4(b) of the document ID/WG.264/2, it was considered that this should be at a practical level at which the emphasis would be placed not so much on general discussions as on individual or group interchange, perhaps in selected industrial sectors. In this way it would be possible to build up a network of contacts among the institutions and with UNIDO itself.

69. It was noted that the working group on the organization of an exhibition was to discuss the design of such an exhibition rather than its actual installation during the Forum. The exhibition would include not only machinery and equipment, but also products and processes originating from developing countries. It was noted, however, that there was a possibility that the exhibition might be flooded with equipment and machinery from different suppliers. Care also had to be taken to see that the organization of such an exhibition did not distract the participants from attending any meetings that might be held concurrently.

70. It was noted that the comments made above would be taken into account by the UNIDO secretariat in working on the design of the Forum. The members of the Group would be kept informed of the ultimate design, date and venue of the Forum.

III. PROGRAMME OF ACTION ON APPROPRIATE INDUSTRIAL TECHNOLOGY

71. The Consultative Group took note of the report of the Executive Director of UNIDO on this subject (ID/B/188) and also of the decision of the Industrial Development Board thereon (ID/B/Dec. IV(X)). It was noted further that several projects under this programme were being implemented. The Group did not have time to discuss project details contained in the programme of action, but voiced the hope that the ideas expressed during the meeting would be taken into account in the further delineation of the programme. Members of the Group were also invited to send their specific comments, if any, on individual projects for the guidance of the secretariat. It was agreed that the secretariat would put the members of the Group on the mailing list for all UNIDO publications and that a preliminary copy of the report to the Industrial Development Board on appropriate industrial technology would be sent to them.

Annex I

LIST OF PARTICIPANTS[a]

Ibrahim Helmi ABDEL-RAHMAN, Adviser to the Prime Minister, Ministry of Planning, c/o UNDP, P.O. Box 932, Cairo, Egypt

Johan van den BRINK, Director, Philips Pilot Plant, P.O. Box 7028, Utrecht, Netherlands

Abdelkader CHANDERLI, Senior Adviser to the President, Arab Fund for Economic and Social Development, P.O. Box 21923, Kuwait

Luis ECHEVERRIA, Ambassador, Permanent Mission of Mexico to UNESCO, 1, rue Miollis, Paris, France

Aldo FERRER, Instituto de Desarrollo Economico y Social, Libertador 1750, Buenos Aires, Argentina

Thorkil KRISTENSEN, Odinsvej 18, 3460 Birkerød, Denmark

René NAVARRE, Former President and Executive General Manager, Institut Français du Petrole, 1, avenue du Premier Consul, 92, Parc Malmaison, Rueil, France

Keichi OSHIMA, Professor, Department of Nuclear Engineering, University of Tokyo, Bunkyo-ku, Tokyo, Japan

Austin ROBINSON, Professor of Economics, Cambridge University, Cambridge, United Kingdom

Mikhail A. SHUMAEV, Chief, Section for the United Nations Technical Assistance Affairs, State Committee for External Economic Relations of the Council of Ministers of the USSR, Moscow, Union of Soviet Socialist Republics

Petre TANASIE, Ambassador, Ministry of Foreign Affairs, Piata Victoriei 1, Bucarest, Romania

Hans Jürgen WARNECKE, Full Professor, Institute for Production, University of Stuttgart, Postfach 951, Stuttgart, Federal Republic of Germany

UNIDO Consultants

Anil Kumar AGARWAL, Assistant Editor, International Institute of Environment and Development, 10, Percy Street, London W1, United Kingdom

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a/ This list does not include the staff members of UNIDO who participated in the meeting.

[illegible] K.D.N. [illegible], [illegible], UNIDO, P.O. Box [illegible], A-1010 Vienna, Austria

[illegible] Manuel [illegible], Professor of Economics, New York University, [illegible], Tisch Hall, Washington Square, New York, N.Y. 10003, United States

Observers

Günther BARTH, Alternate to the Permanent Representative, Permanent Mission of the German Democratic Republic to UNIDO, Bauernmarkt 6/5/12, A-1010 Vienna, Austria

Marin BUHOARA, Alternate Representative of Romania to UNIDO, Prinz Eugen Strasse 60, A-1040 Vienna, Austria

Santiao Lalla Agustin GARCIA-LOPEZ, Ambassador, Embassy of Mexico, Gonzagagasse 7/5, A-1010 Vienna, Austria

Franz GSTÖHL, President, ORIMEF Foundation, Austrasse 42, FL9490 Vaduz, Liechtenstein

Joseph Le PUIGOU, Institut Français du Petrole, Rueil - Malmaison, France

John Edward Somerset PALMER, Consultant, Wavendon Grange, Nr. Milton Keynes, Buckinghamshire MK 17 8LH, United Kingdom

Juan Luis PRIETO, Adviser to Mr. Luis Echeverria, La Interamericana S.A., Insurgentes Sur 1136, Mexico City, Mexico

William G. WELLS Jr., Committee on Science and Technology, United States House of Representatives, Rayburn House Office Building 2321, Washington, D.C. 20515, United States

Representatives of United Nations bodies

Rolf I. ANDREASSON, Senior Economic Affairs Officer, United Nations Conference on Trade and Development, Palais des Nations, 1211 Geneva 10, Switzerland

Ajit BHALLA, Chief, Technology and Employment Branch, International Labour Organisation, 4-route de Morillons, Geneva, Switzerland

Paulo BIFANI, Programme Officer, Division of Environmental Management, United Nations Environment Programme, P.O. Box 30552, Nairobi, Kenya

Béla José CSIK, Nuclear Power and Reactors, International Atomic Energy Agency, Kärtnerring 11, A-1010 Vienna, Austria

Tomihiko FURUTA, Department of Research and Isotopes, International Atomic Energy Agency, Hofzeile 15/1/4, A-1190 Vienna, Austria

Annex II

LIST OF DOCUMENTS

ID/WG.264/1	Towards a strategy for industrial growth and appropriate technology UNIDO secretariat
ID/WG.264/2	Organization of a global forum for consultation on appropriate industrial technology UNIDO secretariat
ID/WG.264/3	List of participants
ID/B/188	Co-operative programme of action on appropriate industrial technology report by the Executive Director of UNIDO submitted to the Industrial Development Board, 1977
PI/38	Lima Declaration and Plan of Action on Industrial Development and Co-operation, adopted by the Second General Conference of UNIDO at its final plenary meeting, Lima, Peru
ID/CONF.3/RES.2	The selection of appropriate industrial technology, adopted by the Second General Conference of UNIDO, Lima, Peru
ID/B/Dec.IV(XI)	Co-operative programme of action on appropriate industrial technology, adopted by the Industrial Development Board at its eleventh session

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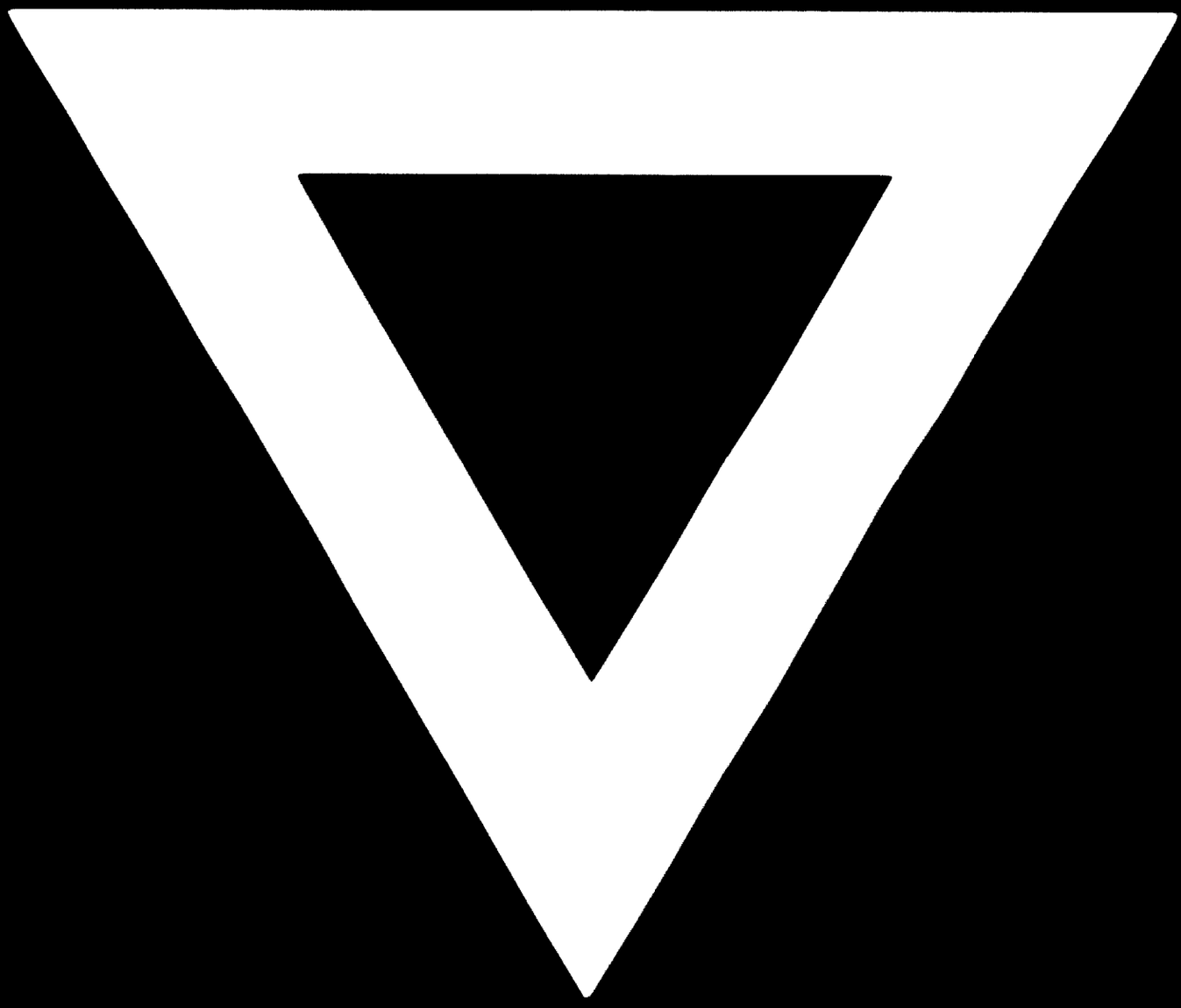

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