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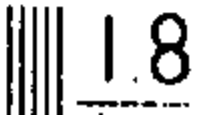
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First Consultation on the Training
of Industrial Manpower

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22-26 November 1982

ISSUES PAPER *

prepared by

the secretariat of UNIDO
in collaboration with
the secretariats of ILO and UNESCO

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PREFACE

Activities undertaken by the secretariat for preparation of the First Consultation

The Board had decided in 1978 that "an inter-secretariat working group should be established by UNIDO, in collaboration with ILO and UNESCO, with a view to examining the ways of maximizing the use of industrial manpower training facilities existing in developed and developing countries and to exploring their potential for expansion in relation to the needs of developing countries. The Executive Director of UNIDO should report to the Board at its thirteenth session on the results of the group's work, with a view to recommending to the Board, if appropriate, the convening of a Consultation Meeting on the Training of Industrial Manpower" (A/33/16, para. 169(a)).

The UNIDO/ILO/UNESCO Working Group was established in December 1978; it suggested that preparations for the First Consultation should examine the potential for:

(a) Greater use of existing training facilities in the developed countries for the benefit of developing countries;

(b) Greater use of existing training facilities in the developing countries and the need for their expansion to allow, inter alia, for increased co-operation among developing countries;

(c) Improving contractual arrangements for the acquisition of industrial skills.

The Board, in 1979, authorized UNIDO to convene in 1981 a First Consultation on the Training of Industrial Manpower. Due to a lack of financial resources this Consultation has had to be postponed to 1982.

In 1979 a report was prepared by UNIDO, in consultation with ILO and UNESCO, entitled "The acquisition and development of industrial skills by developing countries" (ID/CONF.4/8). This report was considered by member countries at the Third General Conference of UNIDO (ID/CONF.4/22, paras. 202 to 210) where all countries generally supported it.

In May 1981, an Expert Group Meeting considered a paper prepared by UNIDO on "Issues for possible consideration by the First Consultation on the Training of Industrial Manpower (ID/WG.341/1) which elaborated and refined the issues submitted to the Third General Conference of UNIDO, taking into account the comments made at that Conference and the conclusions of preparatory work undertaken by UNIDO in 1980.

The Global Preparatory Meeting was convened in Innsbruck, Austria, from 25-27 January 1982; it considered a document (ID/WG.354/1) prepared by the secretariat of UNIDO, in collaboration with the secretariats of ILO and UNESCO. The meeting agreed that the First Consultation should consider the following three issues:

(a) The existing training capacity in developed countries, its potential utilization and adaptation for developing countries;

(b) The potential utilization of existing training capacity in developing countries by other developing countries;

(c) The potential role of international organizations and of national institutions with international training objectives.

In June 1982, the High-level Meeting of Officials responsible for Industrial Manpower Training in Developing Countries met in Bucharest, Romania, following the Ministerial Conference of the Group of 77 which was held in Caracas, Venezuela, in May 1981.

In August 1982, the Intergovernmental Committee of the Group of 77 on the Follow-up and Co-ordination of Economic Co-operation among Developing Countries met in Manial to consider, inter alia, the report of the meeting held in Bucharest.

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INTRODUCTION

1. The First Consultation, in line with the mandate given by the Board, is to examine the ways of maximizing the use of industrial manpower training facilities existing in developed and developing countries and to explore their potential for expansion in relation to the needs of developing countries. In order to achieve the Lima target, a vast number of persons in the developing countries will have to be trained over the next 20 years, during which technological change will take place at an increasingly fast rate. The quantitative and qualitative dimensions of the problem would have to be examined.

2. Preparatory activities have revealed that training provided through commercial arrangements, notably in connection with the export of plant and equipment, has grown to the extent that training through such arrangements may well exceed in importance the training provided through traditional channels. In fact, an informal world market for training has emerged. However, information on supply and demand of training at the world level is, for the time being, dispersed and haphazard; in order to link supply and demand, this information would have to be better organized.

3. Studies show that at the present time, the training component of industrial projects is generally tackled on an ad hoc basis; moreover, training is not usually thought out and planned from the time an industrial project is initially conceived. Furthermore, commercial arrangements and the corresponding contractual relations for the acquisition of technological know-how and skills would often appear to be inadequate in meeting the requirements of a given industrial project. The studies confirm that technology and training should be the subject of long-term programming. In order to ensure the creation and strengthening of a national technological and training capacity and as part of a progressive movement to higher levels of technological complexity, co-operation arrangements should fit into a strategy of a long-term nature.

4. Preparatory activities have also shown that some fundamental questions have to be asked with regard to the approaches and objectives of training industrial manpower. Firstly, developing countries must establish good links between education systems, training systems and employment possibilities, taking into consideration the requirements of industry; secondly, training must be adapted to the evolution of technologies used by enterprises in specific sectors of industry. Thus, specialized management training must be related to the specific requirements of different industries; engineers and technicians

must be trained so as to be effective in industry and to assume increasingly multidisciplinary roles; programmes for supervisor training should take into account the social and cultural conditions prevailing in developing countries; trainers and instructors need to be trained in increasingly larger numbers and assured of a recognized status in training institutions and enterprises.

Topics for discussion

5. The First Consultation on the Training of Industrial Manpower will be concerned with the following question: to what extent can international industrial co-operation in the field of industrial training supplement national efforts to create and develop a national technological and training capacity and to master the industrialization process?

6. In the light of the dimensions of the problem it is suggested that discussions could focus on two broad issues:

Issue 1: Problems of appraising and matching the demand for and supply of training for industry in developing countries

It is considered that developing countries could improve their organization to define their needs and to express their demand for co-operation in industrial training; developed countries could improve the organization and co-ordination of their supply of training to the developing countries. The setting-up of co-ordinating mechanisms in developed and developing countries and the establishment of close links between them would contribute towards matching supply with demand.

Issue 2: Co-operation arrangements for training related to the acquisition of technology in industry by the developing countries

Case studies on the nature and scope of co-operation arrangements and the clauses included in contractual relations show that these are sometimes inadequate in relation to the industrialization and training objectives of developing countries. This issue is therefore concerned with:

(a) The desirability and content of long-term co-operation arrangements;
(b) The possible improvement of contractual relations;
(c) The financing of co-operation in the field of training for industry;
(d) Co-operation amongst developing countries;
(e) The role of international organizations.

ISSUE 1: PROBLEMS OF APPRAISING AND MATCHING THE DEMAND FOR AND SUPPLY OF TRAINING FOR INDUSTRY IN DEVELOPING COUNTRIES

A. A FORMIDABLE CHALLENGE: THE TRAINING OF HUMAN RESOURCES FOR THE INDUSTRIALIZATION OF THE DEVELOPING COUNTRIES

7. The employment problem will dominate the coming decades. On the basis of demographic projections [1/] an assessment can be made of the size of the labour force [2/] that will be available in the future. Thus, in comparison with the 1980 level, by the year 2000 there should be an increase of 42 per cent in the available labour force throughout the world; however, during this same period, it is expected that the increase in the developing countries will total 53 per cent, accounting for 88 per cent of the world-wide rise. [3/]

8. It is going to be necessary, therefore, to generate a very large number of jobs in agriculture, industry, and the service sector, for otherwise the burden of unemployment, particularly in the Third World, will give rise to intractable problems for society.

9. In 1970, throughout the world, industry [4/] employed 23 per cent of the labour force, 38 per cent of it in the developed and 16 per cent of it in the developing countries. It is obvious that as the developing countries industrialize there should be an increase in this percentage, although industrialization can only partially solve the problem of unemployment. [5/] The developing countries' share of world-wide manufacturing production has risen from 8.1 per cent in 1960 to 8.4 per cent in 1970, 9.8 per cent in 1975, 9.9 per cent in 1979, and around 10 per cent in 1982. [6/]

10. Increases in labour productivity in the developing countries have lagged behind those in the developed countries, [7/] and the productivity gap between developing and developed countries has widened. [8/] In comparison with the average for the developing countries, in 1960 productivity in the planned-economy countries was 1.85 times higher and in 1979 3.41 times higher, whereas the corresponding figures for the developed market-economy countries were 3.52 and 4.88, respectively.

11. The past industrialization of the developing countries may be characterized by two features:

(a) Growth which has been more "extensive" than "intensive", as reflected in the low labour productivity already mentioned; investment activities have aimed more at the extension than at the rationalization of production, while a part of the newly created production capacity has remained underutilized;

(b) A limited contribution, despite the "extensive" nature of the industrial build-up, to the absorption of unemployment and underemployment and to the productive use of an expanding labour force. 9/

12. Obviously, within this comprehensive view there are substantial variations in development and evolution from one developing country to another.

13. As far as the future is concerned, it has been estimated that, if the above trends continue, the developing countries' share of world-wide industrial production is unlikely to exceed 16 per cent in the year 2000 10/ - a prospect regarded as unacceptable by the international community for the reason that it will prevent industry from playing the role that it should in solving these countries' burgeoning social problems.

14. In an effort to identify the kind of industrialization policies that could reverse the trend of recent years, during which economic recession has spread to many developing countries, UNIDO has formulated a number of alternative scenarios: 11/

(a) One industrial growth scenario for the developing countries to the year 1990 contemplates an annual increase of 2.6 per cent in employment, 3.8 per cent in productivity, and 6.4 per cent in manufacturing output. Under the interacting hypotheses considered - which are neither those of a crisis scenario nor those of a normative scenario linked to the Lima objective - the labour force in the manufacturing industries is likely to expand by 50 per cent over the 1975 level.

(b) Another scenario, this time relating to industry as a whole for the year 2000 and geared to the Lima objective, envisages growth of 3.8 per cent (per annum) in employment, of 3.5 per cent in productivity, and of 7.5 per cent in industrial production. According to this, normative, scenario, there would be an increase of approximately 150 million persons in the industrial labour force (excluding China).

15. Because of uncertainties in the basic statistics, 12/ it will be best to limit analysis to the order of magnitude of the labour force required for the industrialization of the developing countries and the scale of the - very considerable - training effort that will have to be made from now until the end of the century.

B. APPRAISAL AND CO-ORDINATION OF DEMAND

16. Determining industrial manpower training needs in developing countries is a complex and multidimensional process, some of whose main aspects are summarized below.

(a) The first dimension

17. The first dimension of industrial manpower training is the fact that it is necessarily anticipatory in character. Training demand is governed, on the one hand, by the existing level of education and the workers' assimilation capacity and, on the other hand, by the nature of the industrial projects [13] and of the objectives envisaged by the recipient. [14] The latter may have in mind:

- An operational transfer of technology involving a minimum of local training and a substantial use of foreign manpower;
- A transfer aiming at the eventual functional autonomy of the industrial units and involving systematic training of local manpower;
- An innovative transfer implying an R+D capacity.

18. Given the uncertainty of the future in regard to industrialization trends and the evolution of technology, a broader training designed to facilitate vocational mobility may well provide the safest solution, even at the expense of temporary overqualification in relation to current tasks.

(b) The second dimension

19. The second dimension of industrial manpower training is the changing nature of work, resulting from modifications in the structure of industry. Occupations evolve, some disappear, others come into being. [15] The different industrial sectors exhibit structural differences in respect of the proportions of the different manpower categories required and their respective qualification levels. "Human capital" intensity varies greatly from industrial sector to industrial sector. [16] In a number of countries industrial training is organized on a sector by sector basis. [17]

20. Technical production systems (which probably correspond in some degree to the systems on which work is organized) [18] also appear to exert an influence on the degrees of autonomy in work [19] and on the importance and role of work

groups in production. [20] Very little attention has yet been paid to these highly important questions, [21] although they have considerable implications for the approach to manpower training.

21. In addition, the current scientific and technological revolution is causing changes in the nature of work which are not always immediately perceived and the significance of which remains a subject of argument.

22. Thus, automation and the introduction of electronics into industrial sectors [22] are raising formidable problems in regard to redundancy and the complex process of job dequalification-requalification. [23] The arrival of micro-processors has changed the picture completely, making it possible from now on to automate many production processes under flexible conditions, moreover at a time when the economic depression appears to have entered a long-term cycle. This is causing workers' organizations in developed market-economy countries to express concern about future employment prospects. [24] It would be wrong to assume that the developing countries will not be concerned with this problem. [25] The onward march of mechanization is also changing the nature of work as the technological complexity of machinery increases. One of the principal factors in this increasing complexity is the ever-increasing number of components. [26] A machine is no longer only a mechanical entity, but at the same time a chemical, electrical, electronic, hydraulic etc. entity. It follows that the maintenance and repair functions are becoming increasingly important and now constitute an area of concentration for industrial skills. [27]

23. Thus the development of technology and the technological choices made will affect the nature of work and work qualifications, and hence of the training required.

(c) The third dimension

24. The third dimension of industrial manpower training is the link between the national system of education and training and the technical and industrial system. Thirty, even twenty years ago, many of the problems to be raised at the first Consultation on the Training of Industrial Manpower had not arisen. In the developing countries the manpower needed for embryonic industries and small-scale enterprises could be trained by national systems with little outside assistance. Earlier still, training of the artisan was sufficient to enable him to assimilate technological developments. [28] This is no longer

true when it relates to the transfer of modern industries and technologies and when the internationalization of production processes [29/] involves an altered relationship between the training imparted by national training systems and that obtained under industrial arrangements.

25. Nor is this surprising: there is a necessary correspondence between the level of technology introduced by an industry and the level of vocational competence required for its effective utilization.

26. The initial training by the national system of directors, managerial staff, technicians, foremen and workers is on its own insufficient. It has to be supplemented by specific sectorial training which is most frequently carried out under industrial arrangements. This sectorial training must be planned and implemented in the framework of the structures designed to develop permanent training.

27. It goes without saying that, the lower the educational level of a country, the more long-drawn-out will be the process of the transfer of knowledge, the basic training being, in extreme cases, an extension of the school curriculum. At the opposite end of the scale, the greater the educational capital, the wider the experience acquired, the shorter will be the period required for the transfer of knowledge and the lower the cost.

28. The cost of specific sectorial training may be higher than that of building up the initial educational capital, i.e. the cost of the general and technical education previously received by the various categories of workers. [30/]

29. The most expensive form of training is that relating to the transfer of general technology for a sector. This is followed, in decreasing order of expense, by training for the transfer of specific technologies, which are in most cases licensed innovations, and, lastly, the transfer of technological processes which are often tested techniques and have become a matter of routine.

30. The following initial conclusions may be drawn:

(a) The greater the extent to which industrialization is carried out in the form of sectorial projects, whether large or small, the greater will be the importance of the specific training of "enterprise teams" (équipages des entreprises). [31/] As the role of training becomes decisive in the implementation of projects, a growing "market" for training will be created.

(b) The more necessary it becomes, as a result of the above, to develop national training systems in order to restrict specific, project-linked training to a minimum, the more essential it will be to

ensure that the national systems adequately meet the needs of industry. This is an ongoing task in which frequent adjustments will have to be made, as regards both the initial and the on-going training of the different categories of personnel.

31. If training is to meet the needs of industry, this will necessitate not only a capacity for adaptation within the training system itself, but also action to modify the environment in which it operates, both upstream and downstream.

32. Upstream every effort will have to be made not to create an impossible situation with which the training system would be unable to cope. This happens when, as a result of international industrial arrangements, technological demand and the ability of the available training supply to meet that demand are suddenly thrown out of alignment. An appropriate selection of the levels of technological complexity for the introduction of new industrial activities is of crucial importance. 32/ This makes it necessary to think in terms of reorganizing vocational training for the various categories in "blocks" of increasing technological complexity. 33/

33. "Mastery of the industrialization process" is the aim to be pursued by developing countries. This necessitates a pragmatic approach, adapted to sectors and countries, the details of which are still to be worked out. 34/ It is hoped that the first Consultation on the Training of Industrial Manpower will be able to advise on the usefulness of preparing guidelines on how to master the industrialization process, that is to say how to achieve technological self-sufficiency.

34. The success or failure of training - regardless of how effectively it is imparted - is generally decided during the design and assembly stages of industrial projects. The first requirement is that the contractor should set his stamp on this phase of the work. This necessitates a minimum number of trained personnel capable of understanding the underlying concept of a project and foreseeing its impliactions, and in addition the logistical support of a technical, economic and commercial data base, enabling the best technological alternatives to be selected. Hence the importance of the choice of partners, who should in particular be capable of procuring the necessary training.

35. The mastery of the industrialization process involves a movement in two opposite directions: on the one hand, it is necessary to increase within each national system the capacity to train a large number of workers to given levels

of qualification, while on the other the over-complexity of many industrial projects needs to be simplified. This over-complexity is often the cause of failures in the management of enterprises.

36. Other social considerations should also be taken into consideration. With the technical options available today we can envisage factories no longer obliged to operate on a continuous work regime; we can look for paths of development other than taylorism and fordism which seem to have exhausted their organizational possibilities, 35/ we can reorganize work, chains of command, and work teams in the light of the technological systems used and we can seek to enrich and humanize work itself. 36/

37. The developing countries too should recognize the need for the humanization of work, especially since working in industry is often a traumatic experience for workers previously engaged in agriculture. At the same time, it is essential for these countries to have productive enterprises and to train both the necessary specialists and a large number of more versatile workers, so as to promote professional mobility, the freedom of workers and a more widespread diffusion of techniques. That is why it is so important to encourage polyvalent training 37/ and, where production engineers and executives are concerned, the integration of curricula. Rearranged learning programmes should make it easier to master current technological developments.

38. Downstream too the problem arises of linking training systems with the technical and industrial system, the problem here being that of ensuring a proper correspondence between the training received and the work performed. This adjustment has always been difficult to achieve and tends to become even more so during a period of rapid changes. If it is not achieved, however, the result is a greater or lesser degree of under- or over-qualification. This is a very important problem for the developing countries, where such imbalances are frequent, either because the training received does not correspond to industrial needs or because the services sector drains off those who have been trained for the industrial sector. This phenomenon of a swollen tertiary sector has been observed in all industrial countries, but there it occurred after the industrial base had been created. Where no such base exists, as in many of the developing countries, the transfer to the tertiary sector does not in general contribute to the creation of an economic surplus. It is therefore not enough to provide suitable training for work in

industry; industry itself must offer sufficient incentive, and possess sufficient social prestige, to attract the manpower which has been trained for it, often at considerable social cost.

39. Solving these problems is not easy. It is a matter for the developing as well as the developed countries. The quest for solutions concerns not only governments, but also all parties involved in industrial training and development.

C. SUGGESTED MEASURES FOR IMPROVEMENT

40. It is clearly impossible to discuss all the questions relating to the training of human resources for industrialization in developing countries during the first Consultation. A selection must be made. [39/] This selection takes into account the fact that the questions are raised from the point of view of industry and that, moreover, some of them are dealt with in other forums, notably the ILO.

41. The questions proposed for discussion can be grouped under three headings:

(a) The strengthening of national training systems;

(b) The organization of counterpart mechanisms in the developed and the developing countries;

(c) The role of international organizations.

(a) The strengthening of national training systems

42. The strengthening of national training systems can take place through the formulation of a national strategy for the development of training concepts and of the capacity required to meet the national, sectoral and enterprise needs. In the long run a close interrelationship must be progressively secured between national education and training systems on the one hand and industry on the other. To this end, an integrated national strategy is required to identify sector and enterprise needs, to programme the long-term development of training for industry, and to establish close education-training-industry links. At the same time, the education and training systems should gradually develop the country's absorptive capacity so that it may progressively move to higher levels of technological complexity.

43. Several developing countries have attempted with a reasonable degree of success to establish a close link between education, training and industry. For example, [40] these links have been established for specific branches of industry so that students leaving vocational schools are immediately employed by enterprises as skilled workers; those who pursue their studies further may be employed as technicians or supervisors. The main characteristic is that each sector determines the skilled manpower required in relation to its production objectives, technology utilized etc. Discussions with those responsible for education and training permit the development of programmes to prepare trainees with the qualifications required by each branch of industry. Programmes are continuously adapted to allow for technological changes and those already working in industry benefit from continuing training typically for five months at three-year intervals. The result is that specific training by an enterprise and hence the cost incurred by it is reduced to a minimum, since such training is provided by the education/training system through programmes jointly elaborated with the enterprises concerned.

44. In other cases, [41] the gap between the national supply and demand has been partially overcome by enterprises in a given sector of industry setting up their own training centres; they have thus ensured that manpower with the specific qualifications required is forthcoming. Other case studies have shown variations to this approach; for example, through financial contributions from enterprises to set up training centres or institutions whose objectives are usually defined in conjunction with the objectives of the enterprises concerned. However, the links between enterprises (demand) and the education and training systems (supply) are sometimes loose, which can result in wastage and high costs of training for that branch of industry.

45. Long-term planning of training activities at all levels is necessary. Recognition of this need is not new. Since 1950 numerous countries have made considerable efforts to programme training and co-ordinate it with the education system and with industry. This planning has generally run into difficulties, or even proved a failure, in the developing countries. [42] The reasons for the failures that have occurred are complex; one weak point was that in the countries in question technology - because it was not analysed - was treated as a datum and not as a variable. The lack of sectoral industrial policies in the majority of developing countries [43] meant that modelling techniques could not readily be applied.

46. Experience thus suggests that it would be prudent to adopt less ambitious objectives in this field, especially since the majority of developing countries still have no clearly defined sectoral industrial policies. Moreover, the downstream linkage of training presupposes the formulation and adoption of an industrial social policy designed to avoid discrepancies between the training people receive and the jobs they occupy.

47. In order to strengthen the link between education and industry, UNIDO has sought to provide planners with additional tools through the technological complexity analysis. The capital goods industry provides one example of the application of this method in categorizing the system of training by successive complexity levels for workers, technicians and engineers. 44/ This opens up the prospect of concrete, joint planning at the national level for industry and the corresponding training. It is suggested that this methodology be tested in selected developing countries in order to indicate what changes would need to be made in the existing system of training for the mechanical and electrical industries. 45/

48. There are many other problems faced by developing countries in strengthening their national training systems the solution of which depends on the individual circumstances of each country. In this connection, the approaches developed by the international organizations, notably the ILO, will continue as set out in paragraphs 60-65.

(b) <u>The organization of counterpart mechanisms in the developed and the developing countries</u>

49. A realistic look should be taken at the future of in terms of its two complementary components: the "non-market" tra... provided by national systems, and the "market" in training created by its commercialization, industrial arrangements and the activities of specialized services. This "market" already exists and can be expected to expand as the industrialization of the developing countries proceeds. It has already been noted (paragraph 28) that the cost of specific sectorial training per individual can exceed that of the educational capital. 46/ It has been calculated that in 1990, in one of the UNIDO scenarios, industrial investment could amount to 100,000 million dollars at 1980 prices. Assuming that not less than 5 per cent of that sum would have to be spent on training, the training "market" in 1990 would represent 5,000 million dollars at 1980 prices.

50. This market is imperfect. Demand is uncertain. Supply is split up among various agents: widely-based enterprises responsible for the overall co-ordination of technology transfers, manufacturers of capital equipment, other enterprises of the industry concerned, consultancies, firms specializing in training, etc. From a theoretical point of view, commercialized training is not a "pure exchange" but a "composite exchange". 47/ From a practical point of view, the imperfection of the market is due to the fact that quantities and prices are unknown and the suppliers and their products are not assessed by the market in accordance with their qualities - which are not always fully evaluated for want of sufficient data.

51. Of all investments, the investment in training yields the highest dividends. Whatever the cost of specific sectoral or enterprise training, it is slight by comparison with the loss of earnings resulting from, say, the delay in bringing new installations into full production that can result from inadequate preparation of the personnel who are to man them. 48/ The most disquieting problem is the comparative lack of interest in this aspect of industrial arrangements that developing countries reveal in negotiations and, more generally, their tendency to underestimate training requirements. Eight or even 10 per cent of the cost of a project may not be too much to spend on training activities. But this should be balanced by greater effectiveness in the training imparted and a reduction in unit training costs.

52. It is therefore suggested that the First Consultation should consider ways and means of strengthening training programmes and explore the possibility of reducing training costs and according preferential treatment to training activities in industrial arrangements. This is all the more important in view of another fact which must not be overlooked: following the massive investment in education by the majority of developing countries, there is no longer much extra money available locally. 49/ The financing of specific industrial training will have to be increasingly sought through commercial and international co-operation agreements.

(i) A national co-ordinating mechanism in the developing countries

53. A national co-ordinating mechanism for training activities in the developing countries would be useful. 50/ It could take the form of a national focal point in certain cases. Where there is a plethora of

institutions and no obvious candidate for the leading role, other, more flexible solutions could be envisaged. Whatever form it takes, the mechanism in question, integrated in the framework of each country's training system, could progressively assume the following functions:

- As a source and receiver of information, it could receive and centralize training applications from industry and procure the means and assistance needed for a survey of existing training capacity within the country; collect and analyse information on external training supply; disseminate information on external supply to national applicants.
- At a second level of action, it could procure information and assistance for decision-makers; alternatively, it could assume the functions of a decision-making body itself, or at any rate provide the decision-makers with guidance and advice.
- A third level of action would concern the organization of "upstream" links with education and "downstream" links with industrial and employment policies. This implies the setting up of instruments and methods of action leading to the creation of an integrated national policy-making process.

54. It is suggested that the first Consultation should examine existing solutions and concentrate more particularly on the first function of the proposed mechanism: that of information.

(ii) Co-ordinating mechanisms in the developed countries

55. In the context of the preparations for this Consultation, consideration was given to the question of creating focal points or appropriate mechanisms in the developed countries as a counterpart to those in the developing countries.

56. The idea was examined with interest in the Federal Republic of Germany, France, Belgium, the United States and the United Kingdom. 51/ In the USSR and other socialist countries a co-ordinating mechanism already exists. 52/ In the market-economy developed countries, where training establishments are sometimes in competition with one another, the organization of single focal points appears difficult. There are, however, other ways in which information on training supply could be made accessible to developing countries. For

example, suppliers from market economies have already taken some steps towards improving organization and co-ordination, for example, through the preparation of catalogues or inventories of the technology and training capacity available, through the association of enterprises in order to improve their supply of training, through the envisaged establishment in one case of a co-ordinating mechanism at the national level and to assess demand from and organize supply to developing countries from both public and private sources of training.

57. The study of the organization and co-ordination of supply of the developed countries has enabled certain conclusions to be drawn with regard to the functions or activities which should be undertaken in an organized fashion in order to facilitate developing countries' access to the training capacities existing in the developed countries. 53/ Examples of these activities by developed countries may be summarized as follows:

- Information about potential suppliers and their quantitative capacity. Such information should indicate the industrial sectors, levels of training, teaching methods, previous experience etc. in which industrial training for developing countries is available.
- Diagnosis of developing countries' training capacities and needs to include a continuing assessment of technical and vocational training facilities, existing industrial training facilities, and the skills capacity of the manpower already available. Such information would be of particular value to small and medium-scale enterprises in developed countries.
- Establishment of contact between buyers of training and the most appropriate suppliers, together with the co-ordination of suppliers where necessary. This would meet the demand from developing countries which often requires co-ordinated activities of enterprises, training and financial institutions.

58. These mechanisms in developed and developing countries could usefully collaborate and even take action jointly. For example, developed countries might participate in diagnoses carried out by developing countries to assess their own training capacity, the extent to which foreign co-operation might be helpful, and the formulation of their requirements. Similarly, developed countries might enable developing countries to become more familiar with their available training resources.

59. It is suggested that participants at the First Consultation on the Training of Industrial Manpower should take this opportunity to test the suggestions made above on the establishment of co-ordinating mechanisms in developed and developing countries on the value of their possible functions.

(c) The role of international organizations in relation to Issue 1

60. The ILO, UNESCO and UNIDO are the main international organizations concerned with industrial manpower training; they must seek to ensure that the developing countries have an adequate supply of skilled manpower for the purposes of industrialization. Each organization should therefore be able, within its terms of reference, to pursue the development of its own programmes. The scale of the challenge which industrial manpower training will present over the next two decades should lead the international organizations concerned to give it increasing attention.

61. In the work of these organizations considerable emphasis should be placed on research and study programmes aimed at finding solutions to the problems hampering the industrialization efforts of the developing countries. These problems certainly include those of training maintenance workers and technicians. The same is true of the identification of training requirements; of the adaptation of training to the evolution of technology, the different levels of technological complexity and the new forms of teamwork; and of the multipurpose training of industrial manpower.

62. These organizations can also help to make the different systems and methods of training better known. 54/ Educational innovations and new training methods, such as those using computers, ought to be more widely disseminated. Here the role of the organizations concerned would be to draw attention both to the positive aspects of such methods and to the limits and constraints on their utilization.

63. The international organizations also have a part to play in helping developing countries to set up co-ordination and concertation mechanisms aimed at improving the integration of their education, training and industrialization efforts. Initially, they could assist the national authorities in a few pilot countries willing to put the ideas discussed into practice.

64. Numerous other topics are also of great importance for the advancement of industrial training in developing countries. In this connection, it appears that priority should be given to the building-up of coherent and

comprehensive training systems and to reorient and reorganize the education system so that short and long-term training requirements in all economic sectors are met; to improving the national capacity to undertake long-term planning and programming to meet manpower needs of specific industrial sectors; and to increasing the efficiency and effectiveness of training in order to reduce unit costs incurred in industrial training.

65. Furthermore, the international organizations will continue their efforts in the following fields:

(i) Training of trainers

Training of trainers deserves high priority in developing countries, because without them the new skills brought in from developed countries cannot be multiplied. Such training must be accompanied by appropriate wage and other policies to ensure that trainers are retained in their employment.

(ii) Engineers

Although high priority has been given to the establishment and expansion of engineering schools, often with the support of UNESCO, problems of relevance and quality persist, and a continuing effort should be made to ensure that curricula reflect advances in technologies, in their structure and content and that they are appropriate to the national situation. In addition, engineers of developing countries need to build up their capacities in engineering conception and design, so that they can adapt and create technologies to meet the specific conditions prevailing in their countries.

(iii) Technicians

Training of technicians and higher technicians is a complex social and economic issue, involving problems of status, remuneration, education, and career structures. Training abroad for technicians is sometimes necessary, but long-term solutions will depend on vigorous action to promote technician training and status in developing countries.

(iv) Management training

Although efforts have been made to examine the needs of managers in developing countries and to adapt programmes, renewed attention should be paid to management related to the specific characteristics and production structure of different sectors of industry. More particularly, it is

desirable to prepare training profiles related to the level of complexity of the management techniques required by different industrial sectors. In addition, areas, such as project management, management of scarce resources such as energy, the choice and application of appropriate technology and management information systems using micro-processors, will increasingly be the target for the organizations' technical co-operation activities in the area of management development.

(v) Supervisory training

Because their training needs are still insufficiently recognized, supervisors seldom receive adequate training for their important responsibilities. There is therefore a need to work towards recognized qualifications for supervisors.

(vi) Continuous or permanent training

Continuous or permanent training, a relatively new concept, is particularly important in developing countries. At a time when technological changes occur in relatively short periods of time, personnel must have retraining possibilities to keep abreast of the latest technologies, production methods etc. and to enable them to develop their personal careers.

(vii) Cost-effective methods of training

As costs of education and training have escalated in recent years, it has become increasingly urgent to find innovative and low-cost methods and systems to organize and provide training. This will become even more important to meet the challenge of training ever-increasing numbers.

D. POINTS FOR DISCUSSION

66. Participants at the First Consultation on the Training of Industrial Manpower may wish to pay specific attention to the following points:

(a) In view of developing countries' over-all objective to become technologically self-sufficient and master their industrialization process, to what extent would it be useful to draw up broad guidelines to illustrate how such an objective might be attained (see paragraphs 33-35)?

(b) To what extent can the methodology for analysing technological complexity constitute a supplementary instrument for planners in organizing national training in relation to different levels of technological complexity? To what extent can this methodology be tested in developing countries (see paragraph 47)?

(c) To what extent is the setting-up of co-ordinating mechanisms in developed and developing countries considered potentially useful for the organization of information, thereby facilitating the appraising and matching of the demand for and supply of training for industry in developing countries (see paragraphs 49-59)?

(d) In which way can international organizations, and notably UNIDO, ILO and UNESCO, contribute towards the strengthening of developing countries' national training systems and the establishment of co-ordinating mechanisms in developing countries (paragraphs 60-65)?

ISSUE 2: CO-OPERATION ARRANGEMENTS FOR THE ACQUISITION OF TECHNOLOGY IN INDUSTRY BY THE DEVELOPING COUNTRIES

Introduction

67. The previous Issue discussed the problems arising out of the gap between the supply capacity of the education and training systems and the demand of industrial sectors and/or enterprises in developing countries. It also discussed the desirability of establishing links between some sort of co-ordinating mechanisms or focal points in both developed and developing countries, particularly in order to improve the organization and diffusion of information. This Issue raises the question of the co-operation arrangements for training related to the acquisition of technology.

68. When a training request is made to a developed country, there are at present two main types of co-operation arrangements, i.e. within and outside the framework of an intergovernmental agreement:

(a) Within the framework of an intergovernmental agreement

A ministry of economic co-operation (or equivalent government agency) in a developed country assumes the main responsibility for the three functions mentioned above (para. 57) and generally also provides finance from public sources. If the demand from the developing country is addressed to the developed country's corresponding government agency, it is relatively easy for it to organize and co-ordinate supply of the necessary training services. If the demand from the developing country is for training by the private sector of the developed country, the government agency selects the appropriate supplier of technology and training services. In either case, the government agency remains the focal point for the developing country's inquiry and exercises some control over the quality of training.

(b) Outside the framework of an intergovernmental agreement

There is no single focal point with which an enterprise from the developing country can negotiate and consequently it may find itself with considerable difficulties in the selection of potential partners and in the negotiation and implementation phases of the contract. However, it is possible to envisage that demands from developing country enterprises be addressed to a co-ordinating mechanism or focal point (such as a professional or industry association or other body organized

for that purpose) [55] who would then become the main partner in the developed country. In this way, the demand for training could be addressed to an association of training institutions who would then assume the co-ordinating role for guiding the effective provision of the required training services.

A. THE DESIRABILITY AND CONTENT OF LONG-TERM CO-OPERATION ARRANGEMENTS [56]

69. The argument in favour of long-term co-operation arrangements is based on the long-term nature of the establishment and development of a national technological and training capacity (paras. 42-47). The content of such arrangements should therefore be defined in relation to the industrialization objectives of the developing country and to its initial level of technological know-how.

70. This implies that such long-term co-operation arrangements should enunciate certain principles of co-operation in the field of training for the purpose of industrialization; for example, the following points should be covered:

(a) State the long-term objectives of the co-operation proposed in the sectors of industry concerned, showing the contribution each will make to the improvement of national technological and training capacity in those sectors;

(b) Set out the stages of technological development (routes) to be followed in each sector;

(c) Define the needs of the receiving country and the contribution of the supplying country;

(d) Identify the co-ordinating mechanisms in each country which will be responsible for the organization and co-ordination of the training required;

(e) List the responsibilities and functions of the respective co-ordinating mechanisms;

(f) State the financial arrangements to cover training contracts whether they be of an independent nature or related to the purchase of plant and equipment;

(g) State arrangements for the subsequent assessment of whether know-how and skills have been effectively transferred;

(h) State conditions for the mutual recognition of education and training standards and levels of qualifications in selected priority sectors of industry.

71. It is suggested that participants at the Consultation express their views on the possible advantages and disadvantages of such long-term arrangements and suggest in what direction further investigations should be oriented.

B. THE POSSIBLE IMPROVEMENT OF CONTRACTUAL RELATIONS

72. The case studies [57] of contractual relations in connection with the export of equipment, technology etc. to developing countries reveal that training provided may be partial and fragmentary and is sometimes given little or no importance. The case studies show that improved contractual relations should pay increased attention to the following points:

(a) The objective of the contract; definition of know-how and skills to be transferred; tasks to be performed as a result of training;

(b) The definition of the training to be provided within the agreed cost;

(c) Establish the ownership of the training material, including its further use by the purchaser;

(d) Elaboration of the training programme, including different levels of training, and the training of trainers; relative importance of theoretical and practical training etc.;

(e) Determination of numbers to be trained, including provision for loss after training;

(f) Recruitment of trainees, including methods of selection; definition of qualifications and other criteria for selection;

(g) Arrangements for supervision during training and for subsequent assessment of whether the transfer of skills and related know-how has effectively taken place.

73. As a result of the analysis of current practice regarding contractual relations, some proposals as to the content of contracts have been prepared [58] regarding the type of clauses which may be included in different circumstances to cover the points set out above. These preliminary proposals have been formulated by the UNIDO secretariat in collaboration with experts in this field. The intention is that after further examination in the future, they will provide potential partners with a checklist of points which should be covered by contractual relations. The participants at the Consultation are invited to give their views on the direction which this further examination of this subject should take.

C. THE FINANCING OF CO-OPERATION IN THE FIELD OF TRAINING FOR INDUSTRY

74. Financial institutions are parties to the co-operation arrangements between enterprises and have a direct impact on the capacity of developed countries to provide industrial training to developing countries. The financing of training is not one of their prime objectives: rather the main objective is to finance the sale of plant, equipment etc. Yet, one important criterion for the successful use of export of plant and equipment is the existence of trained technicians, engineers, managers etc. There is, therefore, a vicious circle which must be broken. 59/ To this end, it is imperative that training of industrial manpower in developing countries be given greater priority by financial institutions, since it is only on this basis that viable projects can be identified and subsequently implemented.

75. A question remains as to how the cost of training should be included in the capital cost of the project in order to ensure that training is fully considered from the time the project is conceived. Under current arrangements, such a high proportion of loans is sometimes allocated to capital expenditure, that little is left for training. Similarly, in order to reduce costs, enterprises from developing countries are often ready to sacrifice the purchase of full and complete training. It is important that exporting enterprises, and particularly the small and medium-sized ones, be able to obtain financial resources to cover training needs and particularly the preliminary and exploratory studies; indeed, the financing of both training and exploratory studies should be an integral part of the budget of any project.

76. The investigations undertaken, and the sectoral Consultations held so far, 60/ have shown that major financial institutions, such as the World Bank, regional development banks, are paying increasing attention to the training component of industrial projects. However, the question may be asked: to what extent should financial institutions consider more often investment in industrial training as a crucial investment in social infrastructure? In this way, it might be eligible for financing on conditions similar to those applied to investments in physical infrastructure (e.g. preferential rates of interest, maturities etc.).

77. It is also suggested that public funds be used more often to complement the provision of industrial training by enterprises, including those of the

private sector, by providing for technical assistance for essential training, both for individual projects and also by financing the establishment of training centres for the developing country's priority industries. 61/ Investigations have shown that while this is the practice of some developed countries, it could become increasingly the general practice.

D. CO-OPERATION AMONG DEVELOPING COUNTRIES 62/

78. The investigations undertaken 63/ have shown that there is no significant difference in the modes of co-operation among developing countries and those between developed and developing countries, particularly where commercial forms of co-operation are concerned. The conclusions arrived in the above paragraphs concerning the organization and dissemination of information on demand and supply of training and on the need to improve co-operation arrangements are equally valid in so far as co-operation between developing countries is concerned. In this connection, existing ILO Centres, i.e. CINTERFOR in Latin America, CIADFOR in Africa, and APSDEP in Asia, as well as regional centres, such as the Colombo Plan Technician Education College in Singapore, the East African Management Institute in Arusha, might be able to contribute significantly to the improved organization of demand and supply in their various fields of training. They might, on request and provided resources are available, carry out systematic diagnoses of developing countries' development plans and policies, their industrial structure and training capacity and needs in relation to the specific levels of technological and managerial complexity utilized by industry. Simultaneously, diagnoses would have to be undertaken on the capacity of other developing countries to meet these specific needs.

79. The ILO's regional centres, in collaboration with the ILO and the ILO International Centre for Advanced Technical and Vocational Training (Turin Centre), have recently initiated co-operation at the interregional level intended to establish a broad technical co-operation programme covering the transfer of experience in use of various types of training methods, in administration and management of vocational training schemes and institutions, training of trainers, the financing of training etc. Another activity of these institutions has been the establishment of an Interregional Training Information System (IRTIS) which will significantly improve the information base on training.

80. Co-operation between developing countries can also be increased through the activities of national training institutions with international experience which have the capacity to assess the needs of developing countries, to transfer relevant experience from one developing country to another, and to provide training at the levels of technological and managerial skills required by different industrial sectors.

81. An additional important basis for co-operation among developing countries would be the mutual recognition of training standards. The work being already undertaken by ILO and UNESCO, as well as by APSDEP, CIADFOR and CINTERFOR, on the harmonization and comparison of education and training standards could be usefully strengthened. The ultimate aim should be the mutual recognition of standards on a bilateral, sub-regional, regional and interregional level.

82. In Bucharest in June 1982, a Meeting of High-level Officials responsible for Industrial Manpower Training in Developing Countries considered possible ways and means to encourage co-operation among developing countries. 64/ Amongst these, special attention was paid to the following:

(a) The conclusion of long-term intergovernmental framework agreements, bilaterally or multilaterally, to encourage co-operation in the field of industrial training. Such agreements may identify the industrial sectors subjects of co-operation;

(b) The inclusion in contractual relations for the sale of plant and equipment of clauses specific to the required training of industrial manpower;

(c) The setting-up of joint centres for training and upgrading of personnel required by specific sectors of industry;

(d) The exchange of information and experience on a regular basis related to the development and strengthening of national training systems;

(e) Co-operation on the organization and development of national education systems.

83. In August 1982, the Intergovernmental Committee of the Group of 77 on the Follow-up and Co-ordination of Economic Co-operation among Developing Countries met in Manila to consider, inter alia, the report of the meeting held in Bucharest.

84. The First Consultation is invited to consider the ways and means of enhancing co-operation among developing countries in the field of industrial training, including those recommended at Bucharest and Manila.

E. THE ROLE OF INTERNATIONAL ORGANIZATIONS IN RELATION TO ISSUE 2

85. In relation to points discussed under Issue 2, international organizations should examine the possible forms of long-term industrial co-operation arrangements for the acquisition of industrial skills. They should also examine how human and financial resources could be mobilized to cover co-operation in training industrial manpower at the enterprise, sector and national levels between developing countries. More specifically, international organizations, such as UNIDO, ILO and UNESCO, should:

(a) Assist developing countries in the acquisition of technology and related training;

(b) Assist developing countries in the elaboration of technical requirements in the field of training when purchasing equipment and know-how;

(c) Act as executing agencies of projects designed to provide training abroad for managers, engineers, technicians, supervisors and skilled workers in the skills required by investment projects;

(d) Participate, upon request, in projects that:

(i) Evaluate the training capability of suppliers of training services related to investment projects;

(ii) Evaluate the execution of contracts by suppliers of training services related to investment projects;

(e) Collect and disseminate information concerning bilateral, multilateral and other co-operation arrangements for the acquisition of technology and related training.

86. Similar activities may be performed by national institutions with international training objectives. 65/

F. POINTS FOR DISCUSSION

87. Participants at the First Consultation on the Training of Industrial Manpower may wish to pay specific attention to the following points:

(a) To what extent would long-term co-operation arrangements be useful in supplementing efforts by developing countries to establish and develop their national technological and training capacity? What should be the nature and scope of such long-term co-operation arrangements (see paras. 69-71)?

(b) To what extent can contractual relations for the acquisition of industrial skills be improved by covering fully the seven points mentioned in paragraphs 72-73?

(c) To what extent is it possible for financial institutions to consider investment in industrial training as an investment in social infrastructure, thereby making it eligible for financing on conditions similar to those applied to investments in physical infrastructure? To what extent can financial institutions consider the costs of preliminary and exploratory studies incurred by exporting enterprises (and particularly small and medium-size ones) to be an integral part of the budget of any industrial project (paras. 74-76)?

(d) To what extent can increased use be made of mixed credits (public and private sources of finance) to cover the training component of an industrial project (para. 77)?

(e) In order to facilitate co-operation between developing countries, to what extent can the organization and dissemination of information on the demand for and supply of training be improved through the activities of existing national and regional institutions (para. 78)?

(f) With regard to the role of international organizations, and particularly of UNIDO, ILO and UNESCO, to what extent should they encourage and provide assistance in the conclusion of long-term co-operation arrangements in the field of industrial training? To what extent would the suggested activities included in paragraph 85 support the efforts of developing countries in the field of industrial training?

Bibliographical Notes

1/ "Labour Force Estimates and Projections 1950-2000" (2nd edition, Geneva, 1977), International Labour Organisation.

2/ The term "labour force" refers to the total pool of persons able to work, whether employed or unemployed (including those seeking jobs for the first time). ILO, ibidem.

3/ This increase would amount in the developed countries to 88,800,000 persons, including 74,570,000 in the developed market-economy countries (or an increase of 16.6 per cent) and 14,230,000 in the developed countries with centrally planned economies (an increase of 14 per cent), and to 662,600,000 persons in the developing countries, according to the studies carried out by UNIDO.

4/ In addition to manufacturing, industry is taken here to include mining, utilities (gas. electricity, and water), and the construction sector.

5/ Manufacturing industry employment in the developing countries increased by 3.6 per cent per annum during the period 1960-1970 and by 5.6 per cent per annum during the period 1970-1979; during these same periods, the corresponding rates were 1.7 and -0.3 per cent in the developed market-economy countries and 3.6 and 1.8 per cent in the developed countries with centrally planned economies (Source: Statistical Office of the United Nations Secretariat).

The most recent statistics available indicate a general levelling-off in 1978-1979; thus, growth in employment was nil in the developed market-economy countries, 1 per cent in the developed planned-economy countries, and 1.8 per cent in the developing countries. It is likely that the continuing economic recession in the developed market-economy countries during the last three years has had a negative impact on the employment situation in many developing countries.

The manufacturing growth rates for the developing countries were 6.3 per cent per annum during the period 1960-1970 and 6.5 per cent per annum during the period 1970-1979, as opposed to 5.5 and 3 per cent for the developed market-economy countries and 8.5 and 7.8 per cent for the developed countries with centrally planned economies.

6/ Source: Statistical Office of the United Nations Secretariat.

7/ The increase in labour productivity for the developing countries was only 2.6 per cent per annum during the period 1960-1970 and 0.9 per cent per annum during the period 1970-1979, against 3.7 and 3.3 per cent per annum for the developed market-economy countries and 4.7 and 5.9 per cent per annum for the developed countries with centrally planned economies over the same periods. On the average, it was only 1.5 per cent in the developing countries in 1978-1979 (+4.2 per cent in Latin America and -3.8 per cent in the Asian developing countries, excluding China, while the rationalization of labour in the context of the recession led to an increase of 5.1 per cent in the developed market-economy countries and 3.1 per cent in the countries with centrally planned economies.

8/ The productivity levels were measured by the ratio between value added by manufacture and the size of the workforce.

9/ The document prepared by UNIDO as a special issue of the Industrial Development Survey for the Organization's Third General Conference in 1980 and entitled "World Industry since 1960: Progress and Prospects" (United Nations, New York, 1979) commented on this phenomenon as follows: "The manufacturing sector alone is incapable of providing a solution to the complex problem of unemployment, underemployment and the productive use of an expanding labour force. It is estimated that in order to absorb an annual increase of 3 per cent in the total labour force a manufacturing sector employing some 15 per cent of the labour force - which is generally the case among the developing countries - would have to expand at an annual rate exceeding 20 per cent if allowance were also to be made for marginal increases in productivity. Even in a situation in which the manufacturing sector employs 20 per cent of the labour force, it should expand at a rate of 30 to 35 per cent per annum in order to absorb within a decade the existing rural and urban unemployment and underemployment, amounting to 25 per cent of the labour force. By any standard these are phenomenal growth rates, far exceeding the rates attained in the past by rapidly growing economies."

10/ "System of Consultations. An Analysis (1976-1981)", submitted by the Executive Director to the Industrial Development Board (ID/B.284, UNIDO, 1 April 1982).

11/ "The UNIDO Project: A World Model to Explore Institutional Changes over the Long Run", Industry and Development, No. 6, UNIDO, 1981.

"Uses of the UNITAD Model", World Modelling Working Paper prepared by UNIDO for the ACC Task Force on Long-Term Development Objectives, Technical Working Group, 14-18 December 1981, New York, UNIDO/IS.305, 15 April 1982.

12/ In certain countries, industrial labour force statistics are either not available or exclude enterprises with less than 5, 10 or 12 employees.

13/ The industrial projects may concern the transfer of the technology of an entire branch of industry, the transfer of technology specific to certain enterprises or the transfer of technological processes (G.R. Haul and R.E. Johnson: "The Rand Corporation - Transfers of United States Aerospace Technology to Japan", in "The Technology Factor in International Trade", R. Vernon, NBER, 1970).

14/ The quantity and quality of the transfers depend on the policy and aims of the recipient, who may be interested in an operational transfer of technology, involving a minimum of local training and a substantial use of foreign manpower (an example of this being the iron and steel industry of Qatar, which achieves high performance figures with a 92 per cent foreign, Japanese-managed workforce drawn from 16 different countries) or a transfer aiming at the eventual functional autonomy of the industrial units and involving a systematic effort at training local manpower (the policy of Algeria is representative of this type of systematic effort,

or again an innovative transfer implying a research and development capacity (for example, the development of direct reduction processes by the Mexican iron and steel industry, which has played a pioneering role in this field). These aims, moreover, need not relate solely to existing industrial projects, even long-term projects, but can go beyond a narrow productivist philosophy to embrace a fuller development of the worker himself. Given the uncertainty of the future in regard to industrialization trends and the evolution of technology, a broader training designed to facilitate vocational mobility may well provide the safest solution, even at the expense of temporary over-qualification in relation to current tasks.

15/ The number of occupations listed in the United States Department of Commerce nomenclature has increased from a few thousand to about 300,000: cf. Radovan Ritcha: "La civilisation au carrefour", Editions Anthropos, 1969.

16/ The dispersion of "human capital" in 26 branches of industry in the Federal Republic of Germany varied between 1 and 26 in 1961. Gerhard Fels: "The choice of industry mix in the division of labour between developed and developing countries", Institut für Weltwirtschaft, Kiel, 1971.

17/ For example Romania. C. Stefanescu: "Expérience de la Roumanie dans le domaine de la formation de la main-d'oeuvre industrielle", The Stefan Gheorghiu Academy/UNIDO, July 1982.

18/ In "Industrial Organizations - Theory and Practice" (Oxford University Press, 1965), Joan Woodward identified 11 systems of production which she classified in three main groups: unit production, mass production and continuous production. She was able to show that the three functions of an enterprise - manufacture, marketing and research - varied considerably, both in their relative importance and in the order in which they were brought into play, from system to system. This entailed differences in the method of organization and in the management structures of the enterprise. These findings have in principle been confirmed (see Rockham Jeffrey and Joan Woodward: "Industrial Organization - Behaviour and Control", Oxford University Press, 1970).

19/ J. Woodward's work is, however, the subject of controversy. Some authors believe that enterprises always retain, starting from a given combination of techniques, a certain freedom of manoeuvre in deciding which particular operations are to enjoy a greater or lesser degree of autonomy. P. Dubois: "Techniques et division des travailleurs", Sociologie du travail, No. 2, 1978.

20/ See John L. Burbidge: "Final report on a study of the effects of group production methods on the humanisation of work", June 1975, and "Seminar on the effects of group production methods on the humanisation of work - Proceedings", - June 1976 - International Centre for Advanced Technical and Vocational Training - Turin, Italy - ILO.

21/ Some indication of the problems involved in requalification will be found, in particular, in certain reports by ILO industrial committees, notably the report of the Iron and Steel Committee entitled: "The forecasting of manpower requirements in the iron and steel industry and its significance for the recruitment and vocational training of the industry's labour force" (Geneva, 1975).

22/ Technological Perspectives in the Machine Tool Industry and their Implications for Developing Countries. UNIDO/IS.226, 5 May 1981; Guy Caire: "Automation: technologie - travail - relations sociales - les mutations technologiques", Economica 1981; Benjamin Coriat: "Ouvriers et automates - Procès de travail, économie du temps et théorie de la segmentation de la force de travail" in "Usines et ouvriers - figures du nouvel ordre productif", Maspero 1980. It is to be noted that the impact of new technologies was considered at the Summit Meeting of the Industrialized Countries at Versailles on 5 June 1982 - see the report by the President of the French Republic entitled "Technologie, emploi et croissance".

23/ The repercussions of automation on employment were the subject of discussion during the 1950s and 1960s. The conclusion drawn was that, generally speaking, the loss of employment had been more than compensated for by new jobs. However, this conclusion was prompted by the simultaneous effect of two factors, an economic cycle of exceptional vigour and duration and the limitations of automation itself, which entailed very rigid installations.

24/ See in particular Günther Friedrichs, Head of the Automation and Technology Department, German Metallurgical Association, IG Metall: "Micro-electronics: socio-economic impacts". In the review Futuribles 2000, September 1980;

Tony Mainwaring: "The Trade Union Response to New Technology", Industrial Relations Journal 12 - July/August 1981; also the controversy on the segmentation of labour aroused by the theories of M.J. Piore - see P.B. Doeringer and M.J. Piore: "Internal Labor Markets and Manpower Analysis", Heath Lexington Books, 1971.

25/ For a number of reasons. In the first place, technological and industrial patterns, in which capital equipment plays a determining role, will continue to be dictated by the developed countries for a long time to come. The lack of an adequate capacity for research and development and for the reproduction of manufacturing machinery is a serious obstacle to any policy of "self-reliance", however desirable such a policy might be. In addition, robotization constitutes a threat to the life of assembly chains which have been set up in developing countries largely on account of the low salary levels and which could revert to the industrial countries (thus Peter F. Drucker, in his book "Managing in Turbulent Times" - Heinemann, London, 1980 - believes that production sharing will be the dominant feature of the end of the century. Lastly, experience has shown, in general, that the majority of entrepreneurs in the developing countries, like their counterparts in the developed market-economy countries, prefer to use capital-intensive techniques and employ a smaller workforce.

26/ "La technologie au service du développement", ID/WG.324/4, document submitted by UNIDO at the Global Preparatory Meeting for the First Consultation on the Capital Goods Industry, Warsaw, Poland, 24-28 November 1980.

27/ Michel Cezard: "Les qualifications ouvrières en question". Economie et Statistiques No. 110, April 1979, INSEE, Paris.

28/ See Nathan Rosenberg: "Perspectives on technology". Cambridge University Press, 1976.

29/ See Marc Humbert: "Evolution récente des théories de la division internationale du travail" - special number "Vers une nouvelle division internationale du travail?" - Revue d'Economie Industrielle, 4th quarter, 1980.

30/ In the iron and steel industry, for example, the cost of specific training may reach US$40,000 per man (see discussion theme No. 1 for the Third Consultation on the Iron and Steel Industry, Caracas, Venezuela, 13-17 September 1982, UNIDO, ID/WG.374/1, 24 June 1982), which is more than the cost of the initial educational investment, calculated on the basis of the cost of the years of training required for different categories of worker, using the method devised by Professor Maton and his co-workers at the University of Ghent (Belgium) (see "Productivity, human capital and physical investment in iron and steel - Analysis of an international cross-section", Seminarie voor toegepaste economie - University of Ghent, 1972).

31/ The expression used by Sylvère Seurat in "Réalités du transfert de la technologie", Masson, 1978.

32/ See "La technologie au service du développement", ID/WG.342/5, document submitted to the First Consultation on the Capital Goods Industry, Brussels, Belgium, 21-25 September 1981, UNIDO.

33/ Franco Vidossich: "Recursos humanos y complejidad tecnológica de los bienes de capital" - provisional report - UNIDO, August 1982.

34/ EUREQUIP: "La formation de la main-d'oeuvre industrielle - sa problématique, sa pratique et sa place dans les processus d'accès à la maîtrise industrielle" - UNIDO, February 1982.

35/ See B. Coriat, op. cit. 22/.

36/ See John J. Burbidge, op. cit. 20/.

37/ H.W. French: "Engineering technicians - Some problems of nomenclature and classification - Studies in engineering education", UNESCO, 1981.

M.N. Skatkin: "Marxist-Leninist ideas on polytechnical education in the USSR", UNESCO, 1963.

38/ Leslie Holliday: "The integration of technologies" sponsored by Shell Co. Hutchinson, London 1966.

39/ This selection was made by the preparatory meeting of the First Consultation on the Training of Industrial Manpower - Innsbruck (Austria), 5-27 January 1982.

40/ C. Stefanescu: "Expérience de la Roumanie dans la formation de la main-d'oeuvre industrielle", UNIDO, 1982.

41/ Case studies have been carried out by UNIDO in a number of developing countries, including those prepared by:

- Z. Fares: "Etude de cas de coopération en matière de formation - L'expérience algérienne de l'acquisition de savoir-faire technologique par le biais de la formation industrielle", UNIDO, 1980;

- E. Rappel: "Training of Manpower for the Steel, Petrochemicals and Fertilizer Industries in Brazil", UNIDO, 1978;

- S. Sediono: "Existing Educational and Training Facilities for Industrial Manpower, Manpower Planning and Practices in Industrial Training. (Indonesia)", UNIDO, 1978;

- TETOC: "The Potential for more Effective Use of Existing Training Facilities in Developing Countries: case studies of industrial training in Kenya and Peru", UNIDO, 1981.

42/ Philip H. Combs: "La crise mondiale de l'éducation" - PUF - Paris - 1968, and "What is educational planning?" - IIEP/UNESCO - 1970.

43/ See the analysis by F. Sagasti and others for Latin America - SPRI Project - Canada - 1974.

44/ Franco Vidossich - ref. cit. 33/.

45/ At the request of the Algerian authorities, the method of technological complexity analysis was tested and found to be operational. See "Group of 77 - First meeting on the capital goods industry" - Algiers, Algeria, 10-13 May 1982 - Final report.

46/ See ref. cit. 30/.

47/ Pure exchange means the exchange of "divisible goods made up of homogeneous units ...", "on terms that are known", and where "the parties are equally well informed regarding the terms of the exchange ...".

Composite, as against pure, exchange is defined as a "mixture of free and reciprocal transfers of utilities and of power relationships". It expresses in logical terms the economic relationship which is essentially one of conflict-co-operation.
F. Perroux: "Pouvoir et économie" - Bordas, 1973.

48/ See "1990 scenarios for the iron and steel industry: 'The dossiers'" (UNIDO, ID/WG.374/2/Add.1, 28 July 1982), dossier V, "Design, construction and achievement of full production," chap. D.

49/ Michel Debeauvais - IIPE/UNESCO: "L'éducation dans un nouvel ordre économique international" - UNITAR International Conference on "Alternative Strategies and the Future of Asia" - New Delhi, India, 11-17 March 1980.

50/ This subject was discussed with the representatives of a number of developing countries. See especially:

- Z. Fares: "Refléxions sur la fonction de coordination dans l'acquisition de formation et de savoir-faire technologique au niveau national et dans le cadre de la coopération Sud-sud", UNIDO, 1981;

- K.L.K. Rao: "Focal Points for Co-ordination of Industrial Training Between Developing Countries: a Proposal", UNIDO, 1981.

51/ The idea was discussed with the representatives of a number of developing countries and has been examined in the following studies:

- CESI/SICOFEP: "The Acquisition of Industrial Skills by Developing Countries and the French Position as regards the Training Offer", UNIDO, 1981;

- B. Högberg: "The Supply of Vocational and Management Training in Sweden", UNIDO, 1981;

- A. Maneck: "Training of Specialists and Executive Personnel from Developing Countries in Conjunction with the Export of Plant and Industrial Equipment" (Federal Republic of Germany), UNIDO, 1982;

- H. Patteet: "Formation industrielle à destination des pays en voie de développement - le potentiel de la Belgique", UNIDO, 1981. See also the report of the Conseil Général de l'Economie: "Avis sur le rôle de la Belgique dans la formation industrielle à destination des pays en développement", Brussels, 28 June 1982;

- W.W. Stevenson: "Establishing a Training Information Delivery System for Developing Countries: the Feasibility of Focal Points for Co-ordinating Information on Training Available in Developed Countries", UNIDO, 1981.

52/ I.A. Egorov: "The Experience of the USSR in the Area of Training Local Specialists from Developing Countries", UNIDO, 1980.

53/ CESI/SICOFEP: see ref. cit. 51/.

54/ The following ILO documents describe the training methods used in certain countries: "Ten Years of Training: Developments in France, the Federal Republic of Germany, the United Kingdom, 1968-1978", ILO. 1979; and "Training Systems in Eastern Europe", ILO, 1979.

55/ For example, the French Union of Metallurgical and Mining Industries (U.I.M.M.) has established a number of services concerned with the export of training; the "vocational training and technical assistance" service deals inter alia with:

- planning the educational aspects of vocational training centres;
- the promotion of metallurgical training systems;
- assistance in negotiating contracts;
- a data bank on training available for export.

56/ See also the Final Report of the High-Level Meeting of Officials Responsible for Industrial Manpower Training in Developing Countries, Bucharest, 31 May - 4 June 1982.

57/ M. Salem: "Place et rôle de la formation industrielle dans les contracts de transfert des techniques: une approche juridique", UNIDO, 1980.

58/ M. Salem: "Legal Aspects of Industrial Training", UNIDO, 1981.

59/ See: "A Hungry World", in The Tablet, 22 August 1981.

60/ See, for example, the report of the First Consultation on the Food-Processing Industry, ID/278.

61/ J. Pearce: "Policies of Export Credit Agencies in Financing of Training Component of Industrial Projects", UNIDO, 1982.

62/ See ref. cit. 56/.

63/ A number of studies have been carried out in developing countries, notably:

- O.A. El-Kholy: "Egypt's activities and potential for CDC activities in the field of industrial manpower training", UNIDO, 1980;

- K.L.K. Rao: "Technical Co-operation amongst Developing Countries: an Assessment of Industrial Manpower Training Opportunities in India", UNIDO, 1980.

- J. Spitalnik: "Co-operation between Brazil and other Developing Countries in the Area of Industrial Education and Training", UNIDO, 1980.

64/ See ref. cit. 56/.

65/ F. Viallet: "Rôle des institutions de formation industrielle à vocation internationale pour réduire la dépendance technologique des pays en développement", UNIDO, 1981.