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EDUCATION AND TRAINING PROGRAMMES FOR INDUSTRIALIZATION

The four basic documents for discussion under agenda item 3(c) on Industrial Manpower (ID/CONF.1/30, 31, 32 and 33) are based on recommendations and guidelines provided by the group of experts convened by UNIDO on 12 March 1966 and have been prepared in close collaboration between the Secretariats of UNIDO and ILO. 1/

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1/ The present document was drafted by the ILO.

providers of trained workers with multiple skills, but much remains to be done, particularly in smaller plants and undertakings. Facilities for further training, which would help make up the deficiencies in basic training, are either inadequate technically or else accessible to only a very small minority. Often they provide supplementary training for limited additional skills only and fail to give the necessary related theoretical instruction.

15. If, therefore, the undertakings appear generally dissatisfied with the quality of the workers trained by the school system, it is by no means certain, at least when one looks beyond the immediate short-term results, that they have themselves been able to establish better systems. There are many reasons for this: a certain unawareness of the need for training, lack of adequate facilities, fear of pirating by competitors, to name just three. Whatever the reason, the result is that many countries have failed to exploit the training resources of the undertakings and have established expensive vocational training institutions outside the industrial milieu. This is paradoxical, particularly in countries with a large public industrial sector. In such cases it would seem natural for the state to intervene directly and to expand the training activities of its own industries.

16. In recent years many countries have tried to remedy these defects. Vocational and trade schools and centres have been closed down or converted into institutions providing both basic training and related theoretical instruction for the different levels of training provided in undertakings. Comprehensive apprenticeship systems combining in-plant training and training in schools and centres have been set up in numerous countries of Latin America (Chile, Colombia, Peru, Venezuela), Africa (United Arab Republic) and Asia (India, Malaysia, the Philippines). A large number of countries are in the process of reviewing and modifying their training systems. But it does not seem likely that these efforts will suffice for training skilled labour in the numbers required. Moreover, although it is too early as yet for a systematic assessment of the results achieved, many

of the newer systems have developed their own shortcomings. They have given birth to powerful organizations but in doing so they have often become rigid and the training they provide is not easily adaptable to the changing techniques of industrial production. Since their creation has not always been accompanied by a reform of lower technical and vocational education and training, overlapping has developed. Nor do the institutions always manage to maintain close links with the enterprises, and particularly not with the small undertakings which stand most in need of assistance. The courses given in the training centres are sometimes too long, and the facilities available are not fully utilized. Finally, the cost of these institutions is high, and there has been little analysis to discover whether the expenditure involved might not bring better returns if it were used for other purposes, e.g. if it were converted into massive assistance to training in undertakings.

17. Assistance of the latter type has begun to be organized on a systematic basis in a few countries (India, Mexico, Turkey, United Arab Republic). But still a great many problems need to be solved: employers and educationists need to be won over, staff must be trained, appropriate curricula and teaching methods need to be evolved, and some kind of supervision of the training must be instituted.

11. Middle-level personnel

18. The quality of training for the vast range of technician and other sub-professional occupations seems to be the poorest of all. Teachers of technical subjects, whether in trade schools or in plant workshops, have a very low theoretical and practical instruction. Foremen and supervisors lack pedagogical training and often do not master the skills of their trade. Technicians trained in the technical streams of general secondary education and in technical institutes of secondary or junior college level do not reach the required level. Undertakings have therefore to resort to the traditional sources of technician recruitment, that is either the highly

skilled workers (who do not, however, have the necessary theoretical knowledge and general education) or engineers. Most of the industrialists attending a Colombo Plan Conference held in 1966 stated that few technical education graduates could be employed.^{4/}

19. There are various reasons for these deficiencies in technician training. In the first place, the importance of the technician has only been recognized in recent years as industrial operations have become more diversified and been broken up into component parts as a result of technical change. In addition, technicians' functions are not given recognized status in the social hierarchy: they are sometimes performed by highly skilled workers, sometimes by junior engineers. Thirdly, students who take all their secondary education in technical streams leading up to a first diploma at technician level are often the least gifted students in secondary education. Fourthly, technical education suffers from inadequate organization, partly because of lack of funds, partly because of shortages and shortcomings of teaching staff. Fifthly, co-operation between schools and industry leaves much to be desired.

20. Various arrangements have been made, in an effort to overcome these defects, to provide manpower already in employment with part-time training in schools - for instance, by means of evening, correspondence or sandwich courses. But these are not yet satisfactory and raise a number of difficulties. Full benefit is often not gained from the theoretical instruction given because the job a trainee holds in industry does not give him the corresponding practical experience; the theoretical instruction itself varies considerably in quality; arrangements of the type mentioned are not practicable in an industry expected to grow fast, but in which at the time of training there are not enough technician jobs.

iii. High-level personnel

21. Similar problems exist for the high-level personnel categories and particularly with respect to engineers and managers. The number of students in engineering, commerce and business administration faculties is much lower

^{4/} C. Borjal, Education and Training Requirements for Technicians, UNESCO Seminar on Technical Education in Asia, Bombay, December 1966, Document in Series A*.

than in such branches as law, the humanities and the arts; drop-outs are particularly numerous in the former group. The instruction received is too little geared to the requirements of industrial life. This is particularly noticeable in the case of business schools and colleges and university faculties of commerce.

(a) Engineers

22. The process of initiating future engineers in the practical problems of industrial life is particularly difficult in industrializing countries, many of which have adapted their curricula from those used in industrially advanced countries. Science curricula in particular do not always meet the requirements of industrial life. Teaching methods are stereotype and do not allow students to participate sufficiently actively and practically in the process of learning. Universities and Higher Technical Institutes rarely have the complete range of equipment which, in engineering schools in industrialized countries, supports high-level theoretical courses. Theoretical training and practical work are badly combined and there is room for improvement in the content of the practical work. Students should be given a certain amount of additional or different knowledge because the engineer in an industrializing country does not always have at his disposal facilities such as the specialised libraries, professional study groups and journals which are within easy reach of his counterpart in industrialized countries. In addition, factories do not have enough experienced senior personnel to help newly qualified engineers. Finally, the importance of systematic in-plant training and further training after initial qualification is not given due recognition. The statement that "engineers are not made by a system which first teaches science in the secondary schools and at University and then expects industry to produce the practical engineer"^{5/} is

^{5/} B.V. Bowden, Report of the Committee inquiring into the feasibility of establishing a faculty of technology in the University of Singapore, Singapore, September 1953.

therefore even more valid for industrializing countries than for countries which are already industrially advanced. There is no doubt that the shortcomings in training programmes for engineers in many developing countries form one of the most serious obstacles to rapid industrialization.

(b) Senior management

23. In many developing countries, the inadequacy - and sometimes the complete absence - of training programmes for innovators, entrepreneurs and management of undertakings reflects lack of recognition of the contribution which these groups can make to industrial development. This is due primarily to the cultural and social structure of many developing countries, particularly those in which a traditional and a modern sector exist side by side. Their education system is not oriented towards the goals of an industrial society: educational programmes and methods do not encourage interest in new ideas. Young people tend to be more interested in entering non-technical professions or government service than in becoming industrial managers, when the latter's work does not enjoy equal social status. The pragmatic side of some management activities is often looked down on.

24. It is often said that managers and administrators are self-made and the success achieved by some of them is evoked as an argument against the introduction of training programmes. There are, however, large numbers of undertakings, especially medium and small-sized ones, whose low output is due partly to their antiquated organization and management methods. It is not easy for the senior management of such undertakings to accept the idea of taking training courses. This is so, partly for the reasons indicated above and partly because they do not appreciate the need for such training: they may see no point in improving products which they have no difficulty in selling; they may blame their difficulties on external restrictions (taxes, import quotas, foreign exchange problems) rather than on their own inability; they may prefer to make high profits on a short-term basis.

25. Many countries have made considerable efforts to improve this situation. Centres have been set up or arrangements made for the development of management from undertakings of all sizes. But they are not sufficient. For one thing, many industrialists are not convinced of the utility of the new programmes, especially when these have been developed for use in very different cultural environments.

Cost of education and training

26. Developing countries pay a high price for meagre results. Statistics on expenditure on education and training, which do not nearly include, by far, all training activities (such as training in undertakings, private training programmes and sometimes even certain forms of technical training), indicate that such expenditure represents a substantial part of the national budgets of developing countries and a high proportion of their Gross National Product. Countries such as Burundi, Cambodia, Costa Rica, Dahomey, Peru, the Philippines, Tunisia and Uganda devote from 20 to 25 per cent or even more of their budget to education.^{6/} In Upper Volta 25 per cent of the national budget is spent to provide 9 per cent of the population with primary education.^{7/} Ceylon, Congo (Kinshasa), Ghana, Iraq, Kenya, Libya, the Sudan and Taiwan regularly devote a minimum of 5 per cent of their Gross National Product to education and training.^{8/} In Nigeria the average recurring annual cost of a university student is higher than in an advanced country (nearly \$3,000 per student), with a teacher-student ratio of one to

6/ International Year Book of Education, International Bureau of Education, Vol. XXVII, 1965.

7/ Nguyen Huu Chan, The Cost of Instruction in Fourteen French-speaking African Countries, UNESCO-International Institute for Educational Planning, Paris, 1965 (Working Paper IIEP/PRG-AFR/65.II.I).

8/ UNESCO, Statistical Yearbook, 1965.

sixteen.^{9/} Sir Arthur Lewis has estimated that the cost of a high-school teacher in the United States is equal to double the national income per head, whereas the equivalent figure in Jamaica is 12 and in Nigeria 30.^{10/}

Absence of an integrated system of education and training for industrial development

27. The inadequacies mentioned above do not arise from insufficient recognition of the role of human resources in the development process. Indeed, it is possible that, from the beginning of the present decade which has seen extensive acknowledgement given to the economic value of human resources, some countries have been too eager to invest in people, without having an over-all view of the problem and, in particular, of the criteria which would enable them to assess the costs and benefits of such investment. The crucial point seems to be the lack of a coherent policy, specifying the tasks of the various entities concerned in training with a view to meeting, at the lowest possible cost, needs which have been carefully determined. The growing importance accorded to educational planning is certainly a decisive step towards the establishment of such a policy, but it should not lead to easy optimism. Efforts to this end usually aim at making general and technical education programmes more effective; but they are not always linked very clearly with a country's industrial development aims and they do not cover the very considerable activities in industry, in public services, and even in the armed forces which contribute to the education and training effort. As a result there tends to be no or inadequate co-ordination among a multiplicity of government bodies, rivalry and, in most cases, absence of a national forum for discussing major questions of general policy, working out agreements on objectives to be achieved, and allocating the tasks involved between the different agencies.

^{9/} F. Harbison, A System analysis approach to human resources development planning, UNESCO-IIEP, May 1966 (Working Paper IIEP/9).

^{10/} Sir Arthur Lewis "Education and Economic Development", International Social Science Journal, Vol. XIV, No. 4, 1962. For another more precise and comprehensive measure of the cost of education and training see ID/CONF.1/31 footnote to para. 2.

28. There are, however, examples of co-operation at the working level between educational institutions and industry. Advisory committees have been set up to study the skills and training contents of occupations, and to advise on training curricula and methods of instruction. Their advice, however, is often based on current practice or individual cases, insufficient account being taken of the future or of the situation as a whole, and their membership is not always representative of the real needs of industry.^{11/}

The basic deficiency of such committees tends to be that they are not integrated into a logical over-all system of industrial training, with specific objectives and clearly defined elements.

29. The establishment of such a system appears to be a basic prerequisite for efficient industrial training policies. " ... It should be possible to look at the various constituent elements of human resources development as a system which is somewhat analogous to a system for the generation and distribution of electric power. In using this frame of reference, one can identify skill-generating centres, such as for example schools, universities, training institutes, and employing organizations, which develop people on the job. The linkages between such centres are analogous to transmission lines. The manpower problems encountered by developing countries such as skill shortages and labour surpluses may be thought of as attributable to power failures in particular generating centres, ineffective linkages between these centres, or faulty design which results in the failure of the total system to carry the loads expected of it. A system of human skill generation, like a system of electric power generation, should be designed to carry varying loads, it must have built-in flexibility to meet such loads; it must be adequate in size; and above all its components must be properly balanced. The systems analysis approach makes it easier to identify in operational terms major problem areas, and it compels the analyst to examine the critical

^{11/} Hugh King, The Contribution of Technical Education, Pan-Indian Ocean Conference on Technical Education and Training, Perth, August 1966, Background Paper No. 2.

inter-relationships between various manpower and education programmes. It provides a logical starting point for building a strategy of human resource development ..."^{12/}

II. STRATEGY OF EDUCATION AND TRAINING FOR INDUSTRIAL DEVELOPMENT

30. Countries anxious to attain specific objectives in the field of industrial development should evolve a general strategy in the field of industrial training. By "strategy" is meant here the systematic development of all available resources for the effective education and training in good time of the personnel required for industrial development. As in military science, so here any such broad strategic plan must observe three principles - the principle of power, whereby each country must be firmly resolved to attain the goals it has set for itself and must deploy its forces with this end in view; the principle of security, whereby provision must be made to deal with unforeseen contingencies; and the principle of economy of means, whereby the main effort is devoted to the attainment of high-priority objectives and a minimum of energy exerted on goals of less importance.

31. Reference has already been made to the lack of co-ordination of available training facilities in general and technical education, in industry, in the civil service and the armed forces. At present there is no universal recognition of the need for systematic concerted use of all resources, for it is felt that the education and training arrangements have an inherent flexibility which enables them to meet the requirements of industrial development. The same view is often held in industry itself. Arrangements are often made of course to meet the specific training requirements of a particular industry or factory, especially with regard to jobs considered to be essential. But it is rarely realised that training

^{12/} F. Harbison, "Educational Planning and Human Resources Development", in Fundamentals of Educational Planning, UNESCO-IIEP, Paris, 1967.

activities have to be systematically organised. And the education and training authorities are often left to meet as best they can needs for skilled manpower arising from industrial projects. Even at the level of the individual undertaking, plans for training the staff of a new factory are often left a good deal vaguer than plans for the capital investment and equipment which the factory requires.

32. This lack of systematic organisation causes a considerable waste of time and resources, and often holds up or jeopardises the implementation of industrial schemes. Hence the need to convince manufacturers, as well as the competent national authorities, of the need for a strategy of education and training for industry just as they devise and apply strategies for investment, marketing, and the material organization of production. At the national level, this implies unified planning and direction. Existing machinery may have to be re-designed or machinery created in order to make this possible.

33. The strategy for industrial training should be integrated into the over-all education and training effort. Manpower does not come to industry alone, nor does it remain indefinitely confined to industry. The success of industrialisation policies depends on the quality of personnel in service occupations, in local government and in the civil service, as well as on the quality of industrial manpower. No description will be given here of the conditions which must be met if a general strategy for the use of human resources is to be adopted. But it should be stressed that adoption of such a strategy is an absolute necessity. The absence of an over-all strategy must not, of course, prevent the development of an industrial strategy: but the latter will be less effective or more costly for the country concerned when an over-all strategy does not exist.

34. It is not easy to co-ordinate training efforts over different periods to get a coherent whole. In the short run, manpower forecasts serve no very useful purpose. For skills which cannot be quickly acquired (very highly-qualified staff, say engineers) there is not time to make the

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

necessary adjustments in the national skill-generation system; existing staff have to be given further training (locally or abroad), or foreigners engaged. But the basis for long-term action has to be laid at the same time; and this action has to fit into a long-term plan. Hence the need for manpower forecasting.

35. As regards skills which are readily interchangeable and usually require a short period of training, any urgent action that may be taken should not prejudice the long-term. Thus, when the undertakings cannot train sufficient numbers for a particular sector of industrial development, recourse may be made to centres for accelerated training. However, care must be taken lest such centres rapidly become superfluous or out of date; plans must, therefore, be made right from the beginning for their longer-term use. Here again, the need for manpower forecasts arises.

Three phases in defining a strategy

36. Three steps must be taken in establishing an education and training strategy for industrial development:

- a. Determination of knowledge and skill required; inventory of training institutions; assessment of their output;
- b. Decisions as to the goals to be attained;
- c. Decisions as to the best division of labour between the school system and the industry.

1. The assessment phase

37. First, action to determine the training programmes should be based on the following data:

- a. It is essential to have indicators regarding "strategic manpower", which will have the greatest impact on industrial development as a whole. Such indicators are necessary for certain occupational groups (senior managers and managers, middle-level technical staff; instructors; maintenance personnel), and for certain individual occupations (accountants, draughtsmen and electricians). Such

indicators are essential if a long-term strategy is to be evolved if there is a general industrial development plan.^{13/}

- b. In the shorter run, it is useful to start from manpower coefficients for individual industries. As indicated in ID/CONF.1/31 presented to the Symposium, such coefficients may be of two kinds. The first consists of the percentage distribution of the industry's total labour force among various occupational categories. The second type consists of typical ratios between numbers needed in individual occupations or occupational groups, and the quantity of output.
- c. In some instances, as when a factory is to be set up, there will be need for data about over-all manpower requirements and especially certain key-post or function requirements.

38. For each occupational group or occupation, it is necessary to indicate the knowledge and skills required for normal performance of the job. The information should include the general knowledge required (elements of science, technology and general education) together with the occupational qualifications required - not only manual skills (general and specific), but also intellectual capacities (linguistic abilities, grasp of special calculating techniques and of laboratory work, analytical ability, capacity for synthesis, creativity) and personal qualities (ability to make oneself understood and obeyed by others and to work as a member of a team). It is none too easy to define what is "normal performance" on a particular job; the qualifications currently required should not be overestimated and at the same time provision should be made for the necessary foundation for further training. The definition will doubtless have to be based on the opinions of employers themselves and of other persons qualified to express

^{13/} In a paper devoted to Iran, George B. Baldwin suggests that it would suffice for most countries on the threshold of industrial development to launch model vocational training programmes in the following seven fields: automotive and diesel mechanics, electricity, machine shop operations, foundry operations, clerical work, modern building techniques and printing. (See Harbison and Myers, Manpower and Education, Country Studies in Economic Development, McGraw Hill, New York (1965).)

a view, such as employment service specialists. This has been the line followed in the United States and quite recently in Nigeria.^{14/} Useful guidance may also be obtained from foreign experience and international comparisons.

39. Second, an inventory should be made of the institutions and bodies providing general education and technical training. While, in many developing countries, the educational planning authorities have undertaken a census of such institutions, allowance is rarely made for training carried on by industry - in undertakings, both public and private, in the training schools attached to them - or in the numerous technical and vocational training schemes organised outside the school system (e.g. by the armed forces). Even the technical education given within the general system of education is often covered less accurately than general education and university studies. Furthermore, such inventories are not designed with an eye to any particular sector of the economy, such as industry, but purport to cover all branches of activity.

40. Hence, it would seem important to make an inventory of all facilities for the generation of skills needed for industrialisation. The information gathered should be classified in a way showing the institutions that might be able to educate and train skilled manpower required for specific individual industries, in specific occupational groups, and for certain key occupations. The inventory should comprise a description of the main features of the bodies concerned (total capacity, teaching staff, equipment, origin of trainees, data on financial and budgetary matters), an indication of the number of persons trained, the qualifications obtainable, the effectiveness of the training provided (rate of drop-out, success percentage, jobs held by former trainees in industry, and at what levels), plus, if possible, training costs per head.

^{14/} Survey of Educational and Training Content of Occupations, National Manpower Board, Lagos, Nigeria, (1966) cited in ID/CONF.1/31, paras. 109, 110.

41. Third, the results obtained should be compared with the pattern of occupational and skill requirements, referred to in paras. 37 and 38, as a basis for determining what should be done to improve or develop the existing skill generation system. In the light of this comparison, it should be possible to decide on objectives and assess the tasks to be accomplished.

2. Decision as to objectives

42. Action needed under this heading has been discussed in some detail in ID/CONF.1/31. It will be concerned chiefly with medium and long-term goals. In certain instances, however, it should be possible to decide on short-term ones as well, such as, for instance, the recruitment of foreign workers or instructors, the organization of emergency schemes to assist groups of undertakings, the rationalization of factory training schemes, the conversion or closing of inefficient or unduly costly institutions, and the introduction of new curricula and teaching methods.

43. A decision as to the goals to be reached in training for industrial development gives rise to serious problems. First, quantitative estimates of manpower requirements comprise an element of uncertainty. Second, the qualitative indications which accompany these forecasts depend on the soundness of the analysis and judgment of those who drew up these lists of skills and knowledge required for normal performance on the various jobs. Third, translation of this data into terms of training and education presupposes that some idea already exists of the part to be played by each unit in the educational and training system, and of the way in which tasks will be apportioned among the various institutions and programmes (this being the purpose of the third operation). Hence, these steps are presented here separately only to facilitate analysis. In fact, however, they are closely interconnected, and it will often be necessary to begin with a first approximation of the size of the tasks involved before going on to apportioning them, and then to revert to the problem of deciding on tasks, which should then be possible with greater accuracy.

44. A number of factors make the situation rather more flexible than it might appear. First, human adaptability and the workings of the labour market together make it possible to meet many needs that are not specifically foreseen; second, many jobs can in fact be done by people with a fairly wide range of different qualifications, and third, the scale on which training in undertakings is carried on does not always call for very detailed planning.

3. Allocation of responsibilities

45. In practice, answers will be required to two questions. First, how much general education should precede or accompany the main types of industrial training? Second, how should this training be apportioned between industry and the other bodies concerned?

(a) The requisite basic general education

46. This will vary with the nature and level of skill required. But, for any particular level, the basic general education will vary also in accordance with the general educational objectives pursued by a country, the quality of the education given, the level of development and the degree of technical progress reached. It would seem that, in the case of occupations below lower supervisory level, there is a certain discrepancy between the minimum general education required for industrial production and what one might call the social demand for education. The experience of both the advanced countries in the early stages of their industrialisation and of the developing countries seems to show that a rudimentary vocational training can be given to persons who have received little or no education and even to illiterates. But experience shows, too, that a higher level of general education has been a considerable help in the early stages of industrialisation - both for the advanced and for the developing countries. In addition, from the viewpoint of industrial development, the minimum general education required for basic training at the lowest levels of industrial skill may not be the kind of education a man ought to have

received who aspires to a job of great responsibility. This is a problem of some importance, in view of the numerous higher jobs filled by persons who began at the bottom of the vocational ladder. It also arises when workers are to be given further general education in addition to initial training. The requirements of industrial development may result in a programme which is too narrow or too exclusively practical, whereas both workers and society at large might have gained from a broader education to an extent exceeding the cost of such education.

47. The complexity of these problems should not stop attempts to find answers. These will depend on two things: (a) industry's assessment of the basis of general education required for the various occupations and levels, and (b) the resources the country is prepared to devote to general education as such. Clearly, the general educational system should be able to provide at least the educational basis needed by industry; if it does not, it should be reformed or expanded. Otherwise, industrialization schemes may be jeopardized. This assessment by industry should carry a good deal of weight when it comes to planning general education. Other factors, of course, must be taken into account as well. But, as far as industry is concerned, this condition is necessary and sufficient in itself. If, in addition, the general educational system can provide an education which goes beyond the requirements of industry, so much the better. Industry will probably derive advantage from it and the process of industrialisation is likely to be speeded up. But this is not a necessary condition.

(b) Training by the school system and by industry

48. As noted in earlier parts of this paper, general education is the task of any country's school system. But in most countries the school system also concerns itself to some extent with more or less specialized specific vocational preparation - in technical secondary schools providing various types and levels of occupational skill, and in various university departments and technical colleges. In the terminology of the present paper

such specific vocational preparation is "training by the school system". It is distinct from training sponsored and possibly organized by industry itself outside the school system - e.g. through apprenticeship, in-service and in-plant training schemes. For the acquisition of several types of skill, especially at the skilled worker and technician level, training by the school system and by industry are substitutes - basically similar skills can be learned through one or the other. Indeed, in many countries both methods are used simultaneously, some workers being trained by the school system and others, in the same occupations, by industry. Since the skills for which both media are feasible concern occupations in which relatively large numbers of workers are employed, it is of interest to consider which medium is the best; in other words, how the training work involved is best divided between the two. The question is all the more important since in some cases it has given rise to occasional controversy.

49. In examining this question it is useful, however, to distinguish three aspects and to look at the matter from three angles:

- (a) Training may be provided in the framework of an employment relationship ("training in employment") or outside such a relationship (e.g. "pre-employment training"). In the former case the trainee has an employer who arranges for and bears at least part of the direct cost of the training. In the other case there is no such sponsorship by an employer - training takes place at the choice and responsibility of the trainee, or his parents, or someone else.
- (b) Training may be given at a workplace (shop-floor, office, etc.) or in a special outside training place - i.e. usually some kind of school. In practice, training in employment is largely a matter of training at a workplace, while training not in employment takes place largely at schools. But neither is intrinsically necessary. An employer may send his trainee to a school for part of the training (giving him time off, paying fees, etc.). While a private engineering student, or a graduate engineer receiving a fellowship from an international organisation, may be placed in a factory for a certain period to acquire some specific elements of practical experience.

- (c) Technical schools may be part of a public education system, wholly governed by the educational authorities. Or they may be under some measure of formal control by industry - certain employers having a certain, possibly large or even full, say in the programmes and policies of the schools. Technical schools over which industry has a substantial degree of formal control are referred to below as "training centers"; schools for which this is not the case are called "vocational schools".

50. Most people would agree that in promoting one or the other course under each of these three alternatives, policy-makers should be expected to aim at the optimal balance between costs and benefits. Where one method promised better results for a given cost than the other, the former should be chosen. While a method promising a given training result at lower cost should be preferred over a more costly alternative. On this assumption three practical conclusions may be drawn regarding the above aspects of the roles of industry and the school system in industrial training.

- First, any kind of training is more likely to meet industrial requirements of specific types of skill if industrial employers can make their needs effectively known than if they cannot. So that, other things equal, "training centres" have the advantage over vocational schools wholly controlled by educational authorities.
- Second, whether training in some particular skill is better given in a centre or at a workplace depends mainly on the nature of that skill and on the training facilities available at centres and workplaces. As to the former point, the more specific the skill is to the work done at a particular workplace (with its particular machines, and organization and methods of work) the more obviously training is better given at the workplace. Otherwise trainees may learn to work on the wrong machines and acquire work habits out of line with those of the plant at which they are to work. General skills, however, the "theory" of certain occupations, are not specific to individual workplaces; and in addition they can often be taught more conveniently in the quiet environment and by the specialised teachers of school-like institutions. But, on the

other hand, training facilities existing in local plants may be highly inadequate even for imparting the specific skills that in principle are better taught at the workplace - there may be no instructors, no spare machine-time, or the equipment itself may be obsolete. Limitations of this kind exist, of course, especially in two kinds of plant - those that are badly managed and equipped, and those that are too small for organising training programmes even though they may be well managed. Both types of enterprise are more common in industrialising countries than in advanced nations. So in developing countries the balance of advantage may be with training in centres to a relatively larger extent than in developed countries. Yet, in many cases it may be both possible and preferable to give direct assistance to workplace training schemes rather than to concentrate on training in centres. For instance, when the difficulty is lack of instructors, a central agency of the type proposed in this paper (ITO) can "lend" them to individual enterprises. While medium and small-sized firms may be encouraged to organize group training schemes. Such joint undertakings may work with their own teaching staff and equipment, or they may avail themselves of the facilities existing for pre-employment training programmes.

Third, there are two major advantages (again, where possible, and other things being equal) of training in employment over training outside an employment relationship. One is that the training at the workplace is much simpler, and much more likely to receive proper attention, if it is given to the enterprise's own employees than if it is to be given to outsiders. Thus, in cases where workplace training is technically superior to school training, it is better organised as "training in employment". But, furthermore - as noted in ID/CONF.1/31, training in employment is given once a specific need for specific skills is clearly perceived by a specific enterprise. There is much less risk (than in the case of training not in employment) of people being trained in skills of less than the greatest importance and urgency - let alone skills for which there may be little or no demand at all.

51. The upshot of all this would appear to be that industry should play a much greater and more active role in the training of its manpower than has been customary in either developing or advanced nations. More training should be given at the workplace; what remains to be done in schools should be controlled to some appropriate extent by industry - i.e. there should be a movement towards "centres"; and as much training as possible should be given "in employment". But attention should be called to three limitations of training in employment:

- (a) Such training cannot be expected on any large scale for skills that take several years to acquire and that are not highly specific to the needs of the employer concerned. Such training is both costly and risky. The need for the skill would have to be foreseen by the enterprise long in advance, and the original expectation of that need might prove to have been wrong. Furthermore, the trainee may die or quit the enterprise during or after the training. Training of the type commonly given at universities and technical colleges cannot, therefore, be expected to any large extent to become training in employment. It is likely to remain largely what it has always been - a matter of public educational concern. Though even so it would be highly desirable in many countries for industry to be given some effective role in the determination of curricula, training methods and other policy issues, and to participate in the actual training process by means of suitable in-plant training schemes.
- (b) Even in the case of skills that do not call for long periods of study, the risk that a trainee becomes separated from the enterprise which trained him limits employers' willingness to provide training in employment. This is the case when the skills concerned can be applied also in other enterprises - in particular in competing firms. As stated in paras. 131ff below, this problem may, however, be met largely by system of training levies-cum-grants to individual undertakings, and the establishment of an adequate administrative machinery to implement these measures.
- (c) In developing countries, industry often lacks the technical knowledge and staff for training. As suggested above, the Industrial Training Organisation proposed in this paper could help in overcoming these obstacles. But it will be obvious that the ITO would have to play a major role in tackling all the problems examined in this section - it would indeed be both the nerve-centre and the principal operating arm of a true industrial training system.

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A national industrial training plan and organisation

52. It is recommended that each country should draw up a national industrial training plan to carry out the above mentioned tasks. Such a plan should cover the entire industrial skills spectrum, from engineers to semi-skilled workers. It is suggested that the appropriate machinery for such a plan should be a national Industrial Training Organisation (ITO) possessing the requisite technical and administrative facilities. In this organisation, industry (public and private) would play a dominant part.

53. No model structure can be recommended for the ITO since much depends on the degree of development of the country concerned, the scale and complexity of its industrial projects and its political, governmental and administrative structure. Many countries have set up bodies which undertake these duties to some extent or other: vocational training commissions, national industrial manpower councils, planning commissions, special government departments, vocational training councils, co-ordinating bodies and so on. But there is rarely an overall coherent plan for industrial training. Very often basic questions fail to be settled, e.g. matching of the training requirements created by the plan or other economic sectoral forecasts, with existing training possibilities; co-ordination between manpower planning, educational planning, and the planning of industrial development (including industrial training); and, within the training apparatus, co-ordination between the various activities (accelerated training programmes, management development, training in undertakings, long-term training of high-level personnel). Almost always, even when the need for co-ordination is emphasised, an overall view is lacking.

54. The ITO should be directed by a body empowered, at the national level, to decide on training objectives in the light of industrial development needs and on how such objectives should be achieved. It should have the technical and financial resources to enable it either to encourage education and training activities for industry in accordance with the policies laid down, or itself to undertake such activities. It should be made up of

persons representing industry (governmental and private) - men responsible for planning and carrying out industrial projects, senior managers, trade union leaders, directors of education and training schemes for industry - and representatives of the government departments concerned.

55. This body should have available - or itself create - machinery for the assembly of the data it requires to perform its functions. The nature of these data has been indicated above. In countries where industry is still embryonic, such a central organ would in all likelihood suffice to provide a coherent industrial training system. Where industry is more developed or more diverse, the creation of similar organs in the principal industries should be encouraged, in which case such bodies would have authority delegated to them by the central organ and should enjoy a considerable degree of technical, financial and administrative autonomy, provided always that they conform to the guidelines laid down and work towards the same objectives. Subsidiary organs could also be set up within the bigger industries. It might also be desirable to create inter-industry regional bodies within each country whenever regional problems are sufficiently important or regional industries are heavily interdependent.

56. One essential task to be undertaken by the ITO would be to create or strengthen the links which should exist at every level, for the purposes of industrial training, between the general education system, vocational education, the various industrial training programmes and other institutions (productivity centres, professional associations, trade unions, small industry institutes, etc.). It should draw up training standards itself, or encourage their adoption (conditions of entry, examinations, certificates and diplomas obtainable), help in the establishment of curricula and teaching methods and equipment, supervise the training given, and provide practical assistance to undertakings. It would need adequate financial means, derived either from government subsidies or from contributions by industry (through the introduction of a training tax, or by other means) or from a combination of the two. A more detailed presentation of the financial aspects of the ITO will be found in paras. 147 and 148 of this document.

III. IMPLEMENTATION OF EDUCATION AND TRAINING PROGRAMMES FOR INDUSTRIAL DEVELOPMENT

57. The purpose of this section is to bring out some of the practical difficulties involved in designing education and training programmes for industry as part of the strategy just defined. Two types of problems will be discussed: the organisation and content of these programmes and questions of finance.

Organisation and content of education and training programmes for industrial employment

58. These programmes can be divided into two classes - general preparation for industrial employment, which is provided by the general educational system, and specific preparation for employment, which is provided by a whole range of institutions and schemes going from the national education system to training on the job.

a. General preparation for industrial employment

59. What changes can be made in the general education system in order to equip individuals to benefit from better vocational and technical training? The main need is to adapt educational syllabi and teaching contents and methods to the conditions prevailing in the country concerned and to the needs of industrial development. The type of change needed will vary widely according to the level of industrial development already attained. The principles discussed below, however, may be applicable to a number of countries:

1. The content of the general education syllabus (primary school, junior secondary (or middle) school and senior secondary school) should not only ensure progressive acquisition of knowledge but also so equip the pupils that, on completing a given stage or level of education, they are able to take up a course of initial vocational training. This would involve a far-reaching overhaul of primary education, which should be a self-contained unit since it is all the general education the great majority of the labour force will receive (as was the case in

most of the advanced countries in the early stages of their industrialisation). Emphasis should be placed on the acquisition of basic competence in communication skills (reading, writing and verbal expression), enumeration, measurement and reasoning (arithmetic, science, analysis and synthesis), general culture (history, geography, the pupils' own environment), individual and group behaviour (character building, readiness to learn, civics, team work, health and safety) and creativity (handling and construction of various objects, appreciation of creative art). The age of entry to primary school should not be lower than seven.

ii. The subsequent stage - junior secondary or middle-school education - should also form a self-contained whole. One of the most effective measures for achieving this objective would be to give it official recognition, possibly by awarding a certificate or diploma to pupils who successfully complete the course. Training for many industrial and administrative occupations can well begin after this stage. Full secondary education for entrants into such occupations is in many instances a luxury which countries that are highly industrialised today could not afford during the vital stages of their own industrialisation.

iii. In both primary and secondary education, emphasis should be placed as early as possible upon science teaching (both the exact and the natural sciences) not only for their content but also for their contribution to the intellectual development of the pupils. This is particularly important at secondary education level in which all streams, including the classic stream, should devote considerable attention to mathematics, physics and chemistry.

iv. Text-books should take many of their examples from local conditions and economic life. This principle applies to the arts and humanities as well as to science. Science text-books - especially mathematics - should stress applications of theory to everyday life.

v. Teaching methods should be adapted in the first place to the characteristics of the pupils - by making intensive use of audio-visual aids whenever powers of visual and auditory observations are highly developed, appealing to the pupils' imagination, drawing on the wealth of popular culture - and in the second place to those of the economy in which they will be working. Active teaching methods should be used.

vi. Compulsory courses of initiation to industrial life - involving visits to undertakings - should be introduced.

60. Educational planners have recommended or are considering a number of these measures in many countries. Such reforms will require enlisting the services of all qualified persons in the country, e.g. for the modernisation of syllabi and methods. They will require also more intensive training of student-teachers, combined with the provision of up-dating and other further training for teachers already in employment.

61. The need for improving the quality of educational standards may imply, for some time, some deliberate or de facto curtailment of the right to education. Alternative measures might therefore become necessary. In the case of pupils who have only had a partial primary education, UNESCO is now endeavouring to work out functional literacy programmes to cater for the great mass of virtually illiterate adults. Such programmes, which involve more than the mere teaching of reading and writing, draw upon "all the forces in the nation and, in particular, local authorities and communities, educational, scientific and cultural bodies, public and private enterprises, non-governmental organisations, political groups, religious movements, women's organisations, and so on".^{15/} Other schemes, such as periods of prevocational training combining an introduction to industrial employment with a brushing up of the trainees' general knowledge, are in operation in a number of countries. For persons who fail to complete junior secondary

^{15/} World Conference of Ministers of Education on the Eradication of Illiteracy, Final Report, Teheran, UNESCO, September 1965.

school, evening classes and correspondence courses are widely used and generally effective. Some countries are thinking of making it compulsory for all citizens who have had some education to contribute towards raising the educational standards of those who have not had the same educational opportunities (through extension services or other arrangements). The armed forces can do much to help, not only by organizing literacy programmes for recruits but also through the educational work that can be assumed by military instructors in the areas where they are stationed. A number of countries have launched experiments of this type, e.g. Iran.^{16/}

b. Specific preparation for industrial employment

62. These programmes vary widely. At the lower level of the occupational hierarchy there does not exist any single path; at the higher levels there is less flexibility but alternative means of access are still possible. Training programmes can be divided into three main groups according to the level of training involved. The first level includes industrial manpower up to and including skilled workers and lower-level clerical employees; the second level comprises foremen, supervisors, middle management, instructors and technicians; and the third level covers engineers, administrators and senior managers. In the case of each of these levels, a distinction is to be made between initial training on the one hand and further training or development on the other. Much of the following discussion concerning manpower of the first level is relevant, mutatis mutandis, for personnel of the second and third levels.

1. First-level industrial manpower

63. This is the largest category, since it comprises unskilled workers, semi-skilled workers or operatives and skilled workers and craftsmen. Attempts are often made to classify training programmes catering for these workers by distinguishing between school based training, i.e. training

^{16/} R. Blandy and M. Nashat, "The Education Corps in Iran: A survey of its Social and Economic Aspects", International Labour Review, Geneva, ILO, May 1966.

given in schools or centres, training in undertakings, which includes on-the-job training as well as systematic apprenticeship schemes, and combined systems under which training is given partly in a school or centre and partly in the undertaking.^{17/} These classifications are not wholly satisfactory for the purposes of this report. Quite apart from the facts that in many cases the first two categories are becoming increasingly similar (hence, the need for the third category) and that the distinction cannot always be fully justified (a factory training centre is a school), the classification seems to help little in formulating and carrying out training policies because the criterion applied is the type of training arrangement and not the purpose of the training -- industrial employment. Despite the risk of over-simplification, it is proposed here only to distinguish between training in employment, (also known as "job-linked training", "enterprise training", "employer training", "on-the-job training" and "training in undertakings") and pre-employment training.

(a) Training in employment

64. A distinction should be made between initial training and further training.

Initial training

65. The main characteristic of training in employment is that the trainee has a contractual relationship with the employer (a contract of employment or articles of apprenticeship). The training itself may be given on the job, in special training workshops and training bays, in schools run by individual firms or groups of firms, or in training centres or schools, whether for accelerated or normal courses.

^{17/} Training of National Technical Personnel for Accelerated Industrialisation of Developing Countries, Report of the Secretary-General to the Economic and Social Council, United Nations, (E/390., Add.1 and Add.2), 1964.

66. On-the-job training is appropriate for most semi-skilled jobs. These, including the operation of machines, can be learnt from an experienced worker at the place of work in a very short period of time, which may vary from a few days to a few months. Experience has shown that their skill content is so limited that it is not only expensive but generally inefficient to give the training outside the undertaking. Except in cases where workers come from an environment or area which has hitherto had no contact with industry, the trainees' low standard of general education does not constitute an insuperable obstacle. With improved primary education syllabi and better teaching methods, trainees should have little difficulty in making the adjustment to industrial life, including the observance of health and safety standards.

67. The quality of the training given on the job depends largely on the way in which it is organized. Clear, precise instruction sheets should be issued to the workers to ensure a systematic build-up of knowledge. Often, these instructions can be based on work study or on training methods employed in pilot plants. The standards achieved also depend, to a considerable extent, on the level of skill and teaching abilities of the experienced workers.

68. If these conditions cannot be fulfilled, training on the job can be supplemented or replaced by initial training given in training bars or training workshops up to the point at which trainees can perform a good many production operations and carry out the more difficult tasks.

Apprenticeship

69. Trades and occupations which require training of more than one year's duration should be taught by a system combining practical work and theoretical instruction. Apprenticeship is the most systematic arrangement of this type. The training is given for the most part on the job. It implies teaching a range of skills composing a recognised trade and the provision of a specified amount of related instruction.

It is organized in accordance with a contract specifying the obligations of the contracting parties and at the end of his training the apprentice is recognized as fully qualified in his trade or occupation.

70. In many industrialising countries, existing apprenticeship schemes have so far been handicapped by serious defects-- to such an extent that in some cases the system has fallen into disuse even though the relevant legislation is still in force. These shortcomings are largely due to the fact that apprenticeship systems have been taken over, almost without adaptation, from the industrialised countries with the result that the length of the training -- sometimes as long as five years -- and the skills taught, no longer fit the needs of the industries in question. The systems also suffer in many cases from poor organisation, sometimes generally (lack of clear job descriptions, training plans, examination standards or administrative machinery), and sometimes specifically (unsystematic practical training and inadequate related instruction).

71. This should not prevent examination of ways and means of modernising apprenticeship for the training of skilled workers. The system may have proved defective in practice but in concept it frequently seems to meet the needs of industrial development, since (i) the training is related to a particular occupation and is usually given in the setting in which the apprentice will be employed; (ii) it entails systematic organisation of training for a clearly defined job, covering a specific period and allocating time to both practical work and theoretical instruction; (iii) it is subject to training standards and proficiency tests; (iv) it defines the responsibilities of both employer and apprentice, and (v) it involves a certain degree of supervision and backing from public authorities.

72. Measures to improve apprenticeship systems should concentrate on:
(a) ensuring that the length of training is determined in relation to the needs of each occupation, having regard to the adaptability of the

apprentices; this will often involve, on the one hand, making a substantial reduction in the total duration and, on the other, varying the length of the apprenticeship according to the abilities of the individual apprentice; (b) establishing lists of apprenticeable trades, together with corresponding training programmes and examination standards; (c) establishing graduated stages of apprenticeship, each stage being open to trainees who have attained the level of the previous one, irrespective of whether it was attained as part of an apprenticeship scheme; (d) establishing a national body to promote industrial apprenticeship, with responsibility for setting standards and supervising training and examinations. Such a body should systematically assist firms in need of help, assisting them to organize apprenticeship schemes, designing equipment, helping to arrange inter-firm training schemes, opening centres in which either part of the initial training (both theoretical and practical) can be given, or in which training and further training is provided for training officers and instructors.

73. The first three changes could be introduced without too much difficulty if the country has adopted the recommendations made in the second section of this paper concerning the classification of the qualifications needed for different industrial skills and the definition of the corresponding educational and training standards. The fourth change is bound up with the establishment of a national industrial training organisation of the type referred to earlier. The national body to promote industrial apprenticeship might be one of the branches of this organisation. It might constitute part of a wider scheme to promote all forms of training in undertakings. It might also become the organisation actually providing industrial apprenticeship training -- in co-operation with industry -- as in a number of Latin American countries.

74. In the latter countries, autonomous training institutions have been set up in which initial and further training are given during alternative periods in training centres or schools and in industry. At first,

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emphasis was placed on training taking place outside the undertaking but there is now a tendency to co-ordinate these activities more closely with the training given by the firms, and the institutions are now drawing up training plans and standards for the industry-based training as well as for their own centres. Similar schemes are in operation in other countries e.g. the United Arab Republic, where apprenticeship for 50 occupations in eight industries comprises one year of initial training in centres run by the Government or by large concerns, followed by two years of training on the job.

Conditions for effective training in employment.

75. Whether or not training in employment for skilled occupations takes the form of apprenticeship, its effectiveness depends largely on: (a) the teaching and technical skills of the experienced workers and workshop instructors; (b) the organisation of the firm, particularly the organisation of its training; (c) the organisation of the related instruction; and (d) the general technical bases of the training (syllabi and standards, teaching materials and equipment). The first point is discussed later in this paper in connexion with the further training of skilled workers (paragraphs 81 - 84) and the training of instructors (paragraphs 103 - 105).

Organising the undertaking for the training programmes

76. Managements must be aware of the problems created by the organisation of training programmes and must take appropriate action: reorganisation of production, assignment of suitable technical and supervisory staff and instructors, proper planning and scheduling of the programmes, appointment of training officers. As there is a limit to the number of trainees which can be absorbed by a production unit, it may be advisable, when there are large numbers to be trained, to assign them to special training workshops, plant schools (if the undertaking is large enough), or centres operated by autonomous apprenticeship institutions such as those referred to above. Undertakings, particularly if small, can benefit considerably

from pooling their training resources; in such cases, the initial training can be given in group training centres. This method is useful for trades involving repair and maintenance work. Mobile teams of instructors could also be used.

Related instruction

77. The arrangements for related instruction depend on the size of the undertakings and on whether schools are available for giving theoretical instruction of suitable standard. Large firms may be able to give either the required related instruction or the complete theoretical and practical training in their own workshops or schools, using their own engineers, technicians and management staff. In other cases, day-release or block-release for attending courses in nearby technical schools, or evening classes, or correspondence courses, are the systems most frequently used. The effectiveness of these methods depends on the quality of the schools concerned; but quite often insufficient consideration has been paid to whether, by improving the qualifications of the workers and systematically using their highly qualified staff for training purposes, firms could not themselves provide the necessary related instruction, either on their own account or through some group training arrangement.

78. The question of the best combination of periods of related instruction and practical training is one that is not easy to answer. Although it is difficult to generalise, owing to the variety of trades and subjects taught, it is perhaps safe to say that the time given off to permit attendance at classes of related instruction should not be too short, since very short breaks disrupt production and are less effective for training purposes. On the other hand, unduly long periods spent on production work are also bad because they slow down the progress of training. The formula of block release, for a period lasting from one week up to a maximum of one month, has often proved successful. Evening classes and correspondence courses are also used, mainly in the case of small isolated

firms, or if there is an acute shortage of qualified personnel. The practice of giving a short theoretical lesson in the undertaking every day, or every other day, has been followed successfully in some cases; it has stimulated both the employers' and the trainees' interest in the training and has generally made the training more effective.

Technical backstopping of training in employment

79. As was stated earlier, a systematic apprenticeship scheme requires a schedule or list of recognised apprenticeable trades combined with appropriate training plans and examination standards. This is true of any type of systematic training for skilled work. An important task of the ITO would be to carry out this essential preparatory work and to make its results available to industry. This task could be performed by national apprenticeship services, where they exist (as in South America), or be assigned to a special body to set up to promote training in undertakings (Mexico), or be carried out or promoted by trade testing centres, as in Kenya. It should not be confined to providing the bases of initial training, but should cover all aspects of initial and further training in industry.

Accelerated training centres

80. In the case of complex, new industrial projects, initial training, in the absence of adequate training facilities in the undertakings, could be carried out by accelerated training centres sponsored by industry. Such centres have proved effective in some cases but they have a number of serious drawbacks. For one thing, they are expensive. For another, they are intended to meet a short-term need, which may mean that the training is fairly narrow or may become quickly outdated. Before embarking on such an expenditure, therefore, an investigation should be made of the feasibility and impact of investing the same sum on training in industry (whenever an industrial project is not starting from scratch and is to be spread over a long period), training in other undertakings (especially in the nationalised sector or in large firms), training key workers in

other countries or having them trained by the firms building and equipping the industrial project.

Further training

81. The nature and content of these programmes must vary according to circumstances. In some cases, the objective is to enlarge the workers' knowledge and skills and teach them more highly specialised skills within the same trade and at the same level of qualifications. In others, the need is for systematic upgrading, based on the initial training given by one of the methods already described; this will enable the worker to move up from one skill level to another, e.g., from semi-skilled to skilled and later highly skilled. Further training may in some cases take the form of a prolongation of apprenticeship (involving a second and third stage). Alternatively, the need may be to adapt existing skills in the light of technical progress or changes in production processes; this is "retraining" -- a term which also covers the acquisition of qualifications other than those originally acquired, (e.g. training skilled workers to become specialised in the repair and maintenance of machinery).

82. Programmes of further training, whatever their objective, will vary widely in detail. Their content must take into account not only the minimum standards required but also the skills and aptitudes of the trainees themselves. In many instances, it will be found preferable to divide further training into short periods involving a series of training sessions, each with a limited objective, so as to encourage the trainees and to make due allowance for their frequently limited general and theoretical knowledge.

83. In many industrializing countries, related theoretical instruction is more important in the case of further training than in initial training; first, because of the low educational level of the workers on entry, and secondly, because of the higher degree of skill entailed. Related

instruction should be concerned not so much perhaps with general scientific knowledge as with inculcating certain principles by means of courses of applied technology and experimental work. Development of the workers' level of general knowledge is also important. Probably recourse should be had more frequently to block-release courses for related instruction and, in some cases, to full-time courses in educational institutions.

34. Further training should occupy a key place in national schemes or arrangements for promoting or encouraging training in undertakings. An interesting experiment along these lines is currently in operation in Mexico. The National Service for the Rapid Training of Industrial Manpower has three tasks: to train and give further training to instructors in industry; to assist firms in organising their own initial and further training schemes; to provide a nucleus of permanent training facilities. The Service has a central unit, five area offices and 20 mobile units. Whether it is worthwhile to set up such a network depends on the scale of a country's industrialization drive and the general organisation of its vocational training system. In many South American countries, there are mobile units carrying out similar functions to those of the Mexican Service but coming under the national apprenticeship scheme. Elsewhere, as in Turkey, the United Arab Republic, Taiwan, Cambodia and Tunisia, assistance to industry is the responsibility of productivity centres, vocational training institutions and centres for the training and further training of instructors and supervisors.

(b) Pre-employment training

35. Training prior to employment is usually given in special branches of the educational system, either in vocational schools (lower technical, vocational and trade schools, industrial arts and artisan trades schools), in vocational training centres and in centres for the accelerated training of adults.

86. In many countries, the general education system includes a special technical stream, the first part of which may be complete in itself, designed to give initial vocational training for semi-skilled and skilled industrial occupations. The courses place equal emphasis on the acquisition of general and technical knowledge and practical skills. Sometimes this general and practical instruction is continued beyond the first part of the course in order to give pupils a better theoretical grounding and greater degree of vocational specialisation.

87. Vocational schools give courses for several different trades such as the woodworking, metalworking, engineering, electrical and building trades and clerical employment, or concentrate on a particular industry -- engineering, building, etc. In theory, vocational schools should make good some of the shortcomings of training given in employment, and the best among them in fact do so. They should ensure that theoretical and practical training progress in step with each other; they should continue the pupils' general education and provide the link between school life and the world of work; they should enable their trainees to acquire their practical skills systematically, unhampered by the requirements of industrial production.

88. Unfortunately, many of them have serious shortcomings which have been summarised as follows:

- (i) the serious lack of balance between the numbers trained for a particular occupation and the number entering that occupation, since the majority of those trained often seek and obtain employment in other sectors, such as the army or the administration;
- (ii) the considerable wastage during training which greatly increases the cost per pupil trained;
- (iii) the insufficient adaptation of the training to conditions of work in enterprises, as well as to the speed and quality required on the job;
- (iv) the shortage of personnel and incompleteness of equipment, since the funds available are not always adequate for the needs

of technical institutions; and

- (v) the inadequate qualifications of teaching staff, particularly workshop instructors. 18/

89. It is, therefore, recommended that the work of these institutions should be critically examined from the standpoint of their cost and efficacy. Some countries have already embarked on extensive reforms in this field. As a result, some vocational schools have been closed down; in other cases, they have been converted to other purposes, e.g. to give courses of related instruction needed to complement the initial training and further training arrangements in undertakings, or to provide a wide variety of services (supplementary practical courses of further training, pilot workshops and laboratories, the production of teaching materials).

90. The same applies to accelerated training centres whose courses are not directly linked with specific industrial projects, and are not industry-sponsored. The operation of such centres is only justifiable in so far as the training caters for the needs of industry, both as regards output of trainees and the type of skills taught.

91. There are situations, however, in which initial training must be given away from the place of employment, even though it may be difficult to eliminate all the drawbacks inherent in such a system. Some types of training cannot be given effectively within the undertaking. The best example perhaps is the case of the shorthand typist, whose training consists of courses of further education and group instruction in techniques which can be taught more effectively in the classroom than on the job. The same applies when countries are still in the very early stages of industrialisation and the facilities available in existing firms cannot immediately be improved. In such cases, vocational schools or training

18/ Report of the Secretary-General of the United Nations, op. cit., 1964.

centres may be set up to give industry the manpower it needs and to serve as models for the introduction of modern training methods. This pilot function may continue even after training in undertakings has become widespread.

92. It is suggested that initial training should be given only outside industry if the latter's programmes are totally inadequate or incapable of improvement. It is also important that any pre-employment programmes should be based on careful analysis of the demand for industrial manpower and should be capable of conversion for other purposes, (e.g., to further training) whenever this demand changes. In some instances, the programmes might be sponsored by one or more firms.

93. Although the details of training methods are not to be discussed in this paper, attention might be called to the need to relate practical exercises in vocational schools and training centres to real production work. This is a very controversial question, but it should be possible -- both in order to stimulate interest in the training and for economic considerations -- to devise practical exercises which are not exercises ~~but~~ but which combine educational value and the conservation of scarce materials and resources.

ii. Middle level industrial manpower

94. This category of manpower consists essentially of foremen and supervisors, teaching staff and technicians. Terminology varies widely, mainly because many of their functions overlap. An attempt will be made to classify the training programmes for the different sub-categories on the basis of the main duties involved and their level.

(a) Training of Supervisors

95. Broadly speaking, the duties of foremen and supervisors fall into two categories: firstly, the supervision of skilled workers, which calls for a knowledge of the technical operations performed and often entails

personal intervention to correct faulty work; and, secondly, the planning and supervision of production in a workshop, the detailed programming of the work to be accomplished and the assignment of this work to the various workers. Activities in the former category are often described as 'functional': they require the ability to direct the work of others, to give instruction, to maintain good working relations with the workers and to settle disputes, as well as special knowledge of safety and health rules, administrative and staff regulations. Duties in the second group require a knowledge of the technical processes employed in the workshop and in the factory as well as of systematic work organisation.

96. Where the general level of education and training is fairly low, the main emphasis has been laid on initiation into "functional" activities. To this end, courses have been organised, designed both to increase the supervisor's knowledge of his trade and to initiate him into instructing and supervisory techniques. Methods adapted from Training within Industry for Supervisors (TWI) are frequently used. Where the general level of the worker is higher, or where the technological standard reached by the undertaking makes it necessary, the training given must also cover the second type of activity; hence the need to organise courses of related and technical instruction giving a grounding in general subjects, (mother tongue, applied mathematics, basic science) as well as technical subjects, and an initiation into the organisation and management of undertakings.

97. The "functional" courses should be given as far as possible within the undertakings, bearing in mind the need to relate the subjects taught to the daily work performed. They can then take the form of short special sessions centred, if possible, on a specific operation or series of operations. They should not take up more than a few hours per week. Courses of related and technical instruction generally involve attendance at schools or management-development institutes, productivity centres or

instructor-training institutes. Part-time courses are the most common as it is difficult for undertakings to do without their supervisory staff for a long period. There have, however, been instances of full-time courses which have been successfully completed without difficulty. ^{19/}

98. These activities of supervisory staff overlap with the duties of instructors and technicians. Courses should therefore be planned to cater for the greatest possible numbers. For example, prospective foremen may attend all or some of the courses in teaching techniques for prospective instructors; as for related instruction, this can form part of the courses organised for future technicians. ^{20/} These courses should, as far as possible, be organised within the framework of existing arrangements and make use of facilities already available. Where it is necessary to found special institutions for the purpose, they must be of a comprehensive nature -- further training for different manpower levels, theoretical and practical training combined with advanced training for various functions and in different trades. The experience gained by the teaching staff of these institutions will often enable them to embark upon the production of teaching materials and the establishment of standards for training and pedagogical research.

99. In the case of new industries launched with the backing of foreign firms, advanced training for supervisory staff could be given by these firms outside the country. It may also be indispensable to have recourse to international further training programmes such as those organised by the Centre for Advanced Technical and Vocational Training at Turin.

^{19/} In Nigeria, for example, six-week full-time courses have shown good results.

^{20/} See, for example, the ILO Special Fund projects for supervisors and instructors (India, Morocco) and for instructors and technicians (Israel).

Introduction

1. This paper is very broad in scope. Education and training with a view to industrialisation imply the whole process by which the general and technical knowledge and the skills needed for industrial production are acquired and developed. By qualified personnel is meant any person who possesses some special skill or knowledge required at any stage, and at any level, in the industrial process: from the semi-skilled worker to the technician, the engineer and senior management.
2. The purpose of this paper is to define some of the conditions which must be fulfilled if countries in the process of industrialization are to be endowed with an optimum "skill generation system" - optimum as regards both cost and efficacy. The paper examines problems raised by the creation or development of such a system; it also suggests solutions for these problems in both general and specific terms.
3. The paper is divided into four sections. The first contains a brief description of the main problems. The second is concerned with determining an education and training strategy. The third section discusses some of the more important aspects of the implementation of education and training programmes, while the fourth makes some concrete proposals for international action in this field.

I. THE PROBLEMS

4. Strenuous efforts have been made by developing countries to overcome their problems in the field of education and training. There have been some remarkable achievements - often made at great cost - especially during the last ten years. But much remains to be done. In the following pages the difficulties are summarised which the developing countries themselves admit still have to be overcome. There are notable exceptions among those countries which have already attained a comparatively high level of industrialization. But the broad lines drawn may serve to highlight underlying principles of national and international action which would be suitable for application in a great many cases.

(b) Training of teaching staff

100. It is on the training given to teaching staff that the quality of the workers trained will largely depend; hence the importance of the training programmes organized for such staff, who include teachers of general education, teachers of theoretical technical subjects, and instructors in training establishments and in undertakings.

101. Teachers of general education are trained at pedagogical institutes and teacher training colleges. Their courses last from two to four years after completion of full secondary education. The teachers of theoretical technical courses are trained, likewise after completion of full secondary education at a few specialised institutes generally within higher education. Their studies last from two to four years after completing secondary school, in the case of those giving theoretical instruction up to the level of technician, and from six to eight years after completing secondary school for teachers of higher level personnel. But these standards cannot always be attained, and many countries find it necessary, for example, to entrust such teaching to students who have merely completed their secondary education, usually in technical subjects, or to students who have not completed their undergraduate courses at university.

102. The stress which reforms in general education lay on the teaching of science, on initiation into industrial life and on the use of modern teaching methods should provide these teachers with a better basis for their work. But similar reforms need to take place in the training given to the teachers themselves. In a number of countries, there appears to be a need for the teaching of science to be thoroughly overhauled; curricula and text-books need to be brought up to date and adapted to economic life; more active teaching methods should be used; the regular updating of knowledge should form a recognised part of a teaching career, and special courses should be organised at universities and technical institutes for the elite of the teaching staff in undertakings. Senior managers should

be encouraged to participate in the planning and implementation of these programmes and arrangements should be made for future teachers to spend training periods in industry.

103. Related theoretical instruction for instructors in training institutions and in undertakings is normally given either through full- or part-time courses at secondary technical schools or at special instructor-training centres or at comprehensive institutions of the type already referred to.

104. Future instructors for training institutions or undertakings should generally be chosen from among the best skilled workers and foremen.

Special attention needs to be paid to the following points:

- (a) those chosen should be thoroughly versed in the practical skills required -- this may lead on occasion to the passing over of older workers whose productivity is on the decline, and will nearly always involve the provision of upgrading training;
- (b) useless theoretical knowledge should be eliminated ^{21/} and pedagogical training should be mainly centred on the practical aspects, which will lead to a curtailment in teaching some of the complexities of industrial psychology;
- (c) frequent updating courses will be necessary; it will often be preferable to provide for a series of limited training operations rather than an ambitious comprehensive course which would have the additional drawback of depriving industry for too long a period of the personnel it needs.

105. A large number of instructor-training institutes have been founded in the majority of countries in the process of industrialization -- often under the aegis of the United Nations Special Fund and the International Labour Organisation. They combine skill-upgrading training, theoretical

^{21/} An efficient method is that of the unit exercise: an operation is broken down into a number of sequences (or units) in which theoretical knowledge is imparted in conjunction with the manual work.

instruction and general education, with the application of the knowledge and skill acquired. Arrangements are made for trainee-instructors to give lessons under supervision.^{22/} These institutes have been highly successful on the whole. One of the major problems consists in making these training activities more uniform, whether those involved are intending to work as instructors in training institutions outside undertakings or as in-plant instructors. Differences should exist only where necessary to take account of the level of education and skill of individuals and not as regards the training arrangements in which these individuals must take part.

(c) Training of technicians

106. This category embraces a variety of occupations which, on the one hand, are practiced at various grades between the skilled worker level and the professional level, and, on the other hand, involve functions of various kinds -- technicians working in offices such as draughtsmen, and production technicians such as engine testing specialists. Definitions proposed for this category of staff vary greatly, some stressing the fact that the work performed calls essentially for intellectual capacities while others draw attention to the need for technicians to be endowed with technical knowledge and manual skill in equal proportions; others again emphasize that many of the functions performed, even at the senior level, are more manual than intellectual. Training programmes will vary widely depending on the case.

107. Until quite recently, the majority of the different functions of technicians were performed either by highly skilled workers or by engineers or former engineering students who had failed their examinations

^{22/} For example, in countries such as India, Pakistan, Cambodia, Burma, Algeria, the Congo (Kinshasa), the United Arab Republic, Morocco, Libya, Nigeria, Senegal, Kenya, Tunisia, Iran, Turkey, Chile, Colombia, Peru, Uruguay, Venezuela.

or had not completed their studies, or by students from technical colleges or higher technical institutes. These four sources of recruitment have often shown themselves to be inadequate from the viewpoint of both quantity and quality. There seems, therefore, to be a need for a serious reappraisal of the different technician training programmes in the light of the real and changing needs of industry. Such a reform of programmes might be based, *inter alia*, on the following considerations:

- (a) To fill posts as technicians just above the skilled worker level, which involve operations closely linked with production, such as product inspection, the supervision of maintenance operations and specialisation in the use of certain equipment, regular courses should be organised to broaden the qualifications of the best of the workers already employed. ^{21/} Such courses may be attended full-time or part-time, or they may take the form of evening classes or correspondence courses. In many cases, the necessary related instruction may be combined with that given to instructors and supervisors;
- (b) Arrangements might also be made for some form of apprenticeship up to the second or third grade. The success of such arrangements will depend on the quality of the trainees accepted and the efficacy of the arrangements made both for related instruction and for work organisation within the undertaking;
- (c) Far-reaching changes need to be made in full secondary technical education, the status of which should be raised in the national education system. It should be designed in such a way to enable those who start work immediately upon leaving secondary school to fill a post after as short a period of adaptation as possible, (junior technician level), as well as provide a sound general and theoretical grounding for those who continue their technical studies beyond the secondary school level (technicians and higher technicians). This entails a thorough overhaul of the science and technical curricula;

^{21/} Some firms, notably Tata in India, provide such opportunities for their more able craftsmen with commendable success and organise their own training schemes for the advancement of their employees from the shop floor to the highest supervising grades. H.R. Mills, Report on Technician Training Facilities at the Technician Level in South and Southeast Asia, Colombo Plan Bureau, September 1961.

- (d) Short periods of training or work in industry should be systematically introduced. Secondary technical education needs to be organized in such a way as to provide the courses of related instruction needed to complement the initial and further training given in undertakings, whether in the form of day classes, evening classes or correspondence courses;
- (e) Changes need to be made in higher technical education, whether at technical colleges or at specialised technical institutes whose curriculum covers the end of secondary education and the first two or three years of university. Such courses should be considered as terminal and not as an inferior or truncated form of engineering course. An important place should be given to practical work and to familiarisation with the conditions of industrial life. This may be accomplished through regular alternation between work in the technical establishment and work in an undertaking or through training periods in industry, for example during the holidays; use can also be made of seminars, case studies, simulation techniques, etc., in industry or through industry. Contracts might be arranged between the latter and the institutes, covering mainly the practical arrangements for such training (alternation between the two, the exchange of teaching staff, the supply of equipment), and the relationship between the trainees and the undertakings concerned (pre-employment contracts covering a group of industries or undertakings). These technical establishments should also be capable of providing advanced training to technicians trained by them or by undertakings. Experiments along these lines are being carried out in a number of countries. ^{24/}
- (f) Special attention should be devoted to the subject matter of the science and technology curricula in higher technical establishments. The nature of the subjects taught does not differ greatly from that of the subjects taught in engineering courses, but the range covered is narrower, the theoretical aspects are not gone into so deeply and a larger place is given to applied technology. Educators and industrialists must reappraise the nature and content of the theoretical training to be given to middle-level and higher technicians. Special attention should be given to subjects relating to the organization and management

^{24/} For example, in Colombia, Hong Kong, Japan, Malaysia, Senegal, the Philippines, and Venezuela.

of undertakings, and particularly to work study, the rudiments of costing, and industrial relations.

108. The provision of further training for middle-level industrial manpower is of great importance. Permanent arrangements should be made between undertakings and scholastic institutions for such training. In many cases the attendance of selected personnel at international advanced vocational training courses will have a snowball effect and may give a decisive impetus to national basic and advanced training programmes.

(iii) High level industrial personnel

109. This category of personnel comprises mainly engineers and technologists and senior managers and administrative personnel of undertakings.

(a) Training of engineers and technologists

110. Effective programmes for the training of such personnel should be planned with a view to remedying the shortcomings to which attention has been drawn in Section I of this document. They should be designed to take account of the probably poor quality of the general and scientific education received at secondary school. They should also be so organised as to combine the indispensable deepening of scientific and technical knowledge with the applied study of technological processes, in industry itself, or as close to it as possible. They should also endeavour to resolve the conflict between two contradictory requirements: first, the need to provide - in addition to the traditional engineering subjects, (civil, mechanical, electrical and mining engineering) -- a grounding in the specialised subjects which have emerged from technological progress, (electronics, petroleum technology, etc.); and, secondly, the need to give a very broad training to persons who cannot avail themselves while at work of all the facilities available to their colleagues in industrialized countries for dealing with the host of practical problems which arise in a factory.

111. Far-reaching reforms appear to be necessary to achieve this. They should concern, (i) the syllabi; (ii) the methods used; (iii) the sequence of theoretical instruction and practical work; (iv) in-service training; and (v) courses of further training.

(i) One of the reasons for the drop-out of students in the first or second year of their engineering studies, and the impression of detachment from reality given by the training as a whole, derives from the over-large importance attached all too often to pure mathematics in the syllabus. Sometimes the engineering sciences themselves are not tackled in a down-to-earth manner until half way through the course. A remoulding of the syllabi effected jointly by educators, scientists and industrial experts, should make it possible for courses to be devised which, without hindering a thorough assimilation of the general principles, would devote time from the outset to the application of these principles. With this end in view courses should include subjects relating to the organization and management of undertakings, and particularly the production function, costing and work study. In some cases, industrial drawing courses need to be made more systematic. Finally, the rudiments of a foreign language should be taught, with the emphasis on technical terms, in countries which have no specialised engineering publications of their own.

(ii) Much could be done through the introduction of more practical and active teaching methods, for instance, by curtailing the number of ex cathedra classes and replacing them by discussions and experiments. ^{25/}

^{25/} An expert has recounted how he explained the line transmission theory to student engineers in West Pakistan by putting them to work on a real telephone line; measuring the parameters and calculating the capacity of the line made it much easier for them to understand the underlying theory than if it had first of all been explained to them as an example of a Bessel function or a Fourier series.

(iii) Far-reaching changes also need to be made in syllabi as regards the division of time between theoretical instruction and practical work in the undertaking. Some countries are even endeavouring to organise sandwich courses. One example of this is Malaysia, where curricula include courses on workshop technology and it is compulsory for instruction to be given in fitting, machinery, black-smithing, welding and boiler making in the Faculty's workshops. All the first-year students are assigned to industrial workshops for two months during the holidays. In their third year students spend only two terms at the university: during the last five months they must attend practical courses at industrial establishments approved by the Faculty. In their final year students are required to attend a survey camp, usually established within the framework of a rural development scheme. ^{26/}

(iv) Such alternation obviously does not give a newly graduated engineer all the industrial experience he needs, the more so since during the periods spent on the shop floor the student engineer will more often than not have had to content himself with the role of observer without being able to play an active part. Since the spontaneous adaptation of the new engineer -- alongside a more experienced engineer -- is not the best solution, more and more in-plant training programmes are being organised which round off the training received by the engineer in the course of his studies. These courses vary according to the industry and the undertaking concerned. They provide a systematic and closely supervised guidance to young engineers and emphasise the development of abilities and exercise of judgement in concrete cases rather than the addition of additional knowledge.

^{26/} Chin Fung Kee, UNESCO seminar on Technical Education, Bombay, 1966 (question B.3)



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5. Many of the education and training systems existing in the developing countries are unable to supply, at the right time and in sufficient number, the qualified persons needed for industrial development. Moreover, the education and training provided by these systems are a heavy financial burden on the countries concerned. These points are equally valid for each of the main sources of skill generation: the general education system, and the training system (whether in schools or in undertakings).

Shortages of qualified personnel

6. Almost all developing countries suffer from serious shortages of qualified personnel at all levels and in all key posts in industry: plant managers and administrators, graduate engineers - in design, production and research; technicians, workshop supervisors, pattern-makers, draughtsmen, foremen and supervisors, highly skilled production workers, office employees, repair and maintenance workers. These shortages exist, paradoxically, side by side with unemployment and massive underemployment, and even in conjunction with alarming reductions in the level of industrial employment. In the short term these shortages seriously hamper industrialization plans and programmes. Even in the medium term, it seems in certain cases unlikely that they can be substantially reduced under present conditions. In some countries at early stages of industrialization the output of skill generation systems will not even suffice to supply the qualified personnel needed for replacement purposes.

7. It is also true that in some countries there is an over-production of certain categories of staff. Thus in the Philippines, between 1963 and 1970, an estimated surplus of 15,000 graduate engineers is likely to occur.^{2/} Surpluses of trained personnel, just as much as the shortages, point to one of the main characteristics of the education and training systems of the developing countries: they have rarely been set up with an eye to the countries' industrial development needs.

^{2/} A.S. Bhalla, "Manpower and Economic Planning in the Philippines", International Labour Review, Geneva, Vol. 94, No. 6, December 1966.

8. Even in those cases where there is an over-production of certain categories of qualified personnel, imbalances constitute a serious problem. In the United Arab Republic, where there appears to be too high a proportion of university graduates, there are serious shortages at the technician level, and these shortages will tend to become more acute unless vigorous action is taken to combat current trends.^{3/}

Quality deficiencies

9. Frequently, trained persons have not acquired qualifications needed for the jobs they will be holding in industry. Many examples exist of graduate engineers barely meeting the requirements of jobs at technician level. Admittedly, engineers are in fact often called upon to fill such jobs because of the shortage of competent technicians. Such a substitution is rarely satisfactory: the skills and knowledge of the one occupation bear no relationship to those required of the other, and all too often a poor engineer simply becomes a poor technician. The reasons for such qualitative deficiencies lie in defects found in the main sources of skills and qualifications for industrial employment, the general education system and the training system.

a. The general education system

10. Education has many objectives which are not necessarily linked to the goal of industrial development - e.g. providing a means of access to cultural riches, developing the personality of the individual. It also has, however, another basic aim: to prepare the individual for vocational and technical training. It thus becomes, in the context of this paper, the main stream

^{3/} A study undertaken by the Institute of National Planning, Cairo, estimates that in 1970 the United Arab Republic will be faced by a shortage of 213,000 technicians, or 41.5 per cent of estimated requirements. Figures for 1975 and 1980 show estimated shortfalls of 263,000 (-43.1 per cent) and 373,000 (-47.7 per cent) respectively. M manpower Planning in the United Arab Republic, Cairo, Institute of National Planning, November 1966.

of preparation for industrial employment. Often, however, the organizational structure, curricula and pedagogical methods of the educational system are inadequate and jeopardise the success of training provided later on.

11. Many countries, in pursuit of important social ideals, have heavily emphasized the expansion of primary education; but this quantitative effort has hampered any improvement in the quality of primary education, which in many instances is poor. At the same time it has held back, for sheer lack of resources, the improvement of secondary and higher education. As a result, those who have gone through the primary education system - many without completing it - will not be able while in employment to receive adequate further education, for lack of teachers, instructors and other qualified staff which the other higher levels of education cannot provide. General secondary education suffers from well-known deficiencies: insufficient attention to the sciences, old-fashioned teaching methods, no relation to the realities of economic life, inadequately trained teaching staff. It all too frequently turns out people who have no desire to enter industrial employment later on or on whom industrial vocational training will be partly or wholly wasted.

b. The training system

1. Skilled workers

12. Two main weaknesses characterise manpower training for this group: (1) persistent competition between or overlapping of different types of institutions or form of training - i.e. vocational schools, trade schools and training centres on the one hand, and training provided in undertakings on the other; (2) the low quality and/or high cost of both forms of training. Generally speaking, the vocational and trade schools are very expensive and their graduates are often not accepted by the undertakings. Training centres turn out, at considerable cost, too few workers, or workers whose trade specializations do not match the jobs available, or whose theoretical knowledge and practical skill leaves much to be desired.

Both the training centres and the vocational and trade schools are handicapped by having inadequately trained teachers, theoretical curricula which are too general and often of poor quality, and equipment that is out of date or inappropriate to the instruction given. Furthermore, both types of institution suffer from a total lack of, or at least inadequate links, with industry.

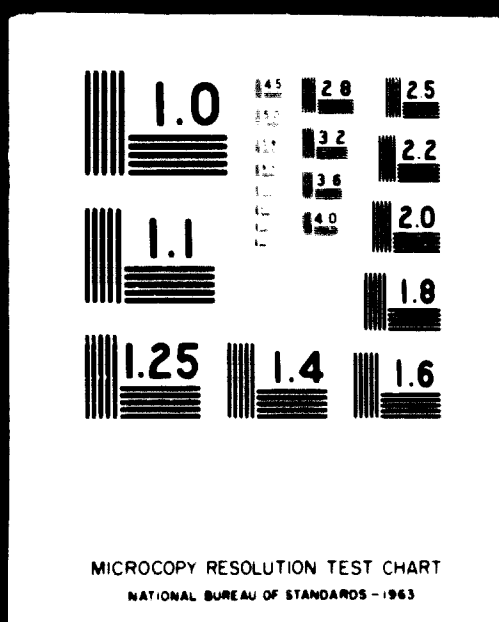
13. To meet acute shortages of skilled manpower required for specific industrial projects, recourse is frequently made to accelerated training centres for adults. Such centres can train persons for specific needs within the space of a few months, but they are expensive to set up and to run. Moreover, the skills taught are narrow and the centres are not flexible enough to adapt to changing needs.

14. Training in undertakings - whether given informally or under a formal apprenticeship scheme - also has well-known defects. Even when it is organized systematically it is often too narrow in scope, dividing the skills and knowledge into too many sub-specialisations, and paying too much attention to learning tricks of the trade rather than to skill training in depth. Instructors lack pedagogical training; teaching materials are either insufficient or totally lacking. In certain cases the training period is far too long: apprentice training, based on the systems of some of the industrialized countries, may last as long as four or five years. The training given in undertakings also tends to neglect the related theoretical instruction, which is an essential part of the training not only for attaining the level of qualification immediately required, but also as a preparation for any further training and retraining made necessary by technical change. This low level of basic training has repercussions throughout the occupational structure. Foremen and highly skilled workers are necessarily recruited among workers trained by the weak system, and they in turn provide the selection basis for a large part of the junior and middle-level technical and managerial staff including the vocational training instructors. Many large and medium-sized undertakings have tried to remedy this situation, and in some countries they are in fact the sole

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for other sectors of the economy. It also presupposes some centralization of efforts, although excessive rigidity is to be avoided.

128. Specific preparation for work in industry -- that is, all programmes and arrangements for technical education, higher education and vocational training at all levels -- is financed, at the national level from three main sources: public money, industry' (individual undertakings or groups of undertakings, trade and professional associations), and private individuals (trainees and their parents).

129. Public money finances the technical side of the general education system and higher education (universities and technical colleges). It also finances certain programmes outside the education or university systems (management development centres, instructor-training centres, centres for teaching methods research), and meets the cost of assistance given to the training activities carried on by undertakings; it finances the national, regional or local co-ordinating and planning bodies and, as a rule, the general operating costs of the entire system -- establishment of training and examinations' standards, general supervision, etc. Industry contributes substantially to all kinds of specific training through the training programmes organised in the undertakings, the contributions of trade and professional associations to individual and group training schemes and direct financial participation in school programmes (scholarships, etc. for initial or further training).

130. In most countries, the general rule is that specific training, both theoretical and practical, carried on outside industry is mainly financed by public money and by the individuals directly concerned, and that the cost of practical training carried on in industry is shared between industry and the trainee, the latter's contribution usually being a temporary reduction in his wage.

131. This general rule may be modified in two ways. First, public money may be used to finance practical training in industry through subsidies or other measures to encourage the employer to provide such training or by defraying part of the costs which the employer would normally have to bear. Secondly, industry itself may be called upon to shoulder part of the burden by paying a training levy -- usually an apprenticeship levy. This is the case in a number of countries at different levels of industrial development, e.g. the United Kingdom, France and several countries in Latin America.

Training levies

132. The administrative rules governing such training levies vary considerably from one country to another. In France, industrial undertakings pay the Treasury a sum equivalent to 0.6 per cent of their total payroll. In practice, about two-thirds of this sum can be reclaimed in exemptions. Briefly, such exemptions can be granted for: (a) wages paid to apprentices during their first ten months of training and with respect to the periods during which they are receiving related instruction, and other training costs, e.g. expenses incurred for special training facilities within the undertaking; (b) the firm's contribution towards setting up and running inter-plant training workshops; and (c) subsidies and gifts in money or in kind made to vocational schools or other training institutions. While the total sum derived from the French apprenticeship levy seems to have little or no effect on the Government's plans for the public vocational training system, the exemptions do encourage firms to organise systematic training in industry and to set up joint training establishments.

133. In the United Kingdom, the training levy inaugurated by the British Industrial Training Act of 1964 was designed to be much more ambitious. It is part of a general industrial training policy and constitutes one of the chief weapons at the disposal of the Industrial Training Boards set up

by the Act.^{28/} Each Board is required to impose a levy on all employers in the industry concerned. (Certain very small firms may gain exemption). This levy takes the form of a percentage of each firm's payroll, except in one industry where the tax is a per capita one. The rates so far applied vary from 0.5 per cent (building) to 2.5 per cent (engineering) of wages and salaries. The sums thus collected go towards financing the administrative expenses of the Board, the subsidies it grants and any direct training activities on which it may embark. The Boards may grant subsidies to firms conducting approved training activities, although firms are not legally obliged to undertake such activities; they can also pay fees to specialist firms or other organisations to run courses for the industry. The rules governing the award of subsidies vary from one Board to another, but the total subsidy paid to a firm is not necessarily linked with the sum it pays in the form of the levy; indeed the subsidy may exceed the levy by as much as 600 per cent. These financial arrangements are intended to encourage and expand all initial and further training activities considered essential for the industry in question -- from the manual worker to top management and from the young new entrant to the older worker requiring retraining.

134. In some Latin American countries, the apprenticeship system provides for a levy on all industrial, and sometimes commercial undertakings of a certain size. This levy varies from 1 per cent (Brazil and Venezuela) to 3 per cent (Colombia) of the total amount paid out in salaries and wages. This income is paid into a fund which finances an autonomous training system. The main difference between this system and the ones described above lies in the fact that in most cases there is little or no possibility of obtaining an exemption or refund.^{29/} This has led to a

^{28/} See Document ID/CONF.1/31, paragraphs 137 - 142

^{29/} Even when it is legally possible for a firm to run its own training school, it seems exceedingly difficult to get the school officially recognised with a view to obtaining exemption from the levy.

reduction in the amount of practical training in undertakings, although recently there has been a marked tendency among these autonomous systems to encourage such training, but by providing services to the undertakings rather than subsidies. Apart from these autonomous systems, financed from an apprenticeship levy or by the latter in conjunction with public funds, there exist in almost all the Latin American countries "compoting" systems of vocational training financed from funds allocated to the national education system or from other public funds.

Arguments for and against training levies

135. Irrespective of the system adopted, industry must accept responsibility for a good proportion of the vocational training given, (chiefly the practical training) especially when the training is peculiar to the needs of the particular firm concerned. In such a case, an employer will consider training expenses as part of his general financial investment in production. These expenses will consist of the wages paid during training, the direct costs of the training programme and the output foregone due to the training activities of the trainees supplied by the firm. Like any other investment, this will have to be profitable, that is to say, the benefit to the firm should exceed actual outlay. But the investment may have been wasted if the trainee leaves for some rival concern or for any other reason.

136. This is no doubt the first, and a major argument in favour of introducing a training levy. Making all undertakings contribute to a fund to be used either to meet the costs of training provided outside the firm or for improving training schemes in undertakings or groups of undertakings, will help combat the pirating of trained staff. The risk of losing a qualified employee is much greater if the skills he has acquired will be of use to him outside his own company. Firms may, therefore, tend to neglect non-specific skills in their training programmes and to recruit their skilled staff elsewhere. One way to solve this problem could be to arrange

For the requisite training to be provided by the public education system, which is, of course, already being done with respect to broad general skills such as reading, writing and arithmetic. The same procedure could be applied to subjects such as carpentry and woodwork, wiring and electricity and so on. Another solution is to reduce the cost of the training in the undertaking, so that the financial burden of losing a person who has been training is offset, in part at least, by a reduction in the sums invested in his training. This would be the effect of a training levy-cum-subsidy system.

137. Secondly, not all employers are equipped technically for organizing training for the necessary numbers or of the required quality within the undertaking. Some of them still need to be convinced that training is a form of investment, and therefore they neglect it, or fail to do any at all. The introduction of a training levy, together with a system of exemptions and subsidies, would help to remedy this situation.

138. Thirdly, the introduction of such a levy system would certainly be an exceedingly effective means of financing a training programme for a whole industry or for a group of industries. Not only would it make all undertakings share in the expenses of the training, but it would also become possible, through the standards applied in the decisions to award exemptions to the levy and subsidies, to influence the training policies of the undertakings in the right direction. It would, no doubt, in addition help to raise the level of skills throughout the industry, encourage the adoption of training standards, facilitate adaptation of technical change and foster mobility of labour. It would associate industry in the task of deciding on the rate, purpose and scope of the levy, the rate being subject to revision in the light of changing needs. It would provide a regular, automatic source for the financing of industrial training, including the running costs of the ITO.

139. A number of arguments have been raised against the training levy systems. These arguments, in so far as they appear to have some foundation, seem to challenge more the manner in which the levies are applied rather than their underlying principles.

140. The extent to which the levies may be a heavy burden for the employer will depend on the rate adopted. It is essential that industry should have a say in determining the rate, which should be reasonable and bear some relation to foreseeable requirements. An important feature of the British Industrial Training Act (1964) in the United Kingdom is that the rate of the levy has to be reviewed from time to time. In any case, since training is as much an investment as any other, an assessment of 1 or 2 per cent of the total payroll must surely represent a very minor contribution for an employer who decides to organize no training on his own account. On the other hand, should he decide to undertake some training himself, the system of exemptions or subsidies should relieve him of almost the entire burden. At the same time, the system helps to protect him against "pirating" and facilitates inter-firm arrangements, the establishment of standards and supervision of the training.

141. Calculating the levy on the basis of total payroll (the usual procedure) can be justified by pointing out that the amounts invested by an undertaking in training activities (and, hence, the benefits it can expect to reap in the shape of subsidies and exemptions) are, by and large, proportional to the size and quality of his labour force, both of which can be roughly measured by the amounts paid out in wages. But administratively, if it is possible to draw finer distinctions it might be well, in the countries where there is heavy unemployment among unskilled workers, to base the levy on skilled labour alone. Be that as it may, the levy can always be calculated in other ways: as a function of the number of persons employed, or the output of the firm, or the value of each production contract. Where administrative costs are heavy, some simplification in procedures should be possible.

142. It is difficult to imagine how a training levy could act as a brake on industrial development, since the whole purpose of the system is to encourage investment to further such development. In this context, the obvious case is that of the countries in the early stages of industrialisation. Provision can always be made for exceptions, and to introduce the levy system gradually. But even in such cases, it will be well to ask whether the opposition to the levy cannot be attributed to a failure to appreciate the importance of the training function in industrial production, or simply to a desire to have the burden of financing it shifted to any sector other than industry. This merely postpones the problem and does nothing to solve it.

143. The suggestion that introducing a levy system would slow down the rate of employment is a theoretical rather than a real problem. If the employer, fearful of having to pay too heavily through the levy, cuts down the number of jobs, especially at the lowest levels, he will have to either reduce output or to introduce capital intensive methods of production. In both instances, it has yet to be proved that payment of the levy would be more expensive.

144. Another criticism is that the levy is too heavy an additional burden; undertakings already have to pay semi-fiscal dues to trade and professional associations to finance training, or make voluntary contributions towards the initial and further in-service training of certain categories of staff (management development courses, financing of studies in universities or institutes of higher learning, etc.). Such activities must obviously be taken into account when any of the subsidies or exemptions (which must be an integral part of the levy system) are awarded, provided, of course, that these activities are in accordance with the approved training policy for the industry concerned.

145. From the above, it would appear that a training levy, combined with a system of subsidies and exemptions, provides a method of finance well adapted to the strategy for industrial education and training outlined in this paper. It is, therefore, recommended that such a system should be established in countries where its introduction would not create any constitutional or legal difficulties and that it constitute in those countries the principal means of financing the ITO.

Financial aspects of the Industrial Training Organisation

146. It may perhaps be useful to summarize here the sources from which the ITO would be financed and the types of financial assistance it would be able to render.

147. The income of the ITO would consist of:

- (a) first, the product of the training levy imposed on all industrial undertakings above a certain size; only very small firms would be exempt;
- (b) second, public funds intended to supplement the above with a view to enabling the organisation to fulfil the purpose; in countries in the very early stages of industrialisation, such public monies might be the main source of finance;
- (c) third, funds supplied through international assistance.

148. The ITO would be empowered to:

- (a) award subsidies (or exemptions) to undertakings or groups of undertakings carrying out training programmes in accordance with the standards laid down by the organisation; such subsidies should cover a substantial part of the cost of these programmes; loans might also be granted, subject to support from development banks;
- (b) provide financial assistance to public educational establishments and to institutions or organisations, (trade unions, trade and professional associations, small-industry institutes, productivity centres, technical colleges, etc.), for such parts of their training programmes as meet both the needs of industry and the standards set by the organisation;

- (c) finance training activities carried on under its auspices when the requirements of industry can be met in no other way. Such activities might range from the establishment of comprehensive training centres, to more limited arrangements for the training of instructors, the preparation of teaching material, or the purchase of equipment.

Contribution to training costs by trainees

149. Specific training for industrial employment receives finance from yet another source: the trainees themselves. Their contribution consists of either the fees they voluntarily pay for their own training, or reduced wages during their practical training in the undertaking. As regards the payment of fees, people would, in all probability, be prepared to make a considerable financial effort if adequate facilities for initial and further training were available and were likely to fit them for higher-paid work. While it is a desirable social objective to assist workers to better themselves through awarding scholarships, loans or outright gifts (which could be financed partly by employers and partly from public funds), many workers in the developing countries may be prepared to take a share in the burden of providing training for industrial employment by making this personal contribution.

Foreign assistance

150. In both general and specific preparation for industrial employment, foreign assistance can be called in to fill the gaps. Such assistance may be public or private, bilateral, multilateral or international. No exact estimate has ever been made of the total amount thus contributed; it is probably very considerable. In countries which have recently become independent, a large proportion of national expenditure on education and training, including operating costs, is being met by foreign aid. This situation will have to be changed little by little; it is generally agreed that most of the effort in this field should be made by the country concerned, and that foreign aid should be selective and aim at filling the gaps and buttressing the national effort at its weak points.

151. This, in effect, is typical of the international assistance provided by the United Nations and its specialised agencies, including specialized bodies for financial assistance. Through the award of loans and gifts, through direct contributions to all types of training activity, (advisory-missions, grant of fellowships for study abroad), through the provision of equipment, these organisations endeavour always to intervene in areas of primary importance and to train the key personnel. Such assistance may take the form of a comprehensive programme, e.g. the World Bank project in Nigeria, which covers a whole range of educational institutions -- general secondary schools, technical and vocational schools, technical colleges and universities and technical teacher-training colleges. It may be concerned with the establishment of a specific institution -- a technical university, science faculty, technical college, teacher-training college, a management development centre or a centre for the training of instructors and supervisors. The assistance may also concentrate on particular aspects such as, for example, further training and education, (fellowship schemes for engineers, courses at an international centre for advanced technical training), assessment of educational and vocational training needs, the preparation of national plans in these fields, the establishment of standards and preparation of teaching materials.

152. It is, however, surprising that relatively little international finance, in the form of international capital transactions, has been made available for training, which is now generally regarded as an investment on the same footing, from the economic point of view, as investment in physical assets. It is suggested that such international financial assistance be made available to industrialising countries which would have established the proposed Industrial Training Organisation.

(v) Further training courses should be organized. They would take place one or two years after the engineer joined the staff of the factory; this would enable him to deepen his knowledge of the general and theoretical aspects which he had not been able to assimilate fully during his initial training, and the importance of which to his daily work he would be better able to appreciate in the light of his own experience. Such courses are all the more necessary in that the new engineer training programmes based on the foregoing considerations may, in some cases, turn out a type of man whose theoretical grounding is less sound than it would have been under the traditional type of programme.

(b) Training of senior managers and administrative staff of undertakings

112. These are the persons responsible for policy-framing, planning, organisation and management in undertakings. In a factory employing several hundred people, where four hierarchical levels can be distinguished -- workers, supervisory staff, departmental heads and top management -- the staff in question will come under the latter two headings; they will include highly qualified persons such as market research and industrial engineering specialists. In a small undertaking, the only persons falling within this category will be the owner-manager and his immediate assistants. As in the case of the other categories of staff, a distinction needs to be made between management education and training programmes and management development programmes. Special care needs to be taken with the organisation of these programmes, not only in view of the strategical importance of this category of staff but because it is only quite recently that the need has been acknowledged for training to be given to managers and executives of undertakings.

113. On a short term basis, efforts should be concentrated on the existing staff of undertakings, i.e. the courses should consist of a quick initiation into management techniques -- as a whole or as regards selected aspects --

IV. A FEW SUGGESTIONS FOR INTERNATIONAL ACTION

153. There is hardly a single aspect of the programmes considered in this paper which has not been the subject of action by some organisation of the United Nations family during the last 15 years. Hence, in this last section, the purpose will not be to describe the whole range of these activities, but rather to bring out a few points on which efforts should be intensified or concentrated. These will be discussed under three headings: (a) the definition and implementation of a suitable strategy of education and training for industrial work; (b) the organisation of effective programmes; and (c) ways of financing such programmes.

International contribution to the definition and implementation of the strategy

154. The purpose of international co-operation in this field is to complement national action where necessary and to enable all countries to profit from the common fund of knowledge and from international experience. To this end, it is essential that the organisations concerned, and especially the UNIDO, ILO and UNESCO, should have a common approach to be reflected in their programmes. In this regard, efforts have already been made by these Organisations, and these are being expanded considerably. The fact that some problems have not yet been completely solved is attributable, not to inadequate co-ordination, but to the far-reaching changes which education and training are undergoing all over the world. The strategy which has been advocated in this document will increasingly demand the integration of activities which were planned separately in both countries and international organisations.

155. Such an integration will not come about through abstract reasoning or by dogmatising, but through concrete concerted efforts within each country. Three tasks ought to enjoy priority and might call for increased co-operation from the international organisations:

- (a) providing instruments to help in the formulation of the strategy;
- (b) preparing national plans of education and training for industry; and
- (c) establishing national industrial training organizations.

a. Provision of the instruments

156. The international organizations should strengthen the statistical basis required for planning education and training for industry (manpower statistics, education and training statistics). Their efforts, which would combine research and operations, should be devoted, inter alia, to the following:

- i. Preparation of the various kinds of manpower indicators, the schedules of skill requirements and the statistics mentioned in Document ID/CONF.1/31 and in paragraphs 37 - 38 of this paper, namely: occupational censuses in certain industries; surveys of the skills possessed by workers in various occupations within these industries; vocational training statistics; catalogues of qualifications required for key occupations.
- ii. Systematic inventory of the various skill-generation processes, determination of methods for improving such processes and analysis of the cost of industrial training programmes.

157. The methodological work required in connexion with these instruments could be undertaken at the world-wide or regional level, but the instruments themselves should be devised in individual countries or by small groups of countries. This process should provide valuable guidelines for action, while contributing to the standardisation of skill definitions, levels, and requirements. A start should be made with research and pilot projects in a few countries, before any really ambitious scheme is tackled, and the instruments evolved should be continuously improved.

b. Definition of the industrial training plan

158. Countries needing advice in this field could request the UNIDO, ILO, UNESCO and appropriate financial agencies to send joint missions to assist them in determining how best to: (i) survey the situation and decide on

objectives mainly by using the instruments mentioned under a. above and, as necessary, assist in devising such instruments; (ii) define the main features and general framework of the plan; (iii) integrate the various national and international activities involved (planning of industrial development, manpower planning, planning of education and training).

c. Organizing the ITO

159. The international agencies should assist countries to set up this key organization. They would do so by providing advice on its scope and objectives, its structure, its technical and financial means of action, its administrative problems, and by participating in its activities. (See paragraphs 52 - 56 and paragraphs 147 - 148).

International contribution to the organisation of effective programmes

160. The international agencies should concentrate on projects of three sorts: (a) those relating to the establishment or reform of education and training arrangements for industry as a whole; (b) those relating to a particular industry; and (c) those relating to techniques of education and training.

a. Improved education and training arrangements for industry as a whole

161. International efforts should aim at assisting countries in improving the education and training arrangements for industry as a whole according to the priorities of national industrial training plans.

b. Launching of integrated projects for particular sectors

162. The international agencies should be able to develop projects for the initial and further training of skilled personnel for a whole industry or for a particular industrial scheme. These projects would be an integral part of medium or long-term industrial plans. They would cover, in a logical order, all skilled personnel, including senior managerial staff. Joint survey missions should precede the projects.

c. Improved techniques of education and training

163. International agencies should help in devising the new techniques of industrial education and training which modern systems will require. Their efforts should be concentrated chiefly on the following:

- (i) development of models showing how programmes might be organized for various branches of industry and for certain key occupations (outlines of sandwich training schemes for managers, engineers, technicians, and middle-level staff; specimen syllabi in scientific and technical subjects at various levels; specimen syllabi of combined theory and practical training for future skilled workers);
- (ii) preparation of manuals, pamphlets, and course outlines at various levels and in the principal occupations within any particular industry; some of these documents may be valid for use in several countries but most will have to be adapted to local conditions.
- (iii) Preparation of training equipment, such as models of school and workshop equipment, audio-visual aids of all kinds, and programmed instruction material;
- (iv) establishment of model laboratories and teaching method offices;
- (v) establishment of education and training standards, (organization and subject-matter of examinations, diplomas, supervision and inspection).

International financial assistance

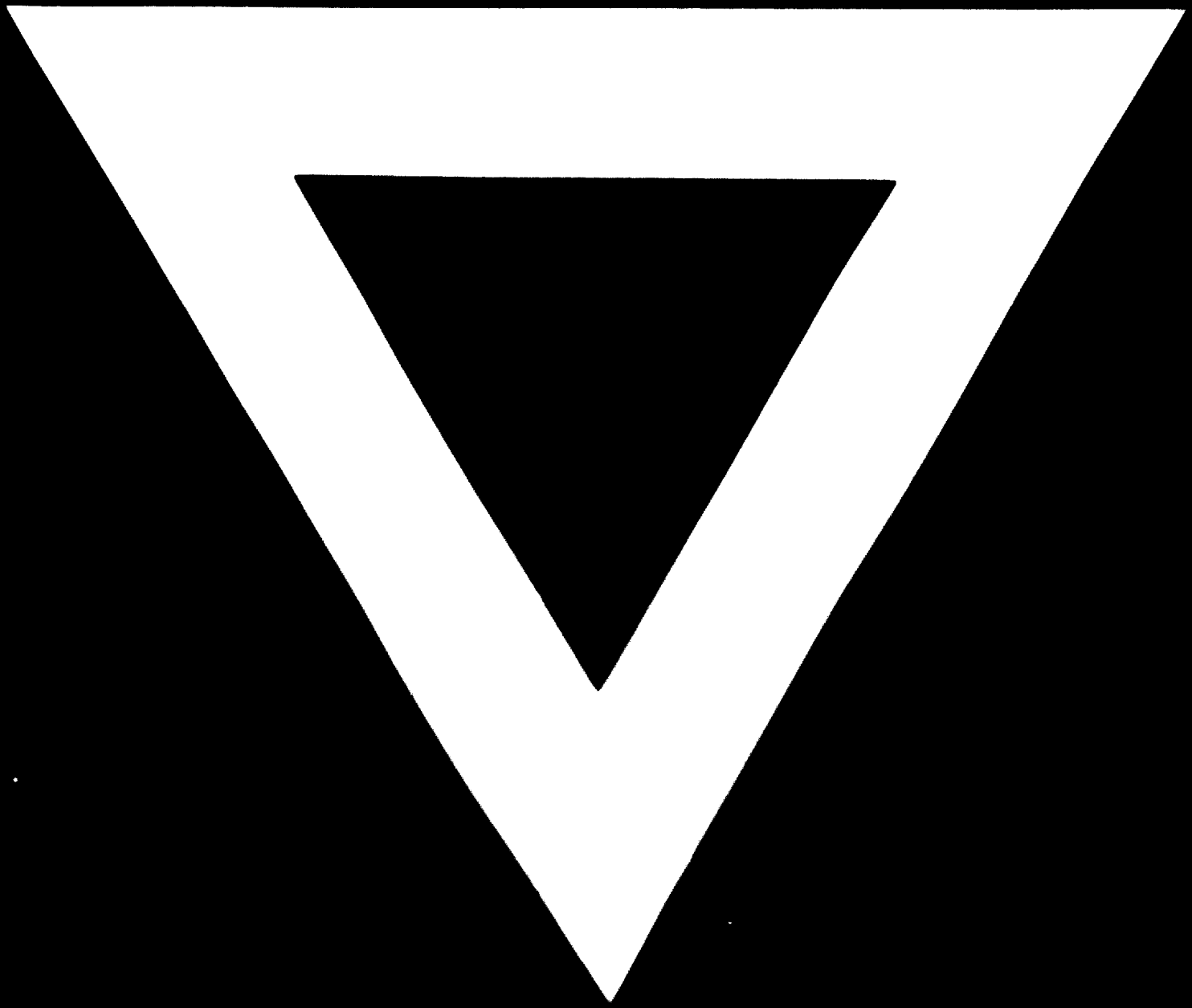
164. Without in any way restricting the scope of what international agencies are doing in education and training, special stress should be placed on four points on which international financial assistance might be given:

- (a) the financing of joint international missions to help countries in devising an over-all strategy (paragraph 158), or for launching sectoral projects. (see paragraphs 158 and 162 of this paper);
- (b) direct financial assistance to national industrial training organizations to supplement their resources when no adequate national funds can be made available. International funds would be devoted to strictly defined aspects, such as programmes of advanced in-service training for managers and engineers, the establishment of a national experimental pedagogical centre to assist training in undertakings, the creation of national demonstration centres and national centres for examinations and standards, the establishment of mobile instructional units, etc.;
- (c) the financing of comprehensive fellowship programmes to provide key-men in industries of particular importance with further training;
- (d) the financing of equipment, purchase of expensive machinery, provision of foreign exchange for purchase of technical books and journals. This assistance might also take the form of long-term loans to finance certain key aspects of a general industrial training plan, the other aspects of the plan being financed from national resources.

165. Mention should be made of two further aspects of international action which could suitably be strengthened. First, there is the part which international agencies can play in providing information, especially through their technical publications and the world-wide, regional and national information centres available to them. It is most important that developing countries should have access to the experience acquired elsewhere. This is the responsibility of international agencies. Special efforts must be made to publish, in the field of training, technical journals, special studies and handbooks, bibliographies and systematic

up-to-date catalogues. Secondly, the international agencies must make public opinion aware of the problems of education and training for industry. Employers' organisations and trade unions, teachers' associations, professional organisations and popular movements of all kinds have a very important part to play in the dissemination of ideas, and should themselves make a vigorous contribution to the activities described in this paper. Organisations such as UNIDO, ILO and UNESCO, by virtue of their facilities all over the world, can help these bodies to play their part. They must, therefore, make strenuous efforts to associate them with schemes for industrial training.





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followed up by a series of management development courses for senior members of the staff. These may take the form of either seminars and demonstrations or of a series of lectures, followed by instruction in a selected, limited number of management techniques, handled in depth and associated with practical work in a small number of undertakings. Efforts may be concentrated on industries and undertakings of national importance, and at times it may be necessary to limit the action to a few of the basic tasks of management such as industrial engineering and costing. Priority should be given to convincing managers and administrative staff in both the public and private sectors of the usefulness and importance of such activities. The initiation sessions will not suffice to convince them: there will have to be swift results. The first practical courses should often, therefore, start by dealing with productivity improvement at the operating level, and go from there to lay stress on production management and the specialised techniques involved such as work study, production planning and supervision and quality control. By degrees, other management techniques may be introduced such as management accounting, market research, personnel administration. These specialised courses may be accompanied or followed by courses in general management. It may sometimes be preferred to concentrate first on the improvement of output and not to tackle the problem of market research until later. Technicians and supervisory staff might well attend such courses, especially on the practical side.

114. These courses should provide just enough theory to enable the participants to understand the principles underlying the techniques being taught, but the emphasis should be laid on practical application. They should not be copies of courses in countries with a different cultural background. The methods used should employ the most striking and effective media, e.g. audio-visual aids, books, programmed instruction, simulation techniques, in so far as these media are appropriate to the circumstances.

115. Stress should be laid in management development programmes on the importance of the rational organisation of training in the undertaking or sponsored by the undertaking. Special attention should be given to the proper timing of initial and further training programmes. The place and functions of the persons responsible for such training (training directors and officers) should also be made clear. It is essentially from among the teaching and managerial staff of undertakings that persons should be recruited to be responsible for all or part of their training activities. The training of such persons could be completed under the arrangements made either for instructor training or for management development, and the institutes existing for this purpose should organize special courses in which stress would be laid on organisational problems.

116. The size of management development programmes will depend on the importance of the industry concerned, the resources available and the needs. In countries where practically nothing has been done in this field, the temptation will be great to devise ambitious programmes. Experience has shown that this is a mistaken policy and that it is better to begin on a modest scale. New programmes should be launched only after a review and assessment of all the programmes existing throughout the country, both public and private; any new programmes should be complementary and not competitive.

117. In many cases it will be advantageous to set up a national management development centre which can encourage, co-ordinate and supplement what is being done in this field. Such a centre will often be the starting point for a series of programmes designed to meet the urgent needs of industry, especially large and medium-scale industries. Programmes for small-scale industries could come within the orbit of such a centre, unless they are handled by special institutes for the development of small-scale industries which can provide not only aid in connexion with the management of undertakings, but also technical extension services, demonstration workshops and often direct assistance with credit and market research.

118. The programmes organized by such centres should not deal with every subject continuously at each level. While it is true that work study and costing are long and complex processes in which continuous training could be given -- perhaps simultaneously in several undertakings -- and while it is also true that a standard type of general management course could be organized throughout the year for industrial management -- job analysis or market research courses need perhaps be given only twice a year.

119. It is hardly possible to make suggestions as to the size of such a centre, for example, as to the number of staff required. Thailand, with a manufacturing industry employing 230,000 persons in 1963 had a management development centre with 17 professional workers on its staff in 1965, but separate facilities existed for small-scale industries. The Israeli Productivity Institute, catering for both manufacturing industry (215,000 persons in 1964) and the non-manufacturing sector (273,000 inclusive of agriculture), had 60 professional workers on its staff in 1965.

120. The question as to who should be responsible for these management development centres is a highly controversial one. Where such centres receive international aid, the government has to furnish counterpart funds which implies that such institutions come under its control even if it is not formally responsible for them. Industry often complains of the inefficiency of "bureaucratic" government-run centres. The best solution might be to make these centres autonomous units under the wing of the proposed ITO, with their own executive body composed of representatives of all those concerned, e.g. ministries, planning authorities, employers' and workers' organisations, universities, professional associations of engineers, etc. There are also instances, mainly in connexion with small-scale industries, of centres attached to development banks, which has the advantage of making the granting of loans subject to strict requirements as regards the sound organization of the undertakings concerned.

121. On a long-term basis the foundations should be laid of a better initiation into industrial life of future industrial managers and administrative staff. It has been suggested that the new general education programmes should include courses on initiation into industrial problems and that the instruction should be modernized by the use of text-books and methods in keeping with the realities of economic life. It has also been suggested that courses on selected management techniques should be included in programmes for the training of technicians and engineers. These are undoubtedly the top priorities. As regards the systematic organisation of management courses at the universities for students with no business experience, it does not appear that arrangements similar to those existing in some advanced countries can be recommended unreservedly for countries in the process of industrialisation. It will no doubt be preferable to concentrate on the gradual improvement of the quality of general and technical education in the country and to make permanent arrangements for initial and further training in undertakings. These arrangements will entail the organisation by industry and for industry, in co-operation with the universities and the technical institutes, of regular courses to be attended by future managerial staff who will alternate practical work with study sessions, and by present managerial staff for whom the courses will take the form of training periods and seminars. Recourse to international advanced training programmes will, in many cases, give an invaluable boost to what individual countries are doing on behalf of this category of staff who are, without a doubt, the keystone in the industrial training structure.

c. Concluding Remarks

122. It may be useful at the end of this section to emphasise some points, namely: (a) the necessity of linking the different programmes with one another; (b) the relationship between education and industry; and (c) the use of all facilities available.

(a) It should be stressed how important it is for the different programmes organized to complement one another. The following is an example of what this can mean in practice. In Kenya, it has been decided to pool the efforts of the major training institutions, the National Trade Testing Centre, the National Industrial Vocational Training Centre and the Management Training and Advisory Centre, with those of the technical colleges. The Trade Testing Centre frames and checks the training standards for skilled workers, which make the levels of training uniform throughout the country and play a role in wage policy, since there is a fixed wage to correspond to each recognized level of skill. The Vocational Training Centre is to be opened near the Trade Testing Centre and will train instructors for undertakings and vocational training centres as well as foremen, give upgrading training to workers and supervise training in undertakings. Trainees who pass the examinations in these courses will be entitled to admission to technician courses. Related instruction will be provided in the country's technical schools and polytechnic. Parallel with these activities the Management Training Centre will help to reorganise industrial undertakings employing workers who have attended these courses. Arrangements of this kind exist, or are planned in a number of other countries.

(b) It has been proposed that co-operation between education and industry should be established first of all at the national level through the ITO where they are both represented. This Organization will no doubt be setting up a certain number of joint committees and subsidiary bodies to deal with specific problems such as the re mouldings of engineer training programmes, the training of clerical staff or the further training of managerial staff, for the whole of the industrial sector. But the setting up of advisory committees at the regional, local or occupational level would also be a useful aid in gradually evolving a common policy and uniform

practices. Some of these committees might deal with matters such as the determination of occupational titles and of the skills pertaining to these occupations in a given industry. Others might study the practical problems of training for this industry, e.g. the subject matter of courses, the layout of workshops.

(c) With a view to using fully all the training facilities available, consideration should be given to the possibility of making use of such facilities as may be offered by youth movements, trade unions, clubs and community centres. Mention has been made of the role of the army in the campaign against illiteracy and to promote the spread of general education. It should be added that in some countries a systematic vocational training programme is organized for recruits.^{27/} It would also seem feasible to encourage organisations of the above-mentioned type to organise their own education and training programme either to give pre-vocational training or to supplement what has been learnt at school or at work. Some of the programmes might be eligible for financial help from the ITO.

Financing of industrial education and training programmes

123. Here again, a distinction is made between general preparation and specific training for work in industry.

124. General preparation -- provided chiefly within the general primary and secondary education system -- is financed mainly from public funds and by private contributions. By far the larger part of the necessary funds is provided by public funds, that is the national budget and contributions

^{27/} In Peru the army has five vocational centres which give training to recruits during the last three months prior to their return to civilian life.. Courses are given, inter alia, in joinery, bricklaying, electricity, ironworking, plumbing, painting and the repair and maintenance of heavy vehicles. In two-and-a-half years 3,000 recruits have been trained. The intention is to turn out between 6,000 and 8,000 semi-skilled workers per year. (The Peruvian Army has 30,000 men). From The Peaceful Use of Military Forces, by Hugh Hanning; Frederick A. Praeger, New York, 1967.

from public authorities at various levels. The money is paid out directly to publicly operated educational institutions and indirectly, by way of transfers and subsidies, to private schools and institutions.

125. By private contributions is meant the money paid by individual persons, when schooling is not free, and organizations (lay, denominational or professional) when they wish to have a type of education which is not available in, or else is needed to supplement, the general education system. Such funds usually constitute only a small fraction of the total resources available, even when private education is on a relatively large scale, since the latter itself often receives public support of some kind or another.

126. It is not possible to discuss in this paper the numerous technical problems connected with the financing of general education. It suffices to say that action to affect the flow of investment, in the sense of the recommendations made in this paper, can be one of the essential instruments in an industrial education and training strategy. A change in the volume of public subsidies, or the abolition of such subsidies, the use of subsidies, as a means of encouraging certain kinds of expenditure, selective credit facilities awarded to regional and local authorities can be just as effective as reforms introduced in the curricula or decisions to close down or convert existing training establishments.

127. If this instrument is to prove effective, there must be real programming of the financing of education. Education, clearly, should cater for the educational requirements of the whole country not merely those of industry. This presupposes, in the first place, that the national education authorities participate in drawing up the industrial education and training plan, and accept it, and secondly, that they are able to reconcile the financial action required by the plan with the needs of other fields of education such as general education policy and training