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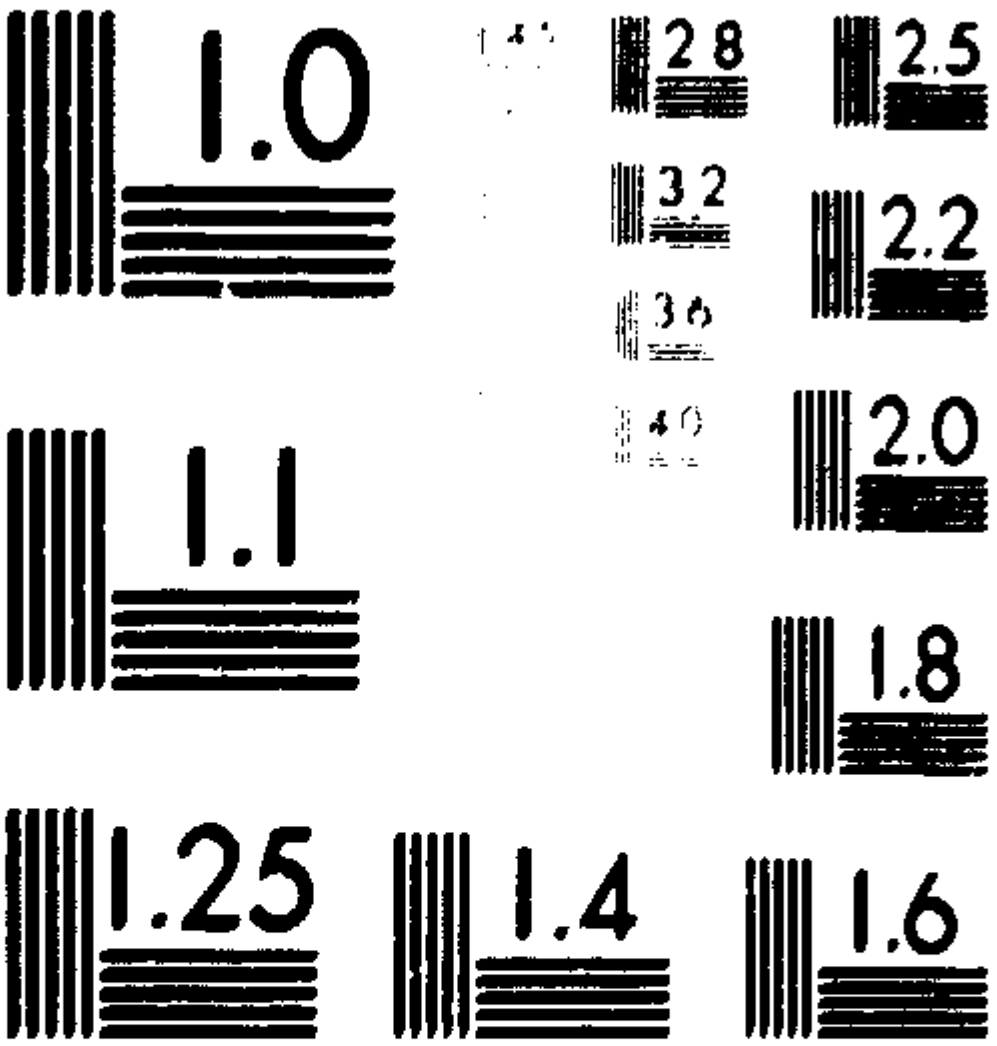

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APPROACHES TO INDUSTRIAL TRAINING*

prepared by

the secretariat of UNIDO

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Introduction

1. The Second Conference of African Governmental Experts on Technical Co-operation among African Countries, which was held in Libreville from 2-11 August 1982, concentrated its discussions on the important problem of the development and utilization of the human resources of the African continent through technical co-operation among developing countries (TCDC) with respect to education, training, promotion of employment and health. It considered the possibilities of developing such co-operation among African countries and also between the African countries and those of the other regions of the Third World.

2. The conference drew particular attention to the vital place allotted to human resources in the Lagos Plan of Action adopted in April 1980 by the African Heads of State and Government at the very first economic summit of the Organization of African Unity (OAU). "Recognizing the need to achieve an increasing measure of self-reliance in the economic and other spheres", that summit of African Heads of State and Government stressed "the importance of trained manpower as an input to activities in the various production sectors and support services as well as in the education and training sector as producer of skills and know-how for its own needs and for other sectors". The Lagos summit also considered that "since Africa's greatest asset is its human resources, full mobilization and effective utilization of the labour force (men, women and youth, both trained and untrained) for national development and social progress should be a major instrument of development".

3. Experience in industrial development over the past 20 years has shown that the prime obstacle to rapid industrial development is not only a lack of financial resources, but also a lack of human resources, and particularly of the skilled manpower responsible for conceiving, developing and managing plans and projects that incorporate a technology suitable to the local socio-economic environment. The development of skilled human resources, however, is one of the most difficult tasks to perform successfully: industrial development generates a demand for trained personnel that can only be met by means of intensified training programmes; in many countries and regions these programmes must proceed faster than industrial development itself. These considerations call for new approaches to the problems of

human resources development. These approaches must be capable of adaptation to change and lead to the acquisition of those skills and know-how which guarantee a certain degree of independence and permit needs determined by the countries themselves to be satisfied. At the same time, the costs associated with such approaches have to be borne in mind.

4. Governments in developing countries are sometimes insufficiently aware of the fact that human resources development should constitute an essential component of any industrial policy. In addition, industries that have been operating along traditional lines over a long period of time may even tend to resist suggestions of this nature. It has to be recognized that industrial policies differ considerably among developing countries, since these policies depend upon such factors as size, natural resource base, stage of development, sectoral priorities etc. For example, many developing countries have been seeking training for complete production, maintenance and management teams for specific industrial projects and, to some degree, the establishment of technology and training centres to support specific sectors of industry.

5. Since the need for qualified industrial personnel is continually both growing and changing, existing training programmes and educational and training infrastructures may not be adequate for the development of quality human resources. Many countries, conscious of this, have established authorities that concern themselves exclusively with training; countries have established joint committees involving the active participation of those from the production sectors as well as ministries of education and labour. The aim of the attempt to focus more clearly on fulfilling training needs has been successful or unsuccessful to the extent that, whatever the institutional and ministerial focus, there has been achievement in getting to grips with the problems involved and in conceiving, developing and implementing consistent policies for ensuring that training is adequate and carried out in a deliberate manner.

6. It does appear that one necessary pre-condition for success is that there should be sufficient overall co-ordination or a clearly determined plan harmonizing national industrialization objectives and priorities. In certain countries, plans for developing quality human resources for industry do not seem to be drawn up in an integrated manner on the basis of the needs

of the related industrial sectors. At the other extreme, however, there is the equal need to preserve a significant degree of flexibility in training programmes and the associated educational preparation. Industrial and technological change is a fact of life; so is the change brought about in industrial product markets which may be based on changes in relative prices such as the costs of energy or of capital. Therefore, a balance has to be sought between a degree of flexibility and a well-prepared and sensitively-implemented industrial manpower development plan. Perhaps most important of all, there needs to be a wider recognition that the whole process earlier described has to be seen within an economic context, whereby the use of financial and human resources incur costs. These costs have to be placed furthermore in each country's socio-economic, political and cultural setting.

Background to new UNIDO approaches to industrial training

7. The most important outcome of the First Consultation on the Training of Industrial Manpower was the recognition of an essential logical coherence in industrial training activity. The "why" of industrial training is clearly answered. Thus:

"In order to achieve their long-term development objectives, the developing countries had to expand their own technological and training capacity. The developing countries had to identify their needs and to formulate policies and plans consistent with that objective.....".1/

8. The basic objective of countries, and particularly the developing countries, aspiring to industrialize is to master their industrialization process,2/ i.e. due priority had to be given to a mastery of the technology in their current or future industrial projects and programmes, and the attainment of industrial development objectives can be facilitated by:

"(a) Integrated economic and human resources planning, including a clear national policy to develop the training of industrial manpower to meet present and foreseeable future needs with regard to the complementarity between national education and industrial training systems;

(b) A system whereby education and training requirements of industries of all sizes can be clearly identified and met, quantitatively and qualitatively".3/

1/ See para.14, Agreed conclusions and recommendations, First Consultation on the Training of Industrial Manpower, report, ID/294, 1982.

2/ Ibid.

3/ Ibid.

The link between industrial training and industrial development

9. Industrial training, at the Consultation, was placed squarely in the context of development objectives (as in para.7 above). Development objectives lead in sequence firstly to a development strategy, then to development plans and policies, and on to development programmes and projects. Forming part of this logical sequence are industrial objectives, strategies, plans, policies, programmes and projects, as well as human resource objectives, strategies etc. The essential linkages of human resource development should be with various economic sectors - industry, agriculture etc., as well as with the education system. Thus human resource development for industry (= industrial training) can be placed within a framework which must be consistent with both the industrial system and the education system.

10. Elements of the approach shown in outline below are based on the framework of consistency between industrial training and industrial objectives examined above. There is in fact a dual framework, since the type of analytical techniques and prescriptions which are appropriate when considering the national aspects of industrial training cannot be used when considering the problems and issues arising from project level training. More specifically, there is a wide collection of heterogeneous writing on the relationship between education/training/occupation/industry/economy which at this national level provides signals which are imperfect. This is why the concept of an "approach" to training considered in terms of national development objectives is used rather than "framework" which carries with it a strong flavour of certainty. In contrast, relatively little difficulty is encountered at the project level where clear prescriptions are relatively straightforward.

Elements of a new approach at the industrial project level

11. Methodologies are being developed which can assist developing countries to selectively acquire and master the technology incorporated in their new and existing industrial projects and programmes.1/ One such methodology provides for the systematic analysis fo each stage in the project development-implementation cycle, with a number of detailed checklists which throw light on the training requirements at each stage.

1/ See, for example, The Training of industrial manpower: its problems, practice and place in the process of access to industrial mastery, by EUREQUIP, 1982, UNIDO.

Starting from the standpoint of training requirements, the various implications - educational, financial, production etc. - of mastering a specific technological activity can be explicitly identified and followed to an appropriate point. Moreover, such an approach can provide a mechanism for testing the consistency between the training implications of projects (as part of industrial programmes and plans) and education/ labour market plans, policies and programmes.

12. In addition, the use of these or similar techniques[1/] is essential in identifying and clearly specifying the services to be purchased where training is provided under sales. Thus, the stage by stage analysis of the training implications at each step of the project cycle provides a framework which is essential for arrangements providing for the purchase of training and is indeed directly analogous to the technical specification in a hardware contract. Without such an analysis, both the purchasers and suppliers of training would run serious risks of mutual misunderstanding,[2/] and external providers of finance, in particular the export credit institutions, might be unwilling to provide assistance.

New approaches to training at the national/global level

13. UNIDO has worked on the development of methodologies linking manpower and training needs to different levels of technological complexity. At the industrial sector level, one family of such methodologies is provided by elaborations of the following:

> "A given state of technology in an industry is linked on the one hand to the productivity of the industry and on the other to the occupational structure (i.e. skill mix) of the labour force in the industry".

The state of technology is held to include not only the production process, equipment, tools used etc., but also management techniques.[3/] It is a

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1/ EUREQUIP, op.cit.

2/ The fact of the matter is that in some industrial sectors and/or industrialized countries the suppliers of training will also need help.

3/ See Pack on the importance of down to earth management techniques, such as production scheduling and plant layout, on developing country capital goods industries, in Fostering the Capital Goods Sectors in LDCs: A Survey of Evidence and Requirements by Howard Pack, World Bank Staff Working Paper, no.376, March 1980.

measure of the "modernity" of the industry and represented by a specific kind of capital equipment and specific kind of organization. When the above hypothesis is tested, it is found to be broadly-speaking correct in a crude sense: paradoxically the narrower an industry is defined, the looser the relationship. Unfortunately, the looser the relationships linking "state of technology" (i.e. "technological complexity") to both productivity and skill-mix, the less useful are these relationships for manpower planning purposes.1/

14. Nevertheless, planning and forecasting based on this family of methodologies is better than guesswork and can suggest rough guides as to the direction in which education/training systems should change.2/ In this connection, recent years have witnessed a much clearer understanding of these rough guides and the greater availability of information and statistics on which proposals for change, at the national level, can be based.3/

1/ For the evidence and elaborations of this point, see Blaug, Peston and Ziderman, The Utilization of Educated Manpower in Industry, 1967; Blaug Layard and Woodhall, The Causes of Educated Unemployment in India, 1970; Layard and Saigal "Educational and Occupational Characteristics of Manpower: An International Comparison" in British Journal of Industrial Relations, June 1966.

2/ Attention is drawn to the existence of a family of methodologies built up around the statistical relationships linking economy/industry/technology/skill/education. See Tinbergen and Bos, "A Planning Model for the Educational Requirements of Economic Development" in Econometric Models of Education, OECD, 1965; Edwards, "Indexes of Labour Productivity as a Partial Measure of Technological Change" in Input-Output Relations, Proceedings of a Conference, Netherlands Economic Institute, 1964; Leicester, The Manpower Link Between Economic Growth and Education, DAS/EID/66.5, OECD, 1966. See also Blaug, Economics of Education: A Selected Annotated Bibliography, 1966, and Blaug, Economics of Education: I, 1969.

3/ The increase in clarity and data availability between 1962 and 1980 is to be found in a comparison of the work of Parnes, Forecasting Educational Needs for Economic and Social Development, OECD, 1962, the proceedings in Policy Conference on Highly-qualified Manpower, OECD, 1967; Horowitz, Zymelman and Herrnstadt in Manpower Requirements for Planning, an International Comparison Approach, Boston, 1966; Zymelman in Occupational Structures of Industries, 1980; Hallak and Caillods in Education, Work and and Employment I and II, UNESCO/International Institute for Education Planning, 1980.

Perhaps the most important factors in this understanding are:

(a) the relationships between employment and industry, technology, skill etc.,; and

(b) appropriate policy responses to uncertainty in the outcomes of manpower and education planning. One such policy response, in certain situations, can be the purchase of specialized training, under contract and as part of the purchase of capital goods.

Skills required for industrial development

15. Knowledge and skills and therefore training and retraining represent a strategic factor of national development. Training in this respect must encompass all levels of personnel. However, of particular importance is the development and training of managerial personnel given the leading role this cadre has in improving the performance of industrial enterprises.

16. In parallel, training should include the technical managerial ranks. In addition to organizing training to improve the technical competence of e.g. senior engineers, engineering design specialists and others, there is a need for training programmes for this cadre in the managerial subjects where gaps in their knowledge, skills and attitudes - such as human relations, financial management and costing, financing of different designs, cost-benefit analysis, several aspects of personnel management etc. - have been observed.

17. Emphasis should be placed on essential technical training of general as well as functional managers in industrial enterprises. This involves technical aspects of training in the areas of production management, transfer of technology, choice of equipment etc.

18. The following specific areas of human manpower development are in particular need of strengthening and would greatly benefit from programmes within the framework of technical co-operation among developing countries or from the assistance of the relevant United Nations bodies.

(a) Training and development of training managers

Considerable effort has been devoted to training teachers and professors in the general education system, but little attempt has been made to train those professionals who are responsible for the manpower training and development function in an organization or industrial enterprise. The lack of training managers (co-ordinators, administrators, directors of training) makes it difficult to implement realistic programmes to develop human resources in any country or region.

(b) Training of trainers

More attention must be paid to the training of trainers, since neither the built-in multiplier effect of the trainers nor their capacity to innovate and conceive training programmes in response to specific needs have been clearly understood. Specifically, priority should be given to the training of trainers in order to develop the necessary skills, knowledge and attitude of the work-force in a systematic and efficient way.

(c) Training of engineers

High priority has already been given to the establishment and expansion of engineering schools. Nevertheless, problems of relevance and quality persist, and a continuing effort must be made to ensure that curricula include extensive practical and laboratory training and reflect advances in technologies in the light of national requirements. In addition, engineers need to build up their capacities in engineering conception and design, so that they can adapt and create technologies to meet the specific conditions prevailing in their own countries.

(d) Training of technicians

Promoting the training of competent technicians - shortages of which threaten the viability of many industrial projects - is a complex social and economic issue, involving problems of status, remuneration, education, and career structures. Increased training opportunities and long-term solutions would appear to depend on vigorous action being taken to promote technician training and status in developing countries.

(e) Training of managers

Although efforts have been made to examine the needs of managers in developing countries, and to adapt programmes to these needs, continued attention should be paid to management in relation to the specific characteristics and production structure of different sectors of industry. It is particularly desirable to prepare training profiles to provide qualifications related to the level of complexity of the management techniques required by differnet industrial sectors.

(f) Training of industrial economic administrators

The more extensive the industrial programme, the more complex become the tasks of the government officials - known as industrial economic administrators - charged with formulating and implementing policies. At the planning and policy-making level, the administrator organizes and co-ordinates the work to be used as the basis for the adoption of key decisions concerning the industrial sector. At the implementation level, he gives shape and substance to policies adopted to foster industrialization. Such administrators are vital to the economic and industrial development of a country. There is still, however, a shortage of trained administrators. Government officials acting in this capacity are required to be

economic and industrial planners and public sector entrepreneurs in varying degrees at different stages in their careers in government service. The complex tasks involved in the industrial development process require a combination of skills in fields such as economics, accountancy, statistics, law, public administration and engineering. While, therefore, an economic or industrial administrator may have had training in one such field, he is also required to be exposed to and deal with questions that demand a better appreciation of other disciplines.

19. Industrial enterprises also have to evolve a human resource development policy of their own, complementary to national policy, but corresponding to their own needs, including a comprehensive training strategy with corresponding mechanisms. Manpower plans are one obligatory element of corporate plans which in turn should be a part of national plans.

20. There is a clear need, therefore, for the adoption on a country, sectoral and enterprise basis of a consciously prepared training strategy with a clear definition of the objectives of training and its relationship to improved performance. However, it is not only the implementation of training itself that deserves utmost attention, but also the whole training cycle as a part of human resource development strategy.

The financing of training for industry

21. Since the First Consultation on the Training of Industrial Manpower did not make significant progress on the issue of the financing of co-operation in the field of training for industry,[1/] the following questions were examined by the High-level Expert Group on Training[2/] so as to facilitate decisions on the subject of industrial training and the development of human resources for industry at UNIDO IV:

(a) To what extent can financial institutions consider the costs of preliminary and exploratory studies incurred by exporting enterprises (and particularly small and medium-sized ones) to be an integral part of the budget of any industrial project?

1/ ID/WG.381/1, paras.74-77; ID/WG.381/2, paras.224-294.

2/ High-level Expert Group Meetings Preparatory to the Fourth General Conference of UNIDO: Accelerated Development of Human Resources for Industrial Development, report, ID/WG.394/8, paras.69-80.

(b) To what extent is it possible for financial institutions to consider investment in industrial training as an investment in social infrastructure, thereby making it eligible for financing on conditions similar to those applied to investments in physical infrastructure?

(c) To what extent can increased use be made of mixed credits (concessional and non-concessional sources of finance) to cover the training component of an industrial project? 1/

22. The outcome of this examination was that the Meeting recommended:

(a) The question related to the provision of funds for training as an essential part of the capital cost of a project should be submitted to UNIDO IV for further consideration;

(b) Steps should be taken by UNIDO and other international organizations to introduce programmes to strengthen the capabilities in public and private sectors in developing countries to master the mechanics of financing of industrial projects and of borrowing in international markets;

(c) Mixed credits (concessional and non-concessional sources of finance) should be used where it is beneficial for training to be undertaken beyond the needs of an individual enterprise or contract.

Technical assistance provided by UNIDO

23. Many developing countries will bear the domestic and foreign exchange costs of industrial training out of their own revenues. But many others require loans as indicated above. UNIDO has a severely limited budget, provided by both developed and developing countries, and this discussion would be incomplete without due attention to the use of these resources. Finance for UNIDO's assistance in the area of training is provided by UNDP, the regular programme and UNIDF. At UNIDO in 1982, some 70 per cent of the $6.7 million technical assistance implemented in training were from non-UNDP resources, i.e. primarily voluntary contributions. Of the 214 technical assistance "projects", 184 were of value less than $150,000.

1/ ID/WG.381/1, paras. 75, 76, 77.

UNIDO assistance financed by the United Nations Development Programme (UNDP)

24. The major source of finance available to UNIDO is that provided by UNDP, especially as it becomes available in the various country programmes. This source of finance accounts for 80 per cent of all financial sources available to UNIDO in the programming of technical assistance. Any projections for the next 20 years are apt to be somewhat theoretical and uncertain, especially since recent trends on multilateral financial assistance have been far from positive. The original assumption of the UNDP Governing Council that there would be an annual increase of 14 per cent in the resources available during the third cycle which commenced on 1 January 1982 has been falsified by events. Instead of an increase in resources, there has been a decline not only in real terms but in nominal terms.

25. Allocations to the different sectors in the country programming process are, in the final analysis, made by developing country governments concerned. UNIDO has been trying to do its best in making preparations for these exercises. It is a matter of no little satisfaction that the share of resources allocated to UNIDO has grown from $199.5 million in the second cycle to $376.8 million in the third cycle. In Africa it has increased from $45.0 million to $95.5 million. Technical co-operation expenditures under the heading "training" amounted to $6.7 million in 1982. The share of Africa was 21 per cent of this amount. Some 30 per cent of the total assistance in training were financed from UNDP resources.

UNIDO assistance financed under the regular programme of technical co-operation

26. We have been getting a biennial allocation of $6.5 million. There has been hardly an increase in nominal terms and, indeed, there has been a decline in real terms. A sum of $2.2 million is assigned to training programmes. These take place in the form of fellowships, group training programmes and projects initiated to strengthen the existing training capabilities of developing countries. Thus, a very considerable share of funds available under this source of finance is assigned to training programmes. These training programmes include those financed from the non-convertible portion of the regular programme and take place as in-plant group training programmes.

UNIDO assistance financed under the United Nations Industrial Development Fund (UNIDF)

27. Training is one of the nine priority areas approved by the Industrial Development Board and the General Assembly. An allocation of 10 per cent had been made for this priority area. However, it is noteworthy that some 28 per cent of all UNIDF funds have gone into training. It may, however, be noted that UNIDF is largely not susceptible to flexible programming. The only flexible and versatile component of this source of finance is the General Convertible Pool which accounts for some $2.8 million out of a total sum of about $12.6 million pledged for 1982.

28. The other types of pledges preclude programming of resources exactly as the UNIDO secretariat may desire. About $7.5 million are donated in the form of Special Purpose Funds which require project-by-project approval. One redeeming feature of this source of finance is, however, that it comes in the form of convertible currency, but the rest of the money comes in the form of non-convertible contributions to be spent, for the most part, on in-plant group training programmes organized largely in donor countries. Thus, while training receives an important portion of these resources, the secretariat does not provide the lead with respect to the particular training modality, but is itself led by the wishes of the donor countries.

29. Even if there is no specific component of training explicitly included, training exists in an implicit form in every project, since it is expected that the national counterparts would have been trained to a degree where external assistance is no longer required by the time it is completed. Thus, training is a pervasive principle in all technical assistance activities in which UNIDO is engaged.