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have frequently been utilized to carry out these studies on large-scale projects which are also of substantial attraction to external investors. However, the foreign experts for undertaking feasibility studies on small- and medium-scale projects, which together make up the bulk of development programmes and which often have some connexions with major projects, are both difficult and expensive to secure, while indigenous experts of comparable experience and capability may be unavailable. This deficiency is more acutely felt in the private sector where small- and medium-scale enterprises predominate. In both public and private sectors, however, the successful implementation of planned projects and the efficient management of enterprises are crucial to the realization of national economic goals.

7. With the immense development tasks now in hand, Africa cannot indefinitely rely upon an increasing inflow of foreign experts to prepare, implement and evaluate its large- and small-scale development plans, programmes and projects. Furthermore, in recent years foreign-owned enterprises in Africa have been finding it increasingly difficult to recruit, pay and retain high-level scientists, technologists and managers from abroad. To break even, they are increasingly looking for indigenous skilled personnel to implement their expanding development programmes. Unfortunately, existing local supply sources have not succeeded in fully meeting the growing demand for trained manpower, both in quality, type and quantity. To meet this shortage, it is therefore imperative that more and more Africans must be trained for higher technical and managerial responsibility.

8. The above exposé with its later elaboration in subsequent chapters, is not meant to give any false impression that increased savings and investment by Africans and increased foreign financial assistance to Africa are not of great importance in activating accelerated economic development in the region. The aim is simply to underscore a factor of growth which has not so far received sufficient and timely attention in African countries. In doing this, emphasis in the analysis will be placed on selected aspects of manpower problems in the industrial development of

African countries, indicating inadequacies in the supply and training of needed manpower and suggesting corrective measures for meeting shortages in manpower resources.

9. The central message which this paper attempts to make widely known is that rapid industrial development in Africa depends substantially on the rate, extent and quality of scientific and technological training and research and the effectiveness with which their results are translated into higher productivity of African workers and entrepreneurs.

CHAPTER II

MANPOWER REQUIREMENTS FOR INDUSTRIAL DEVELOPMENT

(a) Definitions

10. In the context of this paper manpower requirements relates to the minimum quantitative and qualitative requirements of technical and managerial personnel of the intermediate and higher levels, trained in modern skills essential for sustained industrial growth. Training is taken to mean "all forms of preparation for employment within the framework of industrialization and includes, among other things, technical education, vocational training and management training".^{1/} Technical personnel, in its business usage, means technical professionals and skilled workers trained in a specific scientific or other professional field at a university, technical institute or similar establishment, thus covering skilled workers, foremen, engineers and top management.^{2/} Managerial personnel means persons with responsibility for "making decisions and supervising their implementation".^{3/} Industrial development or industrialization is defined in the limited sense of meaning the manufacturing of producer and consumer goods, including mining and the services supporting these activities.^{4/}

(b) Magnitude of Industrial Manpower Requirements

11. The determination of the number of trained technical and managerial personnel for industrial development in the African region as a whole, by levels, skills and quality, is confronted by such basic difficulties as the virtual absence of manpower data, that it is unrealistic to make regional estimates of existing stock and future needs of trained personnel. So far, barely a third of independent African countries are known

^{1/} United Nations document E/3901, Training of National Technical Personnel for Accelerated Industrialization of Developing Countries, p.5

^{2/} Ibid, E/3901/Add.2, p.145; see paragraph 28 below for a breakdown of this group.

^{3/} Ibid, E/3901/Add.2, p.146.

^{4/} This narrow definition which is meant to delimitate the scope of this paper, thus excludes transport, energy and a number of other activities as falling within the usual concept of "industrialization".

to have undertaken any manpower studies and/or assessment of trained manpower requirements by occupational skills and main demand sectors. In the national planning activities of most countries, manpower planning in relation to assessed over-all needs for rapid economic growth is only a recent activity with the result that administrative machinery for manpower planning and the co-ordinated administration of training is largely at the formative stages in a number of countries.

12. Industrial development in Africa is not only concerned with the technological modernization of traditional craft industries but also with the more important task of introducing a whole range of modern industrial complexes and production methods into communities that until recent years had not experienced the use of motive power and scientific production gadgets. This is because industry has been a limited contributor to the national income of African countries. Around 1960 for example, the contribution of industrial output to national income in the African region, excluding the Republic of South Africa, was only 14 per cent, in contrast to 40-50 per cent of a much higher level of national income in the industrial countries.^{1/}

13. The under-development of industrial activities in the region has further accentuated the difficulties of making fairly reasonable estimates of manpower requirements for industrialization. Thus industrial manpower is only recently being built up by humble beginnings and industrial personnel lack technological experience and industrial tradition. In most countries industrial manpower data are often not readily available and there is no sufficient basis and materials for making projections of future manpower needs. National educational systems are still largely endeavouring to appraise industrial requirements for trained skills and to adjust slowly their educational and training efforts to meet assessed needs. Furthermore, industrial activities in the region are not yet

^{1/} Industrial Growth in Africa, United Nations, New York, 1963, Sales No: 63.II.A.3, p.8 and Table 5.

self-generating, but are rather largely the product of political decisions at home and of investment decisions abroad. In such a situation, forecasting industrial activities and manpower requirements for more than a few years ahead is fraught with the hazards of unrealistic prescriptions for ameliorating economic ailments.

14. However, Africa cannot wait to have the full data and other prerequisites for making fairly accurate manpower estimates before taking necessary action to reduce, and eventually to eliminate manpower bottlenecks in its industrialization pursuit. Rather, use is to be made of whatever data and tools are available, however inadequate they may seem, in working out the ways and means of meeting manpower requirements, and in the process of development, improve on available tools, augment data, readjust strategies and re-orientate the objective and content of educational and training programmes.

15. Some preliminary assessments of the manpower requirements for implementing major industrial projects in a number of African countries and sub-regions have been made. These estimates will have to be re-appraised as more data and feasibility studies on known and new projects come to hand. But realistic industrialization that will ensure self-sustaining growth is one which activates both large, medium and small-scale industrial enterprises. It is in this regard that estimates of manpower requirements have to be painstakingly determined and re-evaluated. It is simply a false strategy of development to assume that medium and small-scale enterprises need no sufficiently trained technical and managerial personnel to grow to their fullest capacity.

16. Table 1 shows the estimated additional manpower requirements of industrial projects in the East African sub-region for the next decade. These estimates which call for a new demand of some 25,000 managerial and clerical personnel, 10,000 senior technicians, 24,000 junior technicians and 402,000 skilled and semi-skilled workers, do not as yet include estimates for a few more projects such as printing and new projects not at present envisaged, nor for industrial research.

TABLE 1

New Industrial Employment, 1964-1975, East African Sub-Region

ISIC	Branch	Employment							Total	Remarks
		Manager- ial and clerical staff	Senior Techni- cians	Junior Techni- cians	Skilled workers	Semi- skilled workers	Un- skilled workers	Total		
10	mining and quarrying	1,180	650	1,300	15,800	4,700	2,700	26,330		
20	Food manufacturing	2,400	1,000	1,400	9,200	50,000	61,200	125,200		
21	Beverages	340	80	230	1,200	5,330	800	7,980		
22	Tobacco manufacturing	130	30	50	210	2,230	250	2,900		
23	Textile manufacturing	3,200	1,050	3,200	10,700	78,600	10,700	107,450		
24	Footwear & clothing	1,700	60	1,800	8,000	42,600	3,400	57,500		
25/6	Food, furniture, etc.	1,600	320	1,900	10,900	15,500	2,000	32,220		
27	Pulp and paper printing, etc.	1,500	640	1,700	11,100	4,300	2,100	21,340		
28	Leather industry	230	80	300	4,500	1,600	800	7,510		
29	Rubber manufacturing	220	110	200	800	3,900	300	5,530		
30	Chemical industry	1,000	1,050	2,900	6,400	15,100	2,700	29,950		
31	Petroleum products	420	200	1,060	2,600	2,100	700	7,080		
32	Non-metallic industry	1,180	50	930	6,400	23,000	3,700	35,260		
33	Iron and steel	3,700	590	700	3,600	760	1,200	10,550		
341	Non-ferrous metals	2,500	2,000	3,700	16,700	12,500	4,200	41,600		
35	Metal products	650	320	350	4,300	3,200	1,100	9,920		
36	Mechanical engineering	600	520	620	5,200	1,000	700	8,600		
37	Electrical engineering	640	530	530	5,900	1,800	1,300	10,700		
38	Transport equipment	1,020	340	680	3,400	4,600	1,400	11,440		
39	Miscellaneous	100	50	150	1,000	1,000	300	2,600		
	Total	25,110	9,670	23,700	127,910	273,820	101,550	561,760		

includes sawmilling & associated forest operations

includes sugar cane plantation workers (64,000)

data not available

includes ore mining and processing

Source: Industrial co-ordination in East Africa, A Quantified Approach to First Approximations, UNBDA documents E/CN.14/IVN/102, Table V-1, page III.

17. Estimates of the requirements for the other sub-regions are yet to be made for lack of basic information and data. However, giving due consideration to relative population and market sizes and the tempo of industrial development in the various countries of these sub-regions, it is probable that requirements for industrial personnel in the West African Sub-region will be of fairly the same magnitude as in the East African Sub-region while that for the North African Sub-region will be substantially more.

18. Regional aggregates of additional requirements of engineers, scientists and technicians by 1975 for all African countries, excluding the Republic of South Africa, are shown in Table 2. A net addition of some 20,000 engineers and scientists and 69,000 technicians are forecast to be required for the period 1960-75 in order to meet industrial production targets, while at the same time some further 11,000 engineers and scientists and 4,000 technicians would be needed for replacement due to normal wastage and for Africanization. This means that for the period surveyed some additional 31,000 engineers and scientists and 73,000 technicians must be trained and recruited from among African students.^{1/}

19. A comparison of Table 1 and 2 will reveal obvious disproportions between the relative requirements of the East African Sub-region and the African region as a whole. However, the estimates in Table 2 showed projected requirements for the period 1960-75 which of necessity took into consideration a narrower horizon of industrial possibilities at the time the estimates were made than are currently anticipated or planned for the decade 1965-75. The inevitable conclusion on the data of Table 2 is that

^{1/} These estimates are derived from United Nations document E/3901/Add.1, pp. 23-31.

the estimates are obviously low and do not fully reflect the current potentials of African educational programmes to supply industrial personnel.^{1/} The data in Table 1 on the other hand, are derived from recent input-output estimates of projected mining and industrial activities in the East African sub-region.^{2/} allowing for an ample margin of overestimates, fairly reasonable working estimates for the Sub-region at high and low rates of new demand for industrial personnel have been made in Annex I on the basis of a number of assumptions, including allowance for replacement and Africanization of existing stock.

20. In order to obtain rough estimates of regional aggregates, data for the East African Sub-region have been interpolated rather cautiously for the other sub-regions. The result of this preliminary exercise is shown in Table 3. It has thus been estimated that Africa, excluding the Republic of South Africa, would for the next decade have to train about 29,000 management and supervisory personnel, 52,000 scientists, engineers and technologists, 112,000 technicians and foremen and 1,722,000 skilled and semi-skilled workers in order to successfully implement its industrial development programmes.

21. It is necessary to add a note of warning in interpreting the various manpower estimates contained in the above analysis. It should be clearly understood that the estimates shown in Tables 1, 2 and 3 are meant primarily to indicate rough orders of magnitude of what is required for future industrialization effort in the region. The figures given are not precise and the coverage in the industrial sector is by no means complete. The estimates have been made under a number of hypothetical assumptions which are subject to further review. At best, the estimates reflect what is required to maintain an average rate of growth in industrial employment. Little is so far known of a number of factors that may influence the course and pattern of future industrial growth in the region.

^{1/} See Annex II

^{2/} Industrial Co-ordination in East Africa. A quantified Approach to First Approximations. op.cit. Supplementary Table I, Table A, Chapter II.

TABLE 2

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Estimated Number of Technical Personnel Required
for Industrial Employment in Africa by 1975^a
(in thousands)

Grade	Total stock in 1960	Estimated total Requirements by 1975	Net Addition to stock	Replacement and Africanization of existing stock	Additional Number to be trained by 1975
Engineers and Scientists	13	33	20	11	31
Technicians	14 ^b	83	69	4	73

Source: Training of National Technical Personnel for Accelerated Industrialization of Developing Countries, United Nations document E/3901/Add.1, Tables 1.3 to 1.5, pp. 26-29.

- Notes:
- a/ Estimates based on an assumed cumulative growth rate of 3.1% in industrial employment for the period 1960-75. Data refer to all African countries, excluding the Republic of South Africa.
 - b/ Excluding expatriate technicians.

TABLE 3

Estimated Requirements of Trained Manpower for Industrial Development in Africa, 1965-75
(in thousands)

Sub-Region	Assumed Relative Demand ^{2/}	Management and Supervision				Scientists, Engineers & Technologists				Technicians and Foremen				Skilled and Semi-Skilled workers			
		Net Addition to Stock	Replacement of Existing Stock at 5% p.a.	Total to be Trained by 1975	Net Addition to Stock	Replacement of Existing Stock at 5% p.a.	Total to be Trained by 1975	Net Addition to Stock	Replacement of Existing Stock at 3% p.a.	Total to be Trained by 1975	Net Addition to Stock	Replacement of Existing Stock at 2% p.a.	Total to be Trained				
North Africa	7	7.7	3.5	11.2	13.8	6.3	20.1	33.0	10.5	43.5	545.4	124.3	669.7				
West Africa	5	5.5	2.5	8.0	9.5	4.5	14.4	23.6	7.5	31.1	389.6	88.8	478.4				
Central Africa	2	2.2	1.0	3.2	3.9	1.8	5.7	9.4	3.0	12.4	155.8	35.5	191.3				
East Africa	4	4.4	2.0	6.4	7.9	3.6	11.5	18.9	6.0	24.9	311.7	71.0	382.7				
Regional Total ^{1/}		19.8	9.0	28.8	35.5	16.2	51.7	84.9	27.0	111.9	1402.5	319.6	1722.1				

Source: Proportional to the estimates shown in Annex I.

Note: The above data are based on low estimates of demand, which is 80% of a high level of manpower requirements.

^{1/} Excluding the Republic of South Africa

^{2/} Relative ratios of projected GDP for 1965 with some adjustments downward for North and West Africa.

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SOME ASPECTS OF
MANPOWER REQUIREMENTS AND THE TRAINING OF
TECHNICAL AND MANAGERIAL PERSONNEL FOR INDUSTRIAL DEVELOPMENT

(prepared by the secretariat)

22. Our estimates therefore serve primarily as a rough guide for the re-evaluation of African training policies and strategy in planning educational and training programmes for the fulfillment of industrial programmes. The estimates are, however, significant in that they show the tremendous task involved in training and recruiting the large number of industrial technical personnel required.

23. Aggregates of manpower requirements are of limited usefulness in planning training programmes, particularly in formulating the object and content of training courses. It is absolutely necessary that the occupational skills making up such aggregates should be known as fairly accurately as data and information permit, by type, quality and level. Unfortunately, owing to inadequacies in essential data and information, it has not been possible to make our estimates give break-down figures on requirements in specific individual occupations and related groups of specialisations commonly in demand in industrial enterprises.

(c) Assessing Manpower Requirements

24. The various limitations already noted in any attempt to make fairly accurate manpower estimates for the African region emphasize the need to establish the necessary basis for industrial manpower assessment and for the formulation of training programmes designed to meet assessed needs. This need involves the larger question of manpower planning as an integral part of national over-all development planning. To be able to make realistic and purposeful manpower estimates, it is desirable to have:

- (i) comprehensive, periodically phased national development plans;
- (ii) a set of economic priorities and development strategies;
- (iii) a central machinery for manpower planning and the co-ordinated administration of training;
- (iv) manpower surveys showing the current supply and demand of labour by skills, occupational categories and economic sectors;

1/ Manpower and Training: National Machinery for Manpower Planning and Administration of Training, UNECA document E/CN.14/WP.6/1, pp.7-8.

- (v) studies of development trends in the economy and their impact on the manpower situation;
- (vi) data on population growth and structure; labour force and its distribution; employment and unemployment; wage trends; trends in the development of educational and training facilities; productivity by economic sector; growth rates in national economy; and on comparative developments in other countries, etc.

25. In assessing manpower requirements for industrial development there must be sufficient data and information providing a basis for determining existing stock and future requirements of trained personnel by occupational skills and levels. Both the quantity and quality of personnel in demand are important; the timing of demand and the relation of industrial demand to the supply capacity of existing and anticipated educational institutions are equally important. While it is necessary to achieve a manpower balance in supply and demand for all branches of the industrial sector, it is equally necessary to achieve an over-all balance in manpower demand between the industrial and other economic sectors.

26. To achieve a balance in the supply and demand for industrial personnel and to determine the short-fall or surplus of assessed future manpower requirements, as a basis for formulating training programmes, existing educational and training facilities have to be appraised for their capacity to meet the quantity, quality and type of industrial personnel, relating the time schedule for the output of educational and training institutions with that of manpower placement in industry.

CHAPTER III

TRAINING REQUIREMENTS

(a) Scheme of Occupational Requirements

27. Training facilities for industrial personnel are needed not only to produce new and specialized skills required for industrial expansion, to take advantage of new technologies, to replace normal wastage in existing stock, to raise the proportion of trained personnel in total industrial employment in order to achieve higher productivity, but also to introduce personnel to new production and management techniques. Training requirements, in terms of substance, aim and duration, vary according to occupational skills, level of cadres and the training requirements of specific jobs.

28. Within the broad groups of technical workers and managers with which this paper is concerned, there are some essential requirements in skills and training common to given cadres. These requirements are schematically shown below as follows:

Skill and Training Requirements of Industrial Personnel^{1/}

<u>Cadre</u>	<u>Type of Skill</u>	<u>Training Requirements</u>
A.i) Administrative, Executive and Managerial Personnel	Non-specialized, but preference is for skill in business administration	Sufficiently trained in general education at higher levels with special interest in management training; adaptive training within industry; training in production process and in labour relations
ii) Commercial Personnel	Commercial specialists; Business Economists; Accountants and Book-keepers; Cost Accountants; Chartered Secretaries; etc.	Training in economics, business methods, accounting, marketing, inventory, costing, etc.; adaptive training within industry.

^{1/} Adapted from UN/FAO, Pulp and Paper Prospects in Asia and the Far East Vol. II, Bangkok, 1962, pp.241-245.

<u>Grade</u>	<u>Type of Skill</u>	<u>Training Requirements</u>
B. Technical Personnel ^{1/} (Manufacturing)	i) Engineers and Scientists	Require advanced technical, scientific and engineering knowledge of the main branches of given industry; knowledge of managerial and supervisory techniques with capacity for leadership; adaptive training within industry.
	ii) Technicians, Supervisors and Foremen	Sound technical knowledge and operational skills that are largely machine-centred; detailed knowledge of work process and procedures; some knowledge of managerial and supervisory techniques with ability to train subordinates and deal with day to day labour problems.
	iii) Skilled Workers	Thorough trade or occupational knowledge and skill in general operating methods in industry as well as skills in production and machine maintenance methods.
C. Research Personnel	i) Chemists and Chemical Engineers	Knowledge of theoretical and applied scientific and technical techniques in industrial processes of a given industry, particularly as relevant to the conversion of raw materials into finished products.

^{1/} On standard classification basis, technical workers, strictly technicians and engineers as professionals, both fall within Major Group O of the ILO International Standard Classification of Occupations. On the other hand, craftsmen and production process workers, as skilled workers are classified as such under Major Group 7/8. But in business parlance, technical personnel is commonly stretched to embrace both technical professionals and technical skilled workers, with both groups of workers possessing in varying degrees some specified training in a specific scientific or other professional field at a university, technical institute or similar establishment and which require creative ability. See para 10 above; also International Standard Classification of Occupations, International Labour Office, Geneva 1958, pp. 27, 93.

<u>Cadre</u>	<u>Type of Skill</u>	<u>Training Requirements</u>
C. Research (Cont'd.) Personnel	ii) Technicians	Knowledge of the physical and chemical properties of raw materials and of laboratory methods
	iii) Workers	Non-specialized training; basic education essential for efficient execution of manual tasks.

(b) Technical Education and Training

29. From the essential skill and training requirements of different cadres of industrial personnel shown in the scheme of occupational requirements in the preceding section, it is clear that the fundamental objectives of technical education and training for industrial technical workers are:^{1/}

- (i) the acquisition of scientific and technological knowledge required for understanding the principles underlying the construction and functioning of machines and instruments;
- (ii) the acquisition and development of manipulative and practical skills;
- (iii) the adaptation of trainees' attitudes and skills to conditions of work in industry; and
- (iv) adaptation to standards of industrial output, with regard to speed and quality of production.

30. The degree of application of the above objectives will naturally vary according to the specific requirements of given cadres of technical personnel and to circumstances governing the acquisition of needed training in both formal educational institutions and within industry at home and/or

^{1/} United Nations Document E/3901, op. cit., pp. 11-12.

abroad. Training at various levels is commonly received in technical and vocational schools, higher technical institutes and in centres for further technical training. According to need, training courses may be "sandwiched" with work experience or specifically accelerated and "tailored" to need in order to acquire training in particular vital fields. These training opportunities are in varying stages of development in African countries but facilities are generally weakest and limited for the acquisition of higher technical knowledge and for experience in industrial production processes.

31. Notwithstanding the limited facilities for the acquisition of technical knowledge and industrial experience, preliminary studies by ECA reveal that not enough full utilization is being made of available facilities both on national and regional levels. This under-use of scarce training facilities stems from a number of causes. Firstly, technical education, due to historical factors, has not succeeded in attracting sufficient numbers of trainable youths largely as a result of discriminatory conditions of work and remuneration as well as of low social prestige accorded to technical skills. Secondly, lack of technical teachers and instructors for expanding training programmes. Thirdly, the relatively higher expense for providing technical education facilities. Fourthly, the paucity of substantial modern industrial enterprises offering opportunity for on-the-job experience. Fifthly, the want of systematic development and co-ordination at national level of the apprenticeship and training activities of private industrialists. Lastly, the language barrier and other difficulties which prevent greater intra-African co-operation in the development and utilization of technical education and training at post-primary school level.

32. These problems which have so far handicapped the effective development of technical education and training to meet industrial requirements have been further accentuated by the failure in many African countries to take necessary action in:

- (i) evolving adequate national machinery for assessing national needs of technical manpower in a period of rapid structural changes in their economies;

- (ii) re-designing technical education syllabi in terms of assessed manpower needs;
- (iii) making technical education and training programmes reflect the spectrum of experiences of a wide range of advanced and developing countries and avoiding excessive biases towards the traditional aspects of those of the former metropolitan countries;
- (iv) training sufficient numbers of indigenous technical education teachers and instructors; and
- (v) integrating government and private technical training programmes in order to ensure uniform standards, co-operative responsibility and harmony in training objectives, through a system of inspection, approval of syllabi and financial support for private training activities.

33. At the secondary school level technical and vocational education in African countries suffers also from the more common problems of student enrolment failing to reflect adequately manpower demands and apparent shortages; excessive school drop-outs during training; divorce of formal training from conditions of work in industry; inadequate equipment; inadequately qualified technical teachers; and the lack of vocational guidance enabling students to pursue such vocations as best suited their aptitude. These problems can only be eliminated when technical education is properly provided with the resources, curricula orientation and emphasis that will enable it to play its allotted task as the principal provider of technical personnel for industry.

34. Industry itself provides an alternative and complementary area for the acquisition of technical education and experience through apprenticeship, on-the-job training and workshops or industrial schools for workers. In the private sector, a substantial amount of training is offered to indigenous persons to learn particular vocations as are necessary for the progress of an enterprise. However, the full potentials for training technical personnel by industry itself have not been developed. In most African countries,

apprenticeship systems are not co-ordinated and standardized at national levels. While the large establishments, generally either state-owned or expatriate-owned, are able to evolve in-plant and in-service training schemes for their workers, the majority of indigenous small-and medium-scale employers hardly organize sustained training schemes to up-grade the productive capacity of their workers.

35. Where self-help schemes in providing training for workers operate, it is more often than not on an individual rather than on a co-operative basis. In this regard, African industrialists have not yet been able to borrow a leaf from the experience of co-operative self-help effort for developing adequate numbers of technical personnel in other developing regions.

36. In Latin America for example, the urgent need to accelerate the training of workers to provide the trained manpower required for rapid economic development led to the emergence of a new system of apprenticeship and the establishment in several countries of specialized services, mainly through industrial self-help, for its application. In Brazil, this service was first established in 1942 by an organization of industrialists, the National Service of Industrial Apprenticeship (SENAI). Later a counterpart organization for commercial training, the SENAC, was evolved. In some other Latin American countries similar services, co-operatively supported by industrialists and assisted by Government, have been developed for apprenticeship and in-service training for thousands of industrial technical personnel.^{1/}

37. These Latin American self-help services for industry indicate some basic principles which should guide industrialists in Africa in organizing and developing private training programmes. Firstly, the need to establish systematic training facilities for young persons who combine in the training process the advantages of school career with those of future work atmosphere,

^{1/} These are CONET in Argentina, SENA in Columbia, INCE (The National Institute of Educational Co-operation) in Venezuela and SENATI in Peru. See United Nations document E/3901/Add.2, op.cit. pp.124-128.

alternated in "sandwich" courses. Secondly, an obligation on employers to employ as paid apprentices a certain number of young persons whose training is related to the demand for their services and whose future employment is assured. Thirdly, the co-operation between the State and employers in the training of industrial workers. Fourthly, the evolution of systematized and standardized national apprenticeship services. Fifthly, the advantages of joint effort in such co-operative organizations assisting industry to survey its technical manpower requirements and tailor training programmes to current needs.

38. There is therefore within in-plant training in industry a large unexplored potential for developing industry's own training schemes for producing and up-grading the quality of technical personnel and supervisors in African countries. In addition to utilizing such self-help training schemes, machinery could also be developed co-operatively for promoting the participation of future African high-level technological and scientific personnel in programmes of industrial technical experience such as are organized by such international organizations as IAESTE and AIESEC.^{1/}

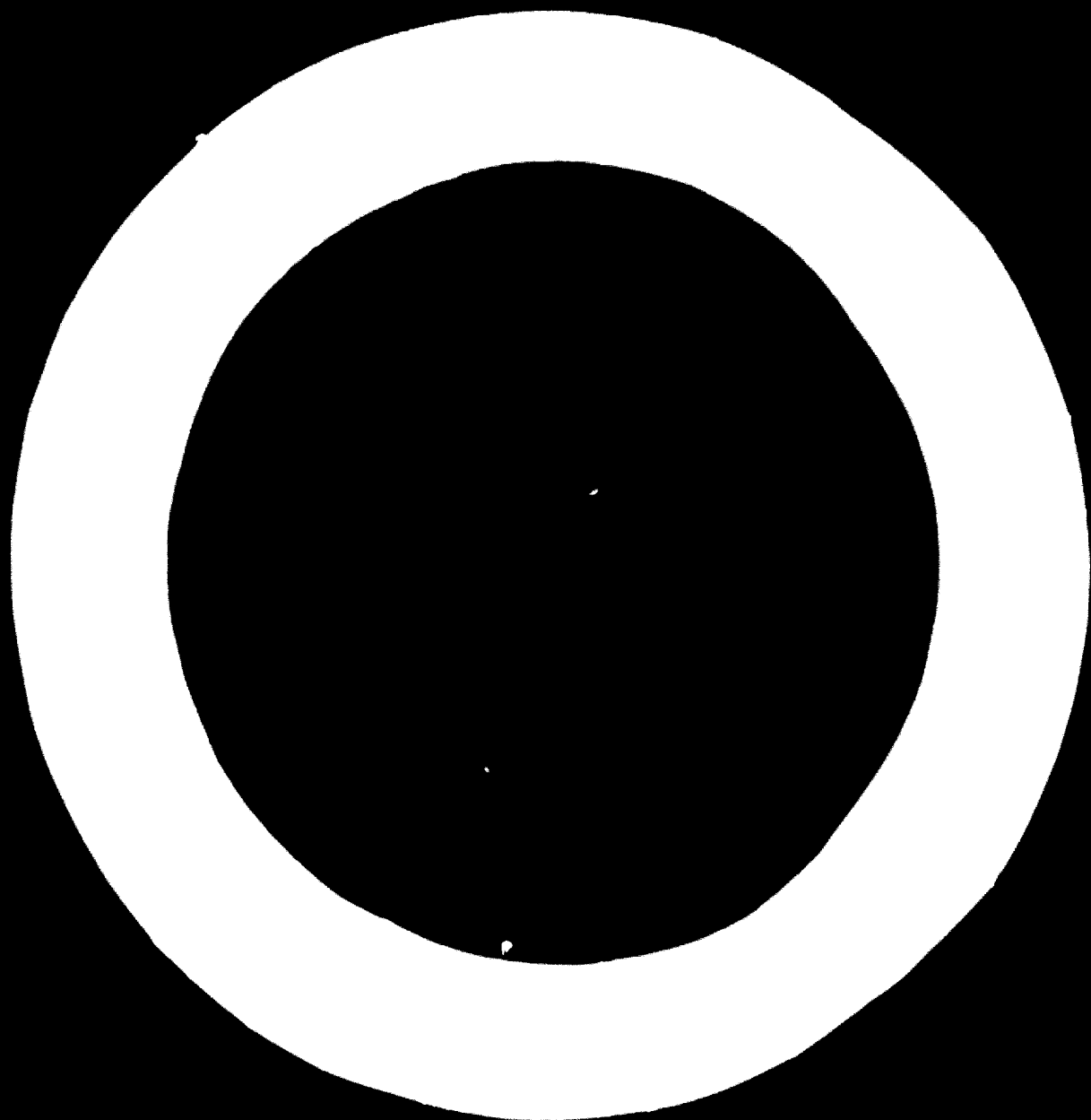
(c) Management Training

39. The training of industrial executives is essential for the attainment of self-generating economy. In addressing trainees at the Agra Advanced Management Programme in December 1964, Shri T.N. Singh, Union Minister of Industry and Heavy Engineering, India, emphasized the fact that trained managerial personnel was an essential factor in efficient resource mobilization and use; and that though technical manpower shortages could be solved by hiring them or training them at home or abroad, it was much more difficult with managerial shortages. "The problem of equipping managers with proper managerial skills could be solved only if more management training programmes were organized".^{2/}

^{1/} See also paragraph 71 below.

^{2/} National Productivity Council, India, Information, Vol. 2 No.12, December 1964, pp. 1, 6.

40. In most African countries, indigenous technologists having little or no formal training in modern management techniques, are frequently being appointed to take charge of multi-million dollar public enterprises. The consequences for national economic growth of inefficiently managed public utilities and enterprises producing critical products in wasting resources and slowing down the pace of economic modernization are obvious. But the old-fashioned notions die hard that a little training in one or two elementary management techniques would do for "backward" Africa.
41. Today there are large and expanding national public utility and industrial complexes, frequently with producing units scattered over a wide area and requiring the most efficient forms of programming of production stores management, expenditure controls, price determination and accounting. In some cases these public undertakings have far-reaching impact on the rest of the economy with the result that it is no longer safe to leave the management of these enterprises and public utilities in the hands of technologists or accountants unfamiliar with modern management methods. In the private sector, adequate stock of trained management personnel is equally essential to ensure higher productivity.
42. Three stages in the education and training of managers for industrialization may be distinguished, namely: pre-service education; post-education job experience; and managerial experience and further training. Education and training or re-training are therefore necessary all through the career of managerial personnel. What must be borne in mind is that the development of managers is a continuing process in order to foster innovation and renewal of ideas.
43. Looking at the management situation in industries and the relatively low proportion of local personnel in top management, it cannot be said that management education and training has been accorded the important place it deserves in national manpower development. Neither the substance of the training requirements of management personnel nor the timing of the supply and/or "Africanization" of trained management personnel has been fully appreciated in most countries.



44. In terms of substance, training is needed in many fields of modern business management, particularly in such fields as project planning, evaluation and management, financial management; personnel management, small business promotion and management; management of public enterprises; production and quality control; economics of innovation; materials management; inventory control; costing, etc.

45. According to the level of training, opportunity should be available for managers of the same or allied industrial undertakings to meet to discuss common problems, exchange ideas and develop mutual understanding. Orientation courses are particularly desirable for the renewal and rebirth of ideas and for acquaintance with the latest developments in the application of management techniques.

46. Periodic technical orientation of managers in both private and public sectors is a necessity for industrial growth. Almost all management decisions involve technical considerations. Effective use of existing technology depends on the appreciation of its role in industrial development. It is therefore not enough for managers to have adequate numbers of technical staff to resolve technical problems; they themselves should be fully informed on all technical matters, thereby becoming more capable of judging the recommendations of technical experts and better able to draw on the technological experience of advanced economies. Technical orientation courses are therefore useful in facilitating an understanding and profitable adoption of technological innovations from abroad.

47. There is thus a strong case not only for improving and broadening the substance and objective of management education and training but also for the widespread introduction of curricula which provide for a combination of education in technology and business management. In promoting this objective it would be necessary for African countries to develop efficient national, sub-regional and/or regional management institutes that have separate or corporate existence with universities, institutes of public administration or similar institutions with which there should be effective co-operation in developing management education. ✓

✓ This is further elaborated upon in paragraphs 61-64 below.

48. The proper timing of training is of particular importance under the present situation where the rate of growth in the number of large enterprises seems to be outpacing the rate of increase in the available stock of experienced top management personnel. Furthermore, the present trend in management practice is for an ever increasing application of scientific data processed by computers and for managers to be innovation and technology minded. Time is needed to produce men and women of such calibre. To produce the kind of Africans to run and develop successfully the type of industrial products and services demanded in modern competitive markets will take some 10 to 15 years after university education.
49. It has been estimated that it takes some 5 to 7 years from conception to bring a hydroelectric power plant of average size on stream. Most of the strategic industries envisaged for African sub-regional markets will take about the same gestation period. As these plants come on stream there must be available a substantial body of supervisors with experience in industrial factories overseas or elsewhere in Africa as well as efficiently trained technicians and skilled workers to run them. If African countries were to start from scratch to train men and women for managerial and technical grades it would mean producing managers in another ten years (four at university and six for industrial experience to gain maturity) and technologists in at least 8-9 years (four in a technological college and 4-5 years for industrial experience) assuming an adequate supply of trainable secondary school graduates.
50. Thus for strategic industrial projects due to come on stream by 1975, steps must be taken immediately to launch a massive assault on their manpower and training needs. The needed managers (and technologists) will not reach the desired maturity unless their post-graduate development is deliberately planned and properly timed. It has to be borne in mind that with managers the real learning process begins on the job after theoretical education. For trainees with exceptional managerial aptitude, it will take an absolute minimum of some five years of on-the-job training at assistant manager level before aspiring to higher managerial responsibility.

51. As regards who to train, it is generally accepted that management personnel at all levels and in all production and services sectors should be given appropriate training and an opportunity to rediscover and appraise new management ideas. It is, however, not often appreciated the necessity to provide management training for the higher echelons of the Civil Services of African countries. This training is necessary because African governments are obliged in their economic leadership role to take a much more direct responsibility in the development process, including production and distribution activities, than is conventional in developed economies. The issue that arises from this involvement is the competence of government with its large staff lacking training in business management, to plan industrial programmes, design viable projects and to manage enterprises and public utilities efficiently.

52. The key requirement in this regard is not only the mobilization of competent manpower for public undertakings but also the introduction and acceptance of the notion that the higher civil service personnel forms part of the national managerial elite whose role has expanded and developed with the increase in the pace of economic change, the scope of the public sector and the keenness of the struggle for survival in a competitive world. This level of personnel must therefore acquire familiarity with modern business concepts, techniques and practices if the public sector enterprises are to give an effective entrepreneurial leadership, not only in demonstrating enterprise but also in extending enterprise to new areas in order to reduce the current over-concentration in agriculture, trade and distribution. While meeting part of the training requirements of this level of civil servants in existing institutes of public administration, advantage could also be taken of the facilities of the proposed national, sub-regional or regional management institutes mentioned earlier in providing them with training in modern business management techniques.

(d) Training Strategy

53. The above analysis on the training requirements of industrial technical and managerial personnel has somehow indicated what training strategy should be applied to the situation. This can be spelt out in a summary form to facilitate a recapitulation of what should be done:
- Firstly, the specialized training requirements of industrial, technical and managerial personnel should be recognized and adequate measures provided to meet assessed needs.
 - Secondly, the training of such personnel should be planned, with due regard to cadres, type of training requirements, duration of training time, timing of demand for the services of special skills and to period for industrial experience.
 - Thirdly, realistic industrial manpower planning must be based on fairly accurate assessment of existing stock of trained personnel and of future requirements according to the needs of planned development programmes. There must be adequate machinery for the needed assessment and planning of training programmes.
 - Fourthly, existing educational and training facilities, including training policies and strategy, must be re-evaluated with a view to ensuring their adequate orientation to the manpower needs for accelerated industrialization.
 - Fifthly, the training programmes of current and future industrial personnel should have a reasonable blend between business education and technology, and industrial experience or workshop environment should form a complementary part of the education of industrial managers and technical workers.
 - Sixthly, the immense potential for self-help services for the training of apprentices and supervisors for industries, sponsored by industrialists themselves, and where possible with reasonable assistance by government, should be fully explored and utilized.
 - Finally, international assistance should be mobilized and co-ordinated through intra-African co-operation in developing training facilities and programmes aimed at making good deficiencies in industrial management, technical and research personnel.

CHAPTER IV

INSTITUTIONAL FACILITIES FOR TRAINING

54. This chapter is concerned firstly, with indicating gaps and inadequacies in existing training policies and facilities for industrial personnel, particularly managers; and secondly, with the need for a sub-regional or regional approach to the development and utilization of training facilities.

(a) Existing facilities

55. A recent study on education for development in the East African sub-region revealed that at the secondary and post-secondary levels educational facilities in the sub-region were not adequately meeting the manpower requirements for accelerated economic growth.^{1/} A number of training courses essential for the production of specialised skills are either completely unavailable or underdeveloped. There is a marked attachment to conventional study courses with little or no awareness of the need to develop new courses in technological and business education fields. In the face of scarce resources, the fullest use is not often made of existing educational establishments and facilities to train a maximum number of trainable Africans, particularly in development skills in short supply. These features in the educational systems are not peculiar to the East African sub-region alone. Excepting a few educationally outstanding countries, the educational systems in most African countries are, by and large, inadequately geared to meet the needs of rapidly changing economic structures, and consequently they suffer from gaps and inadequacies.

^{1/} Trained manpower Requirements for Accelerated Economic Growth in the East African Sub-region. UNECA document E/CN.14/LJ/ECOP/9, Chapter IV.

56. Limitations on the provision of technical education in the region have been noted earlier in paragraph 33. Technical and managerial specialists are the products of post-secondary education and of industries. It is therefore necessary to take a summary look at the adequacy of higher educational institutions in Africa in meeting manpower requirements for industrialization.

57. A common limitation on the availability and utilisation of training facilities in higher educational institutions in the region is their relative physical and intellectual isolationism and aloofness, a factor which accentuates the conventionality of their training courses. Their efforts tend to be divorced from the development needs of the business world. This isolationist's attitude of universities is largely the heritage of 17th and 18th century philosophies of the design and functions of the "seats of learning". Such an attitude is now rapidly crumbling in those European countries where it used to be regarded with pride, and both universities and industries as well as the business world in general are increasingly intensifying contacts and influencing each other's thinking in development matters. In Africa, by contrast, a large measure of conventionality in study courses and isolationism in spreading influence still prevail. A large part of the yeast of development is thus kept from contact with the dough. What is still further distressing is that the governing councils and academic authorities of these African institutions are not acting in full consciousness of the frantic efforts now being made in countries of older universities to redesign and reform education to cope more appropriately with the needs of technological and economic change.

58. The prevailing pattern of subject and department structure and of student enrolment by field of study, as well as the lack of facilities for training in certain specialized professional and technical fields and the apparent under-use of faculty facilities in most African higher educational institutions obviously demonstrate the lack of sufficient orientation of their activities and facilities to the region's priority development needs.^{1/}

^{1/} Trained Manpower Requirements for Accelerated Economic Growth in the East African Sub-region, op. cit., Paras. 64-66, 74-87.

59. Management education for instance, is not offered in most African universities as a major specialized discipline. A number of universities offer training courses in commerce and economics but not in modern business management as a specialized science. Excluding higher commercial institutes there are currently less than a dozen post-secondary Colleges or Centres of Business Administration in the region.

60. In the research field, the activities of African universities have too little an emphasis on the applied research needs of industry and other development sectors. This is partly a product of their seeming isolation from the industrial world and partly of their attachment to basic research. More is still to be done to organize applied research at the initiative and/or assistance of universities for the adaptation of known technological and scientific innovations to solve African development problems. Furthermore, the size and composition of university research personnel does not so far convince any observer that African universities are fully aware of the immediate and long-run advantages of training African research scientists and technologists to meet industrial needs for such a cadre of technical personnel. In this connexion, it is of the utmost importance for African economic progress that local higher educational institutions should adhere to the objectives of higher education as elaborated by the Tananarive 1962 Conference on the Development of Higher Education in Africa and that African countries should strive to meet set targets for rapidly expanding their stock of scientific and research personnel as formulated in the Lagos "Outline Plan for Scientific Research and Training in Africa".^{1/}

(b) Sub-regional Institutes

61. The gaps and limitations in existing national institutions and the need for concerted self-help effort among African countries immediately suggest the establishment of some specialized, sub-regional or regional

^{1/} See The Development of Higher Education in Africa, UNESCO, Paris 1963, pp. 17-19; also Outline of a Plan for Scientific Research and Training in Africa, UNESCO/ECA, Paris 1964.

technological, research and management training centres to meet the needs for specialized personnel for industrialization. However, a number of existing national or multi-national institutions have facilities with potentials for development to meet the training requirements of countries in some sub-regions. For instance, a number of universities can, with some financial support, evolve effective departments of business education. The African Institute for Economic Development and Planning, Dakar, can also develop management training on a regional basis for civil servants responsible for planning and managing public enterprises. Similarly, universities can do a lot to increase the number of industrial research workers in training.

62. In the technological field, facilities in the United Arab Republic (Egypt) are indicative of the type of training facilities that need to be developed on a sub-regional basis to serve the needs of nascent industries. At the post-secondary level, technical higher education in university faculties, higher technical institutes and the Polytechnical Institute for Higher Education at Mansoura prepare students to be qualified technical teachers, technicians and engineers. The Polytechnical Institute in particular is designed to provide specialized training in production engineering, mechanical engineering, electrical engineering, electronics, textile engineering, civil engineering, agricultural economics and other specialisms in the industrial, commercial and agricultural fields.^{1/}

63. As most African countries are at present not in a position to finance and provide the teaching staff and adequate number of trainees for higher technical institutes of the type operating in the UAR and in a few other centres, it is therefore desirable that, through co-operative effort, a few large technological training centres operating on inter-disciplinary principle be established on sub-regional basis to meet the need for technical personnel and technical teachers. The need today is to identify

^{1/} Mohammed K. Karby: Technical Education in the Arab States, UNESCO Educational Studies and Documents No.53, Paris 1965, pp.23-25.

and accelerate the training of young African men and women of above average ability in a few central technological centres through intra-African co-operation and foreign technical assistance and where trainees would have the facilities for independent thinking, experimentation, innovations and technical experience.

64. But while it is necessary to develop new national, sub-regional or regional institutes for technical and management education and training, it is even more important to evaluate existing training opportunities with a view to ensuring their fullest utilization in meeting new manpower requirements. Hopefully, a contribution is to be made in this respect under the UNESCO-IAU African University Co-operation Project for evaluating higher educational resources and facilities with a view to analysing the problems involved in making the fullest use of these facilities on an African-wide basis. African countries would also need to take greater cognizance of, and explore ways of making the fullest use of the facilities of United Nations specialized agencies and particularly of the following specialized institutes for the training of technical personnel:

- (i) The International Institute for Educational Planning of UNESCO;
- (ii) The International Vocational Training Information and Research Centre at the ILO;
- (iii) The African Institute for Economic Development and Planning (IDEP), Dakar;
- (iv) The International Computation Centre in Rome by UNESCO;
- (v) The UNESCO School Construction Bureau for Africa, Khartoum;
- (vi) The Economic Development Institute of the World Bank (IBRD), Washington;
- (vii) The Institute of the International Monetary Fund, Washington;
- (viii) Centre Africain de Formation et de Recherche Administratives pour le Développement, (CAFRAD), Morocco.

CHAPTER V

INTERNATIONAL ACTION

65. The African industrial manpower problems and needs as outlined in the preceding chapters call for an increased measure of international action in two broad fronts if the manpower bottlenecks indicated are not to unduly retard the pace of industrial growth. Action is needed by African governments and industrialists themselves through co-operative self-help and by international agencies and foreign governments in assisting African countries to help themselves.

(a) Intra-African Action

66. It is widely known that many African countries are too small to support modern industrial development. Larger markets and the pooling of resources will make it possible to bring about economies of scale in a whole range of import substituting industries. Industrial research and technological training which are too expensive for many individual countries can be developed speedily only through co-operation. In this regard the Economic Commission for Africa with the assistance of the United Nations specialized agencies, has shown initiative in sponsoring the establishment of the African Institute for Economic Development and Planning and the African Development Bank as institutional instruments for fostering intra-African economic co-operation. Encouragement is steadily being given to the harmonization of economic policies and development programmes on sub-regional basis, and effective response in this direction has been steadily growing in the industrial field.

67. But if sub-regional economies within an integrated African economy is to emerge, and if economic collaboration is to become a reality and not stultified by expensive expatriate technical personnel or by lack of the critical skills essential for rapid industrial growth, it is desirable that there should be effective co-operation among African countries in

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developing and utilizing multi-national educational and training facilities for the production of managerial and technical skills in demand. They would have to harmonize their management and technical training legislations and policies, particularly between the francophone and anglophone groups of countries. They would need to accept the principle that effective sub-regional and regional economic integration can only be built on legal, financial, economic and educational and training institutions that are jointly sponsored and used by the co-operating countries.

(b) International Action Outside Africa

68. African national income of barely US\$120 per capita^{1/} indicates serious limitations on any concerted action to collaborate in achieving rapid economic take-off by poor countries. But once African countries are able to ascertain the missing and scarce skills necessary for industrialization, they could mobilize the bulk of foreign aid resources in men, materials, and fellowships to augment their pooled resources for the development of sub-regional or regional management, technical or research training centres which could train trainable Africans to meet manpower needs. To attract the needed foreign aid for education and training, the projects to be aided must themselves be aid-worthy in terms both of their adequacy in meeting assessed manpower needs and the readiness of African governments to sponsor their own institutions and to make the most productive use of aid received.

69. Technical assistance from the advanced and rapidly developing countries for promoting large-scale training of African technical teachers, technical personnel and managers is not limited to assistance in men and money. Equally important are opportunities in these countries for African trainees to acquire managerial and technical experience on the job in industries and establishments and to obtain advanced training in the

^{1/} Gross domestic product at 1958 factor cost.

institutions of more advanced countries. Assistance in training African personnel can also be provided in the form of teaching personnel and equipment for conducting on-the-spot short training courses in a number of African countries, particularly for a large number of public servants and commercial and industrial personnel.

70. In responding to African demand for more technical assistance in training, both bilateral and multilateral aid-giving organizations and governments would need to take greater cognizance of the following elements in African training problems and needs:

- (i) the tremendous task in men, materials and money involved in the training effort;
- (ii) the need to provide increased assistance to African countries, particularly in support of sub-regional or multi-national training programmes;
- (iii) the need to provide more training opportunities for African trainees in their institutions and industrial establishments and to adapt more overseas training programmes to African development needs;
- (iv) the need for technical assistance programmes and the supply of foreign experts to be geared more and more to the local development of African trained personnel; and
- (v) the beneficial effect of concerted action and co-operation among the specialized agencies and other aid-giving bodies in providing technical assistance to African countries.

71. While taking the fullest advantage of the foreign aid resources and institutions of international governmental organizations, increased use should also be made of foreign private international organizations, both through the encouragement of training of nationals by extra-territorial business enterprises with foreign-based headquarters and through the exchange of students for technical experience in developed economies.

In the latter connexion, African countries would need to know more of the activities of, and take the fullest advantage of the training opportunities offered by such non-governmental organizations as the International Association for the Exchange of Students for Technical Experience, (IAESTE), the Association internationale des Etudiants en Sciences économiques et commerciales (AIESEC) and the European Association of Management Training Centres, Brussels.

CHAPTER VI

RECOMMENDATIONS FOR ACTION

72. The magnitude of the problem of securing adequate numbers of trained management and technical personnel for industrialization in the region and the search for practical measures directed to solving the manpower bottlenecks indicated in the analysis in this paper suggest consideration for the following recommendations:

1. Existing stock and requirements of management and technical personnel for new and existing industries should be assessed and periodically reviewed in each member State and an order of priority and areas of urgent training needs be established as a rational basis for formulating and implementing training programmes.
2. Training programmes for the production of national industrial manpower should be suitably dovetailed with both national educational programmes and industrial development programmes within the context of over-all national development planning.
3. Existing training facilities and institutions in African countries should be re-appraised for inadequacies and gaps, with a view to ensuring their fullest use in meeting manpower needs, introducing new training courses and providing for the re-orientation of training courses to current needs and technological change.
4. An effective central machinery for the co-ordinated administration of national training programmes is needed in each country to carry out decisions taken on training policies and programmes, to evolve and review national training strategy and to implement approved plan of action in matters relating to training.
5. Co-operative self-help among industrialists in the region should be encouraged with government financial assistance in providing systematic apprenticeship services and further training facilities for industrial personnel.

6. National Productivity Councils with provincial branches should be developed to raise the productivity of industrial workers through their encouragement of improved training among industrial management and technical personnel at home and abroad.
7. Intra-African co-operation in training key personnel for rapid industrialization should be encouraged through the development of regional or sub-regional technological, management and industrial research centres or institutes which should, besides training urgently needed African personnel, identify industrial training problems, utilize the experience of advanced countries in working out country solutions to development problems, and collect and disseminate training information relevant to technology, management education and industrial development processes.
8. In developing regional training institutions special attention should be given to:
 - (a) ways and means of resolving language barriers in transmitting scientific knowledge and technical skill and experience to African trainees;
 - (b) methods of improving the utilisation of existing educational and training facilities for post-graduate training and for technical experience at national and regional levels;
 - (c) the need to substantially improve on the present situation of management education;
 - (d) the possibility of introducing joint courses in technology, economics and business management; and to
 - (e) the value of technical orientation courses and opportunity for the exchange of views among industrial management and technical personnel.

9. A substantial part of international and bilateral aid to African countries should, as a matter of national priority, be devoted to education and training in specific identified skills. Wherever possible, such education and training should be organized on a multi-national basis and executed through permanent institutions located in the region.
10. African countries should endeavour to take the greatest advantage of existing international specialized institutions for the training of technical personnel and of available non-governmental international organizations providing students and management personnel with opportunity for acquiring industrial and/or technical experience in or outside Africa.

ANNEX I

E/CN.4/1975/Annex I

Estimated Industrial Trained Manpower Requirements in the
East Africa Sub-region, 1965-75
(in thousands)

C a t e g o r y	Existing Stock by about 1965 (est)	Estimated % of Industrial Labour Force	% for Replacement of Existing Stock	Absolute Replacement Needs	New Employment 1965-75		Total to be trained by 1975		Total Labour Force by 1975	
					High	Low (at 80%)	High	Low	High	Low
Management and Supervision	4.0	1.0	5 *	2.0	5.5	4.4	7.5	6.4	9.5	8.4
Engineers, Scientists and Technologists	7.2	1.8	5 *	3.6	9.9	7.9	13.5	11.5	17.1	15.1
Technicians and Foremen	17.2	4.3	3½ *	6.0	23.6	18.9	29.6	24.9	40.8	36.1
Skilled and Semi-Skilled Workers	284.0	71.0	2½	71.0	389.7	311.7	460.7	382.7	673.7	595.7
Unskilled Workers	87.6	21.9	2½	21.9	120.2	96.2	142.1	118.1	207.8	183.8
Clerical Workers										
T O T A L	400.1/	100 %	-	104.5	548.9	439.1	653.4	543.6	948.9	839.1

Source: Based on estimates made in document E/CN.4/INR/102, Tables A and B annexed to Chapter II and Table V-1, p. 111.

* Including and element of Africanization

1/ Total for 1963 has been estimated at 390,000.

ANNEX II

Estimates of Potential Output of Technicians and Scientists and Engineers in Africa by Sub-Regions, 1965-75
(in thousands)

Technicians (2nd level education)

Sub-Regions	Total 2nd Level School Enrolment (1963/64)	% enrolled in Tech. & Voc. Courses (around 1958/59)	Estimated Enrolment in Tech. & Voc. Courses	Estimated Annual Output (1 in a 3-year course)	Assumed Growth rate p.a.	Annual Output by 1975	1965-75 Aggregate Output
North Africa	1040	20 %	208	52	7 %	55.7	557
West Africa	568	15 %	85	21	6 %	22.3	223
East Africa	244	20 %	49	12	5 %	12.6	126
Central Africa	116	25 %	29	7	5 %	7.4	74
Regional Total ^{1/}	1968	-	371 ^{2/}	92 ^{3/}	0.7 % (Cumulative)	98.0 ^{3/}	980 ^{3/}

Scientists and Engineers (3rd level education)

Sub-Regions	Total 3rd Level Educational Enrolment at Home & Abroad (around 1963)	% enrolled in Nat. Science & Engineering Course (1963)	Estimated Enrolment in Natural Science & Engineering Courses	Estimated Annual Output (1/6 in a 4-5 year course)	Assumed Growth rate p.a.	Annual Output by 1975	1965-75 Aggregate Output
North Africa	165	20 %	33.0	5.5	7 %	5.9	59.0
West Africa	26	18 %	4.7	0.8	6 %	0.85	8.5
East Africa	17	20 %	3.4	0.5	5 %	0.53	5.3
Central Africa	5	12 %	0.6	0.1	5 %	0.11	1.1
Regional Total ^{1/}	213	-	41.7	6.9	0.7 % (Cumulative)	7.39	73.9

Source: Enrolment data are derived from UNESCO/AFMIN/4, UNESCO/EDAP/S/4, UNESCO ST/Q/72 (or ST/Q/60) and Africa Report, Vol. 8 No.10 November 1963.

^{1/} Excluding the Republic of South Africa

^{2/} Of which some 20% or less may have further training as technologists.

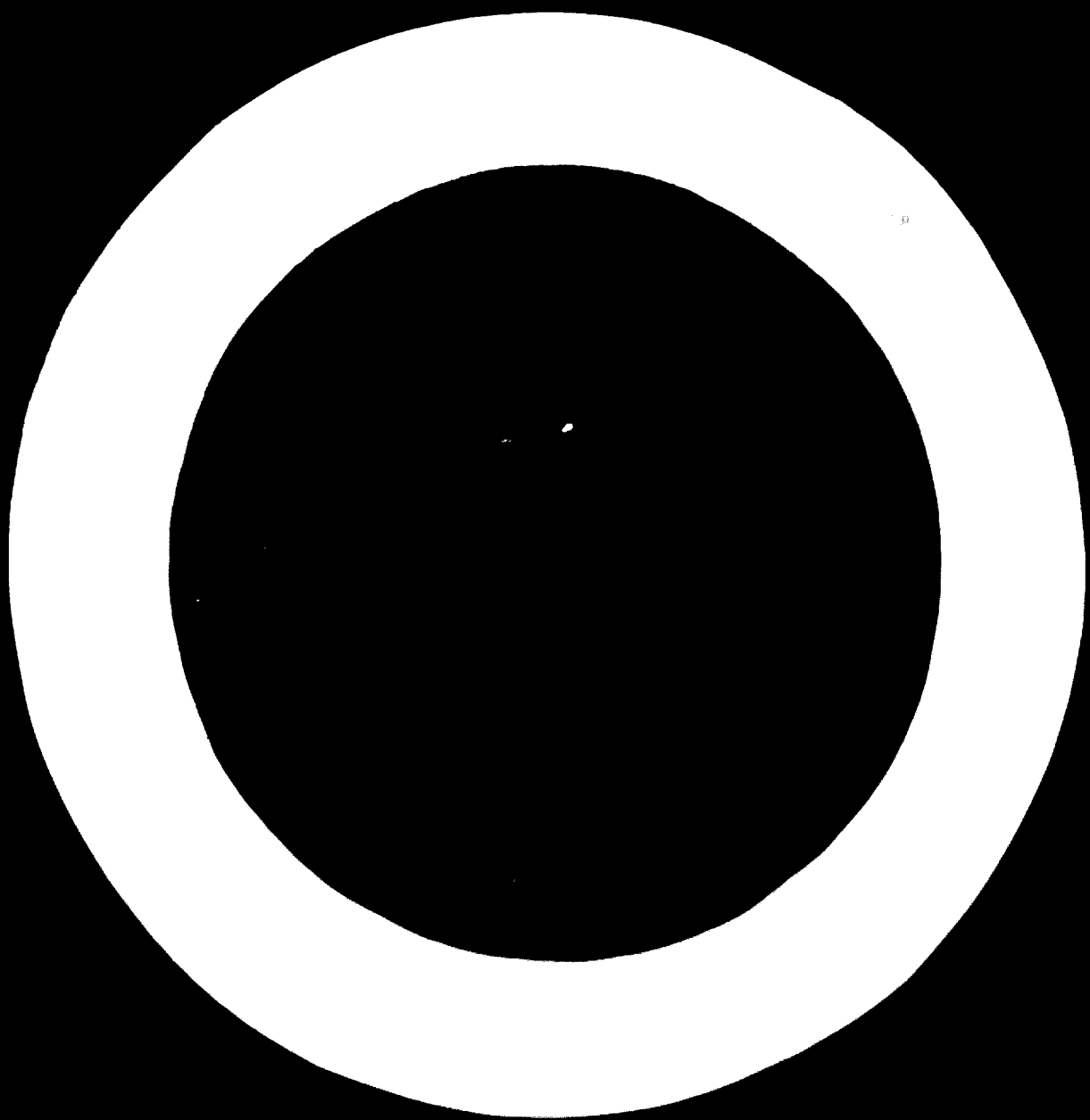
^{3/} The total around 1961/62 was 283,000; see Statistical Bulletin for Africa, No.1, Part I, UNESCO, November 1965.

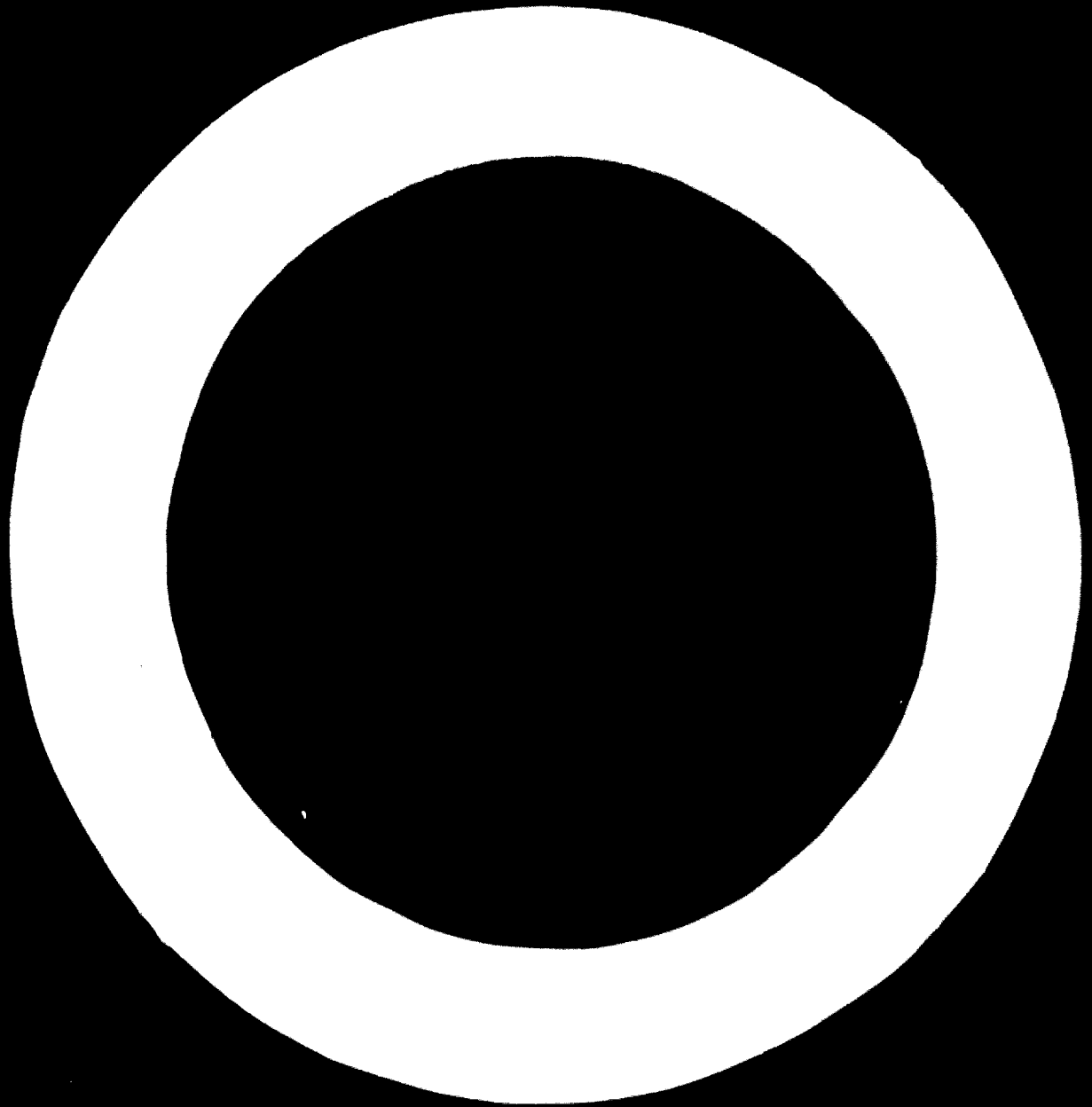
SOME ASPECTS OF
MANAGEMENT DEVELOPMENT
IN AFRICA

Information Paper prepared for the United Nations
Symposium on Industrialisation in Africa
(Cairo, 27 January to 10 February, 1966)

This paper is an appendix to the document, Some Aspects of Manpower Requirements and the Training of Technical and Managerial Personnel for Industrial Development.

E/CN.14/AS/V/9





Supplementing the background paper on Technical and Managerial Training as prepared by the United Nations Economic Commission for Africa, it will be useful to describe in some detail the scope and the nature of the I.L.O. management programme, in its general aspects as well as in regard to some projects specifically planned for Africa.

Role of Management in Economic Development and Industrialisation

Managerial skills are among the scarcest resources in all the developing countries. The dimensions of the need for management development may be illustrated by the following examples. For example, basing itself on the 1960 census of manufacturers, a Latin American country estimates that there were then about 10,500 manufacturing firms employing a total of about 15,000 operating managers or persons in related occupations, this figure excludes small firms, omits transport, public utilities and similar service enterprises and takes no account of the very substantial rise in output and employment in the last five years. Thus, it may be estimated that the present figure might be between 25,000 and 30,000; meanwhile, current management development programmes available in that country register about 1,200 participants annually. In another country, the total industrial supervisory force was estimated recently at about 100,000 with a cumulative annual growth of this group, which includes all categories of foremen as well as specialists, of 5 per cent. It is quite clear from these figures alone that a much larger management development effort is needed and that a wide and systematic dissemination of education and training in the different aspects of management could help to enlarge the managerial class from which persons with the right talents can move up as top managers.

These are figures for countries where a sizable industry already exists. The I.L.O. has also been concerned with the problem of countries where the industrialization is in a very early stage. As a result it has been carrying out large-scale activities in the training of managers and executives for new plants, specialists in various fields of management in private as well as in public enterprises and in fact of future entrepreneurs and managers for the enterprise yet to be established. A major objective in all these projects is to provide training in the various managerial techniques not only to the managers and the senior executives of the large-scale manufacturing and service enterprises but also to the owners and managers of medium-scale and small-scale enterprises. An important feature of these management development projects is the attention being paid to the special needs of the entrepreneurs in the medium and small-scale industries for training in various managerial skills such as production planning and control, quality control and cost accounts.

For a number of reasons, the training of managers at the level of foreman and chargehand - often described as "supervisors" - is an indispensable component of a programme of management development. Managers of this level are by far the most numerous, and in being in direct touch with the operatives they have a crucial influence on the level of both morale and output. To maximise its effectiveness the training of these supervisors must be closely coordinated, as to both timing and content, with the training of the other levels of management. At the same time the presentation of management concepts in terms that are meaningful and interesting to people who may have had little formal education offers a unique challenge to teaching skills.

The I.L.O.'s activities in this field, often of a pioneer nature, developed in the past decade in response to the growing interest of the governments and in improving the productivity of the economy all round as a means of quickly raising the standards of living of the people. At first the efforts were directed to a limited number of management techniques such as work study, plant organisation and simple systems of incentive payments applied mainly at the shop floor level. It soon became evident that other complementary measures were needed if the productivity gains were to become substantial and lasting. In particular the scope for the individual worker's effort and initiative was found to be restricted due to various bottlenecks beyond his immediate control. Parallel introduction of other industrial engineering techniques such as production planning and control, quality control and cost accounting was necessary. Further, the efforts of the specialist and the middle management at productivity improvement were liable to be frustrated unless the upper reaches of the management understood and supported the use of these techniques to improve and maintain the efficiency of the undertaking. These lessons, from experience, have led to the present broad approach to management development in most of the I.L.O. projects. Projects of such a wide scope have become feasible thanks to the greatly augmented resources made available through the United Nations Special Fund.

The Method of Management Training

The I.L.O. programmes in management development are of the "post experience" type, i.e. addressing themselves to those persons who already had a certain degree of practical experience principally in the industry but also in other fields. In recent years, these programmes also included increasing numbers of government officials concerned with economic development. The reasons for this are various. First of all, it became clear that economic development benefits if both the government officials and industrialists speak the same professional language. The enterprise is the basic instrument of economic development and consequently the understand-

ing of its problems by the economic planners and other government officials is of considerable importance. Secondly, of course, government officials are frequently called upon to make decisions which vitally affect the operations of industrial enterprises and finally, persons whose basic professional background in public service may find themselves nowadays directly involved in the management of service and manufacturing enterprises.

Some details concerning the methods of the I.L.O. management programme may be described as follows:

Transfer of Knowledge. The object of all technical assistance, particularly assistance in this field, is the transfer of knowledge from the experts to nationals of the countries concerned. It is the aim of I.L.O. management development missions to work for their own elimination. Transfer of knowledge by itself is not enough. The knowledge must be transferred to people who will be able to pass it on to the greatest number of their fellow-countrymen. The second aim therefore is to achieve the highest possible multiplying effect. This is normally achieved by attaching the missions to national management development or productivity organisations - permanent bodies established in the countries concerned to promote better management and to provide development and training facilities for industry. They are generally Government sponsored. In the case of the Special Fund projects, one of the conditions for financial assistance by the Fund is that the government concerned shall set up an appropriate counterpart organisation with financial facilities and suitably qualified staff. It is this staff who will be trained in the practice of various aspects of management by the I.L.O. experts in order that they may in turn be able to pass on their knowledge to an ever increasing number of industrialists.

Practical "Know-How": What is this knowledge which is transferred by the I.L.O. experts to their national counterparts? First of all it is not merely book learning. In many cases the professional staff of national centres have extensive academic training and some practical experience. They have often read widely in the field of management. What is essential and needed in order to achieve better management and higher productivity in developing countries is practical "know-how", the sort of knowledge which a man acquires in the course of many years of practice of his profession. This is something which can only be transmitted by close working together of expert and national staff members in the development of programmes of training, both theoretical and practical, and in practical projects, since the most important part of the training is to ensure that the national staff of centres and the people whom, in turn, they will train, will gain the confidence needed actually to apply what they know in practical situations in industrial enterprises.

Experience over ten years has shown that a national organisation provided with adequate counterparts is absolutely essential if management knowledge is to be properly disseminated in a country, particularly once the international experts have gone. In every case, where I.L.O. experts have worked in countries, where there was no organisation to which they could be attached and no permanent counterparts to whom they could pass their knowledge, the effects of the missions' work have quickly disappeared and within a year or two it has been difficult to find any improvement in industrial performance resulting from it. It is for this reason that great emphasis is laid upon the setting up of suitable national organisations with which the experts can work.

An Advisory Role: It should finally be added that the role of the experts is always advisory and never executive; they do not become directors or staff executives but are advisors to them.

Management Development and Technology

The emphasis of the I.L.O. management development programmes is on the practical art of "getting things done", on "reasoning out of solutions to industrial problems" - in short on the administration of enterprises or in the operating of specific phases of their activities. In this respect the I.L.O. management development programme parallels the approach developed both in the United States some two generations ago and in Western Europe perhaps one generation ago, of treating the managerial arts as a separate field of knowledge. Nevertheless in some programmes management development is linked with technology. This arises first of all in our assistance to various small fledging undertakings where technology is of primary importance. Secondly, it is also applied in so-called sectorial programmes where productivity drive is centred on individual industrial sectors which receive priority in the countries' development or which are bottlenecks. Even then, however, the emphasis is on industrial methods applicable to that particular branch of industry. By and large pure technology is considered a thing apart.

Productivity

The concepts of productivity and management development are practically synonymous in that the productive employment of available resources depends primarily on the effectiveness of the industrial management. Nevertheless, in the organisation and in the application of management development training some specialised activities have come into being which could be labelled productivity rather than management development. The principal among them is promotion. Experience shows that

to induce managers and other specialists concerned with the industry special promotional efforts are required. It is undoubtedly part of human nature to resist change and progress in productivity implies precisely the one basic thing and that is acceptance of change.

Other programmes which may be included under the heading of productivity cover such activities as the organisation of industrial associations. The encouragement of the creation of professional bodies such as for example, a marketing institute or an association of industrial accountants. Other programmes may be concerned with the activation of group work among operating managers and government officials concerned with some special phase of economic activities, for example, exports.

A rather new field for the application of productivity techniques is public works in developing countries. The basic aim pursued consists in increasing productivity of manual labour through improved methods and organisation of work and thus delay the point when the use of machines becomes more economic. If this could be achieved the results would be increased employment opportunities and savings in foreign exchange otherwise spent on import of machinery.

Since 1962 I.L.O. has been engaged in research into the possibilities of increasing the productivity over a wide range of earthmoving activities in India, Nigeria and Tanzania such as dam, railway and road construction. The findings of these studies were presented to a Technical Meeting on Productivity and Employment in Public Works in Africa, held in Lagos in December 1963 and attended by selected representatives of 18 African countries. The Meeting stressed the importance for the development of African countries of the application of labour intensive methods in the field of public works and concluded by calling upon the I.L.O. to provide, in collaboration with other international agencies, practical assistance to national and local authorities. Preliminary negotiations are at present going on in 3 African countries for the preparation of a request for assistance from the Special Fund in this field.

The History and the Present Scope of I.L.O. Management Development

Although the original I.L.O. activities in productivity date back to 1952, it is mainly since 1958 that the programmes took a wider scope. In 1958, the 42nd Session of the International Labour Conference passed a Resolution inviting the I.L.O. to give high priority to activities which would contribute to meeting the need for management development and training, especially in less industrialised countries. The Resolution was confirmed by the Governing Body in November of the same year. The decision to extend the activities of the

I.L.O. in this field coincided with the setting up of the United Nations Special Fund which was to have a considerable effect on the development of the work.

This Resolution has the effect of endowing the I.L.O. with something it had not previously possessed, namely, a unit at Geneva composed of specialists in management and management development to administer the management development and productivity missions and to assist them to make their work more effective through the provision of centralised services in the form of basic teaching materials, the development of new teaching methods and some research into problems of general interest to management in developing countries.

By 1958 there were 9 long-term missions (a year or longer) and 8 short missions, the latter generally for demonstration only. From 1958 onward the number of requests for assistance began to increase more rapidly. There appear to be three main reasons for this; the first is that the work of the earlier I.L.O. productivity missions was becoming known throughout the world, governments and employers' organisations were beginning to be aware of the need for management development and, thirdly, the coming of the Special Fund made available for technical assistance financial resources far larger than had ever been available to the United Nations in the past. Whereas, under the Expanded Programmes, each project had to compete with other projects for finance from a more or less inelastic global sum allocated annually to each country receiving assistance, the sum to be shared by all the United Nations agencies, each project under the Special Fund is a separate entity, negotiated separately and designed on a scale adapted to the needs of the country. Special Fund projects are for a fixed period, generally four or five years.

At the present time, taking into account projects fully in operation or in the early stages of implementation, the number of management development projects amounts to 42 and includes 225 international experts, together with counterpart personnel operating in these projects the total number of professionals active in these projects amounts to 502. The total cost of international assistance devoted to these projects amounts to about \$16 million, which averages about 3.35 million a year; together with national counterpart funds committed to these projects, the annual cost of operation represents about \$7 million.

Management Development and Productivity Activities of the I.L.O. in Africa.

The rapid expansion of I.L.O. technical assistance activities in the field of management development and productivity improvement referred to earlier in this paper is especially visible in Africa where the number of large projects in operation (those financed by the Special Fund) has passed from one in 1963 to four to date, with three requests at present under consideration by the Special Fund and four more at an advanced stage of preparation by the individual governments. Together with the projects financed by the Expanded Programme of Technical Assistance the number of experts passed from eight in 1963 to 43 in 1965.

In Algeria an Industrial Engineering expert is assisting in the preliminary preparation for the establishment of a National Institute for Productivity and Industrial Development for which the Government has requested assistance from the Special Fund.

An Industrial Engineering expert is also assisting the National Productivity Centre in Accra in the preparation and conducting of courses in industrial engineering techniques as well as providing advisory services to specific undertakings in these techniques. He will shortly be joined by an expert in Management Accounting.

In Guinea two I.L.O. experts, one in General Management and the other in Industrial Accounting, are assisting the Government in the preparation of a long-term management training and productivity development programme for public and private undertakings for the implementation of which the Government has requested assistance from the Special Fund.

The primary purpose of the Management Training and Advisory Centre in Nairobi, in the establishment of which the I.L.O. is assisting, is to provide advisory and information services as well as training in management development and productivity improvement to existing and new enterprises including public utilities and services.

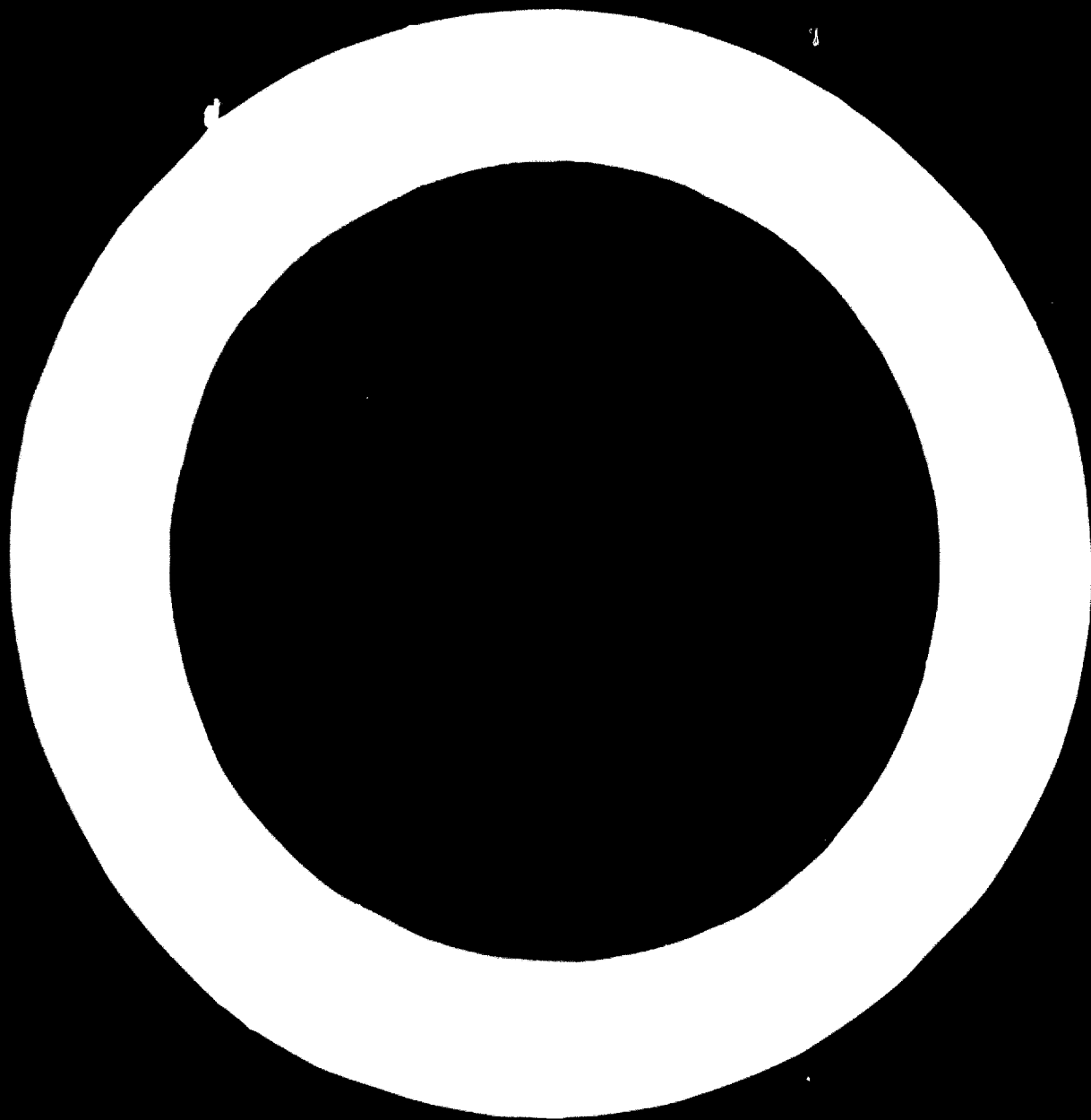
The I.L.O. has also been designated as executing agency to assist the Government of Sudan in the establishment of a Management Development and Productivity Centre in Khartoum, the purpose of which is to provide training and development in management and supervision as well as productivity promotion and improvement in such fields as General Management, Industrial Engineering, Management Accounting, Marketing and Sales, and Supervisory Training.



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FOREWORD

This paper is primarily concerned with an exposition of main issues in selected aspects of manpower problems in the industrial development of African countries. In this exposition emphasis is placed on indicating inadequacies in the supply and training of technical and managerial personnel and on necessary corrective measures as conditioned by African specific circumstances and development goals, rather than on general basic principles of technical education and training on which information is available in well known publications. Because of this limitation, it is necessary to supplement the analysis in the paper with information available in the United Nations document E/3901, "Training of National Technical Personnel for Accelerated Industrialization of Developing Countries" and with the recommendations contained in "Technical and Vocational Education and Training" by UNESCO and the ILO.



SOME ASPECTS OF
MANPOWER REQUIREMENTS AND THE TRAINING OF
TECHNICAL AND MANAGERIAL PERSONNEL
FOR INDUSTRIAL DEVELOPMENT

CHAPTER I

INTRODUCTION

1. In rightly stressing the importance of human factor input in the process of economic growth at the 1962 San Juan International Conference on Middle Level Manpower, David A. Morse, ILO Director-General, said:

"We have learned the lesson that although new financial investment is of course necessary in developing countries, it may be ineffective, or even wasteful, if there is not present the capacity to use capital. This capacity to use it includes, chief and foremost, the education and skills in the labour force of the kind needed to make new equipment productive. Thus, the lack of competent trained personnel is, as so many have now come to recognize, a central problem in nearly every field of economic and social development and in nearly every developing country."^{1/}

2. In the African region, experience is steadily demonstrating the fact that the economic and social policies and actions governing the supply, skills and attitude of the labour force, including entrepreneurial personnel, lie at the root of economic growth process. ECA studies of the economic and technical feasibility of a number of specific industrial

^{1/} Godwin, F.W., Goodwin, R.N. and Haddad, W.F. (ed.): The Hidden Force, A Report of the International Conference on Middle Level Manpower, San Juan, Puerto Rico, October 10-12, 1962, New York 1963, p.29.

projects and of the ways and means of accelerating general economic and social development, have also revealed how closely the development of an economy is associated with changes in its organic and structural relations, including social relationships.

3. To facilitate the desired structural changes, labour, capital and enterprise must move more and more away from old avenues of economic activity into new ones. But the new areas and activities call for new and often higher degrees of skill on the part of the worker and of superior organizing capacity on that of the entrepreneur.

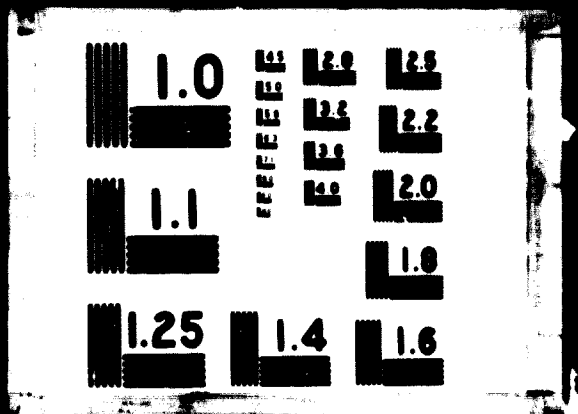
4. Recent studies on economic trends in some Western European and American countries have shown that their economic progress since the last war has been due much more to improved skill, management and organization than to capital investment. By contrast, the high hopes for a rapid industrialization in Latin America, after establishing the institutional and legal framework for systems of economic integration, were not realized largely because economic planners under-estimated and partly over-looked the role and behaviour of agents of production and distribution. In the African region, the education and training of indigenous entrepreneurs, managerial personnel and key technical manpower for industries has not received sufficient attention and development resources, despite the growing awareness of the leverage that trained manpower provides for accelerated economic growth.

5. African countries, have not, up till now, paid enough attention to the need for adequate numbers of trained technical and managerial personnel, with the result that, in some cases, development projects have been held up or substantially revised due to the lack of suitably qualified Africans at technical and managerial levels to implement development programmes.

6. Most independent African countries have relied upon the services of foreign experts to draw up their development plans. This has not been up till now too difficult a task. But such plans have to be followed up by detailed feasibility and engineering studies for which suitably qualified Africans are scarce. External technical assistance personnel

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The National Institute for Productivity in Dar-es-Salaam, to which the I.L.O. is giving assistance, provides advisory information and training for industries and businesses in the fields of management development and labour productivity with a view to promoting and improving productivity throughout the country by introducing modern productivity techniques and establishing standards of performance for the establishment of proper wage structures.

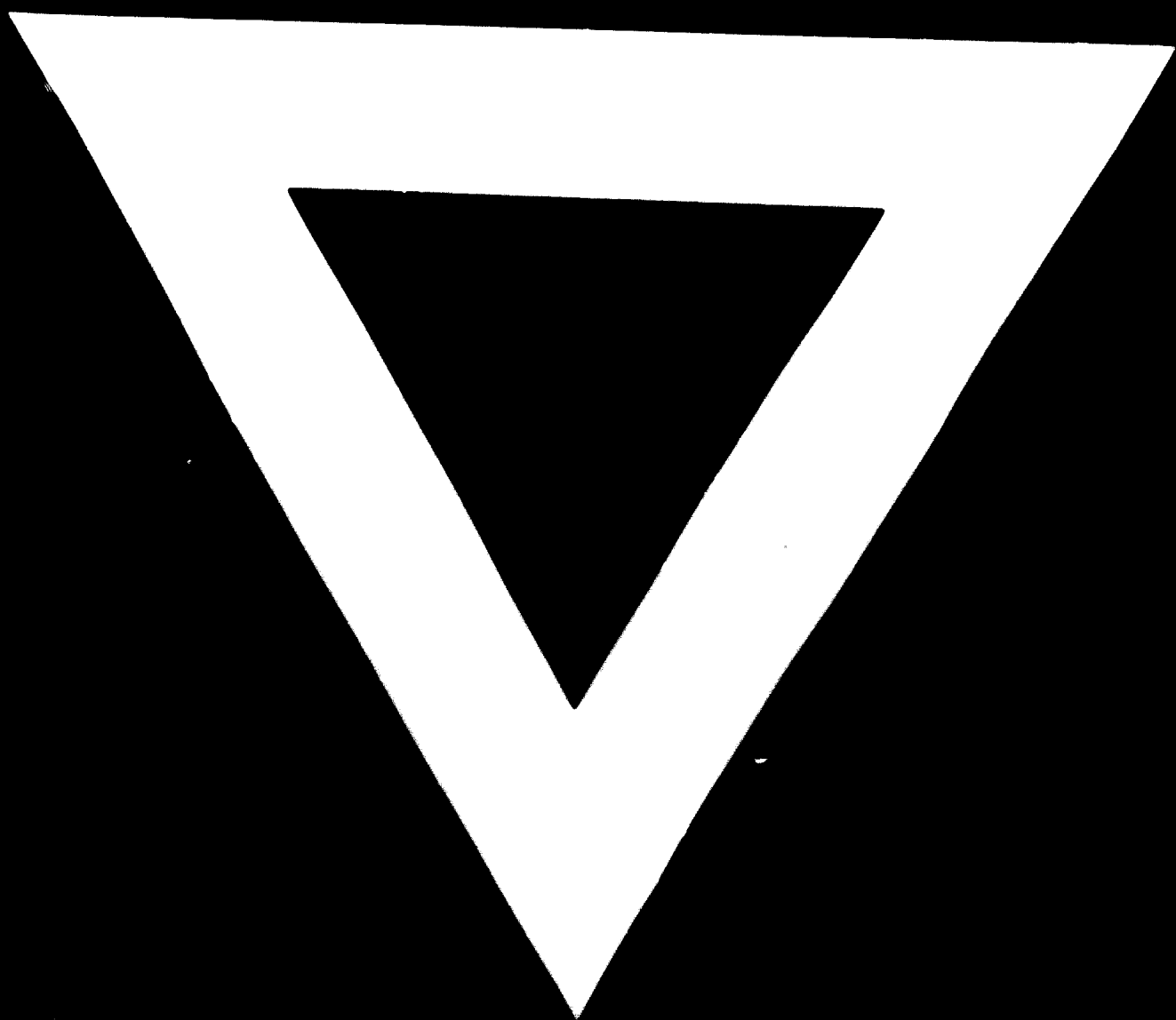
Since 1962, a team of 4 I.L.O. specialists in the fields of management development, industrial engineering, management accounting and marketing management have been attached to the National Vocational Training and Productivity Institute in Radès (Tunisia) to organise and conduct training courses for managers at all levels as well as to assist undertakings in introducing modern management techniques. The greatly increased needs due to rapid expansion of economic activities in the country on the one hand, and the favourable results achieved by the Institute to date on the other hand, have increased needs due to rapid expansion of economic activities in the country on the one hand, and the favourable results achieved by the Institute to date on the other hand, have decided the Government to separate the productivity activities from the existing Institute and to set up a separate National Institute for Productivity. A request for assistance from the Special Fund has been submitted by the Government for consideration by the Governing Council in its January 1966 Session which provides, apart from the supply of equipment and the granting of fellowships, for a total of eight experts.

The primary purpose of the Management Training and Advisory Centre in Kampala in the establishment of which the I.L.O. is assisting consists in preparing Ugandan personnel for managerial and advisory posts, in providing Ugandan entrepreneurs with advisory services and technical training as well as in improving the organisation and operation of existing and new enterprises. The project, financed by the Special Fund, provides for a total of ten international experts.

I.L.O. activities in the field of management development and productivity improvement in the United Arab Republic go as far back as 1954. To date some 25 experts, serving for various periods, have been appointed in such fields as general management, management accounting, productivity in textile mills and supervisory training. At present a team of four I.L.O. experts in the fields of work study, marketing management and cost accounting assist the Productivity and Vocational Training Department of the Ministry of Industries in Cairo in the training of middle level management. They will be joined early next year by three additional experts in the fields of materials handling and layout, management control and operational research.

It may be worthwhile mentioning that I.L.O. undertook in 1964 a survey of managerial problems and needs in some eight African countries, the general findings of which were published in a Report in 1965.

Finally, a Technical Meeting on the Development of Managerial Resources for Industrialisation is foreseen in the Management Development and Small Scale Industries programmes which will be held in East Africa in the fall of 1966.



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