UNITED NATIONS
ECONOMIC
AND
SOCIAL COUNCIL

Distr.
LIMITED

E/CN.14/WP.6/18
20 June 1968

Original: ENGLISH

ECONOMIC COMMISSION FOR AFRICA
Working Party on Manpower and Training
Addis Ababa, 28 October-1 November 1968

AFRICA'S ECONOMIC TRANSFORMATION AND IMPLICATIONS FOR EDUCATIONAL AND MANPOWER DEVELOPMENT[1/]

(Prepared by the ECA secretariat)

1/ This paper was specially prepared for the Conference on Education and Scientific and Technical Training in Relation to Development in Africa, Nairobi, 16-27 July 1968, jointly sponsored by UNESCO and the Organization of African Unity.

M68-886

PART I

I. INTRODUCTION*

1. The population of the African Region is rising at an estimated rate of about 2.5 per cent per annum and demographers estimate that it is likely to rise, in absolute figures, from some 311 million at present to well over 600 million by the end of the century. The most striking aspect of the demographic trend is the very high dependency ratio : 45 per cent of the population is estimated to be under fifteen years of age compared with 25 per cent elsewhere.

2. The African region is exceptionally endowed with both mineral and agricultural natural resources, the full extent of which is unknown to its government and peoples. In the field of agriculture there has been strikingly disparate advance. With minor modifications in technology and in social structure Africa has considerably raised the volume of her exports, through peasant farming of oilseeds, natural fibres, natural rubber, cocoa, coffee, tea and other traditional agricultural export products, although earnings therefrom have not kept pace with output. On the side of food production, Africa's efforts to feed herself constitute a record of failure. One of the many consequences of this is the utilization of scarce foreign exchange on importing such food which the Region could itself have produced amply for itself by a determined effort at transforming the agricultural sector.

3. As regards industry the Region depends, with little exception, on the initiative of foreign private enterprise. The most cursory study of the geographical direction of flow and the enterprise preference of private foreign investment indicates the limitations of this source of support for accelerated industrial development in depth and on a broad front.

II. RECENT TRENDS IN AFRICA'S ECONOMIC DEVELOPMENT[1/]

4. The real gross domestic product (GDP) of Developing Africa[2/] increased by, 3.4 per cent per annum, from US$27.4 billion in 1960 to US$ 33.4 billion in 1966, and with a rise in absolute terms from US$106 in 1960 to US$122 in 1966, the corresponding increase in income per head was 1 per cent per annum. This per capita rate of growth was among the smallest rates recorded by the major regions of the world; and in absolute figures the average annual addition to GDP per head in Developing Africa between 1960 and 1966 was US$ 1. In a period which covers most of the Development Decade, the relatively slow growth in average African incomes implied by all this is particularly disappointing. The more so since the average income levels suggested by a per capita GDP of US $106 are also among the lowest in the world.

---

* This introduction is taken from ECA document E/CN.14/WP.6/3/Add.1, p.2, Recent Development in Education and Training.

1/ For more detailed discussion of development of African economy between 1960 and 1966 see, A Survey of Economic Conditions in Africa 1967 Parts 1 and 2. (E/CN.14/409)

2/ "Developing Africa" is all Africa excluding the Republic of South Africa, Lesotho, Botswana and Swaziland.

5. It can be argued that changes in per capita income provide the best single measure of economic growth. It is obvious that absolute increments to income per head in any period depend upon the initial level of income and its subsequent rate of growth; and it is evident that Developing Africa has suffered in recent years from the least desirable combination of these two elements - low levels and low growth rates. As a consequence, the poverty and harsh conditions which characterized much of the continent at the beginning of the decade were but slightly alleviated in the succeeding years; and higher rates of growth of initially larger incomes elsewhere have simply served to sharpen the contrast between African and other conditions. It is thus clear that the main immediate requirement in Africa is for rapid income growth sustained over two or three decades. This is so both in terms of improving the conditions of life of the present generation of African peoples and in terms of ensuring to future, but not too distant, generations standards of living which at least approach those now enjoyed in the more affluent parts of the world.

6. Although considerable economic progress was recorded in a number of Developing African countries, it may be taken that the slow rates of growth were the rule rather than the exception. In the circumstances a most important question concerning recent economic performance in Africa is that of identifying the reasons for the unsatisfactory increases in output and income.

7. To some extent the disappointing results were due to special and not necessarily recurring circumstances. Thus, in 1960 Algeria and Congo (Kinshasa) between them accounted for more than 14 per cent of the total GDP of Developing Africa, and in 1966 the same countries contained almost 10 per cent of the total population. Between 1960 and 1966, however, product per capita in the two countries taken together fell by approximately 5 per cent per annum as a consequence of political difficulties and their aftermath. If the combined Algerian and Congolese per capita product had remained unchanged between 1960 and 1966, then the growth rate in per capita GDP for Developing Africa as a whole would have been 13 per cent higher than it was in fact.

8. It has also to be remembered that most countries in Developing Africa gained their independence in 1960 or subsequently; and that the assumption of power was frequently as abrupt as the need to develop was strong. In many countries, essential first steps in the effort to achieve economic growth were the strengthening of the government machinery at appropriate points and the extension and improvement of economic and social infrastructure. Although essential, these activities are not in the short run highly productive; and any marked increase in the proportion of available resources devoted to them could, in combination with significant increases in population, reduce the rate of growth of per capita product below what it might be expected to reach subsequently. Conclusive evidence on this point is not available. There are, however, some straws in the wind; and it may be noted, for example, that although the proportion

of GDP devoted to capital formation in Developing Africa remained roughly constant, about 15 per cent as between 1960 and 1966, investment on general government account increased more quickly than GDP and total investment. It may also be cautiously noted that the share of Developing Africa's GDP originating in transport and public administration increased from 5.7 and 8.3 per cent respectively in 1960 to 6.1 and 9.4 per cent respectively in 1966.3/

9. Between 1960 and 1965 Africa's population grew at an annual rate of 2.3 per cent; and in terms of world regions, this rate was surpassed only in South Asia and Latin America. In more than 30 African countries population increases of 2 per cent or more were recorded between 1960 and 1966. Over the same time period population increase in the developed countries was normally much smaller. There is reason to believe that - given the level of economic development in African countries - the higher African rate of growth had an adverse effect on the rate of increase in per capita product.

10. In the discussion of the trade and growth problems of the developing countries, much attention has been paid to the trend in foreign exchange earnings accruing from the export of goods. This trend for Developing Africa was relatively favourable between 1960 and 1966, and the level of export earnings rose from US$5,300 million in 1960 to US $8,390 million (at current prices) in 1966. The value of African exports thus increased at an annual average rate of 8 per cent, which was considerably higher than the corresponding rate for developing countries as a whole, but somewhat lower than the rates recorded by the centrally-planned and developed market economies respectively. In real terms, the exports of Developing Africa increased at an average rate of 7.4 per cent per annum. To some extent, the favourable development of African exports between 1960 and 1966 was due to special circumstances which are unlikely to operate with the same force in the future. The most striking example of this is the rapid growth of petroleum exports which - based almost entirely on new discovery and exploitation - accounted for 47.8 per cent of the absolute change in total export value over the period in question. The increase in coffee earnings accounted for a further 7.6 per cent of the total increase; and it is again likely that the fairly rapid growth of coffee exports which made this contribution possible would be difficult to repeat within the context of the International Coffee Agreement. Among other commodities which made a significant contribution to the total increase in export earnings were copper, iron ore, groundnuts, diamonds, phosphates, citrus fruits and tin metal.

3/ These figures would support the point being made if they reflected an increase in the allocation of resources to the activities in question and if the short-run productivity of the resources were less than they would be if they were otherwise employed.

11. The recorded increase in aggregate export earnings between 1960 and 1966 reflected favourable developments in a large number of Developing African countries; and no fewer than 20 such countries registered rates of growth in the value of their exports of 7 per cent or more per annum over the period. It has, of course, to be remembered that export earnings are but one of the trade and payments factors which operate on the growth prospects of African countries; and it has also to be remembered that favourable changes in one of these factors in any period may be offset by unfavourable changes in others. That some such process was at work between 1960 and 1966 is suggested by the somewhat naive but certainly not irrelevant comparison of export and import experience.4/ Thus, imports of goods into Developing Africa increased in current value from US $6,550 million in 1960 to US $8,260 million in 1966 and thereby grew at an average rate of 4 per cent per annum; and the corresponding real rate of growth was 2.8 per cent. It is true that this relatively slow rate of increase - which was lower than those recorded by developing countries as a group, centrally-planned and developed market economies - can in part be explained by the special circumstances of Algeria, where imports fell by about US $500 million. If Algeria were excluded, the import rate of growth for Developing Africa would rise to about 6 per cent at current prices and would thus be somewhat greater than the rate for developing countries as a whole, but still significantly lower than the corresponding rates for the centrally-planned and developed market economies and, of course, African exports.

12. In African country terms, 7 of the 20 countries which experienced export rates of growth of 7 per cent or more were apparently unable to translate this experience into correspondingly high relative increase in imports; and some further measure of the importance of rapidly growing export earnings as a necessary (but not sufficient) condition for import growth may be had from the fact that of 15 countries for which information is available and in which export growth between 1960 and 1966 was less than 7 per cent per annum, only 4 managed to increase their imports over the same period by a rate of 7 per cent or more.

13. Broadly speaking, the volume of imports obtainable from any given level of earnings will be the less, the higher import prices and the higher the proportion of export earnings absorbed by unfavourable balances on the invisible account; and some discussion of these elements is possible on the basis of the limited information available. As far as import prices are concerned, the unit values of imports into Developing Africa rose rather slowly - by about 1 per cent per annum - between 1960 and 1966. Even this modest increase was, however, greater than the rise in African export values; and some US $237 million from the 1966 export earnings was required to offset the higher rate of increase of import prices.

4/ Naive, because it abstracts from other forces operating on the GDP growth rate and hence on import demand.

14. That some part of export earnings will normally be required to finance deficits on the invisible account is strongly suggested by evidence available for 14 countries in 1966. Of the 14 countries, only 4 registered a favourable balance as a result of their invisible transactions; and, apart from the special circumstance of the Egyptian ownership of the Suez Canal, in none of these countries was the balance sufficiently favourable to add as much as 3 per cent to export earnings. On the other hand, the negative balance in the remaining 10 countries absorbed from 3.3 to 44.2 per cent of export earnings; and the ratio of the negative balance to export earnings was 10 per cent or more in 9 of the countries and 20 per cent or more in 6 of the countries.

15. Information on changes in the current account as a whole between 1960 (or the nearest later year for which figures can be obtained) and 1966 may be had for 15 African countries. These changes incorporate changes in merchandise exports and imports; and it is therefore necessary to be doubly cautious in interpreting their significance in the present context. At the very least, however, the fact that the state of the current account deteriorated in 9 of the 15 countries supports the presumption that improvements in earnings from merchandise exports were to some extent offset by increasing deficits on invisible account.

16. In terms of the sectoral contributions to the GDP, agricultural activity in Developing Africa is the most important single form of economic effort. Thus, in 1960 agricultural activity contributed almost 40 per cent of the GDP of Developing Africa as a whole; and between 1960 and 1966 value-added by agriculture increased at an average annual rate of 1.3 per cent per annum. This compared with a corresponding increase in GDP of 3.4 per cent and was the only sectoral rate of growth to be less than 2 per cent. Among the sub-regions the 1960 weight of agriculture ranged from 32 per cent in North Africa to 57 per cent in West Africa, and the rates of agricultural increase were lower than those of total GDP except in Central Africa. In that sub-region, however, both GDP and agriculture grew by less than 1 per cent per annum. In North Africa, where value-added by agriculture actually declined and West Africa, the agricultural increases were the lowest recorded among the eight sectors; and in East Africa only mining and construction - with very modest 1960 weights - recorded lower rates than agriculture. It may, therefore, be concluded that higher rates of agricultural growth would have done much to raise the levels of GDP and, therefore, GDP per capita; and a quick measure of the extent to which this is so may be provided by the observation that if agriculture in Developing Africa as a whole had increased at the same rate as total GDP then the corresponding rate of growth of GDP per head would have been 70 per cent higher than in fact it was.

17. The fact that agricultural output generally grew more slowly than GDP means, of course, that the rate of growth of the other sectors combined must have grown more rapidly. Mention has already been made of transport and public administration; and it should now be noted that in Developing Africa as a whole value-added by mining activities increased by 13.4 per cent per annum between 1960 and 1966 - and was thus the fastest-growing

sector - and that the net contribution of manufacturing activity increased by 4.2 per cent per annum. The rapid increase in mining owed, of course, a great deal to petroleum and, to a lesser extent, iron ore; and the expansion of petroleum output in North Africa was reflected in a rate of growth of mineral production of 28 per cent each year, while, because of petroleum in Nigeria and iron ore in Mauritania and Liberia, the corresponding increase in West Africa was more than 9 per cent. In East and Central Africa mining activity was relatively stagnant.

18. Apart from Central Africa (where sub-regional changes were heavily influenced by the special circumstances of Congo, Kinshasa), the value-added by manufacturing increased by about 5 per cent or more per annum in the various sub-regions; and manufacturing was the fastest-growing sector in East Africa. By 1966, however, manufacturing industry was still contributing less than 12 per cent of total GDP. It was also, for the most part, largely concentrated on easily produced consumer goods and a limited range of intermediate goods (mostly building materials). Manufacturing industry normally represents, par excellence, the modern sector of the economy in which technical progress is most heavily embodied and output per head is highest. It is for this reason that for most countries economic development should be seen as a process of industrialization; and it is for this reason also that the Economic Commission for Africa is and has been seeking to promote sub-regional economic co-operation which would enlarge the scope of the market and thus enable more and more viable industries to be established. It has, however, to be remembered that in Developing Africa the majority of the population is still dependent on agriculture for its income; and that significant increases in agricultural productivity and incomes would ipso facto do much to increase the scope for manufacturing industry.

19. It is important in the present discussion not to lose sight of the economic importance of construction, commerce and other services. Taken together these activities contributed 31 per cent of the total GDP in 1960 and between 1960 and 1966 they grew by 3.7, 2.2 and 2.1 per cent respectively. Construction is particularly important since it forms a large constituent part of capital formation; and inadequate capacity in the construction industry can be a serious constraint on development, just as a rapidly growing construction industry can be a modest leading sector with beneficial effects on the employment of local labour and the use of local materials. Nor should commerce and the other service industries be regarded as entirely passive components of economic development - expanding with but not contributing to the growth of the economy. In the early stages of the growth process, commercial activity can provide invaluable entrepreneurial training and supply much-needed capital for industrial development. When all is said and done, however, the pace of economic progress is critically dependent on agriculture and industry (including mining); and due weight must be given to this fact in any consideration of a strategy for economic development in Developing Africa.

20. Discussion thus far has been concerned with a consideration of recent trends in Africa's economic development. These have their implications for human resources development for in the last analys's, an adequate supply of well-trained persons is the basic requirement for development. Because of previous neglect of education and training, developing African countries in their first years of independence - were desperately short of skills; and this shortage was undoubtedly a strong contributing factor to the generally slow ratio of growth. A graphic of somewhat impressionistic measure of the shortage of skills may be obtained by considering enrolment in primary schools. On the basis of the most recent information for 52 African countries and territories, the percentage of the 5 to 14 age group in total population in primary schools was less than 50 in 31 countries; less than 25 in 17 countries; less than 15 in 9 countries; and less than 10 in 6 countries. These figures have evident and disturbing implications for the supply of skilled manpower.

PART II

III. HUMAN RESOURCES FOR DEVELOPMENT

21. The analysis in the preceding section points to Africa's need for far-reaching economic transformation. To this end national development plans are being designed and reformulated to accelerate the pace, and broaden the scope of the transformation process in order to attain higher living standards for all. To achieve this objective, more material and human investment resources are needed and the bulk of these must come from within the continent.

22. Development itself involves the task of mobilizing and rationally utilizing locally available resources. In Africa, human resources constitute an immense valuable investment material which when wisely applied can bring about rapid economic and social development. In fact, as the experience of the advanced and industrially developed countries have shown, it is developed human resources in the form of capacity and skill acquired through education and training, particularly as applied to science and technology, which constitute the prime lever in the process of accelerated development and technological advancement.

23. Africa's total population has been projected to rise from 311 million in 1965 to 352 million by 1970, 400 million by 1975 and 458 million by 1980. Nearly 50 per cent of this huge population will be in the age group 15-60, which is the economically active group. A small proportion of those below the legal working age and of those above 60 years of age will make some limited contributions to national development while some in the working age-groups and a very high proportion of the adult females will not be engaged in gainful employment. The overall economic activity rate has been forecast to fall from 41.1 per cent in 1960 to 39.4 per cent by 1970 and 37.5 per cent by 1980.[2/] The relatively high rate of population

---

5/ ILO African Advisory Committee, Third Session, Employment Policy in Africa, AF.A.C/III/3,p.2;

growth over the next two decades[6] will make the population more youthful and the economically active population would have to support more persons per head than hitherto. Increased population will provide more able-bodied workers to run factory wheels and plough the land.

24. Sheer huge numbers of working pairs of hands and of low-income consumers will not bring about the desired degree of economic and technological transformation of Africa. Population explosion, by injecting millions of mouths to be fed without an equally high rate of economic growth and increase in national income, might result in a vicious cycle of increased poverty serving as a nursery bed for increased population which in turn will make it more difficult for the economy to get into the saddle of accelerated development. What is therefore more important is a rising proportion of the economically active population which is developed through education, training and job experience, particularly in disciplines derived from science and technical education, that can be injected into the economy. In this regard, Africa's apparent advantage of teeming population available for development is dismally deficient in qualitative attributes. Thus both the shortage of trained manpower and the preponderance of underemployed and unemployed unskilled workforce constitute real constraints on national development efforts.

25. Both developed and developing countries are striving to improve the educational profile of their labour force in order to raise productivity. To achieve this objective increasing emphasis is being placed on science and technical education and on the application of scientific knowledge to the process of development. Increasing proportion of national income is being invested by the industrialized countries to facilitate the application of science and technology to development.

26. In the African region the bulk of the labour force is made up of persons without formal education. In Tanzania for example, only 0.1 per cent of the labour force around 1962 had higher education, compared with around 3.8 per cent in Japan and the USSR and 11.9 per cent in the USA.[7] Resources of scientists and engineers constitute less than one-tenth of 1 per cent of the labour force in most African countries. In Nigeria for example, the proportion was only 0.01 per cent in 1959, compared with around 1 per cent in Italy and the United Kingdom, 1.2 per cent in the USSR and 1.7 per cent in the USA.[8] Excepting the United Arab Republic (Egypt) and the Republic of South Africa, a relatively high proportion, ranging from under 30 per cent to over 80 per cent of the limited high-level manpower resources is of foreign origin.[9] Furthermore, the labour force has too thin a veneer of science and technology based disciplines to be able to cope adequately with the technological requirements of modern development, without which the desired transition from traditional to modern economic structures will be difficult to achieve.

6/ Population growth rate has been estimated to rise from the current round 2.4 per cent to 2.6 per cent per annum during the 1970s.

7/ Angus Maddison: The Use of Foreign Training and Skills in Developing Economies, OECD (Mimeographed), Paris 1964, pp. 4-5 Table 1;

8/ Angus Maddison: Foreign Skills and Technical Assistance in Economic Development, OECD, Paris 1965, p 18, Table 1.

9/ Ibid, pp. 19-20.

27. During the period 1960-66 the total gross domestic product (GDP) of Africa as a whole grew at 3.9 per cent annually at a compound rate, while the growth rates in agriculture and manufacturing industry were 1.3 per cent and 4.2 per cent respectively.[10/] Assuming a relatively high overall annual growth rate of 5 per cent in GDP during the 1970s and that agriculture should sustain a growth rate either at par or even higher than the rate of population growth, more employment can be generated to enable a greater proportion of the economically active population to participate in national development. Since some two-thirds or more of the economically active population were employed in agriculture by 1967 and this was in the slowest growing sector, only limited increased overall employment opportunities will be generated in that sector in the near future.

28. The amount of employment potentials that the modern sectors of the economy will generate will depend to a large extent on the capital/labour components of future investments. Past trends in the general level of employment do not however, give much hope for optimism in regard to Africa finding gainfull employment for all her people willing and able to work. With a determined development effort and political stability a slightly rising trend of general level of employment can be anticipated, provided improved income can be derived from Africa's main resources in agriculture and mining and that adequate resources will be available for investment in industry, transport and the services. By contrast, any possible future increase in unemployment levels, especially of unemployment among educated young persons, will accentuate constraints on development efforts.

29. In yet another direction the prospective population increase in the age-group 0-14 will accentuate strains in the deployment of material resources. This age-group which is estimated to account for some 45 per cent of the total population will increase in absolute numbers from some 155 million by 1970 to around 205 million by 1980. These young persons and children would have to be fed, clothed and schooled much better than their predecessors a generation ago. Increased school enrolment at all levels will in particular cause severe strains in public and private financial resources. An increasing proportion of the national income would have to be devoted to providing educational facilities in order to satisfy a major part of the growing demand for education. More teachers, school buildings and teaching aids will be required and these will cost huge sums of money.

30. Increased investment in education, partly prompted by sheer large increases in the school-age population, may in the short run result in a diversion of material resources from alternative more fruitful economic uses. Where sufficient care was not taken to prevent wastage in educational

---

10/ ECA, Annual Economic Survey, 1967, document E/CN.14/409. For Developing Africa, that is, all Africa excluding the Republic of South Africa, Lesotho, Botswana and Swaziland the average annual compound rate of growth in GDP was only 3.4 per cent.

investment, a real economic loss may be sustained and the rate of economic growth may be retarded due to a diversion of resources to that part of the educational programme which fails to contribute fully to national product, even in the form of trained manpower. This particularly concerns investment in primary education where in several African countries between 40 per cent and 50 per cent of the pupils enrolled in the first year class fail to reach the sixth and final year class and school leavers have no vocational skills for the types of jobs available.

IV. MANPOWER REQUIREMENTS FOR DEVELOPMENT AND IMPLICATIONS FOR EDUCATIONAL DEVELOPMENT

31. African countries currently face a manpower crisis. Middle and high-level technical, scientific, professional and managerial skills are in acute short supply, whilst surpluses of unskilled workers abound. In some countries such as Togo and Dahomey the peculiar problem is that of a surplus output of high-level manpower which local economies find difficult to absorb. "Some African countries..... are so short of skills that a good deal of their capital aid receipts are not properly used and their capacity to use larger investment funds is limited".[11] To alleviate the manpower shortages increasing reliance is being placed on the importation of foreign skills through bilateral and labour market arrangements. In 1963 for instance African countries received over 66,600 technical assistance personnel from the OECD member countries alone. Of these some 33,300 were teachers, mainly primary and secondary school teachers.[12] Multilateral technical assistance sources provide several countries with top-level expert personnel for the public service, whilst foreign private investment brings with it top-level management and technical personnel. Notwithstanding the rapid advances in "Africanization" and "localization" over the past decade, African countries continue to rely on external sources for that type and level of skilled manpower which their educational systems have been unable to produce.

32. Manpower requirements for the 1970s would have to be of a higher magnitude in terms of numbers and of more complex "skill mix" in terms of quality, if African countries really mean business with the task of industrialization and agricultural modernization. A better educational profile in the labour force is a necessity for technological progress and structural transformation in African economies.

33. There are no sufficient data on a regional basis to indicate the quantitative magnitude of Africa's future requirements of trained manpower. Hardly more than half the number of independent African countries have thus

11/ Angus Maddison: Foreign Skills and Technical Assistance in Economic Development, op.cit, pp 11-12.

12/ Ibid, pp 21-22 & 92.

far made estimates of their manpower requirements by category, occupational type and economic sectors. However, available data on several countries that have established manpower programmes generally indicate that trained manpower shortages will be experienced over the next decade at the level of skilled operatives and higher, and that shortages at the middle-level will constitute a very severe constraint on development efforts. The following table shows the relative degree of future manpower shortages in a number of African countries.

34. Global data on manpower shortages only reflect the gap between overall future manpower demand and supply. The gap becomes more meaningful and of serious concern when consideration is given to the requirements both for Africanization and for growth in particular occupational fields. The shortage in future supply of teachers, engineers, scientists and technicians is a case in point. In the industrial sector for instance, a United Nations survey has indicated that Africa would require by 1975 an estimated total of 33,000 engineers and scientists and 83,000 technicians. Of these some 31,000 engineers and scientists and 73,000 technicians would have to be trained by 1975.[13/] At the time these estimates were made the scope of industrialization in Africa was only just beginning to be visualized. Allowing for some underestimates in the survey, it is probable that the training requirements by 1980 will be about half as much again as that indicated by the survey.

35. Table 2 shows estimated future manpower requirements for the implementation of proposed industrial programmes in East and West Africa.

36. In qualitative terms, future development programmes will require a labour input of a better skill mix than hitherto necessary. In industry, agriculture, transport, commerce or education, skilled operatives and managers would require better knowledge of the application of science and technology to facilitate their operations. Some new types of skills would be required to cope with resource identification and exploitation; to produce these skills locally new courses would have to be included in educational programmes. Furthermore, if the present socio-cultural and attitudinal restraints on the acceptance of change and innovation are to be eliminated and development attitudes specially fostered, a new orientation in the objective of educational programmes would be needed.

37. African educational systems are equally deficient in qualitative capacity to cope with future manpower requirements. In the East African subregion for example, local higher educational facilities do not provide opportunities for professional and specialized training in many fields essential to rapid economic development.[14/] In West Africa, a number of

13/ Training of National Technical Personnel for Accelerated Industrialization in Developing Countries, United Nations document E/3901/Add.1, pp.26-29.

14/ Trained Manpower Requirements for Accelerated Economic Growth in the East African Sub-region, ECA document E/CN.14/LU/ECOP/9,p.35.

TABLE 1

Future manpower supply/demand situation in selected African countries

Country	Plan period	Additional demand				Additional supply				Net difference (Shortfall (-) Surplus (+))			
		Manpower category			Total	Manpower category			Total	Manpower category			Total
		I	II	III		I	II	III		I	II	III	
Algeria	1966-73	23,000	70,000	-	103,000	5,000	20,000	-	25,000	- 18,000	- 50,000	-	- 68,000
Botswana	1966-91	1,607		NA	NA	970		NA	NA	-637		NA	NA
Cameroon	1966-71	2,652	7,004	16,756	26,412	1,023	5,111	16,211	22,345	- 1,629	- 1,893	- 545	- 4,067
Dahomey	1966-70	914		2,413	3,327	1,500		9,000	10,500	+600		+ 8,100	+ 8,700
Ethiopia	1968-72	7,131	6,515	79,499	93,145	3,640	4,232[a]	NA	NA	- 3,491	NA	NA	NA
Ghana	1963/64-1969/70	12,000		151,500	163,500	9,050		104,100	113,150	- 8,950		-47,400	- 50,350
Ivory Coast	1963/64-1969/70	6,904	14,804		44,991	1,156	3,644	15,249	20,049	- 5,748	- 11,160		- 46,650
Kenya	1964-70	7,300	39,900		26,900	6,600	36,500	3,500	46,600	- 700	- 3,400	- 29,742	- 27,500
Libya	1964-69	5,054		14,357	74,100	1,841		7,171	9,012	- 3,213		- 23,400	- 10,399
Nigeria[b]	1963-68	18,000		44,400	19,411	8,894		15,146	24,040	- 9,106		- 7,186	- 38,360
Somalia	1965-69	853			62,400	481		395	876	- 372		29,254	- 1,615
Sudan	1961/62-1970/71			1,638	2,491		6,549					- 1,243	- 27,313
Tanzania	1964/65-1968/69	7,300			46,600[c]			12,738	19,287	-751			- 2,097
Togo	1966-70	2,905	6,555	39,300	26,722	1,962	5,401	NA	7,363	- 943	- 1,154	- 26,562	- 2,470
Tunisia	1965-68	425	860	17,262	4,155	NA	1,200	5,000	NA		+ 340	NA	+ 26,000
UAR	1965-85	4,500	16,500	2,870	66,500	4,000	12,000	76,500	92,500	- 500	- 4,500	+ 2,130	-1,870,067
Upper Volta	1967-70	634,734	1,409,678	45,500	2,735,317	388,050	214,650	262,550	865,250	-246,684	-1,195,028	+ 31,000	+ 2,014
Zambia	1965-70	134	226	690,905	1,190	170	395	2,639	3,204	+ 36	+ 169	-428,355	- 9,260
		2,000	3,750	830	15,650	650	940	4,800	6,390	- 1,350	- 2,810	+ 1,809	
				9,900								- 5,100	

Sources: Compiled by ECA secretariat from published national development plans and manpower survey reports.

a/ Excluding administrative and clerical.

b/ Upper target - excluding teaching and research staff.

c/ Adde.: 88,000 administrative, clerical all levels.

NA: Not available.

Manpower category:

I - Persons with university education, professional training or equivalent experience.

II - Persons with one to three years' post-secondary education or vocational or technical training.

III - Persons with secondary school education or apprenticeship or craft training.

TABLE 2

Estimated manpower requirements for industrialization programmes in the East and West African sub-region, 1965-1975

(in thousands)

	Sub-region	
	East Africa	West Africa
Senior Management Personnel	34.6	48.7
Engineers and Scientists	7.1	11.7
Technicians	19.0	34.5
Clerical	84.0	120.8
Skilled and semi-skilled operatives	453.5	666.1

Source: Data calculated by ECA secretatiat (estimates subject to further revision as more refined information becomes available on industrial programme proposals).

countries contemplate establishing national or sub-regional iron and steel and chemical plants; but there are no institutional facilities for producing locally African metallurgists, chemical engineers and technologists and their supporting sub-professionals.[15] Even in such obviously essential fields as food science and technology, hydrology and mineralogy local training and research facilities are either limited or non-existing.

38. The faculty and department structure of African universities and thier academic outlook are largely characterized by academic conventionalism and adherence to Western tradition.[16] Notwithstanding the growing emphasis for the production of a greater number of science and technology graduates, the proportion of higher educational students enrolled in scientific and technological courses in Middle Africa fell from 41.6 per cent of the total number of higher educational students in 1960/61 to 36.2 per cent by 1965/66, although the comparative proportion for North Africa rose from 38.4 per cent to 42.9 per cent.[17]

39. Education at both the second and third level is still largely academic in course content and orientation, a preparation for individual intellectual development. There has been little or no attention directed to encouraging the practical application of knowledge to development. Even for technical students practical training is virtually confined to classroom and laboratory conditions and the opportunity for practical training in the real world of industry, agriculture and business is not taken full advantage of. As a result, African educational systems have been producing and continue to produce intellectual elites and persons interested in only high-status white-collar jobs, while the economy suffers from lack of men at the doing level, men willing to apply their acquired knowledge and skills to pioneer development in their own countries.[18]

40. The above analysis of the situation and future trends in manpower requirements in relation to supply prospects, leads to a number of direct and indirect implications for educational development. Some of the more important of these implications are:

- Increased school enrolment at all levels in an effort to produce more trained manpower: this requires more teachers, school buildings, classroom furniture and laboratory equipment, teaching aids, higher wage and maintenance bills, etc.

15/ Trained Manpower Requirements for Accelerated Economic Development in the West African Sub-region, ECAdocument E/CN.14/INR/113, pp.30-33.

16/ See Sir Eric Ashbey's Godkin lectures entitled "African Universities and the Western Tradition".

17/ Trends in Educational Thought and Action: Basis for Future Programme, UNESCO-OAU/CESTA/3, p.13.

18/ F.D. Patterson: Education for African Development (mimeographed), 31pages.

See also ECA "Memorandum on the Value of Practical Training in the Education of Scientific and Technical Personnel in Africa", MPTR/10/68.

- To cope with the shortage of middle and high-level manpower, including skilled operatives, requires substantial expansion in secondary, teacher training and university enrolment. To improve the "skill mix" of the labour force, expanded programmes of science and technical education at both leveles would be required and more resources in teachers, equipment and laboratory facilities would be needed in order to attain the 60 per cent target envisaged by the Addis Ababa Plan and the Tananarive Conference regarding the proportion of higher education students to be enrolled in science and technology by 1980.

- Qualitative improvements in the production of manpower through formal education will involve carricula reform and adaptation to relate school syllabi to the requirements for development; to prepare professional and technical persons for jobs; and to foster an attitude favourable to the acceptance of change and innovation in the process of development.

- Since teachers are the key to qualitative and quantitative improvements in educational programmes, and hence in the local production of trained manpower, expanded programmes of teacher training and of programmes employing modern teaching aids, will be required.

- University institutions might consider assuming new functions or intensifying action on accepted new functions such as those for the production of secondary school teachers, the development of science teaching programmes, and the organization of specialized courses for management personnel as well as for officials directly involved in promoting development action.

- At the primary level the main problem is that of making education more productive in terms of output of school leavers and providing them that type of education which will enable them to contribute to national income. Orientation in primary education objective would have to be in the direction of vocational training and rural education. New corps of rural teachers who will not only teach in the classroom but also demonstrate agricultural practice, impart skills in particular rural crafts and trades and serve as animateurs to the rural communities would have to be developed.

- The above expansion in facilities and qualitative improvements can only be achieved if a higher proportion of the national income, over and above the current average of around 4 per cent, can be made available for educational investment. In the alternative, a measure of overall qualitative improvement and quantitative expansion in the priority fields and levels of education can be achieved if current wastage in the educational pipeline, caused by school drop-out, repeaters and poor quality teaching, can be considerably reduced.

- It will also be necessary to intensify action in the field of educational planning not only to relate educational enrolment to future manpower requirements, but also to ensure that wastage in educational investment is kept to the barest minimum, and where possible, completely eliminated.

V. THE COST OF EDUCATION IN RELATION TO GROWTH TRENDS IN ECONOMIC CAPACITY

41. Over the past decade public expenditure on education has substantially grown in absolute magnitude, accounting for a rising proportion of the national income devoted to human resources development through formal education. This increased investment has been in accordance with the high priority African countries have given to education as a means of fostering economic and social development. For the countries of Middle Africa for example, public expenditure on education over the period 1960/61 to 1965/66 grew at an annual average rate of 11 per cent, nearly threefold the rate of annual increase in gross domestic product. For 23 African countries covered by a recent UNESCO survey, an average of 4.2 of their national income was allocated to educational programmes.[19]

42. In many African countries educational expenditure has already reached a level equal to, or higher than 5 per cent of the gross domestic product and when considered in monetary income, the proportion is much higher, reaching up to over 10 per cent in some cases.[20] In most African countries educational expenditure account for some 15 per cent or more of the public current budget; for some countries the proportion is as high as 30-40 per cent.

43. Annual total public educational expenditure per head of pupils enrolled for first and second level education varied from country to country. Around 1961 it ranged from as low as under US $10 in some countries to as high as over $100 in some others.[21] At the third level per capita annual expenditure on students enrolled is proportionately much higher, depending upon the field of study. The level of this type of expenditure in Makerere University College, by field of study, around 1965 is shown in Table 3.

44. In terms of real unit cost educational investment should be related to the quantity and quality of the final products of each level of the educational system. Unfortunately, data are not available at the time of

19/ UNESCO-OAU/CESTA/3 op. cit., p.14.

20/ The Financing of National Plans of Education, Review of Recent Trends in Expenditures for Education in Africa, UNESCO/AFRIN/5.

21/ Trends in the Financing of Education in Certain African Countries, UNESCO-OAU/CESTA/REF.4, p. 15.

TABLE 3

Annual cost per student enrolled in
Makerere University College, around 1965
(in £ sterling[1/])

Faculty	Arts & Social Science	Agriculture	Education	Science	Fine Arts	Medicine
Department[2/]	260.1	1286.1*	227.5	850.9	524.3	957.2
Faculty	9.0	41.0	35.3	26.6	9.0	48.3
Library.	52.8	52.8	52.8	52.8	52.8	38.9
College Administration .	175.9	175.9	175.9	175.9	175.9	175.9
Amenities	32.9	32.9	32.9	32.9	32.9	32.9
Miscellaneous. . .	6.2	6.2	6.2	6.2	6.2	6.2
Hall.	131.7	131.7	131.7	131.7	131.7	131.7
Total	668.6	1726.6	662.3	1277.0	932.8	1391.0

Source: East Africa Journal (Special Issue), East African Brain Power, August 1965, p.11.

* On income average £88.2 per cent student, thus reading the cost to £1197.9.

1/ Pre-devaluation £ sterling

2/ 90 per cent of departmental expenditure being salaries and emoluments.

writing this paper to demonstrate the heavy cost of producing one unit of trained manpower of a given category of skill capacity. However, as already noted, African educational systems suffer from high school drop-out, repeaters and failures in the final school leaving examinations and from poor quality teaching. In many countries barely up to half of the pupils enrolled in the first year of primary education reach the final year; at the second and third levels the casualities are of a relatively lower order but the amount so wasted on each drop-out is very substantial.

45. Increased educational enrolment during the 1970s, in response partly to manpower demand and partly to increases in the school-age population demanding schooling facilities, will result in a relatively higher order of educational expenditure. Similarly, qualitative improvements in the educational system, better education and status for teachers and increased use of better teaching aids, will lead to increased educational expenditure, both overall and per pupil enrolled. In consequence of these developments a higher proportion of the national income and of public budget would have to be devoted to educational development programmes.

46. The current level of educational investment is causing financial strains in some African economies. It is therefore doubtful whether countries already feeling the heavy weight of educational budget would be in a position to invest a higher proportion of their national income on education. If the present high growth rates in educational enrolment are to be maintained[22] or not to be allowed to drop by any significant margins, then something of the order of 6 per cent or more of the national income would need to be devoted to education. This rate of investment is more than African economies can bear.

47. Table 4 shows projected high and low trends in per capita GDP for Africa over the next decade. Between 1960 and 1966 the total GDP of all Africa grew at a compound rate of 3.9 per cent per annum.[23] The prospects of maintaining, let alone improving on, that level of achievement are not so bright, considering the outcome of the Second UNCTAD Conference and the recurrent political and social instability in most parts of the continent. At best an annual growth of 4.1 per cent in the early 1970s and 4.6 per cent by the late 1970s might be attained. Considering either way, the regional per capita GDP could increase by between $7 and $25 over a period of fifteen years, or between $0.5 and $1.6 per annum.

48. The implications are that the limited growth envisaged in total GDP will not create a sufficiently ample economic capacity for African countries to afford devoting a higher percentage of national income to educational programmes; doing so might be at the risk of starving the economically

---

22/ In the period 1960-65 enrolment at the primary level grew at 4.5 per cent annually;. second level at 7.3 per cent (General Courses at 9.9 per cent) and third level at 10.6 per cent.

23/ The average annual compound rate of growth in the GDP of Developing Africa being only 3.4 per cent. Since 1967 GDP growth rate has been on the downward trend.

productive sectors of the economy of the material means for rapid growth and invariably ultimately making it difficult for these sectors to produce more resources to be deployed to further educational development.

49. If ony a slight increase in the proportion of national income devoted to education can be attained over the next decade, then the expansion and improvement in educational facilities envisaged for the same period can be achieved through either a reduction in the unit cost of education by eliminating avoidable wastage in the system and so raise the productivity of educational investment, or reliance on increased educational aid from bilateral and multilateral sources. The experience gained in the 1960s, however, indicates that the better approach is self-reliance and cost-reducing measures. This could be reinforced by educational investment priorities in terms of the educational and manpower needs for the acceleration of the pace of economic growth. This means concentrating national educational efforts on those levels and types of education that will in the next five to ten years have an immediate contribution to national development efforts, whilst not neglecting other levels and aspects of education.

VI. RECENT DEVELOPMENTS IN EDUCATION AND TRAINING IN INDUSTRIALIZED COUNTRIES: THE LESSONS THEY HOLD FOR AFRICA

50. A false hope often made out to developing countries in an attempt to assist them overcome their manpower shortages is the suggestion that it is unwise and economically inadvisable for them to strive at self-sufficiency in trained manpower as both market forces and aid programmes will ensure a steady supply of specialized foreign skills to assist with the implementation of their development plans. The sad truth is that recruitment from the world labour market will be more competitive and expensive in the years ahead and that present donors of technical assistance personnel will in the future find it equally difficult to cope with their own manpower requirements, let alone that of finding it easy and cheap to generously make available first class manpower to developing countries. These are the facts Africa must face and understand.

51. Take the case of the United Kingdom. In 1963 it provided African countries with 10,380 experts under its technical assistance programmes.[24] In recent years Britain has been scared by the threat of "brain drain", the migration of British scientists, engineers, doctors, nurses and other skilled personnel to the USA and Canada.[25] Furthermore, her desire to get her economic systems to keep pace with world-wide technological revolution has led to an increased concern over the role of British educational systems

---

24/ Angus Maddison: Foreign Skills and Technical Assistance in Economic Development, op. cit. p. 21, Table 2.

25/ James A. Wilson: the Emigration of British Scientists, Minerva, A Review of Science Learning and Policy, Vol. V. No. 1, Autumn 1966, pp 20-29.

TABLE 4

Projected future trends in per capita GDP of Africa[1], 1965-1980
(at 1960 market prices)

		1965	1970	1975	1980
Total GDP (in billion US$)	H	42.45	48.26	58.84	73.64
	L	-	47.18	54.71	65.61
North Africa	H	13.02	13.35	15.48	18.74
	L	-	13.22	13.96	15.79
West Africa	H	8.94	9.87	12.00	15.00
	L	-	9.21	10.27	11.79
East Africa	H	6.15	7.27	8.72	10.76
	L	-	7.06	8.18	9.67
Central Africa	H	2.62	2.81	3.27	3.95
	L	-	2.73	2.93	3.17
Other Africa	H	11.72	14.96	19.37	25.19
	L	-	-	-	-
Total Population (in millions)		310.9	351.7	400.1	457.7
North Africa		74.3	85.8	99.3	115.2
West Africa[2]		97.3	111.2	127.5	147.0
East Africa[2]		72.2	80.5	90.5	102.1
Central Africa		30.7	33.3	36.9	41.5
Other Africa		36.4	40.9	45.9	51.8
Per Capita GDP (in US$)	H	136	137	147	161
	L	-	134	137	143
North Africa	H	175	156	156	163
	L	-	154	140	137
West Africa	H	92	89	94	102
	L	-	83	80	80
East Africa[2]	H	85	90	96	105
	L	-	88	90	95
Central Africa	H	85	84	89	95
	L	-	82	79	76
Other Africa	H	322	366	422	486
	L	-	-	-	-

Source: ECA secretariat

1/ Including the Republic of South Africa.
2/ Including Rwanda.
H: High L: Low

in effectively ensuring an adequate trained manpower supply for sheer economic survival and improvement of living standards. This concern has resulted in sustained efforts to identify and eliminate deficiencies in her educational systems. Important developments in this regard are:[26]

I. Development and application of audio-visual aids and other forms of educational technology to improve the quality of teaching and training. This has included:

(a) more extensive educational broadcasting based on advanced research and the use of high quality personnel;

(b) the use of closed circuit television for schools and universities;

(c) the emergence of an industry for the production and distribution of educational films (extending considerably to industrial training);

(d) the establishment in institutions of higher education of facilities for research and training in technical aids to education. The following illustrations may be cited:

(1) lectureships in television techniques and audiovisual aids such as those at Coventry College of Education and Norwood Technical College;

(2) the University Television Service of the University of Leeds;

(3) the University of Manchester Television Centre;

(e) intensified research and development in programmed learning. Nor is all this left to government alone. Private industry is responding to the challenge to design and produce the required equipment and to participate in programmes as, for example, the lectureship on Television Techniques at the Marconi Company's College and the Universities Closed Circuit Television Programme promoted by Granada Television.

II. The expansion and improvement of teaching in mathematics, science and technology has evoked, for example:

(a) intensive courses for teachers of physics, biology, chemistry and mathematics designed to introduce them to new techniques as well as to bring them up-to-date in their subjects; special opportunities are provided for experiments in order to correct over-emphasis on theory;

(b) investigations into the possibility of introducing into secondary school courses a greater familiarity with engineering concepts and methods;[27]

26/ This country case example is taken from an ECA document, Recent Developments in Education and Training, E/CN.14/WP.6/3 Add. 1, pp.3-8.

27/ See: "Engineering Among the Schools" - a survey by T.G.Page for the Institute of Mechanical Engineering, London, 1965.

(c) the spontaneous emergence of a number of secondary schools in which exploration of advanced theoretical, scientific and technological ideas has been encouraged up to the point of practical experiments;

(d) arrangements for secondary school teachers to gain practical experience and understanding on factory shop floors;

(e) special efforts to economize on expensive facilities required for fifth and sixth form science by the establishment of, for example, in London, a Consortium of Local Education Authorities for the Provision of Science Equipment;

(f) recognition of the need for an adequate cadre of school science inspectors, including the establishment of new departments in teacher training colleges for specialist teachers in science.

III. Particular innovations in university teaching, training and research programmes include:

(a) the increasing insistence on tying theoretical learning more closely to practical application at the post-secondary level. Here the sandwich training course has evolved via the Diploma in Technology into the B.Sc. (Technology). The applied aspects of Chemistry, Physics, Biology and Mathematics have now attained the status of degrees in their own right;

(b) university teaching has been the subject of intense examination and experiment.[28] It seems to be now less satisfactory to regard post-graduate research experience as sufficient to confer pedagogical competence or to align such teaching with the needs of the economy. Not only is insistence being placed more and more on previous industrial experience but specific arrangements are being developed between universities and industrial enterprises to provide this experience. At the same time the possibilities of similar arrangements between universities' departments and government institutions are being either utilized or explored;

(c) the penetration of the university by the business world through the full or part-time appointment of professors from the latter;

(d) the increasing, though sometimes excessive, involvement of university staff in business consultancy and of university laboratories in sponsored research. This growing contact, common in the United States, has led, in the United Kingdom, to the emergence of the industrial liaison officer appointed by universities and other institutions of higher education;

28/ See: Report of the Committee on University Teaching Methods; H.M.S.O., 1964.

(e) the rapid extension of the subject-matter considered proper to university study such as building science and technology, transportation, environmental planning, information science, operations research, etc.;

(f) the re-organization of university departmental structures into schools, e.g. of Materials Science and Technology, of the Earth Sciences, of the Biological Sciences, of Environmental Planning and Engineering;

(g) the widening of the geographical scope of university work through Extension Departments and the concept of the University of the Air, the most notable recent developments being in the United Kingdom, Poland[29] and the Federal Republic of Germany;

(h) the emergence of the combined degree, e.g. engineering with economics or management; economics with sociology or law or management, etc.;

(i) closely associated with this is the rapid development of intensive short courses designed to bring scientists, technologists and managers up-to-date in their subjects. So rapid is the acceleration in the growth of science and technology that it has been claimed that engineers become out-of-date within seven years from graduation;

IV. The establishment of new institutions to define directions and devise the means of accelerating progress. Of these the following may by mentioned:

(a) the National Foundation for Educational Research in England and Wales. Its Constructive Education Project, for example, is a long-term study of the factors influencing the attitudes, behaviour and attainment of pupils in secondary and primary schools;

(b) the Schools Council for the Curriculum and Examinations which, inter alia, promotes research and development in curricula, teaching methods and examinations in primary and secondary schools;

(c) the Investigation into Tests of Academic Aptitude, sponsored by the Committee of Vice-Chancellors and Principals of Institutions of Higher Education;

(d) the National Committee for Audio-Visual Aids in Education;

(e) extensive research into curricula reform supported by the Nuffield Foundation's Science Teaching Project. This work appears to be similar to the more extensive efforts of the National Science Foundation in the USA;

29/ See: Poland's "University of the Air" - New Scientist, 23 June, 1966, page 765.

(f) the National advisory Council on Education for Industry and Commerce whose investigation of Technical College Resources has brought to light serious underutilization of resources.30/

52. Take the case of the Peoples Republic of China. Here higher educational programmes have in recent years been geared to science and engineering, while those in law, humanities and the arts have been downgraded; professional faculties at university level have been expanded and more sub-professional institutions have been established. These developments have been motivated by a desire to provide an appropriate base for rapid industrialization in China.

53. Other developed and rapidly developing countries are equally making advances with educational reform and innovations in a variety of ways in order to make education contribute more effectively to economic and social development, and in particular to facilitate, deepen and broaden the application of science and technology to the process of development. Efforts in this direction include expanded programmes of research and development; use of programmed instruction and teaching by television; university of the air; co-operative arrangements among colleges and universities in joint research programmes, for purchase of equipment and sharing of the best scholars; storing and transmitting of educational information on tapes and microfilms; an all-year-round use of college campus facilities; establishment of technological colleges and universities, etc. These efforts reflect the concern of progressive countries not to be left behind in the race for technological leadership and for a share in world markets.

VII. CONCLUSION

54. If the technologically advanced countries are deeply concerned with doing something positive about the scope, quality and orientation of their educational systems in order to keep their economies buoyant, then African countries must get the cue and act when there is time. If the developed countries are making evolutionary changes in their education and manpower development, then African countries must plan to achieve what should amount to a revolutionary change in the field of human resources development.

55. The need to adopt revolutionary changes in African educational systems has been necessitated by two factors. In the first place, Africa is, by world standards, at the lowest level in the scale of social development: it has one of the world's highest population growth rates; the lowest adult literacy rate; the lowest percentage of the school-age population enrolled in formal education; the world's highest incidence of morbidity and mortality from diseases; the lowest life expectancy rate; in terms of a composite

30/ See: New Scientist. 2 June, 1966, p. 572.

index of the level of human resources development twenty-six of some thirty countries with the least developed human resources are in Africa;[31] and the regional per capita income is only a meagre $137, less than 1/22nd of that of the USA.[32]

56. In the second place, the scope and orientation of the current educational systems are out of alignment with what is needed to bring about the much desired industrial and agricultural revolution and all the structural transformation which facilitates this revolution. In outlook and programme content, Africa's educational programmes are still designed for the production of intellectual elites and a workforce for the maintenance of law and order and for the promotion of commercial exchange with the industrialized world.

57. The effect of the low level of social development in the African region is that economic and social progress has been handicapped by the underdevelopment of Africa's human resources of the type needed for rapid economic growth and social change. To accelerate the pace of economic development and to foster a popular acceptance of innovation and change in the socio-economic framework, education must be development oriented and training must provide the men with the right skill and attitudes needed to bring about technological transformation and higher living standards in the region.

58. The desired changes in the educational system, a process of modernization and reorientation towards preparing the individual more adequately towards coping with the challenge of economic transformation, must be brought about by Africans themselves, not only in initiating changes and determining the content and orientation of educational and training programmes, but also in providing indigenous teachers and the material means to effect planned changes. This implies developing education through self-help. This should not be taken to mean that external educational aid is not required; on the contrary, more of it will be needed to support local efforts.

59. Many African countries with limited material and human resources will find it more difficult to achieve the needed break-through in educational and economic revolution should they contemplate to go it all by themselves.

31/ F. Harlison & C.A. Myers: Education, Manpower and Economic Growth: Strategies of Human Resources Development, New York 1964, p. 33. A recent UNCTAD study, using as parameters the levels of income per capita, energy consumption and the structure of trade and production showed that Africa contains 21 of the 27 least developed countries in the world.

32/ When the Republic of South Africa, Lesotho, Botswana and Swaziland are excluded the per capita income for Developing Africa drops to only $112 or about 1/27th of that of the USA.

They can, however, achieve greater strength and wider scope for the education and training of their nationals if they team up with their neighbours. In this regard, intra-African collaboration in developing and utilizing specialized educational facilities for training and research on sub-regional, regional or multi national basis is an economic necessity. The provision of certain types and levels of educational and research facilities designed to foster technological revolution in the region should be conceived and developed within the framework of African co-operation.