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REVITALIZING AFRICAN INSTITUTIONS OF HIGHER LEARNING FOR LONG-TERM DEVELOPMENT

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I INTRODUCTION

1. Higher education in African countries has taken the full brunt of the socio-economic crisis. The application of structural adjustment programmes in the education sector has also contributed to the contraction of enrolment and programmes, and to a drop in quality in institutions of higher learning. Policies for the development of the education sector have openly advocated for the diversion of resources away from higher education to provide greater support to the basic and primary education sector. ECA has consistently argued forcefully against such policies on the grounds that the issue was not so much either basic or tertiary education, but, given Africa's development priorities and objective needs, rather, basic and tertiary education.

2. This argument is based on the fact that the spread of literacy in society is as important for Africa's development as is the build-up and strengthening of the middle and high-level manpower base. And as basic education is an important vehicle for propagating literacy, so also is higher education the only means of developing middle and high level manpower. Therefore, Africa's development requirement allows no choice between one and the other. If the constraints on according equal priority to this two-pronged attack on problems of development in Africa are financial, then the expenditure switches should not be made within the sector, but rather be made between sectors. The AAF-SAP's1/ recommendations on expenditure switches have advocated a diversion of resources from the less productive or unproductive sectors such as defence, to the more crucial ones such as education. UNDP's Human Development Report2/ also strongly supports this position.

3. This background is important for situating the problems of Africa's higher education institutions within the context of the confusion over competing priorities that has afflicted Africa's resource allocation policies and blurred visions of what public investment should give priority to for long-term structural transformation and sustained and sustainable development to take root on the African continent. Fortunately, with the growing awareness of the centrality of man in the development process, policy-makers are becoming more mindful of the need to

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1/UNECA, African Alternative Framework to Structural Adjustment, Addis Ababa, 1989.

2/UNDP, Human Development Report, New York, 1990, 1991.

develop his capacities and capabilities to chart his own development path and be better placed to solve the social and economic development problems that surround him. This need cannot be met without a significant strengthening of Africa's higher education institutions so that they are able to provide the development factor inputs of entrepreneurship, management capacity, scientific and technological skilled manpower, etc.

4. At present, the imbalances in higher education for development are many: the bias of programmes offered in institutions of higher learning does not minor the expressed priorities of development in that it gives less weight to the critical fields of science, technology, agriculture, medicine, engineering and management; access to higher education is still too limited to achieve the minimum spread necessary to ensure that development is internalized and sustained within society; higher education is itself too dependent on external sources for teaching and research resources, and for the origination of knowledge and know-how; research, especially applied research is at too low a level to contribute in any meaningful way to the search for solutions to Africa's development problems; and the interface between university and the community at large is far from being adequate.

5. This paper examines these issues with a view to suggesting how policy formulation and implementation for the higher education sector could be oriented towards revitalizing the institutions of higher learning so that they are able to

contribute more effectively towards Africa's socio-economic transformation and development.

II PROBLEMS OF HIGHER EDUCATION IN THE SOCIO ECONOMIC TRANSFORMATION AND DEVELOPMENT OF AFRICA

6. At present, African higher education is plagued with a host of problems which act as a constraining factor in its relevance to needs of development. These problems are structural, infrastructural, financial and qualitative in nature. They also stem in part from ownership and governance as well as from economies of scale.

(a) The Structure of Higher Education

7. There is a certain amount of irrelevance in Africa's higher education vis-a-vis Africa's development priorities. Course offerings are still heavily biased in favour of the liberal arts as opposed to science, engineering, agriculture, medicine and management which are the fields which are critical to socio-economic development in Africa. Table 1 and figure 1, show higher education enrolment for 34 countries in Africa by major subjects in the 1986/87 period. Liberal arts (that is, humanities, law and social sciences) courses account, on average, for about one third of total enrolment. This contrasts with agricultural sciences -- one of the major priority areas in Africa -- whose average enrolment is only 6.32 per cent. Only five countries (Angola, Guinea, Kenya, Mozambique and Tanzania) have enrolment in scientific and technical subjects in excess of 50 per cent. Seven others have enrolment in scientific subjects of, at least, 40 per cent.

8. The share of commercial and management related courses is also very low. Only Liberia at 40 per cent has the highest enrolment in this category of courses. Looked at from a broad classification, higher education in Africa in the 1980s had 60 per cent of its enrolment devoted to courses in liberal arts and 40 per cent to scientific subjects. This ratio is about the same as in the early 1960s when the need for government public administrators and for indigenizing the public service was of high priority.

9. Of late, however, the development priority has shifted, placing emphasis on scientific and technical skills. But the structure of higher education does not seem to have changed to reflect these new priorities. If this trend continues, it is difficult to see how the objectives of AAF-SAP (of human centred development by alleviating poverty and raising welfare of the people; establishing self-sustaining process of economic-growth and development; and increasing national and regional integration so as to attain self-reliance) and the Lagos Plan of Action, could be achieved.

10. Education for its own sake, is a luxury Africa can ill afford. Higher education in Africa should produce skills and knowledge that can be used more effectively to solve some of the region's development problems. In the recent past, problems of desertification and frequent droughts have afflicted many countries in the continent. Yet, only few African countries offer courses in hydrology, water resources and irrigation engineering.3/

3/See ECA, "Africa's Socio-Economic Crisis: The Challenge to Institutions of Higher Learning" E/ECA/AAU/ED/85/8, Paper Presented to the Second Conference of Vice-

Table 1 Higher Education in Africa: Distribution by Major Subject and Share Percentage Changes in the 1980s.

		.....Per Cent Share.....				... % Change from 1980 ...			
COUNTRY	YEAR	EDUC%	LIB%	COMM%	SCI%	EDCH%	LIBCH%	COMMCH%	SCICH%
Algeria	1986	13.59	19.89	2.04	41.09	424.4	-48.4	95.2	-28.8
Angola	1986	1.50	34.33	n/a	64.17	-58.1	-18.6	n/a	18.3
Benin	1986	4.85	67.17	2.86	25.12	-65.3	41.9	-76.4	-5.5
Botswana	1987	20.04	44.48	24.12	10.82	-20.8	-0.3	210.9	-51.5
Burkina Faso	1986	0.77	50.15	15.62	33.46	n/a	-14.6	71.5	100.1
Burundi	1987	15.98	35.09	10.66	36.10	85.4	-38.5	506.7	16.3
CAR	1987	4.36	58.50	13.65	23.71	-66.6	13.1	-23.6	36.3
Congo	1986	12.91	68.01	n/a	15.55	-41.5	20.7	-100.0	-14.6
Ivory Coast	1986	25.67	38.38	3.69	32.27	41.4	-21.3	-31.6	19.7
Egypt	1986	14.38	31.34	24.09	28.72	17.4	11.1	19.7	-18.2
Ethiopia	1987	19.42	16.15	26.53	37.90	58.2	-48.1	n/a	-33.1
Ghana	1986	3.71	34.03	16.13	42.22	18.5	-20.1	87.9	-7.5
Guinea	1987	4.71	17.52	n/a	77.76	-64.2	n/a	-100.0	8.6
Kenya	1986	25.72	8.56	9.53	56.20	-6.6	-60.1	39.1	27.3
Lesotho	1987	77.69	9.33	8.05	4.94	34.1	-47.5	-36.9	-57.2
Liberia	1987	7.62	13.19	40.02	39.06	0.9	222.4	58.0	18.2
Madagascar	1987	3.00	20.73	n/a	43.36	147.1	-59.0	-100.0	7.6
Malawi	1987	56.87	8.32	7.34	27.47	291.7	-32.1	-56.1	-19.3
Mali	1986	27.80	7.98	22.36	41.85	-29.7	-59.2	38.6	71.6
Mauritius	1987	44.75	5.60	11.58	36.50	-18.2	7.7	-22.5	45.2
Morocco	1987	4.64	51.09	5.50	37.10	807.2	-33.7	n/a	65.8
Mozambique	1987	22.74	16.49	n/a	60.77	60.1	-57.5	n/a	29.3
Niger	1986	8.80	61.59	n/a	29.61	-54.1	66.1	n/a	-44.8
Nigeria	1986	15.18	33.71	5.29	43.27	-6.4	-0.6	-7.1	6.0
Rwanda	1986	9.46	40.66	13.41	36.47	-37.4	-19.3	n/a	8.7
Senegal	1987	2.37	53.34	2.12	40.35	-52.6	-5.0	-62.8	23.5
Somalia	1986	48.10	18.48	5.47	25.87	34.1	94.8	-45.7	-42.0
Sudan	1986	4.08	67.15	2.11	26.66	54.7	49.5	-91.0	4.9
Swaziland	1986	4.11	37.39	23.04	35.45	-82.6	213.0	-2.9	-13.0
Togo	1987	2.50	46.28	21.38	29.84	-65.5	-13.8	2644.5	-9.6
Tunisia	1987	6.10	42.50	11.04	40.37	-11.0	54.1	-42.6	-12.9
Uganda	1986	24.36	16.26	23.04	32.82	174.9	-44.9	44.8	-28.2
Tanzania	1987	12.68	17.12	7.83	61.56	-48.9	-8.1	40.5	20.7
Zambia	1986	26.62	22.69	7.61	39.04	-11.5	45.5	-59.8	10.3

Source: UNESCO, 1989 Statistical Yearbook

Chancellors... op. cit. p. 12.

11. At present, Africa has the lowest number of scientists and engineers engaged in R & D per million inhabitants. Fig. 2 shows that Africa's stocks of scientists and engineers was 2,593 and 3,451 in 1980 and 1985, respectively, much lower than the average for developing countries at 6,272 and 8,263; Asia at 8,944 and 11,686; Latin America at 9,754 and 11,759; etc. With such a low endowment of scientists and engineers, Africa's ability to use science and technology in the service of development is very much limited.

12. On the other hand, figure 1 shows the projected post-graduate enrolment by field of engineering for the period 1981/82 to 1989/90.4/ While these figures are indicative of the trend, it would, by all accounts, seem that the actual enrolment and numbers of graduates in post-graduate engineering has been low in Africa in the 1980s. There is a clear need for intensifying engineering training at post-graduate level so as to increase the technical skill base necessary for socio-economic transformation.

13. Another problem of African higher education is that of limited access. Table 3 shows that only 2 per cent of the total enrolment in the entire educational system is in higher education. The percentage share of higher education in Africa compares very unfavourable with Asia at 4 per cent; Latin America and the Caribbean 7 per cent and Oceania at 11 per cent.5/ Such low access to higher education, does not allow for the type of spread of middle- and high- level skills that would ensure that development is internalized and sustained within African economies.

14. Teaching materials, especially books, and the quality and dedication of staff are crucially important to the quality of education. Unfortunately, the resource cuts in the eduction sector have made access to teaching materials difficult for student and institution alike. Teachers have been demoralized and demotivated by their low salaries and poor working conditions. Many have turned to secondary jobs to supplement their meagre incomes, thus neglecting their

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4/Derived from UNESCO, African Network of Scientific and Technological Institutions, Nairobi.

5/See UNESCO, 1989 Statistical Yearbook, table 2.2.

teaching and research responsibilities. This situation has led to dramatic drops in the quality of higher education in Africa. UNESCO reports that in one African university, under the prevailing conditions of work and study observed, more than 20 years would be needed to produce graduates from a first-degree course theoretically lasting 4 years.[6]

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[6]UNESCO: "Educational strategies for the 1990s in Africa...", Paper presented to the Sixth Conference of Ministers of Education and Those Responsible for Economic Planning in Africa. Dakar, Senegal, July 1991.

Figure 1

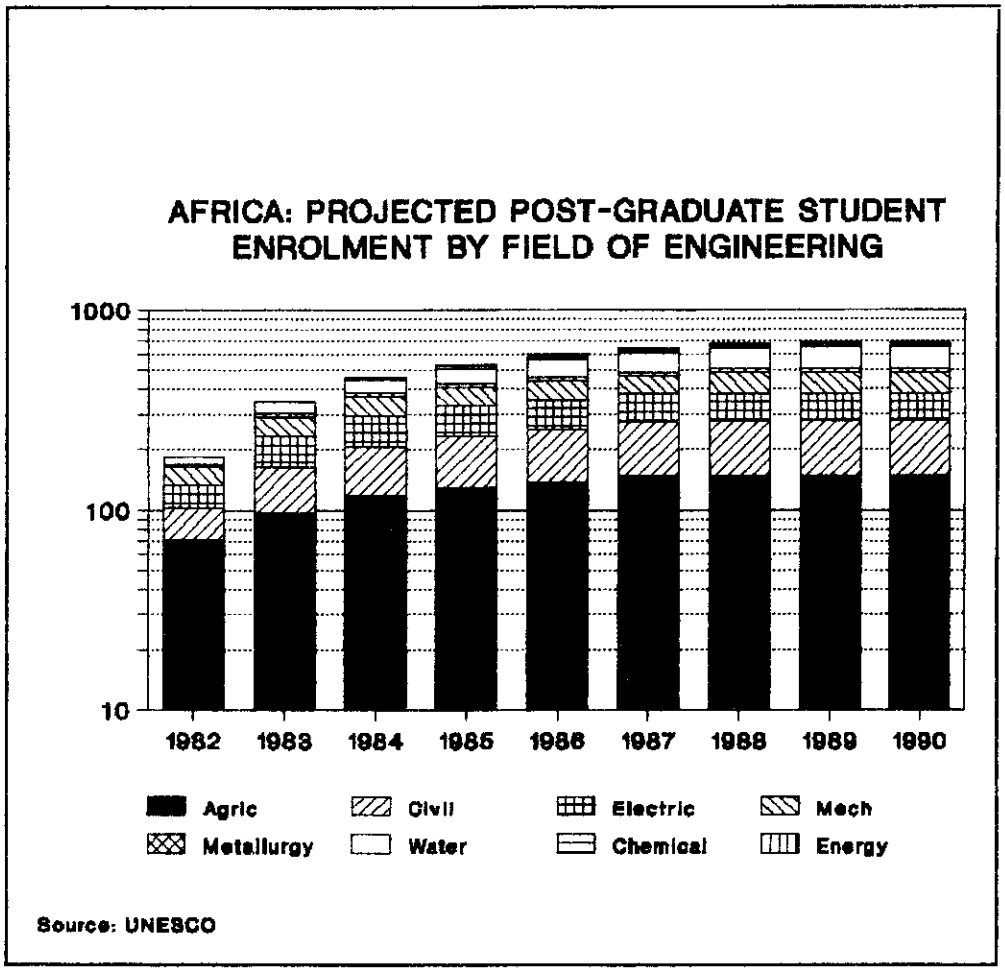
AFRICA: PROJECTED POST-GRADUATE STUDENT ENROLMENT BY FIELD OF ENGINEERING
1000
100
10
1982
1983
1984
1985
1986
1987
1988
1989
1990
Agric
Civil
Electric
Mech
Metallurgy
Water
Chemical
Energy
Source: UNESCO

Table 3 Estimated Enrolment ('000) by Level of Education in Africa, 1965-1987.

YEAR	TOTAL	LEVEL1	PER CENT	LEVEL2	PER CENT	LEVEL3	PER CENT
1965	29520	26181	89.0	3028	10.0	311	1.0
1970	38808	33444	86.0	4885	13.0	479	1.0
1975	48849	40227	82.0	7804	16.0	818	2.0
1980	74292	59182	80.0	13715	18.0	1396	2.0
1985	86922	65679	76.0	19358	22.0	1885	2.0
1987	91034	68321	75.0	20650	23.0	2063	2.0

Source: UNESCO, 1989 Statistical Yearbook, table 2.2

(b) Higher Education and Agricultural Development

15. Attaining food self-sufficiency is of topmost priority to African governments. Yet higher education has not been too responsive in support of this priority. Enrolment in agriculture and related disciplines is extremely low and applied research in agriculture is woefully inadequate although some countries have increased their applied research. This is the case in Ghana (Legon), Ibadan, Tanzania (Sokoine), Zambia and Zimbabwe. In some cases, research has led to improved agricultural practices, marketing or seed varieties. However, research on Africa's food security problems, rural industrialization, agricultural productivity, improving extension services, etc. has yet to be undertaken, on a broader scale, by higher education institutions.

16. The range and intensity of research activities in African institutions of higher learning is insufficient to unravel all the problems confronting Africa's food and agricultural production. Very little is being done in the area of climatology, meteorology and related disciplines to help the African decision-maker and farmer better understand what to expect from the weather and other climatic conditions in order to guide their decisions on agricultural production.

With the exception of the University of Zimbabwe, which has an on-going research programme in irrigation, hardly anything else exists in African universities to suggest that research activities are concerned with water problems in the continent.

17. Generally, research programmes have, for the most part, not addressed themselves to food security problems of the continent or to the questions of agricultural settlement, rural industrialization and productivity, research results ave not trickled down to benefit the farmer.[7] Furthermore, research, teaching and learning in African institutions of higher learning continue to be carried out in isolation of the needs of the community, to the extent that third level educational institutions have not adequately established functional linkages between themselves and policy-makers, practitioners and clients such as farmers, planners, investors, entrepreneurs, etc.

(c) Reduced Expenditure on Higher Education and the Problems of Brain Drain

17. The economic problems of the 1980s which necessitated the adoption of structural adjustment programmes in many African countries caused a reduction in overall public expenditure. Figure 3 shows that while a few African countries managed to increase public expenditure (at current prices) on higher education, the amount of resources, in real terms devoted to higher education declined over the decade.

18. The fall in real wages, inadequate facilities, falling standards of living and political problems have contributed to a significant out-migration of university teachers and researchers to the developed countries or elsewhere in the world where conditions are much better than those which obtain in Africa. The 1990 African Employment Report by JASPA estimates that real wages have been falling at an average annual rate of about 10 per cent since 1980. It therefore comes as no surprise that the number of high- and middle- level professional Africans that migrated out of the region increased from about 40,000 in 1985 to about 70,000

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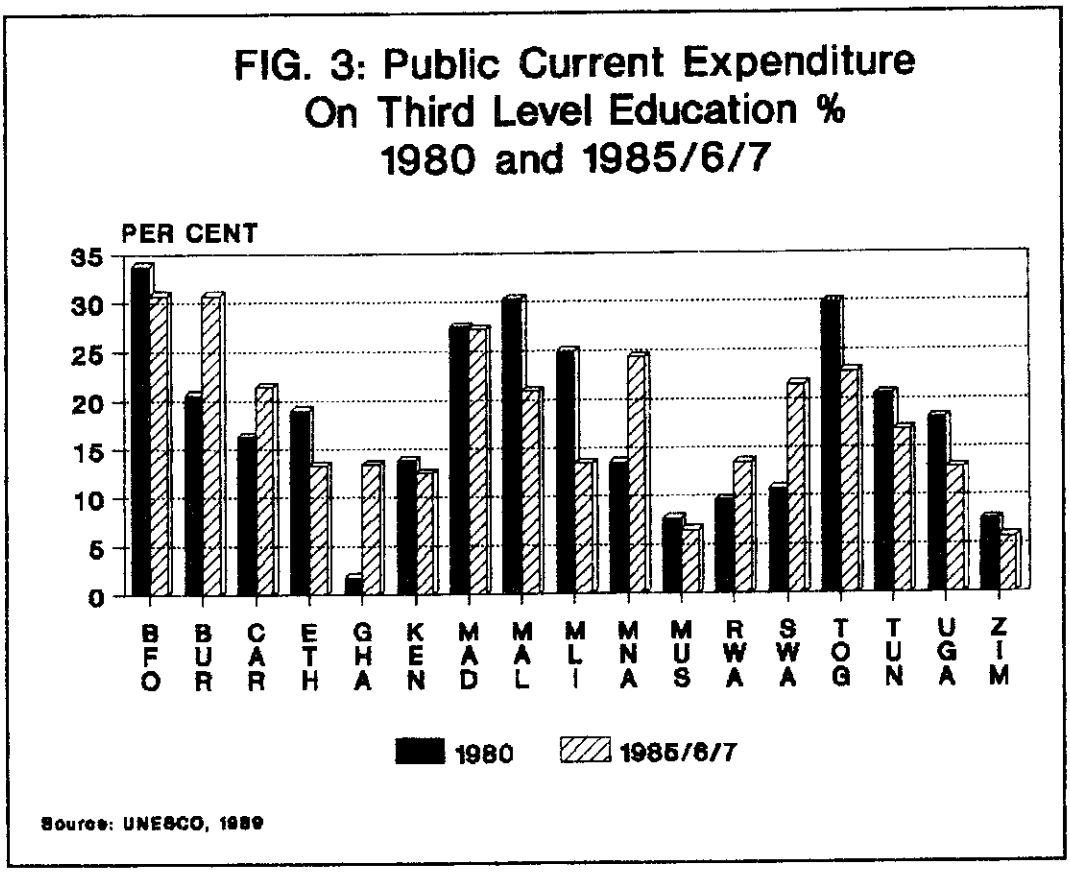
[7]OAU/ECA/FAO: "Report on the Food Situation in Africa", Addis Ababa, 1984.

by mid-1987.[8] Many of these migrants are higher education teachers and researchers.

[8]See Crispin Grey-Johnson, "An Enabling Environment to Retain Africa's High-Level Manpower", in Adedeji et al (ed) The Human Dimension of Africa's Persistent Economic Crisis, Hans Zel, London, 1990.



19. The main consequence of reduced expenditure on higher education, coupled with the brain drain is the poor quality of graduating students. The widespread shortage of books, up-to-date journals and magazines, laboratory equipment and other resources necessary to conduct scientific research, poor quality of teaching and researching staff, etc. combine to compound the problem.

What this does is to further erode the skills base and make it difficult for Africa to be in a position to implement its policies of socio-economic transformation.

(d) Inter-Institutional Co-operation

20. It goes without saying that African institutions of higher learning cannot, individually, undertake all the manpower development activities required in all sectors of the economy. Some form of regional framework would need to be created within which, through inter-institutional cooperation, intensified action can be taken. A programme of institutional specialization and cooperation in manpower development would help to serve the need. This could amount to sharing the tasks and responsibilities among African institutions such that, for example, some institutions would concentrate on the training and education of chemical engineers; some on electro-mechanical engineers; some trainers, etc. This arrangement would ease the pressure on existing institutions to cover all fields with meager resources.

21. At the SADCC sub-regional level, this is already happening in agricultural sciences.

> *To avoid duplication of higher level training in agricultural sciences and to meet the region's human resources development needs, SADCC has agreed to carry out specialized postgraduate training in selected universities. The University of Zimbabwe will specialize in agricultural economics; Sokoine University, Tanzania, in agricultural engineering; University of Malawi, in animal sciences; and the University of Zambia, in crop sciences.*[9]

Similar co-operation and specialization at the post-graduate level is required in other parts of Africa if the inherent problems of high level manpower, especially scientific and technical, are to be solved.

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[9]The World Bank, Sub-Saharan Africa: From Crisis to Sustainable Growth, (Washington, D.C.: World Bank, 1989), p. 155.

III POLICIES FOR REVITALIZING AFRICA'S HIGHER EDUCATION TOWARDS SOCIO-ECONOMIC TRANSFORMATION

22. The institutions of higher learning need an infusion of a new dynamism to reorient them more towards playing a decisive role in Africa's socio-economic transformation and development. As a first step needs that are critical to the proper functioning of any institution have to be met: staff development, building maintenance, student welfare, library acquisitions consumable supplies, basic services such as water and electricity etc. These would inevitably call for greater financial outlays to be made to the institutions. 90-100% of the funding of the institutions is provided by national governments. With the economic crisis, funding levels have dropped to insignificant proportions. A recent study conducted by the Association of African Universities found out that:

> *Even where substantial and sustained increases in the local currency were provided ... at about the middle of the decade (1980s) the funds fell to unacceptably low values in real terms relative to the funds at the beginning of the decade. For example, in 1983/84 the capital funds of Obafemi Awolowo University, Ife, decreased to 6% of the level in 1980/81. Those of Ahmadu Bello University, Zaria fell to 4%. Addis Ababa University dropped to 35% and University of Ghana reached a low of 29% in 1985/86. In some cases, later signs of recovery appeared, but towards the close of the decade, the capital funds remained less than their real worth at the commencement of the decade with the exception of the University of Ghana. Examples are Obafemi Awolowo, Ife, recovering to only 17% in 1988-89, Ahmadu Bello University to 9% in 1986-87, while Addis Ababa University reached 43% in 1987-88"*[10]

23. The study went on to show that in some other cases, although government allocations had increased in nominal terms, in real terms they had dropped

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[10] See AAU, Cost-Effectiveness and Efficiency in African University, Accra, 1990.

dramatically. The example was given of the University of Gezira in the Sudan where there was a three-fold increase in the capital funds from 1979-80 to 1988-

89. The dollar equivalent, however, dropped four-fold from US$3.7 million in 1979/80 to US$1 million in 1984/85 then to a paltry US$7.33 thousand in 1988/89.[11]

24. With these drops in magnitude of funding, the expansion of higher education has been severely constrained, capital development and services have stagnated and research capacity has dropped to about 50 per cent of capacity.[12] Under these conditions, it is difficult for the Universities to play any significant role in Africa's development.

(a) Making Higher-Education Development Oriented

25. To increase food production; reduce poverty; promote regional co-operation; etc., Africa's higher education system will need to reorient its teaching and research programmes to have a bias towards engineering and technical subjects, agricultural sciences, industry, rural and manpower development and the overall management of national economies and the environment. To achieve this, higher education should be more oriented towards problem-solving; encourage multi-disciplinary approaches to problem analysis; increase courses and/or programmes which prepare the students for self-employment, especially in the area of agriculture, by emphasizing the acquisition of entrepreneurial skills; and sensitize both the students and the lecturers to the current problems facing the region.

26. With regard to research, the role of higher institutions should be to integrate research findings from other regions of the world with those from the Africa region so as to enhance the contribution of higher education to socio-

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[11]AAU, op.cit.

[12]See World Bank, Report of a Working Group on Higher Education, Washington, 1991.

economic transformation and development. Institutional co-operation through exchange of teaching materials, research networking, fellowship programmes and setting up specialized post-graduate training centres should be encouraged.

27. Curricula reform is needed as there is very little in African higher education systems that distinguishes them from curricula in developed countries, especially in scientific, technical and engineering disciplines. Yet, any curriculum should be determined by the needs for social, economic and political development of a particular society. The needs, in skills and knowledge, in Africa differ from those in western industrialized countries. Much of the talk on curricular reform in Africa is about the primary and secondary levels, and not so much of the higher education level.

28. A critical bottleneck in the provision of human resources for development is the availability of middle-level manpower: technicians, engineering assistants, agricultural assistants, accounting assistants, middle-level managers, supervisors and foremen, extension officers, nurses and midwives, etc. are all in very short supply within the continent. The accepted ratio of professional to technical staff is one to four or five. The latter constitute the category of manpower that should be produced in colleges/institutes of technology, polytechnics, and other third-level non-university institutions. The demand for these types of manpower is likely to grow as the African economies grow but, with the current situation it is certain that the institutions will be unable to meet the demand. For example, in Nigeria today, the pattern of enrolment in universities and polytechnics would give almost nine professionals to one technician in agriculture; 1.3 professionals to one technician in industry and three medical scientists to one medical technician and other support personnel[13]. Steps should be taken to reverse such technician to professional ratios in all African countries.

29. There are two options: either undertake massive quantitative expansion of institutions' capabilities or devise non-formal skill acquisition programmes. The shortage of capital for expanding higher education will set a limit to the desired growth in enrolment and output. The alternative should thus be on utilizing non-

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[13]Adebayo Adedeji, A Review of Education Policy in Nigeria, 1980-1990, Addis Ababa, January 1991

traditional avenues such as distance learning, skill specific non-formal training programmes, radio, TV or the "university of the air" to accelerate the rate at which middle level manpower is developed. Universities should assist non-university institutions so as to strengthen the latter's ability to produce middle-level manpower needed for development.

30. Other than capital and physical resources, instructional resources in higher education also need to be increased. For disciplines such as medicine, science and engineering, instruction can be of high quality only if laboratories are well equipped. Growth in these disciplines will necessitate growth in instructional materials and equipment. Much of these instructional materials are, however, imported at very high costs. Given the foreign exchange constraints affecting many countries in Africa, there is a clear need for universities to concentrate on research programmes which would help produce instructional materials locally. With industry support, third level education would thus be rendering a service both to itself and to the course of African manpower development.

31. There is also the need for increasing the number of teachers, lecturers, assistants and laboratory technicians. Much of the teaching personnel in institutions of higher learning in Africa are, at present, provided from outside Africa. With growth in enrolment in the future, the demand for instructors will also grow. To reduce dependence on the outside world, African universities will have to initiate relevant programmes as a matter of urgency. Post-graduate programmes in all the disciplines will have to be intensified, as well as teacher training programmes. Recruitment will also have to be made among the large pool of Africans teaching in universities or operating in other economic activities in developed countries. The situation calls for concerted collective action to respond to the need for provision of teaching resources for African third level education.

32. A lot of financial resources for training in Africa comes from external aid sources. This represents an indirect cost to the region because of the astronomical costs involved. The continent would benefit more if assistance in the form of fellowships, scholarships, etc., were converted into direct grants to develop third-level educational, training and research institutions in Africa. The present arrangement simply hands over to Africa a finished product produced elsewhere; it does not give Africa the capability to produce the product. Third-level

institutions should, individually and collectively, put pressure on donor agencies to assist them in strengthening their own capability to produce the human resources Africa needs by utilizing, at least, a part of the sum allocated for training Africans abroad to the development and strengthening of existing institutions in Africa.

33. At the domestic level, resources for manpower training in institutions of higher learning should come from both public and private sectors. More African countries would need to devise realistic fiscal measures that would enable employers of labour and users of services to contribute to the cost of scientific and technological training.

34. Industrial and technological development rely heavily on research and development, a part of which is undertaken by industries themselves. In developed countries, universities are an important agent in the development of industry through their intensive R & D activities. With the present resource constraints in Africa, there is a strong case for universities to begin developing their R & D consultancy capabilities as a means of providing greater service to industry and increasing their own internal earnings. In this regard, there is a great need for inter-institutional cooperation, for harmonization of research programmes and for dissemination of information.

35. Much of the tools available to institutions of higher learning to work will come from governments. These institutions would need the support and confidence of governments to be able to fulfil their responsibilities fully. In many countries, the existing relationship between institutions of higher learning and governments has not been the most conducive to mutual respect and trust.

(b) Improving the Quality of Higher Education

36. The quality of higher education, could be enhanced by increasing expenditure on education so as to enable institutions of higher learning to purchase some of the much needed books, materials, equipment, and to motivate critical staff by increasing their earnings; etc. The problem of relevance could be overcome by making higher education problem-solving through increased interaction with the world of work.

37. Increasing spending on education may sound unrealistic in the context of budgetary constraints which characterize many an African economy. While an absolute increase in total budgetary allocations may prove to be difficult, a change in government priorities could release a significant amount of resources to the educational system. Consider the ratios of military expenditure to health and education expenditure; and soldiers as a per cent of teachers depicted in table 4. Except for Mauritius at 4 times, the other 39 African countries shown in the table spend, at least, 15 times more on the military in the case of Niger to 231 times in Chad, 250 in Ethiopia and 323 in Uganda. As regards soldiers as a per cent of teachers, table 4 shows that Kenya and Mauritius at 10 per cent are the lowest and Ethiopia at 494 and Somalia at 525 per cent are the highest. While the countries with the highest figures are, or have been, experiencing some forms of internal conflicts and/or civil wars, even those countries without such problems seem to spend, on average, more on the military than on education. A reduction of spending on sectors such as defence could release a tremendous amount of resources for use in bolstering the higher education sector.

38. In addition to these expenditure switches, sealing off the sources of foreign exchange leakages such as the huge external debt service payments, exorbitant expatriate salaries and the many illicit transfers by transnational corporation, would contribute greatly to the conservation of resources for much greater support to the higher education sector. While Africa was losing its high-level manpower to the west due to poor conditions at home, 40 countries in Sub-Saharan Africa had an estimated number of about 80,000 expatriate technical personnel at an annual cost of about US$4 billion in 1988.[14] A reduction in the number of such personnel could release a significant amount of resources that could be channelled towards strengthening higher education.

39. To further enhance the quality of higher education, the problem of falling real earnings of academic staff could be resolved through the adoption of non-wage pay incentives which tend to increase the real incomes of vulnerable groups.

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[14]IFAD, Human Resources, Structural Adjustment and the Development of Smallholders and Rural Poor, (Rome: IFAD, 1988).

The provision of low-to-service mortgages, car loans, professional, book, and other such allowances, sabbatical leave, and restricting the use of foreign consultants in preference to local ones, among other measures, could boost the morale and improve the quality of research and teaching in higher education.

40. With regard to external debt, data from the World Bank and UNDP[15] show that external public debt in Sub-Saharan Africa, as a percentage of GNP, rose from 17 per cent in 1970 to 78 per cent in 1987. Debt servicing in 1987 accounted for 20 per cent of exports and interest payments on long-term loans amounted to US$2.5 billion in the same year. If these repayments could be reduced, resources for financing higher education and other priority areas could be generated.

41. The relevance of higher education in Africa could be improved by changing its output structure. The skills needed for Africa's transformation, among others include, veterinary, crop and soil scientists; farm management specialists and agronomists; accountants; management specialists; engineers of all sorts and architects; metallurgists, geologists and mining engineers; telecommunication and electronics experts; and computing and modelling skills. These skills could help to increase, for example, the supply of factor inputs such as entrepreneurial skills; raw and intermediate inputs; and communications and transport networks.

[15]World Bank, Sub-Saharan Africa: From Crisis to Sustainable Growth, op. cit., Statistical Appendix, table 22; and UNDP, Human Development Report 1990, Human Development Indicators, table 19.

Table 4: Military Expenditure Compared to Expenditure on Education and Health

COUNTRY	MILITARY EXPENDTURE % GNP	RATIO OF MILITARY TO EDUC. & HEALTH	ARMS IMPORTS US$MIL	RATIO OF ODA TO MILITARY EXPEND.	SOLDIERS AS % OF TEACHERS	PER CAPITA FOOD PRODN INDEX, 1979/81=100
	1986	1986	1987	1986	1986	1986-88
Niger	0.7	15	10	25.6	22	83
Mali	2.5	64	40	12	38	97
B. Faso	3	88	0	7.7	57	116
S. Leone	1.2	32	0	5.4	20	101
Chad	6	231	100	4.1	233	103
Guinea	3	75	50	3.1	77	93
Somalia	4.4	71	20	7.4	525	100
Mauritania	4.9	62	0	5.5	200	89
Benin	2.3	53	0	5.3	19	110
Burundi	3.5	100	20	4.6	71	100
Mozambique	7	-	120	1.6	73	83
Malawi	2.3	38	0	6.6	31	85
Sudan	5.9	140	50	1.8	88	89
CAR	1.7	26	0	10.7	50	87
Senegal	2.3	40	5	8.3	59	106
Ethiopia	8.6	165	1000	1.4	494	89
Zaire	3	250	30	2.9	17	98
Rwanda	1.9	50	0	6.8	33	82
Angola	12	273	1600	-	165	87
Nigeria	1	56	60	0	30	103
Liberia	2.2	34	10	4.4	55	92
Togo	3.2	45	0	7	36	88
Uganda	4.2	323	40	0.6	30	121
Ghana	0.9	24	10	6.1	14	108
Ivory Coast	1.2	20	0	2.1	13	104
Congo	4.6	66	5	1.4	75	92
Tanzania	3.3	61	110	3.1	42	89
Madagascar	2.4	45	30	4.9	37	97
Cameroon	1.7	49	5	1.4	18	97
Kenya	1.2	20	10	2.8	10	89
Zambia	3.2	49	0	5.5	47	96
Morocco	5.1	74	130	0.6	102	106
Egypt	8.9	153	1500	0.5	168	111
Gabon	3.8	56	0	0.6	83	97
Zimbabwe	5	49	80	0.8	59	81
Lesotho	2.4	47	0	5.9	29	80
Algeria	1.9	23	700	0	71	106
Botswana	2.3	19	0	4.1	38	69
Tunisia	6.2	81	50	0.4	55	111
Libya	12	92	625	-	104	119
Mauritius	0.2	4	0	18.7	10	106

Source: UNDP, 1990 Human Development Report.

42. To achieve this, priority should be given to scientific and technical disciplines. To this end, secondary education which prepares students for higher education needs to be reformed and focused on scientific and technical subjects so as to increase the number of candidates with the potential for scientific training.

43. With regard to food security and famine, agricultural research in general and research on food preservation and storage in particular needs to be intensified so as to combat the problems of persistent food shortages and malnutrition. Increased agricultural production would release the much needed resources through reduced imports of food and agricultural raw and intermediate inputs. The foreign exchange so saved could then be used for other national development priorities.

44. Agricultural research should concentrate on production for local needs with particular attention being paid to crop varieties, reduction of post-harvest losses, soil and water conservation and land tenure systems. There is also the need for research to assist Africa to better understand the causes of drought and desertification, strengthen the region's meteorological and hydrological data base, improve early warning systems for planning and production, determine the correct balance between livestock population sizes and the carrying capacity of the land, especially in the arid and semi- arid areas.

45. Industrial strategies have to be redefined and the necessary inward-looking linkages established so that industrial development does not become an economic and social liability but a true engine of social and economic transformation. Industrial research should therefore address itself, among other things, to establishing an inventory of locally available natural resource inputs for use in industrial production; propose small-scale industries for improving agricultural productivity; re-examine import substitution industries with a view to making them cost-effective, viable and efficient; analysis of factor-proportions suitable for industrialization; undertake R & D that could solve some of the industrialization problems in Africa; develop technological packages such as drought resistant seed varieties, fertilizers, and herbicides so as to increase agricultural yields; and develop industrial consultancy services within higher level education so as to provide assistance to the private and public enterprises.

IV CONCLUSION

46. The institutions of higher learning on the African Continent are going through a period of decline and decay. The causes of this situation are financial at the root. Efforts should therefore be intensified to redress the financial crisis that is threatening to dismantle higher education in Africa. Resource allocation policies have to be reviewed so that the amounts required to render higher education relevant to and effective in meeting development needs could be channelled towards the institutions.

47. The institutions themselves must undertake internal reforms aimed at aligning their curricula, programmes and course contents towards addressing the realities of underdevelopment that surround them. They should also strive to biais their work more towards scientific study and research in order to be able to respond to the continent's industrial and technological development needs.

48. Finally cooperation among African countries should be intensified in the field of higher education in a bid to rationalize the delivery of programmes, avoid waste and achieve greater cost effectiveness. Sub-regional economic groupings such as ECOWAS, ECCAS, etc. may provide the framework within which such cooperation could be developed.