Dist.
LIMITED

PAMM/AAU/ED/7/82
23 December 1981

Original: ENGLISH

ECONOMIC COMMISSION
FOR AFRICA (ECA)

ASSOCIATION OF AFRICAN
UNIVERSITIES (AAU)

Conference of Vice-Chancellors/
Presidents/Rectors of Institutions
of Higher Learning in Africa*

Addis Ababa 25-29 January 1982

ON MAXIMISING THE CONTRIBUTION OF AFRICAN UNIVERSITIES TO NATIONAL DEVELOPMENT

by

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29 October 1981

1/ Organized in collaboration with UNESCO and OAU

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CHUKUKA OKONJO[1/]

" ..... We need the high-level and Tanzanian-oriented professional and qualified personnel that the University has been turning out. We have been well served by the great majority of Dar-es-Salaam University graduates. We have every reason to expect to be well served in the future if academic standards and the struggle against elitism are maintained. But we have to work out what we can do to bring this University into better relation to the economy of our country, and the future development of our society. We have to think in terms of what staff and students can do themselves - for the University of which they are members, and thus for the larger society. I am confident that we will all work together in the search for answers to at least some of the questions I have been raising today. ....."

Mwalimu Julius Nyerere[2/]

1. The Crisis in African University Education

As the African countries pass through their second phase of decolonization which is characterized by their no longer accepting without question alien models of development, the search for appropriate models and alternative strategies of development more in keeping with the cultural identity of the African peoples and more consistent with the social economic cultural and environmental realities of the region has been intensified. No longer accepting that the goal of development is the transformation of their countries into consumer societies, in the image of the developed countries of the world Africans have increasingly recognized that man is the centre-piece of development. Consequently these countries are now directing their efforts towards effecting a development which would result in a kind of society which serves man, enhances his well-being, preserves his dignity and creates conditions, both material and spiritual, which enable man to realise his undoubted potentialities.

1/ The author is Director of the Regional Institute for Population Studies at the University of Ghana an institution sponsored and supported by the United Nations and the Government of the Republic of Ghana. The views expressed here are however not those of the United Nations or of the Government of the Republic of Ghana. They are also not official points of view of the Director of the Regional Institute for Population Studies, but are views personal to the author.

2/ See full text of the speech delivered by the Chancellor of the University of Dar es Salaam, 30 August 1980 p.5.

In keeping with this new goal, the attempts at development are no longer focussed solely on growth in the economic sector, but now have a wider spread, with both the economic sector and education being regarded as leading sectors in the struggle to emancipate African man. For, it is felt, that these two sectors harbour the key to social understanding and social transformation in the sense that changes, brought about by any of them, would result in very deep side-effects all over society. Accordingly African countries have invested sizeable proportions of their national budgets - in some cases up to 40% - on education, with the proportion spent on the universities reaching and exceeding in some places 30% of the national budget on education[1/], and inevitably raising difficult questions of choice between the tertiary and the other rungs of education.[2/]

This massive investment in university and other forms of tertiary education which however still leaves most African countries well behind the developed ones in the proportion of their population that have access to tertiary education[3/], has yielded dividends. For with the professional and qualified people they have been turning out taking over from the colonial administrators and business managers the top and other echelons of the apparatus of the state and the economy, the transition from colonial status to independence has been relatively smooth. And with the state apparatus running smoothly and the rate of economic growth accelerating, it seemed that the administrative and organizational infrastructure for a great leap forward in national development and individual well being had been well and truly laid.

Yet the last few years have seen growing criticism of the universities, as the pace of economic growth has slowed down in response to the unfavourable economic conditions most African countries now face, and as the pressure on places in the universities has increased as a result of the expansion of the primary and secondary school systems, undertaken in the more optimistic decades of the 50s and 60s. Regarded on the one hand as being Western in pattern, elitist in outlook, restrictive in nature, and overemphasising academic research

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1/ To take just one example, this is the case in Tanzania where expenditure on the single university with some 3400 students amounted to 31% of the total budget of the Ministry of National Education.

2/ Various aspects of this problem which has been referred to elsewhere as the educational dilemma of investment in higher education versus primary education, are extensively discussed in the book 'The Education Dilemma. Policy Issues in the 1980s'.

3/ With the exception of Egypt, which has 1368 students per 100000 inhabitants in the tertiary level of education, the number of students per 100000 inhabitants in the African countries in 1977 ranges from a low of 10 in Mozambique to 568 in the Libyan Arab Jamahiriya. 22 out of the 43 African countries listed in the UNESCO 1980 Statistical Yearbook have 100 students per 100000 inhabitants or less, while 15 countries have between 100 to 300 students per 100000 inhabitants. For purposes of comparison most European countries range between 1479 to 2284 students per 100000 inhabitants, while in Canada and the United States the figures are 3548 and 5197 students. See UNESCO 1980 Statistical Yearbook p. 423-431.

not geared to solve local needs and problems on the other the universities arethought of as being insufficiently innovative to have neglected science and technology in favour of the arts and to have ignored the realities of the African situation and not modified their style of operation to suit the more modest financial resources of their sponsoring nations.

Lastly but even more important from the point of view of national development, they are considered on good grounds as not being self-reliant. Still dependent as they are, on the universities of the North, for their academic sustenance they are faulted for not having succeeded in transferring their intellectual power base to their native cultures. In consequence, it it pointed out their graduates are alienated from their societies and reject traditional values like social justice solidarity and cooperation. Internalising, as they do during their stay in university Western values of individualism, meritocracy and consumerism, such graduates exhibit parasitic attitudes believing that because of their education their country owes them a living.

Whils accepting that there are some grounds for criticising their record, the universities have however forcefully pointed out that one of the goals initially set them was that of ensuring the academic equivalent of their degrees with those of their western counterparts. This in turn had implied, in the initial stages of their development that they had had to model themselves on the pattern of the metropolitan universities. And in the circumstances obtaining in the countries at the time of their foundation, the metropolitan universities were the only models that could in practice be adopted. Since then however the universities have gone some way in meeting the needs and solving the problems of their countries.

Directing attention to their bursting classrooms, laboratories, libraries, staff and student accommodation, they argue that university facilities are stretched to the limit in their attempts to expand intakes to meet the increasing demand for places from graduates of the rapidly expanding secondary school system. And the physical constraints have become such that their living in cramped quarters has made students perpetually restive. In consequence their violent outbursts are now accepted as a regular feature of life in the universities.

To remedy this, massive investments in teaching, residential, recreational and other facilities are necessary, which the governments have been unable to provide. Even more serious from the point of view of the universities, is the effect the deteriorating physical conditions are having on their quality of life and instruction. Universities have therefore to worry not only about student turbulence and the resulting disruption of work, but also about the effect of all these on their academic standards.

Moreover as costs have escalated with the world-wide inflation, the real resources made available to the universities have not been able to keep pace with inflation and expansion. One result of this has been that the lack of teaching materials and of finance for research are exposing the universities to the risk of their degenerating into degree factories churning out illiterate and non-numerate graduates and so endangering the academic equivalency which they have achieved at great cost and effort.

In addition, it is not generally appreciated that universities, which are up to world standards imply professors and lecturers with parity of training, work and living standards as their peers in the most advanced countries. Neglect of this fact and the erosion of facilities for work and or of the living standards of university teachers invariably leads to a massive migration of academics from the universities of a country, with devastating effects for the academics life of such countries.

The tremendous demand for university places, they further argue, is dependent on society's valuation of the paper qualifications obtained at the schools and universities and no acceptable alternatives which can secure comparable status and remuneration as the possession of a university degree now exist. Governments could help to change this situation by readjusting the salary structure so that artisans and sub-professionals can depending on their individual abilities and capabilities, earn the highest incomes available now to professionals.

Such a measure, coupled with reduced salary differentials, would set up countervailing forces which would lower the pressure for places in the universities, and leave them free for those who wish to pursue knowledge for its own sake. A continuation of current policy, however, can only lead to an escalation of the qualifications spiral and continued pressure on the universities. This in turn would result in an oversupply of graduates, leading to graduate unemployment as has already happened in the cases of primary and secondary school leavers.

The problems and contradictions outlined here, which have arisen in the course of the development of African universities, are the consequences in the education sector, of a development theory which not only equated modernisation with westernisation but also saw development as the establishment of a western bridgehead in a traditional - read backward - society, with the westernised sector being gradually enlarged until the whole society became westernised.[1/] This prescription for development, whose economic variant is the 'unequal growth' development model using a 'high growth rate with trickle down' strategy has already been faulted on many grounds.[2/] More important, the success of the Chinese and Cuban 'equity with growth' development models has lead to serious search being made for alternative models and strategies of development, within the framework of capitalist or mixed economies.

1/ This formulation should be compared with that of Ronald Dore in his article 'The Future of Formal Education in the Developing Countries' in the book Simons, John (ed.), The Education Dilemma. Policy issues for the Developing Countries in the 1980s., p. 69-76. Persons familiar with Centre-Periphery theory can also compare with benefit Johan Galtung's formulation of the bridgehead concept in his article 'A Structural Theory of Imperialism'.

2/ See for example J. Friedman's article entitled The Crisis of Transition: Critique of Strategies of Crisis Management' in Development and Change Vol. 10. No. 1. January 1979.

The search for an appropriate strategy of development usually now begins with problem identification, which in our case would be that of identifying those needs of a country which must be met for everyone in it to have an acceptable existence and quality of life, while at the same time catering for the long term survival needs of the country. Next follows an itemisation of the resources - including both the natural and human resources - which are available for use towards meeting the projected needs. On the basis of these resources, the surpluses and deficits detected meaningful plans for raising the welfare of society, alleviating its wants and meeeting its needs are devised howbeit in such a manner that the standard of living of no one is allowed to fall below an accepted and prescribed minimum, while the quality of life of each person in the country is enhanced.

Economically the efforts at development are therefore not just directed to increasing the rate of economic growth, and so of the gross national product, without watching the welfare and distributional aspects of growth. They are rather directed towards ensuring growth, with a more even distribution of the benefits of growth, as well as to seeing that the most disadvantaged are helped to achieve the agreed minimum standard of living and that they enjoy an enhanced quality of life. This is supported ideologically through extolling and enthroning values like social justice solidarity and cooperation. Such a strategy is now familiar to you in the form of the Monrovia Strategy for the Economic Development of Africa and the Lagos Plan of Action to implement it.

Can therefore an educational variant of this economic strategy for development be found? Can we create and operate an educational system which not only ensures a minimum basic education for all but also meets the survival needs of our countries in the long-term? Can the education we give be so oriented that it generates more self-knowledge about our countries, and becomes more relevant through curriculum change in the direction of a greater stress on science and technology and their application to solving the problems of living in a difficult environment?

Can we provide an education which is not only cost-effective but also results in increased inventiveness and innovation in society marries work and study and combines knowledge with practice thus making those participating in it useful and ready to give service to the nation? Can we devise an education system which ensures the mass participation of the population and guarantees our catching up with the developed countries within the first 25 years of the 21st century, while at the same time generating self-reliance in the individual and country? Can the universities be restructured so that they can participate meaningfully in this urgent serarch for an education rooted in African self-knowledge and culture and which restores dignity and self-respect to African man?

We venture to suggest that these questions can be answered positively, provided we are prepared to stop thinking of a desirable education system simply as a linear expansion of the system handed down to us. And provided, also, we are willing to dig deep into our cultures take and modernise the forms of cooperation used in the past and adopt them to solve the crucial problems of educational expansion and restructuring at reasonable cost. In addition,

these positive replies are predicated on the assumption that the political will exists to carry through the many reforms that are needed as also to mobilize the people in favour of them. Granted the fulfilment of these conditions we believe that the measures which we outline below can provide the universities with a framework for action in the desired directions of maximizing their contribution to national development.

It is therefore suggested that the universities take action which would lead to the establishment of a more relevant education system and maximise their contribution to national development through:

(i) doubling the intake of students by rearranging the pattern of the academic year and having two intakes of students each year with each intake completing its work for the year in 24 weeks. The opportunity of introducing the double intake-system could also be used to decongest the universities, and restructure the composition of the student body so that there is a bias towards science and technology and their application to the solution of the problems of our living in a harsh environment;

(ii) reorganizing the work schedules of university teachers so that more effective teaching and research can be done, through granting each teacher four weeks of paid annual leave apart from any breaks in the new university year, and instituting a system of rotary research sabbaticals such that each teacher is guaranteed one year free from teaching duties, which can be wholly devoted to research within the country after three years of teaching and research. This provision for a rotatory sabbatical year can be administered flexibly, so that, for example, a teacher so desiring, can take a research sabbatical of one term after three terms of teaching and research or of two terms after $1\frac{1}{2}$ years of teaching and research;

(iii) adopting a work-study method for training their students with students who have completed their year of lecture at the university being set to work in sectors of the economy like the education sector, which are useful for their future training and are critical to national development;

(iv) establishing a consultancy, planning and advisory services in which staff and graduate students can serve and be of use in advising on problems of national development. Further developing in collaboration with Government, business and industry test and research laboratories and centres, around universities, to solve problems raised by the various sectors of industry and business and utilizing

the opportunities which these laboratories offer to increase the graduate component of the student body, such that one out of every three students in the university would be doing postgraduate work.[1/]

If in addition Government would introduce into the pre-university system the condition that each secondary school graduate must undergo one and half to two years of national service after say six years of secondary education, and if this service is undertaken in the basic education level of the education system, then a closed loop system for the transmission of educational values would have been established.

Educational value would thus not just flow upwards from the primary or basic level of education to the secondary and tertiary levels and from there on to the post-doctoral centres of advanced studies, but would as well flow in the reverse direction through university teachers spending their time at centres of advanced studies in their home countries and then going back to teach in their universities; through university students going to teach in secondary schools on a rotatory but continuing basis; and through secondary school graduates participating in teaching at the primary or basic level of education all over a country.

In this way the universities will no longer be isolated and shut off from the life and realities of the nation, but would rather be transformed from being academic ivory towers to becoming crucial links in the circular transmission of educational values in an education system better geared to meet the needs of the nation and the challenges of development.

2. Doubling the throughput of a University Through a Double Intake System

"..... We were in any case dependent on the outside world to get the University started. And we were correct in our determination to aim from the beginning at high standards of scholarship. It is therefore very important that we should not now under-estimate the contribution - to our society as well as the University - which was made by the initiators of the University College, or which has been made by those who have passed through the College or University. I repeat it is in large part their contribution over the years which now enables us to ask ourselves some questions.

We started building in a certain way; we have continued expanding - in the same way. Do we still think we should be doing that? And is there really any other way of expanding the University? ...."

Mwalimu Julius Nyerere

1/ The first measure has been suggested for a United Kingdom University in a study commissioned by the Organization for Economic Cooperation and Development (OECD) based in Paris, see Bottomley et. al. 1972. The first three measured have appeared together in slightly different forms in an article prepared by the author in October 1979 abd dekuvered as an Inter-Faculty lecture at the University of Ghana in January 1980. The fourth measure was also included in an unpublished manuscript submitted to the Academic Planning Committee of the University of Ghana in 1981 See Okonjo1979 and 1980.

While the universities have been fairly successful in training the political and other professioanl manpower needed to replace the old colonial administration and run the country, they have not been so successful in creating the techno-scientific and managerial manpower base required for an expanding economy which meets the needs of every one and guarantees an acceptable quality of life for all. For as the experience of countries with mixed economies which have recently successfully combined accelerated growth with improvement of the incomes of the poor shows, they have engaged in massive accumulation of human capital and skill creation far in excess of current demand, as the second of a sequence of three strategies for accelerating growth.[1/]

The production of the large number of professionals needed to man the techno-scientific and managerial infra-structure, required to support a rapidly expanding economy cannot however be obtained through restructuring the limited number of admissions now being made into the universities in favour of science, technology and business students.[2/] For this would cut drastically into the manpower maintenance training being so successfully carried out by the universities, This goal can best be met by expanding the intake into the universities, and using the opportunity of the increased intake to admit more students into the fields of specialization required.

One major constraint however to an expansion of the intake in this fashion has been the necessity for providing new residential accomodation for the increased number of students and staff, new classrooms, laboratories, lecture halls etc., which require large financial resources, which governments are increasingly unable to provide. The pattern of utilization of university buildings and the way in which most universities organize their work during the year however provide a way out of the current dilemma. Through the more intensive use of university buildings and the re-organization of the academic year, an increase in the intake can be carried out without a massive construction programme of new university buildings.

1/ See Adelman, I., 1975

2/ Two interrelated sets of problems are touched on here - the need to increase the thoroughput of students and the critical fields of study in which output must be considerably increased. This section of the paper provides an answer to the first set of problems but only a partial answer to the second, which is just discussed in a general manner here. A full and adequate answer to the second set of problems that of areas of training, requires a detailed analysis of the manpower situation in a country. It is pertinent however to sound a note of caution about such manpower studies, as they are only too often based on a consideration, on the demand side, of the effective demand for high level manpower of the owners of the means of production. They usually do not consider a country's requirements for high level manpower such that it can meet the minimum needs of every inhabitant as well as the long term needs for survival. What is therefore needed in such studies is not just a maintenance plus approach but rather an anticipatory approach to manpower planning.

Most universities now operate three terms of 10, 11 and 11 weeks respectively or two semesters of 16 weeks each, making a total of 32 weeks in the year. In addition to make up a year of 52 weeks there are three weeks of vacation at Christmas, three at Easter and 14 weeks of long vacation in the three term system, while provision is made in the semester system for two vacations of usually 6 and 14 weeks each. Thus effectively teaching or duties related to teaching do not go on for 20 weeks in the year.

In order to achieve the maximum utilization of the buildings it is proposed that the whole pattern of the academic year be changed so that the long periods in which university buildings are not in use are avoided. In addition it is suggested that two separate student populations be taught in parallel so that teaching and residential accommodation could be used for 48 weeks in the year. By extending the length of the working week student numbers can be doubled within the existing stock of buildings.[1/]

Consider each course that operates a conventional 3 year, 3 terms or 2 semesters system or a 3 year 3 terms or 2 semesters system with one year spent abroad or in industry as is the case with languages like French, or subjects like Pharmacy or Engineering. The course can be translated into the double entry system by dividing the academic year into 4 terms as follows:

First Intake	MICHAELMAS TERM	12 weeks	October-December
	Break	3 days	
	LENT TERM	12 weeks	January-March
	VACATION	1½ weeks	
Second Intake	TRINITY TERM	12 weeks	April-June
	BREAK	3 days	
	LAMASS TERM	12 weeks	July-September
	VACATION	1½ weeks	

Assuming that the academic session consists of 32 weeks with 35 hours a week of possible teaching time being available in a working week of 5 days, then a conventional 3 year, 32 weeks programme or such a programme with a year abroad or in industry has (3 x 32 x 35) hours, that is 3360 hours, available for teaching and examining. If the period in which teaching could be done in the week is extended to 50 hours, the same amount of teaching and examining

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1/ Compare Bottomley et. al., 1972, p. 204-205

could be done in 2 terms of 12 weeks in the new system as (3 years x 2 terms x 12 weeks x 50 hours) or 3600 hours will be available for teaching and examining. It must however be remarked that a working week of 50 hours does not mean that teachers work 50 hours a week but rather that if teaching is confined to 5 days in the week, lectures can be held from 7 a.m. to 7 p.m. on a working day, allowing a 2 hour break for lunch.

Students could thus receive the same amount of teaching per year as in the conventional system, although this teaching is concentrated in a six months period instead of an eight and half months one under the present system. Students have a clear six months away from the university between each year of the course. These six months can be effectively utilised if the student is programmed to work in a field where his knowledge would be useful. Year abroad or sandwich programmes can be completed in $3\frac{1}{2}$ instead of 4 years and if the year out of the university is split such programmes can be completed in 3 years.[1/] The shorter length of time spent at the university implies for governments which meet the bill for higher education a reduction in the cost of student maintenance. There are of course numerous other patterns of double intake which could be adopted. The example described is only just to illustrate the possibilities of the system.

The feasibility of the double intake system has been shown on the assumption that universities actually offer 32 weeks of teaching and examining to their students in a year. A study of the total time available for teaching in many African universities however shows that effectively there are usually only some 25 to 27 weeks of teaching, between five and seven weeks out of the 32 weeks being used for revision and examination. Thus at least 25 weeks of the year there is no teaching.

In effect then in a 3 year degree programme in which there is a working week of 35 hours 2835 hours are available for teaching the courses. A little calculation would show that the same amount of teaching time would be available if teaching is done in 24 weeks with the length of the working week being limited to 40 hours as under such a regime 2880 hours would be available for teaching. It should therefore be easier to switch over under these conditions to the new system, as lectures need only be scheduled each day in a five day week over a period of eight hours, that is from say eight in the morning to 5.30 p.m. in the evening allowing a $1\frac{1}{2}$ hours break for lunch.

By moving over into a year made up of 4 terms of 12 weeks each, the university can admit 2 batches of students yearly with each batch receiving 24 weeks of teaching. Thus if the first batch of students is admitted in October they would go down in March. After a break of $1\frac{1}{2}$ weeks, a new batch of students could then be admitted who in turn will be taught for 24 weeks and go down in September followed by $1\frac{1}{2}$ weeks break. After the break students

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1/ Compare Bottomley et. al., ibid

for their second year, while a new batch of students would be admitted into their first year and so on. Handled this way a university can admit twice the number of students it now admits in any one year without having to construct new residential accommodation, classrooms or laboratories.

Lest we are accused of advocating a lowering of standards, let us hasten to point out that quite a number of the English speaking universities of Eastern and Southern Africa have a 24 weeks teaching year and the equivalence of their degrees is not doubted. Another easy calculation also shows that compressing the material now taught in 27 weeks into 24 does not have any major staff implications since this only results in the average teaching load in a week increasing by 2 hours. Thus if the average teaching load is 10 hours a week under the 27 weeks teaching regime, each teacher would now be required to teach 12 hours a week for 24 weeks without its being necessary to recruit additional staff.

However teaching 2 batches of students each year would mean that teachers would be engaged in teaching, which they have to combine with research 48 weeks of the year. To obviate such an overleading of teachers, it is proposed that the total number of hours taught by each teacher over the year remain the same as under the conventional 32 weeks system assuming that teaching is done in all weeks of this system. A teacher delivering 10 hours of lectures a week would thus be required to do 320 hours of teaching and examining in the year.

Since operation of the new system, which has 48 teaching weeks, would require that a teacher with the same average teaching load would have to do 480 hours under the new system it is clear that in order that a teacher in the new system should do 320 hours of teaching a year, each teacher in the old system will have to be replaced in the new system by $1\frac{1}{2}$ teachers. In other words the teaching staff of the university must be increased by 50%, in order that staff do not have more teaching to do than in the old system.

With such an increase in staffing each teacher would only be required to do 32 weeks of combined teaching and research in a year. Allowing for the 4 weeks in the year, when the university is on short vacations, each teacher would still have 16 weeks in a year at his disposal, which he can utilise both for leave and full time research.

The double intake system makes it possible for the size of the student body to be doubled in three years for universities which have a 3 year degree programme. 1/

1/ The thoroughput of students is doubled as compared with a single intake system whether the students are residential or non-residential. Efficiencies in the operation of a single intake system are carried over into the double intake system and do not affect the relationship between the two thoroughputs as the new system essentially depends on a more efficient utilisation of a year by the university which is familiar in American universities in the form of the two summer semesters. The double intake system does not preclude other methods of training high level manpower like correspondence courses and open universities from being used. The double-intake system can also be fruitfully adopted by other teritiary institutions like polytechnics which run a year similar to that of the universities.

Sicne the need to expand the proportion of students reading the sciences and technology has been acknowledged in all African countries, the rapid expansion of the student body, implied by a doubling of the numbers in three years, offers an opportunity to restructure the student body, without reducing the absolute numbers of students studying the arts. This is achieved through allowing a greater proportion of the extra intake to be admitted to read the sciences and technology, and manipulating their numbers to achieve the desired proportion between the arts, sciences and technology. The actual proportions would of course be arrived at, after a study of the manpower requirements of the nation by the governmental authorities responsible for manpower planning.

3. Cost Effectiveness of the Double Intake System

> "..... Since the University of Dar-es-Salaam was established in 1970 - by which time a great deal of physical investment had been made - Shs. 253.5 million has been spent on capital investment on the three University campuses. That is not very much money, but - even at today's inflated prices - it would finance six four-stream secondary schools, and take two of them to Form 6 level. But to plan is to choose, and we chose to use the money to expand the University.
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> What worries me more than the capital expenditure is the recurrent cost of the University. In 1979/80 it was Shs. 51,584 per student, totalling Shs. 175.384,000! .... Put another way, it costs as much to educate 3400 students at the University as it does to give primary education to 640,000 pupils, ..."
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> Mwalimu Julius Nyerere[1/]

Before discussing the three other measures which with the double intake system, should form the framework of action for the universities to maximise their contributions to national development and the problems that might arise in adopting this framework, two prior questions ought to be answered: First is the double intake system more cost-effective than the single intake system? If the answer to this question is yes, then by what margin and does the margin compensate for the structural dislocations and adjustments which would be necessary if a change over from the single intake to the double intake system is undertaken?

These questions were investigated in respect of the thirteen older universities in the Nigerian university system, which using the single intake system are expected by 1985 to have some 103650 students. The costs of establishing and operating a double intake system with a thoroughput of 207300 students was compared with that of a single intake system with 103650 students

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[1/] See Mwalimu Julius Nyerere op. cit., p. 5

and another with double this thoroughput of students. The results obtained are reported on in detail in the paper attached as an appendix to this paper.[1]

Table 1 of this paper summarizes the results to be found in tables 8, 9 and 10 of the appendix. The results are striking. Thus annual recurrent expenditure incurred for training 207300 students using the double intake system is only 24.3% higher than that incurred in training 103650 students using the single intake system, the estimated expenditures being ₦595 million for the former and ₦478 million for the latter. When 207300 are enrolled, using the single intake system annual recurrent costs rise to ₦920 million or it costs 54.6% more than in the double intake systems. Gross cost per student which is ₦4616 in the single intake model and falls slightly to ₦4437 with double enrolment falls significantly to ₦2869 under the double intake system.

The savings in capital cost are even more striking. No capital costs are imputed for the single intake thoroughput of 103650 students because the facilities are assumed to be already existing. To take on an additional 103650 students which the double intake system allows the university to enrol costs only ₦399 million over and above the capital costs incurred in the single intake system. When however the same 207300 students are enrolled using the single intake system, a sum of ₦3690 million has to be found over and above the capital costs for a single intake of 103650. In other words the double intake system enables a savings of more than ₦3290 million to be made.

In comparison it needs only be mentioned that the total allocation by the Federal Government of Nigeria to education during the Plan Period 1981-1985 is only ₦2200 million, and of this sum ₦1250 million or 56.8% of the total capital investment in this sector is for expanding the universities so that enrolment can be raised from 57542 to 103650 students. The cost saving possibilities inherent in the double intake system therefore makes its implementation attractive, provided of course there are no major problems which are associated with the system and to which no viable solutions can be found. We now turn to discuss the major problems which might arise in implementing the double intake system and the three measures already outlined which are in part solutions to some of the anticipated problems.

1/ The appendix to this paper was prepared by Mr. Osasona in partial fulfilment of the requirements of the Graduate Diploma in Population Studies of the University of Ghana with Dr. S.C. Okoye and myself as supervisors. Mr. Osasona is a Planning Officer in the Nigeria Universities Commission (NUC), who was given leave of absence from his duties at the Commission to undertake the 12 months course of study leading to the Diploma at the Diploma at the Institute. He has since returned to the Commission.

TABLE

SUMMARY OF EXPENSES FOR THE THREE FORMS OF INTAKE

	Single Annual Intake	Double Annual Intake	Single Intake with Double Enrolment	Percentage Increase in expenditure of double annual intake on single intake (%)	Percentage Increase in Expenditure of double enrolment on double intake
Number of Students	103,550	207,300	207,300	100.0	0.0
Number of Teachers	8,851	13,308	17,414	50.2	30.9
Student per Teacher	11.7	15.8	11.9	33.3	-23.7
Direct Teaching Costs ₦	138,454,000	185,345.000	259,283,000 m	34.6	39.1
Teaching Support Costs ₦	6,924,000	9,315,000	12,954,000	34.5	39.2
Research ₦	24,575,000	32,438,000	44,739,000	32.0	37.9
Teaching Cost per Student ₦	1,336	899	1,251	-32.7	39.1
Public Service ₦	14,539,000	19,557,000	27,227,000	34.6	39.1
Library ₦	23,844,000	29,740,000	45,989,000	24,7	54.6
Teaching & Research Equipment ₦	23,844,000	29,740,000	45,989,000	24,7	54.6
Univ. Staff Development ₦	12,700,000	25,400,000	25,400,000	100.0	.0
P.G. Programme Development ₦	5,400,000	10,800,000	10,800,000	100,0	0.0
General Academic Expenditure ₦	4,710,000	5,890,000	9,140,000	25.0	55.2
Total Academic Expenditure ₦	258,501,000	354,485,00	486,781,000	37.1	37.3
Administrative Support Costs ₦	212,321,000	231,509,000	420,945,000	9.0	81.8
Retirement Benefits ₦	4,777,000	5,948,000	9,196,000	24.5	54.6
Grand Total: Recurrent ₦	478,399,000	594,743,000	919,722,000	24.3	54.6
Gross Cost per Student ₦	4,616	2,859	4,437	-37.8	54.7
Capital Expenses [1]	*	398,520,000	3590,000,000		

Note 1 The capital expenses for a thoroughput of 103,650 students admitted through a single intake system have been taken as given. The sums set down as capital expenses in the double intake and double enrolment columns represent capital expenditures which will be incurred over and above that required for the single intake of 103,650 students

4. Increasing the Research Output of University Teachers and Encouraging Post-Graduate Studies

No university teacher works in a social vacuum. Although nobody knows how to make a major intellectual advance simply by planning to do so the atmosphere and environment of a place has something to do with success in such endeavours. While then no one can say exactly how a country should organise its affairs so that it can guarantee to produce a steady stream of new ideas and inventions maintain a high economic standard of living and simultaneously ensure that its citizens are humane and and worthy people at least steps can be taken to so organize affairs so that when the ideas do come the most can be made of them.

A fundamental step in this direction is establishing an adequate system of education and technical training. A second vital step is for the country to possess a reasonable organization for research and development.[1/] We therefore turn to look at research and the possible effects of the introduction of a double intake system on how it is organized and carried out in African universities.

The double intake system reduces vacation time from twenty to only four weeks. Although rest and recuperation can be given each teacher through a judicious planning of the time table of a department which should make it possible for members of staff to go on leave for four weeks in a year the removal of the long vacation which is regarded by many academic as the prime time for research raises problems in respect of the advancement and promotion prospects of university teachers. For one major criterion used by university promotion committees for awarding promotion is that of contribution to knowledge assessed by the number and quality of publications in learned journals or books.

While there could be a trade off between teaching and research, and a government financing a university could insist that its priority is the production of graduates in other words teaching, yet there are so many manifest advantages for teaching and for the development of a country which arise from the large body of highly trained personnel assembled in a university being encouraged to do research that a decision to cut down on research in favour of teaching is one which cannot be taken lightly. In fact the problem in the African universities is not that too much research is being done, but rather that there is too little of it.

Three reasons are usually given for the paucity of the research effort and of publishing. First and foremost has been the lack of money to finance research. A second reason has been the lack of time to investigate

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1/ See Magnus Pyke 'Scientific Discoveries and their Purpose' in Thinking Britain. New Trends in the Arts Science and Technology p. 32-62

problems in depth or to write up work already done. A third reason often offered is that some governments prefer to award research projects to non national experts and as such do not provide the needed facilities for research locally. These reasons point to a failure in the planning, management and organization of research by the universities.

One consequence of this failure is that a considerable number of university teachers feel themselves unable to take on the supervision of post-graduate students. For as such teachers are not conducting enough research on local problems they feel themselves unable to guide others. The result is that the best graduate students available instead of carrying out research in their home countries on local problems are sent to the universities of the North for higher degree work. And as we have pointed out elsewhere this leads to bonds of academic dependence being forged with the consequent dis-orientation of the whole future academic leadership of a country and their diversion from paying attention to researching the urgent problems of their country to working on problems which may be intellectually satisfying but do not have much relevance for their lives of their fellow citizens.[1/]

Under the conventional system of operation teaching and research are expected to go hand in hand. Acceptance of the need to combine both activities does not however preclude the possibility of altering the actual distribution of time between the two or re-organizing the amount of time allocated to each as no justification is usually given for any particular time distribution pattern.

In-depth research and writing up is usually done during the long vacation. Each year therefore a teacher combining teaching and research for the 48 weeks of the double intake system could possibly lose some fourteen weeks of full research time as compared with a teacher operating the current single intake system. This is a three years period would amount to forty-two weeks which combined with his annual leave of four weeks a year almost make up a whole year. In other therefore to restore this possible loss in full research time it is suggested that a system of rotating research sabbaticals for university teachers be established. Each teacher, after three years of continuous combined teaching and research would be allowed one full year of teaching, which would be devoted to conducting research in the country and writing up any work done.

The idea of a year free from teaching which is devoted to research, thinking and reflecting on one's work is familiar to university teachers the form of the sabbatical, which is normally taken after six years of teaching and research. The point that must however be made is that writing up of work initiated during a teaching period cannot wait for six years. Such long waits accustom university teachers to not writing at all, a situation familiar to Appointment and Promotion committees in the plea "I had too much of a teaching load and so had no time to write." It is therefore preferable to have a research sabbatical every fourth year after three years of combined teaching and research.

1/ See Okonjo, C. 1979

Some teachers might even find waiting for three years before going on a sabbatical too long. In that case the provision could be flexibly administered, so that persons not wishing to do the full three years of combined teaching and research, could take their sabatical on a prorata basis. Thus, combined teaching and research for $1\frac{1}{2}$ years would enable an applicant seeking leave to have a 6 months research sabbatical or after 3 terms of teaching and research he would earn one term of research sabbatical leave and so on.

The granting of four weeks of paid leave per annum and the introduction of a year devoted to full time research after three years of comvined teaching and research, which can be administered flexibly on a pro-rata basis, do have implications for staffing. For it means that extra teaching staff has to be found to cover the duties of those who are away on annual leave or on research sabbatical, if the teaching load of those teachers not on leave, is not to be increased. With four weeks of paid leave out of a possible 48 working weeks, the existing teaching staff has to be increased by 4/48 or for every 100 teachers some 108.5 now have to be employed.

Let us now consider the effects of a one-year research sabbatical every fourth year on the augmented staff, on the assumption that the university has a three year degree programme. If one third of the augmented staff go away on sabbatical and we have an equivalent number of teachers recruited from outside to replace those who have left, we can set in motion a rotatory cycle such that each teacher can have a year's research sabbatical after three years of teaching.

This cycle requires an initial running in period and some staff might have to wait for four or even five years before they can go on their first sabbatical. However, if we consider a situation where a steady state has been reached, it means that the augmented staff must be increased by one-third - i.e. $\frac{1}{3}$ of 108.5 = in order to cater for the research sabbatical In other words where the university used to employ 100 teachers, it would now need (108.5 + 36.2 - in order to cater for the research sabbatical. In other words where the university used to employ 100 teachers, it would now need (108.5 + 36.2) teachers, that is some 144.7 teachers.

A similar calculation would show that, if the university is more generous and grants its teachers six, instead of four weeks of annual paid leave and a fourth year research sabattical then for every 100 teaching staff, the university would now have to employ 150. In other words the more generous leave condition does not imply more than a 50% expansion in teaching staff, confirming the results we have already obtained when thinking about the work load of teachers but then from the view point of the teaching load. Each year then a university teacher would have to do 32 weeks of teaching and research, have four to six weeks of paid annual leave, dependent on how generous the university authorities are and would be entitled to from 14 to 16 weeks research sabbatical, which he can accumulate. The implications of this regime for the university is that teaching staff must be increased by no more than 50%.

There are good reasons for re-organizing the work of the staff in the universities in the way that has been suggested. As would have already been observed although university teachers are expected to conduct research no particular time in the year is set aside for research, as it is supposed to be a continuous and on-going activity. Experience however shows that the long vacation when teachers are expected in part to rest and recuperate is also a period when they are expected to conduct intense research. Anyone who has had to run this regime soon recognises what a strenuous effort this involves.

Neither does such an arrangement benefit teachers of subjects like Chemistry and Agriculture who have to carry out experiments for prolonged periods in order to obtain results. They do have to conduct their experiments during term and vacation time. And when they are ready to report their results more often than not they have to do this during term time. Agreed annual leave and a flexible research sabbatical would meet the needs of such and other staff for rest and research.

If the experience of sabbatical years is anything to go by a free year devoted to research and writing by one quarter of the teaching staff would lead to a considerable volume of research being done on local problems. This would especially be the case if the sabbatical is granted subject to the condition that teachers would normally be required to remain within the country during the research year.

The opportunity then of having so many university teachers conducting full time research within the country each year could be used to establish and operate either full time research unversities where teachers can spend their research year or centres of advanced studies under the supervision of the national academy of arts and sciences where teachers can research and reflect. Such institutions would of course have their own core staff and the brighter post-graduate students could also go up to such institutions for further work.

Such an arrangement would almost immediately yield three advantages. Instead of most university teachers migrating to universities of the North for post-doctoral research work, senior academics from the North could be invited down to spend their own sabbaticals and periods of leave in such centres of advanced studies or research universities. Surrounded by local academics, the presence of such a senior academic would not just be an encouragement and stimulus to the odd local academic who would have been considered lucky to secure a place in the visitors laboratory or department, but to the scientific community around Properly organised a local team of scholars could be made to work together with the visiting scholar on an important local problem of interest.

Secondly the bringing together of local academics from the different universities of a country could lead to greater cooperation in research effort and to a cross fertilization of ideas. It would promote the writing of those needed textbooks which have a local background and reflect local problems and conditions and make easier the existence of a virile academic corpus known to other intellectual centres through its research and publications. It would also enable a more rapid accumulation by academics of a country of knowledge about the country which is then stored within

the country which is then stored within the country a matter of some importance since it is now normal to search for background information to local problems in the universities and research centres of the North.

The bringing together on a continuous basis in one or two institutions of a larger number of research workers makes research in the country readily visible - a matter of some importance in securing finance for research in a less developed country. Scientists not being salesmen are usually diffident about pushing their product and so can languish away in their laboratories and research offices without being noticed by the governmental authorities that could allocate funds for research. A centre of advanced studies or a research university or science city is a different proposition. It is a highly visible and prestigious institution whose financial needs cannot be so easily overlooked.

For the more mundane practitioner of research who returns to his university to teach after a year away on research sabbatical this fourth year fits better in the career structure. A teacher recruited at age 24 with a Masters degree as an Assistant Lecturer or one with a Ph.D. at age 28 as Lecturer can hope to move up the academic ladder every four years since he would have had a proper opportunity to do research and publish. He could therefore hope by the time he is 44 to reach the exalted rank of professor. Brighter and harder working people would move up the ladder much faster. As things now stand since research time is not properly organized many academics end up by not doing any worthwhile research at all. The change in the research atmosphere can be easily imagined when an academic realises that he has some 468 weeks in his career at the university which he can fully devote to research.

Equally important such a re-organization of research would give a big filip to post-graduate work in African universities For with research being carried out full time on a rotating basis by one quarter of the teaching staff each year, university teachers would fees themselves more able to take on the supervision of post-graduate students, who are expected to earn their degrees by conducting research and adding to the stock of knowledge.

Forcibly immersed as it were, in a year of intense research and writing after three years of teaching and research, the psychological block which prevents many teachers from taking on research students would be overcome. Increased post-graduate work in African countries would also eliminate the situation whereby these countries use the scarcest resource they have - brain power - to subsidise the more rapid development of the North through African countries sending their best graduate students to the universities of the North for higher degrees and are in effect used as unpaid research assistants. 1/

1/ In support of their case against foreign students at British universities paying higher fees, as was proposed by the Conservative Government of Margaret Thatcher in Britain, opponents of the scheme have argued that Britain benefits by some one hundred million pounds sterling from their research.

If post-graduate work is fully developed African universities can grow their teaching staff. There should then be no difficulty over a three year period, to generate the 50% increase in teaching staff needed to operate the double intake system, without over burdening the current teaching staff. In the interim while the post-graduate students are not yet qualified to be taken on as full fledged teachers, they can be inducted into the system as graduate research or teaching assistants.

In this capacity they would relieve the teachers of some of the tedium of routine work like the marking of essays and set work, the carrying out the demonstrations in laboratories etc. which arise in the instruction of under-graduates. Performance in these duties would also enable the university to better judge the suitability of a post-graduate student for a teaching or research appointment in the university.

5. A Work-Study Programme for Under-graduates

> "The real race is to create within a society like ours developed human beings at a rate equal to the growing management requirements of the infrastructure. There must be enough of them to manage the political institutions, the hospitals, nursing services, entrepreneur demands, research demands et cetera. You just don't have enough of these people."
>
> Michael Manley[1/]
> Prime Minister of Jamaica.

Under the double intake system in which teaching for each intake is concentrated into a six months period, each student is sent down for at least 24 weeks between each year of the course. These six months can be effectively utilized to the benefit of the student and the nation, if the student is programmed to work in an area, there his theoretical knowledge can be applied and where crucial service can be given to the nation. This work done outside the classroom can be guaranteed to become effective work, if the tasks carried out are monitored and assessed as part of the student's work for his degree. This is the case in the leading universities of the developed countries, where sandwich courses and work-study programmes are no longer innovations and have become part of the normal repertoire of instruction.

The work-study method, if properly used would enable study at the university to become more responsive and adaptable to the tasks of development in a country. It would lead to students becoming more task-than-desk oriented and more appreciative of the fact that their country does not owe them a living, and that he who does not work cannot expect to eat. Work-study would thus help to eliminate the parasitic life style of students, whereby they are now wholly maintained by the state and their relatives, at a period when they should have begun, in great measures to take care of themselves.

1/ Manley 1979, XXXI

Implementing work study programmes for under-graduate requires considerable cooperation between a university, government, commerce and industry and necessitates the establishment of a 'STUDENT PLACEMENT AND WORK STUDY MONITORING OFFICE' in the university. This office, in cooperation with commerce and industry and the governmental authorities responsible for manpower planning and for national service matters, would assume responsibility for placing students, keeping track of their performance outside the university and arranging for staff supervision of their work.

Since such work would count as part of their work for their degrees and would be assessed as such, the office would be a department in the Academic Office of a university, and would come under the overall supervision of the chief official of the university - usually called the Deputy Registrar (Academic) or Academic Officer - normally responsible for keeping the academic records of students for admissions and examinations. Although cooperation between commerce and industry, government departments and the university will be necessary, it must be stressed that responsibility for the students and their work will be squarely that of the university which will maintain their work records and supervise their training and assess all these with other tests and examinations as part of their work for the award of their degrees.

The idea put forward here is not new and is already being implemented in various universities. Persons for example training to become teachers, nurses or engineers do have their work outside the classroom assessed for the award of a degree by universities all over the world. The only difference here is that work study would be extended to students like those in agriculture, medicine, the sciences, arts and social sciences etc., who normally would not have undertaken such work-study before.

One advantage which the work-study method has over normal methods of training and which should recommend it to African universities is that it increases the understanding by the students of the material taught in class, since it enables them to see the link between theory and practice. If work-study is then coupled with an arrangement, whereby examinations are conducted in September, during the short break of 1½ weeks for students who have finished lectures for the year in March, and in April for those who complete their year's work in September, examination results should improve. This would be so, for as against the current system in which students are examined three weeks after lectures have ended students would now have a six months period in which to revise, understand and digest the material taught at lectures and would have had the opportunity to relate what they have learnt to practice in the outside world.

Again the system of examining six months after lectures have ended has a decided advantage over the current system in which students are examined three weeks after the end of lectures. As it is, the current system is biased in favour of students with photographic memories or are quick on the uptake, and against those who require much more time to reflect on and assimilate the material, which has been taught. It would also help to eliminate the practice, whereby teachers who find themselves working under a time constraint, concentrate on teaching those portions of the syllabus, on which they have set examination

questions. In fact, a student who monitors the tail end of lectures in an academic session carefully is invariably in a position to guess one or two questions, which appear in the end of year examinations.

One critical area in which university students on work-study can make an immediate impact on and contribution to national development is that of teaching in schools at the secondary level of education. Although most countries now recognize that, for the basic needs of their population to be met and their quality of life to be improved upon, large numbers of educated and trained manpower need to be channelled into rural development to help improve small scale agriculture promote small-scale industry, deliver cheap health care provide adult and continuing education etc., the education system is still geared to maintenance training. That is, it is still geared towards producing the manpower needed to fill the high level posts in the bureaucracy and the professions.

The production of a large number of educated and trained manpower, whose duty it would be to initiate a revolution in the countryside and so in the lives of the majority of the population of a country requires a very broad base of secondary education to provide the educated manpower, These after training in the neeessary skills, can tackle the massive arduous and slow task of helping the rural majority of the population to improve on their current conditions of life not through a violent break with the past but rather through a careful selection, adaptation and application of available techniques appropriate to the environment and the cultural and socio-economic conditions.

The two major problems, which have to be faced in creating a widely expanded secondary level of education are those of providing the expertise required - the teachers to teach - and the financing of the system. With respect to the first problem, in a period where attention has been focussed first on tertiary and then on primary education, the teacher education programmes of most countries have not been designed owing to cost constraints, to produce teachers in the large numbers required to expand the secondary level of education significantly. The result has been that in the African countries enrolment ratios at the secondary level usually do not exceed 30%, and can be as low as 2% as compared with from 70% to 90% in the developed countries of the world.[1/]

Here to double intake system comes in useful. As in this system, a student is free from lectures for at least 24 weeks in the year if the secondary school year, which nowhere runs for longer than 42 weeks is slightly reorganised into two portions each not exceeding 21 weeks each portion could be fitted into the 24 weeks period of lectures of one intake in the university. Secondary school

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1/ In Africa only the Congo, the Libyan Arab Jamahiriya and Reunion can be said to have satisfactory enrolment ratios at the secondary level. For the relevant statistics consult UNESCO 1980 Statistical Yearbook p. 153-215

pupils can then be taught by those students who have completed their year of lectures at the university and should then be engaged in work-study. Two such students, from the two intakes teaching sequentially would cover work in a subject in a secondary school for the year, in other words would provide one man-year of teaching.

Consider for example, the case of Tanzania, where the secondary school enrolment ratio was 4% in 1976 and which now has 3400 students in university. The double intake system would enable in the first place 3400 extra students to be admitted into the university with only around a 25% increase in recurrent expenditure.[1/] If the students are made to teach while away from the university, the two batches of students admitted through the double-intake system could provide Tanzania with 3400 man years of teaching. This would enable enrolment at the secondary school level to be expanded within three years by 102000 pupils, assuming a teacher-pupil ratio of 1:30. If, for purposes of argument, that portion of the output of the university by which the expanded output would exceed current output is employed after graduation solely in teaching, it becomes possible to expand the secondary enrolment by 204000 pupils.[2/]

Since the greater part of the cost of secondary education is attributed to personal emoluments, in terms of the financial costs to Government it is to be noted that the first expansion by 102000 can be carried out at minimal cost, since the teachers - the undergraduates - do not have to be paid for their services. For they are already being maintained for the year by the state and their teaching is reckoned as part of their work for their degree. The second expansion however, which increases the secondary school population by another 10200, does have cost implications. For this expansion would be carried out through requiring one half of the expanded output of graduates made available because of the double-intake system, to take up teaching and these have to be paid graduate salaries.

But if during the initial period of expansion of the secondary school system, secondary schools are encouraged in a spirit of self-reliance, not only to plant their own food but also cash crops, sufficient income can be generated by the school to meet the pay of the graduates who would be directed to teach in the school when payment of salaries to them is due.

1/ Capital costs would also be minimal but their magnitude cannot be quoted here as we do not have the capital cost structure of the University of Dar es Salaam.

2/ In the cases of Nigeria and Ghana where the anticipated single intake into the universities would be 103650 and 10000 respectively by 1985, and therefore the double intakes would be 207300 and 20000, secondary school enrolment can be increased by some 6 million in the case of Nigeria and by 600000 pupils for Ghana, with the quality of the teaching being guaranteed. Such expansions would also require an expansion of the inspectorate branch of the Ministry of Education.

If the cash crops planted by the school are for example crops like sugar cane which require only some 14 to 17 months to mature, then the financial burden on a school and ultimately on government would be minimal having regard to the fact that the costs for constructing the secondary schools would be financed from the money saved by not expanding the university through the single intake system.

In effect by using its already available manpower through a reorganization of the work of the university, Tanzania would be giving itself annually (3400 x $50,000) = $170,000 technical assistance, if the imputed cost for importing a teacher from outside is reckoned at $50,000. This sum is also a measure of the degree of dependence to which Tanzania in this case and African countries, in general would condemn themselves by sticking to the single intake system and not being imaginative enough to pull themselves up by their bootstraps through adapting a double-intake system.

Teaching in a secondary school as explained here is of course only one out of so many possibilities of usefully employing students, who have finished their year of lectures at university. Medical students for example, could work in village dispensaires, which from part of a cheap health care delivery system, while students of agriculture could work with farmers on farms and so on.

6. Changing Over from the Single Intake to the Double Intake System

While the double intake system with its associated rotatory research sabbaticals and work-study for undergraduates has over-riding advantages over the single intake system which make an immediate change-over advisable for African countries, the transition from the single intake system to the new one has to be planned carefully, as a number of problems can be anticipated.

Some of these problems are the recruitment of the 50% additional staff needed to run the system, the provision of housing and office accommodation for the extra staff, the rational use of university teaching staff during the period when the staff position would not have improved, the more complex timetabling and increased record keeping which the new system involves, and the problem of securing increased supplies like food, for students for a 12 months instead of an $8\frac{1}{2}$ months period .

Since however the doubling of the intake would take place over a period of three to four years, depending on whether the university has a three to four year degree structure, the university does have some time to adjust to the anticipated situation.

In this regard it must be observed that from taking a decision to introduce the double intake system and actually implementing it around one year of preparation would be needed. During this period, and in order to enable a change-over from the single intake system to be undertaken smoothly, the following preparatory measures should be effected.

(i) As soon as the decision is taken to introduce the double intake system a full inventory of all rooms in the university and the nature of their use whether for residence, general study service, teaching, research, office space, etc. should be undertaken.

(ii) A space utilisation study of all the rooms thus identified should be carried out. Here attention would be paid to the size of the group, using each space during term time and the purpose of its use. It may well be that with the space identification, and utilization studies, a much more optimal use of space could be organized with classrooms being fitted to the actual size of the classes using them.

(iii) Further a time utilization study of all the spaces identified and available in the university should be organized. In this study, particular attention would need to be given to the time required in preparing laboratories for use, since this could form a critical constraint on the thoroughput of laboratories in subjects like the sciences and engineering. Additional technical support staff might be needed to overcome this constraint.

(iv) A fourth study would have to be mounted on current student study patterns, their use of space and time for study, feeding, library work and recreation.

(v) Because the implementation of a rotatory research sabbatical implies that one quarter of the expanded staff strength will be away in any one year, plans for replacing the teachers taking the rotatory research sabbatical have to be worked out well in advance. Each department of the university would therefore have to be requested to budget for at least four to six graduate teaching assistants yearly, to help with the teaching and other work. Such assistants would work part or full-time for their masters degree with a view to their becoming university teachers and it would normally be out of these cadres that the most capable would be selected to join the staff.

(vi) In order to rationalise the use of staff and not over-burden them, especially at the initial stages of the introduction of the double intake system the structure of all course options offered in the university, should be studied. The aim here would be to identify and eliminate costly course options and to combine basic lectures which are common to groups of subjects like Mathematics, Statistics-Physics and Computer Science or the biological and medical sciences. Thus in the transition period when staff strength is being built up, the many optional subjects, with experience shows are relatively costly to run, would be limited to a minimum. The opportunity of examining the structure of teaching could also be used to revise the curriculum so that it is more in line and keeping with national needs and goals.

(vii) Cognate with the study on the structure of teaching, a study of the number of contact hours each teacher has with students would have to be undertaken. Planning the development of teaching could then be based on the number of contact hours, not on the staff-student ratio which gives poor guidance as to the number of new staff required as student numbers increase. As should be evident now, doubling the number of students does not necessarily lead to a doubling of the the number of staff required, as one would be led to think by the staff-student ratio. For the number of staff required depends on what is being taught, the size of the room being used for the teaching, and of crucial importance, on how the teaching is done, whether through lectures, a seminar, classes, tutorials or laboratories - in other words on the number of contact hours envisaged.

(viii) In conjunction with the contact hours study, a study of the number of hours actually devoted by university teachers to research, university administration and public service would need to be carried out. This would enable the university to have an over-view of the time utilization structure of its teaching and research staff and of the cost structure of the services being rendered by them. It will then be possible, utilizing these figures and other financial records to find out the cost of training a student, capital and maintenance costs, academic teaching costs, research costs, public service costs, administration costs, supporting staff costs, technical staff costs, etc.

(ix) Since the increase in the number of students following the introduction of a double intake system would bring with it more complicated time-tabling, a university would need to purchase or have donated to it a mini-computer for its increased administrative work, record keeping, and the continuous monitoring of student performance as well as of its cost structure. The cost of such a computer is now well within the purchasing power of most universities, as recent developments in computer technology have reduced the price of mini-computers to between $45,000 to $200,000. Universities that cannot afford such a sum could of course have one donated to them by a funding agency.

(x) Also in preparation for the introduction of the double-intake system the academic office of the university through its student placements and work study monitoring section would have to prepare a roster of undergraduates who would still be studying at the time of the introduction of the new system. These will have to be divided into two groups, one to continue their studies with the first group of freshmen under the double intake system, at the beginning of the academic year while the second group of undergraduates would be assigned to work places in areas of critical importance to national development. They would then return, at the end of six months, to the university to continue their studies, with a second intake of freshmen, who have also been placed on work-study, and the system of rotating students between work and the university can then proceed normally.

One other problem which would immediately have to be dealt with, since the main thrust of expansion would be in the sciences and technology, would be how to guarantee a steady supply of good science students for admission to the university. Since the obstacle to increasing the mathematics and science intake has been the lack of laboratories and appropriate equipment as well as qualified science and mathematics teachers in secondary schools, the solution required must have a long- and a short-term component.

In the long term more resources have to be made available for the building of science laboratories, the purchase of science equipment and the training of science and mathematics teachers. Government would therefore have to take into consideration the possible construction and operation of science equipment factories and workshops as a priority element in its development programme, if the volume of science equipment which will be required each year, warrants it. Such a project and the financing of science equipment in the schools at all levels could be paid for through a new tax of say 2% of the annual turnover levied on all establishments excepting educational establishments, with a workforce of 20 or more. This tax would be paid into a special fund which will be specifically used for financing the purchase of scientific and technological equipment and supporting training in science and technology at all levels.

In the short term the universities would have to lower their standards for the admission of science students and such students would be required to spend a longer time on their degree work. Simultaneously government would operate a crash programme of science teaching in special schools. There students with an arts orientation can receive intensive tuition in science, until such a period when the output of science students from the secondary schools is enough to meet the needs of the universities, when such schools can be phased out.

The introduction of the double intake system will undoubtedly result in an increased burden of work being placed on the shoulders of the current teachers for a period of some three years or so, before the expanded post-graduate programmes of a university generate the new teachers who would help share the burden. It should therefore be clear that in the initial three years of a change-over university staff will be called upon to make sacrifices. Such sacrifices would be much easier to bear, particularly in countries which run a mixed economy and have an ideological orientation which is not socialist, if their extra contribution is clearly recognised by the national authorities and arrangements are made to compensate them for it and to ensure that university teachers enjoy more than the usual commendation accorded them by the nation for their work. For without such recognition and compensation, it would be difficult asking university teachers who relatively to their professional compeers outside the university are often underpaid for their services, to make the requisite sacrifices, which are required to implement this system.

It will therefore be necessary to ensure that the remuneration of the university teachers is made comparable with those of similar public servants in the parastatals and that they are accorded those privileges which these their other colleagues enjoy. Thus for example in preparing for housing the 50%

increase in staff, which would be required in the university, action could be taken to ensure that the housing portion of the programme could be taken up by a housing corporation or a bank, with university staff being given the requisite soft loans to build their own houses. Alternatively, if university teaching staff are not to live in their own houses, they could be given priority in the allocation of public housing. Since more of the new persons being recruited as teaching staff would be unmarried or newly married men and women, the type of houses initially required would be relatively modest and could be designed as core houses, which could be expanded later, as the size of the family of the member of staff increases.

With regard to the office accommodation which will necessarily have to be built for the teachers, we can only remind ourselves that what would be required is only a fraction of the building which would have had to be done if student numbers were to double, using the single intake system.

One final problem we might have to consider in a region, which suffers from perennial food shortages, would be that of ensuring an adequate supply of food for the students throughout the year. As all the students, bar a few, are citizens, there should be in theory no food problem, since as citizens of the country they would have to be fed whether they are in university or not. The problem is therefore essentially one of the organization of the purchasing and delivery of food to the university. The purchase of food, particularly the supply of animal proteins could however create problems in areas where there is a perennial shortage of meat and fish. This should however offer university faculties of agriculture the opportunity not just to teach but to practice, for example, commercial poultry farming, using work-study students from the faculty to run such farms, during the six months when they would be out of classes.

A university catering for 4000 students monthly for 12 months in the year that is with a thoroughput of 8000 undergraduates, would require some 12000 broilers and 4000 dozen eggs weekly which can be supplied by a university commercial poultry farm containing 165000 birds 150000 of which would be broilers and 15000 layers. Set the task of supplying a captive market like the university a Faculty of Agriculture worth its name should be able to meet these demands. Meat and dairy products production could also be diversified through the commercial rearing of rabbits and of goats for milk and meat.

The problem of implementation will of course differ from university to university and cannot therefore all be enumerated here. University wide task forces would have to be set up to find solutions to these problems. One final element in the organization of the change would be the setting up of a university wide coordinating committee, which would supervise and co-ordinate the many activities required for the change-over. Such a task could be entrusted to either the Development or Academic Planning Committee of the university

The attempts by the university to rationalise its operations would help to generate a new spirit of cooperation and change in the universities and would foster a new spirit of meeting challenges, as they arise, among staff and students, in their joint effort to modify the methods of operation of their universities to suit the conditions of obtaining in their countries.

7. Forging Links with the National Community: Postgraduate Studies and Research for Development: Pre-University Students and Life-Long Education

The feasibility of using undergraduates to solve problems critical to national development has been shown in our example of students on work-study teaching in the secondary schools. This principle need not apply just to undergraduates only, but can be extended to postgraduates and pre-university students. African universities, as it is, face the daunting task of providing their countries with the techno-scientific and managerial manpower base which would enable them to make the transition from being agricultural societies to becoming post-industrial societies in the early years of the 21st century in a situation where knowledge is changing and is being accumulated rapidly and very little is known about how the existent traditional systems in Africa operate.

In order to give the students the feel of these systems, so that the mistake made in the past of transplanting practices and techniques developed in other cultures to our cultures, in the belief that they were detachable, from their cultural natrix and reattachable to ours would be avoided, it is necessary to immerse pre-university students in our own cultures, and that post-graduate students keep in constant daily touch with our cultural matrix during their period of research.

Implementing this principle would imply that pre-university students, before coming up to university, should work and be of service to the people and live with them in their normal circumstances. They would be required to have given some service or served an apprenticeship in an area which they might later wish to study. In this way, students entering university would have acquired a feel for the quality of life of the society. They would also have been imbued with a healthy notion of service to the national community.

The idea of service to the people would be greatly strengthened, if governments would introduce on our suggested fifth measure, requiring all persons who complete their secondary education to give the country national service for one and half to two years. Since short term training programmes, which make it possible for secondary school leavers to acquire skills in teaching, adult and continuing education, agricultural and industrial extension, cheap health care delivery now exist, such training would rapidly create an army of dedicated young men and women, who could be directed to work in the country-side and help in its transformation. They would then themselves learn at first hand what the problems of development which their university training would help them to tackle, are. Thus the universities will get maturer students, who know that their stay in the university is not only a privilege but also an opportunity to contribute to improving national welfare .

In the same way post graduate students would by their research be looking more closely at the operations of the existing systems in the country. Working, while at the same time studying their research would tend to be more relevant than they are now. The difficulty here is even that post-graduate studies in African universities hardly exist and one of the important considerations which universities must plan for is the desirability of expanding completely out-of-recognition the amount of post-graduate work which is being done.

One can hardly take comfort from the fact that in a country like Nigeria, 33 years after university education took firm root, the country is producing no more than 150 Masters and Ph.D. degree students in any one year. Should the production of graduate students continue at this rate in Nigeria and the other African countries Africa's hopes of ever initiating a scientific-technological revolution are bound to be disappointed.

It is therefore important that the policies with regard to graduate training be drastically reviewed so that over the next five years the number of graduate students can be massively increased. The goal in some 7 years time should be for a university with a thoroughput of some 7000 to 8000 resident undergraduate students to have an additional thoroughput of some 2700 to 3500 graduate students. Most of these graduate students would be required to be non-residential and part-time students working in Government commerce or industry to support themselves while they take their degrees. If even each such student requires five years to take a Master's degree, this would imply more than a ten fold increase in the number of persons obtaining graduate qualifieations in an African university, without further pressure being exerted on student residential accommodation.

There are of course very good reasons for insisting that the proportion of graduate students doing part-time study in the student body be increased. It is evident that the broad knowledge of a discipline acquired in three to four years of undergraduate work is not enough to meet the demands of modern day industry and even administration. Graduate work is necessary and employers, including the international agencies like the United Nations and governments, are beginning to demand higher degrees for employment in supervisory positions.

Moreover it is not longer realistic economics to expect students who are aged 24 and above to undertake graduate studies full time. Most graduate students in the universities although registered as full time students now work part of the time and require three to six years to take their degrees. The universities can thus only help matters by acknowledging the existing situation, recognising the trend and modifying their programmes accordingly.

Graduate students could combine half-time or quarter-time study with work in government, commerce, industry or research establishments. Lectures and seminars could then be arranged to fall in the afternoons and evenings or to take place on Saturdays and Sundays. Employers could be persuaded to release their employees so that they may devote one or two full days a week to their studies, especially in cases where experimental work cannot be carried out on the employer's premises. What is being advocated here is not an utopian dream. It has been normal practice in reputable universities like Israel's TECHNION for more than 20 years.

The point touched upon in the last paragraph, that of cooperation between a university, government, the commercial and industrial organizations is one which the universities can develop and exploit much more fully than they do now to their own and the nation's benefit.

Cooperation with Government and industry can be expanded to take in the fields of consultancy, of consultancy, testing, research, development, detailed planning and the provision of advisory services. With salaries not keeping pace with inflation, university teachers have sought means of supplementing their income. One way which quite a number of teachers have adopted has been that of taking up consultancies. This practice has usually been frowned upon by university authorities in the belief that academic work should not be mixed up with extra curricular activity which is income earning and could lead to university teachers not giving of their best to their students and the university.

If it is however realised that such consulting work could be of benefit to the teacher, his students and the nation then university rules and regulations on consulting, which are out of step with current realities, would have to be modified. In order to enable a more systematic approach to the problem of consulting and supplementing staff and graduate student income to be adopted, it is suggested that a university set up an organization owned by it, but separate from it. Its mandate would include consulting, testing of products, research on scientific and technological problems, solving problems of development, detailed planning, the carrying out of ad hoc investigations and the provision of advisory services.

Teachers and graduates students would participate in the activities of the organization and would be paid from the fees charged customers. Here the practice would be that a substantial proportion of the fees paid will go to the staff and student consultants, while a smaller proportion would be retained by the organization for the payment of the permanent staff and for the purchase and replacement of equipment and the building of new research and testing laboratories. The concept should be that of a business firm run for profit, which has to support itself and contribute income to its owners - the University. Such an institution aggressively looking for contracts, would best be headed by a senior person from business or industry with the rank and status of a professor. The incumbent should therefore not be a practicing academic but rather someone who has had academic experience as also the necessary governmental, business and industrial contacts.

The creation of such an organization would make the massive intellectual and professional expertise locked up in the university staff and graduate students readily available to Government and industry. As it is now, Government, commerce and industry have no means of knowing what human resources are available for them to call upon. Consequently they spend millions of dollars paying foreign expert to come to their succour, while equivalent or even better but unorganized expertise exists on their doorsteps for them to tap.

Moreover a consultancy, research, development, planning, testing and advisory service based on a university would provide a greater and more founded wealth of expertise than is now available in most countries through the private consulting and testing agencies. Such an organization would not only provide an outlet for teachers on research sabbaticals, but would form a crucial link between the university and the outside world. It would give university teachers and students realistic, down to earth and relevant experience where it matters - in the country's development. And such relevant experience can only improve teaching and research and make the university more relevant to the needs of African societies. It would also help to change the ivory-tower image which most universities possess.

An organization as that suggested can easily, in cooperation with Government, business and industry establish a series of needed laboratories and research establishments. One can think immediately among others of a Soil Testing Laboratory, a Chemical Testing Laboratory, a Seed Testing Laboratory, an Industrial Psychology Testing Laboratory, a Food Industries Research Centre, a Centre for Urban and Regional Studies, a Diagnostic Centre, a Biomedical as well as a Biochemical Research Centre, an Operations Research Centre, a Business Management Research Centre and Service. These laboratories and research centres, which will be built around the university, will take on problems from Government, business and industry and solve them and such problems could form the basis of research theses The advantages accruing from such a development would be immense.

This university owned organization could also act as the official owner of the intellectual property of the academic and other members of staff of the university, where matters like patents, author's rights, licensing, sale of instruments developed by them are concerned - an area to which little thought is given among academics. Lastly such an organization would ensure that while the staff member's rights to his share of the profits are safeguarded, the costs and the risks usually involved in such procedures can be saved him.

SUMMARY AND CONCLUSION

The paper points out the benefits which could accrue to African countries if steps are taken to introduce five measures which would lead to the universities helping to establish a more relevant education system and maximizing their contribution to national development through:

(i) doubling the intake of the universities through rearranging the pattern of the academic year and having two intakes a year, with each intake completing its work for the year in 24 weeks;

(ii) instituting rotating research sabbaticals for university teaching staff on the basis of three years of teaching and research followed by one year which is free from teaching duties and is wholly devoted to research in the country;

(iii) adopting a work-study programme of training in the universities, with students who have completed their year of lectures being set to work in sectors of the economy like education, which are critical for national development;

(iv) establishing, planning and advisory services in which staff and graduate students can serve and developing in collaboration with governments, commerce and industry, research laboratories and centres around universities to solve pressing problems of research and offer opportunities for research to post-graduate students; and

(v) introducing the condition that all secondary school students should give service to the nation in the rural areas of the country for $1\frac{1}{2}$ to 2 years after graduation.

These benefits include a more rapid supply of high level manpower to their countries, the lowering of unit costs for the production of a graduate the generation of much needed research in the country, the breaking of the constraints to the expansion of secondary education, the generation of an attitude of self-reliance and the psychological revitalisation of the whole country in its attempts to seek internal solutions to its problems of development. These gains are secured with no extra workload being placed on teaching staff in the universities, when the new system is fully operative. Public savings and gains which are generated by the new system as against doubling intake by the conventional system are outlined.

Some problems to be encountered in changing over from the conventional to the proposed system are discussed and it is condluded that these do not raise insurmountable difficulties, given a fair degree of patriotism and willingness to work for their country on the part of both staff and students.

Whichever way we look at it then, the universitieis stand to gain from the changes being advocated here. In any case the various suggestions made for the universitieis to take a deeper look into their functioning would be useful to them, even if the strucutral changes advocated are not adopted. If however the structural changes are adopted and the universities work for them to succeed - and we know that the universities can make them succeed - the universities would have given their countries and their Governments an object lesson in thinking their way out of African development problems. The tools and resources are there not in the forms the universities are used to. They can reorganize themselves and mobilise these resources. All then that is left is for them to conquer their psychological inertia and prejudice for the known, reorganise themselves and revitalise their universities and so revitalise their countries and Africa.[1/]

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Accra, 29th October 1981

1/ I would wish to acknowledge the contribution to my thinking on the problem made by the following persons: K. Amissah-Arthur, Fred Aryee, Adjei Bekoe, E.A.K. Edzii, Alex Ekwueme, Daniel Ghansah, Godfrey Lardner, the Manpower Division of the Economic Commission for Africa, B.K. Mensah, Kwame Mfodwo, S.Mfodwo, Kamene Okonjo, Ngozi Okonjo-Iweala, F.G.T. Torto and K. Twum-Barima and many other persons too numerous to mention here.

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