JHEA/RESA Vol. 2, No. 1, 2004, pp. 211–240

(ISSN 0851–7762)

African Universities and the Challenge of Research Capacity Development[1]

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Abstract

Critical for Africa's future is strengthening indigenous educational systems and institutions for generating and applying knowledge by assuring long-term *public* support with emphasis on research capacity. In addition to individual skills developed in research work, research capacity includes: quality of the research environment, funding, adequate infrastructure, research incentives, time available to the researcher, etc. In most African countries, conditions for research have been severely compromised as manifest by the generally poor remuneration, heavy teaching loads, inability to mentor young faculty, and inadequate infrastructure. While the adequacy of public funding is a crucial condition, there are a number of concrete programmatic initiatives that could be taken by the higher education and research institutions themselves. These include strengthening of graduate study, improvements in the management of research, provision of a "soft landing " for young faculty, identification and concentration on "areas of strength, " and pooling resources with other institutions. Special initiatives aimed at individual research capacity development include the *Study Programme for Higher Education Management* of the Association of African Universities (AAU); the Working Groups and Institutes of the Council for the Development of Social research in Africa (CODESRIA); and the work of the National Mathematics Centre of Nigeria.

Résumé

Pour son propre avenir, l'Afrique a besoin de renforcer son système d'éducation et ses institutions indigènes, pour la génération et l'application du savoir, en assurant un support *public* à long-terme, avec une attention toute particulière accordée à la capacité de recherche. Outre le savoir-faire personnel développé

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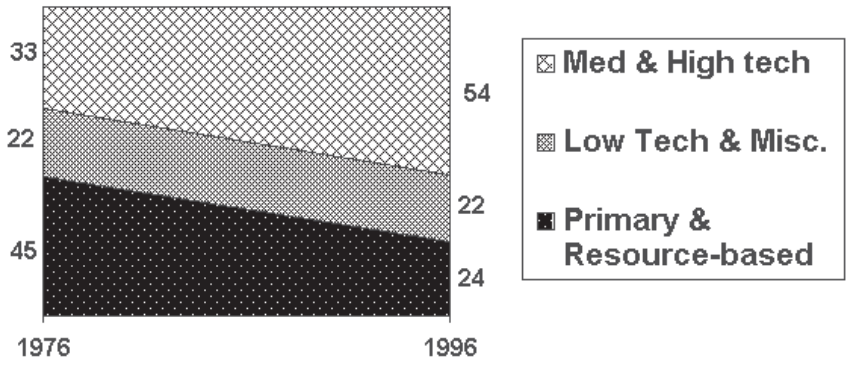
dans le cadre du travail de recherche, la capacité de recherche englobe : la qualité de l'environnement de recherche, le financement, les infrastructures adéquates, les formes d'incitations à la recherche, le temps disponible pour le chercheur etc. Dans la plupart des pays africains, les conditions de recherche sont remises en cause, comme le prouvent les faibles niveaux de rémunération, les lourdes charges d'enseignement, l'incapacité à encadrer les jeunes facultés, et les infrastructures inappropriées. Même si le financement public demeure une condition primordiale, il y a un certain nombre d'initiatives programmatiques concrètes qui pourraient être adoptées par l'éducation supérieure et les institutions de recherche elles-mêmes. Celles-ci englobent un renforcement des études de second/troisième cycle, une amélioration de la gestion de la recherché, l'assurance d'un _atterissage en douceur " pour la jeune faculté, l'identification et le ciblage de " zones fortes " et enfin, le partage de ressources avec d'autres institutions. Parmi les initiatives spéciales visant à développer la capacité individuelle de recherche, figurent : *le Programme d'études pour la gestion de l'éducation supérieur (Study Programme for Higher Education Management),* de l'Association des Universités Africaines (AAU), les groupes de travail et instituts du Conseil pour le Développement de la Recherche en Sciences Sociales en Afrique (CODESRIA), ainsi que les travaux du *National Mathematics Centre* du Nigeria.

Introduction

The rise and spread of the "knowledge society " in the developed countries has led to the hegemony of modern knowledge and its manifestations and has opened up virtually all societies to increased pressure from global values, products, and services. This development has implications, both positive and negative, for all societies. On the positive side, the spread of modern knowledge offers possibilities for improvements in the quality of life worldwide, through the better understanding of modern hygiene, nutrition, environmental protection, governance systems, and so forth. It also provides the initial conditions for productivity increases in virtually all production and social sectors. On the negative side, one could mention the tendency to political and economic domination by developed economies and their institutions; the increasing homogenization of cultures and threat to local knowledge, resulting from the unrestrained importation and imposition of foreign goods, services, and cultural forms; and the exacerbation of local differences and inequalities through uneven access to such knowledge and the means for its application.

Today, production, management, and service delivery in all sectors require basic as well as advanced technical and managerial competencies, without which a society will tend to underperform in global competition. The evidence is that goods and services to which value has been added by modern technology dominate world commerce, with the result that export-led economic growth favors those with access to value-adding technology. Figure 1 provides a graphic illustration of this point.

Figure 1: Technological intensity of goods in international trade, in percentages.



In all this, access to modern knowledge and its application feature decisively. Every society must have the capacity to generate, acquire, adapt, and apply modern knowledge if it is to take advantage of the opportunities and reduce the risks posed by the rise of the knowledge society.[2] While foreign expertise could be deployed for many purposes, certain foundational functions—including the identification of needs, the making of basic policy choices, and, indeed, the very selection of foreign expertise—are best performed by local cadres. Here it is important to distinguish access to information from the acquisition of knowledge, which is a more deliberate, more purposive activity. Information is transformed into knowledge when it comes to be "owned, " through absorption, synthesis with prior knowledge and experience, and location in context. Thus, knowledge can only be acquired through doing for one's self.

With the increase in the knowledge intensity of social and economic life worldwide, the majority of societies face a real threat from the unequal access to current information and modern knowledge. This situation exacerbates the phenomenon of unequal development and exchange in international trade, widening the development gaps between the information-rich and information-poor among and within countries and regions. At the same time, it reinforces the political and cultural dominance of the North. Countering these tendencies calls for a range of political, cultural, and economic measures at the national and global levels, which cannot be fully explored here. What can be said is that every society needs to insure the existence of viable indigenous knowledge systems, i.e., local institutions, structures, and cadres which, in combination, are able to access knowledge from all sources—external and home-grown, traditional and modern—synthesize it, adapt it, and generally make it usable by local communities and agencies under local conditions. The inadequacy of such systems in Africa is both cause and effect of the continent's knowledge-poverty and deepening material deprivation.

The situation is different elsewhere. In industrialized countries, advanced learning and research are receiving increased attention and investment in recognition of their acknowledged contribution to economic development and global competitiveness. The resulting "surplus capacity " in the higher education sector in the Organization of Economic Cooperation and Development (OECD) countries is increasingly absorbing global excess demand for higher education in the form of (a) students and researchers from developing countries who go to OECD countries for study and research and (b) the marketing of higher education by institutions in developed countries to developing countries, from outside or on-site. Not surprisingly, higher education is increasingly recognised in OECD circles as an "export industry with a positive balance of trade " (Mallea et al. 2001).

It is instructive that those same OECD countries that, as donors, exercise so much influence on the development of Africa's higher education systems downgraded their support in the 1980s and 1990s, pressing African governments to favor basic education at the expense of higher education. The argument, most forcefully articulated in a number of World Bank documents, is that, given generally low coverage in Africa, basic education yields a better return on investment than higher education and is, in any event, more equitable. There is much to question about the technical basis of this argument and its soundness in the contemporary situation of Africa (Carnoy 2000: 15–17, Schultz 2001; Task Force 2000: 39). But the concern here is with the effect of its adoption, namely, the severe underfunding of the already run-down African universities and research institutions, despite the acknowledged preeminence of high-level

knowledge as a factor of growth and development in modern society and at a time of exploding demand for higher education in Africa. It does not take much to divine the source and causes of the "excess global demand " for higher education that is to balance the "surplus capacity " in the OECD countries!

Does this situation, created through deliberate policy and specific measures which entrench initial differences, look like a case of "manufactured comparative advantage " to be used to explain and justify supposedly market-determined differential development of the various parts of the world? By thus deepening the international imbalances in the provision of higher education, are these contradictory policies not consolidating the existing system of unequal global development?

What remains clear through all this is the crucial role that Africa's systems and institutions for knowledge generation, synthesis, adaptation, and application have to play in insuring the advancement of the national interest on all fronts, economic, social, cultural, and political. Central to these knowledge systems are the universities and their research and advanced training programs. To a greater degree than elsewhere, Africa's universities continue to provide the vast bulk of its research and train virtually all its researchers. To be sure, alternate sites for the generation and adaptation of knowledge are emerging and assuming prominence: public research institutes, private research centers, firm-based research units, regional and subregional centers, nongovernmental organizations, and so forth. But the trend is only beginning and has yet to pose any kind of threat to the dominance of the university as the core of the knowledge generation, reproduction, and dissemination systems in Africa. Thus, the strength of Africa's universities and research institutions is a key condition for its development, and their weakness is an index of, as well as a contributor to, its poverty.

Recognition of these simple truths, the fashioning of appropriate policies, and the mobilization of the relevant constituencies and resources in their support are strategic imperatives that call for national political and policy leadership of the highest order. Sad to say, African countries have ceded this strategic ground under pressure from the international financial institutions and the donor community, as well as from their weak economic situation. Over the past two decades, they have tended to underfund and run down their universities and research institutions, purportedly in favor of strengthening basic education. The situation at Makerere University in the 1970s and 1980s illustrates the situation. (See Appendix.) While there were varying degrees of deterioration from country to country and institution to institution, and while several

universities, including Makerere itself, have started on the road to recovery, the general pattern of the period has been the same.

This brief account of the degradation of indigenous knowledge production capabilities in Africa at a time of heightened global appreciation of the significance of knowledge generation and application provides a backdrop to the consideration of the circumstances of African research and research capacity development.[3] It is not my intention to cover fully the current state of African higher education nor the status and future of research in Africa. More modestly, I will paint a broad-brush picture of the context of research capacity development, distinguishing two main components of research capacity, namely the environmental and the human, as explained below, and their current status across Africa. This discussion will serve as background to the consideration of the challenges that need to be addressed in developing long-term knowledge generation and application capacities. I shall conclude with a description of some programs that are helping to meet these challenges.

Research Capacity in Africa

My vision for African research is the sustained indigenous generation of world-class research results and new knowledge that help our understanding of African conditions and contribute to the advancement of its people.[4] This definition envisages research by African researchers working primarily at African institutions, turning out first-rate knowledge on locally relevant issues. The insistence on African research and researchers at African institutions is to insure rootedness and the sustainability of knowledge generation, as well as the increased likelihood of relevance and applicability. This condition presupposes local institutions and an environment adequate to support research of the highest calibre and insists upon the rootedness of such research as well as its positive spill-over effects on the local society.

Though successful research is frequently attributed to individual researchers or research teams, we all know that such success is determined by more than individual brilliance, hard work, and team competencies. It turns also on such factors as the nature and quality of the research environment generally, the facilities and other means at the disposal of the researchers, and prior or contemporaneous work by other researchers in related fields. In talking about research capacity, therefore, it is useful to consider two key components. In addition to a human (individual or team) component, which may be called the "active " component, there is also an "environmental " component, constituted by the social, institutional, and material factors that provide a setting for the research enterprise and condition its success or failure. This environmental

component may be viewed through two key sets of conditions, the general or broad societal conditions on the one hand, and, on the other, the institutional, namely, organizational, managerial, and material conditions within a particular institution.

Research Capacity: The Active Component

In universities and research institutions, the capacity of individual researchers, including their skills, competencies, attitudes, and values, is developed primarily through appropriate training programs and courses and involvement in research activity. It is nurtured by the assembling of a critical mass of researchers, the cultivation of a positive research culture, and the presence of incentive systems that make a research career attractive.

The traditional, and still dominant, research model is that of an individual or a small group of persons pursuing research on a topic of their choice and in their area of professional interest. The typical project is still discipline oriented, university based, and funded by the university or under its auspices. It makes free use of university facilities and time and is undertaken essentially as part of the academic career of the researcher who decides what to study and whether and how to disseminate the results. Support for this reading of the situation is provided by a study of research management in nine African universities, undertaken by the Association of African Universities (AAU) in 1996. As displayed in Table 1, the proportion of individual (as against team and multidisciplinary) research projects conducted over 1989–1994, ranged from almost 95% at one end of the scale to 50% at the other (Shabani 1996, Table 2).

A variant on this theme has emerged strongly in recent years. With the reduction in institutional funding for research, there has been increasing recourse to commissioned projects procured directly from a donor or other sponsor without university involvement. Particularly in the social sciences, this pattern has reportedly led to increasing individualization and, from the perspective of the university, informalization of research. Owing to its funding outside the institutional system, this kind of research provides scant support to the building of institutional capacity, given the likely external determination of topics and its generally applied character, nor is it likely to make much of a contribution to systematic theory building.

This continuing importance of individual research gives graduate and postdoctoral training particular significance, as a key source of generational continuity and maintenance of the "human capital stock " for research. I will address this subject in greater depth below.

Table 1: Categories of research projects: Individual research conducted from 1989 to 1994

University	Basic Sciences			Applied Sciences			Humanities				% of total
	MA/MS	Ph.D.	Others	MA/MS	Ph.D.	Others	MA/MS	Ph.D.	Others	Others	number of projects
1. Antananarivo (Madagascar)	na	na	na	na	na	na	na	na	na	na	na
	na	na	na	na	na	na	na	na	na	na	na
2. Enugu State University of Science and Technology (Nigeria)	na	na	na	na	na	na	na	na	na	na	na
3. Zimbabwe	30	12	122	68	38	303	26	14	66	669	60
4. Malawi	na	na	na	na	na	na	na	na	na	na	na
5. Yaoundé 1 (Cameroon)	21	33	41	12	2	26	36	12	9	192	na
6. Ouagadougou (Burkina Faso)	0	2	42	0	12	155	0	7	191	409	77.7
7. Université Nationale de la Côte D'Ivoire	na	na	na	na	na	na	na	na	na	na	na
8. Ghana—Legon	na	na	na	na	na	na	na	na	na	na	na
9. Uyo (Nigeria)	0	0	2	0	0	3	0	0	19	24	83
10. Suez Canal University (Egypt)	79	82	0	478	174	0	180	81	0	1074	94.5
11. International Center Insect Physiology and Ecology (Kenya)	0	20	0	0	20	0	0	0	0	40	50

Source: Juma Shabani, *Research Management in African Universities* (1996), Table 2.

Research Capacity: The Environment Dimension

General Conditions

The first set of general factors that facilitate or hinder research, independent of the skills or values of individual researchers, relate to the macro-environment of public policy and resource allocation. In the first place, research interest and individual capacity are rooted in the quality of education in the society generally. An educational system that encourages and equips people to be curious about nature and society and to develop an interest in the pursuit of knowledge and ideas is an indispensable general condition for the development and sustenance of a research culture. Also important are broad social policies and practices that encourage and facilitate the flow of information and reward innovation and inquiry. An atmosphere of political or cultural intolerance has a chilling effect on research, and, therefore, on the nurturing of research capacity. Further, social recognition of achievement and the ready utilization of good ideas provide nonmaterial but powerful incentives to research excellence and innovation.

A more immediately relevant condition is the availability and adequacy of the means for undertaking research. The underfunding of research and research institutions in Africa has already been mentioned. Since much vital research yields little direct and obvious benefit, the strategic importance of long-term public support for the sustenance of a research culture and capacities is generally recognized. In the industrialized and newly industrializing countries, such public support is supplemented by private investment, especially in applied research. In Africa, on the other hand, straitened economic circumstances combined with the recent policy bias against public financing of higher education, have contributed to the underresourcing of research. (See Table 1.) This policy constitutes a major strategic misstep. But the problem is more fundamental yet. To appreciate this, account must be taken of the character of most African economies and the specific forms of their insertion into the global economy. As the typical African economy has become more outward looking, its leading edges have locked more firmly into external knowledge sources: local producers relying on foreign-based parent companies for research, the use of finished inputs in local manufacturing and agriculture, the wholesale importation of finished consumer goods, and the dependence of government and public institutions on foreign expertise and experts in preference to local sources. Under such conditions, local knowledge generation becomes increasingly uneconomic, and market forces direct resources away from support for the local production of modern knowledge.

If it is accepted that the local production and reproduction of knowledge are crucial to the effective and sustainable development and management of society, then the absence of incentives for private investment in research and research capacity development in most African countries represents an instance of market failure. Generally, explicit public policy would correct for such market failure. As earlier noted, that is the situation in the OECD countries, where official policy reinforces the market in insuring that higher education and research receive adequate investment from both private and public sources. But this is not what is happening in Africa, at least not with the frequency and on the scale required to make a difference. Not surprisingly, underinvestment leads to generally anemic local research performance and capacity development. I will return to this topic later.

Institutional Conditions

The second category of environmental conditions for successful research focuses on the institutional context within which research is conducted. The key elements here are a minimum of research infrastructure, such as laboratories, equipment, libraries, and an effective system of information storage, retrieval, and utilization; appropriate management systems; and policies that facilitate and support the research enterprise including incentives that recognize and reward high-calibre research. The need for facilities, good management, and appropriate incentives is obvious, and calls for little emphasis here. What is not so well appreciated is the effect of nonmaterial conditions such as vibrant graduate study programs, effective research management systems, and an institutional culture supportive of research and inquiry. I will comment briefly about the first two of these conditions.

The extreme weakness of graduate study programs in most African universities is among the most serious of the institutional limitations on research capacity development. While the paucity of relevant data makes it difficult to be firm on numbers, the AAU study mentioned above found that, in the early 1990s, excluding the one fully graduate institution in the sample, the proportion of graduate students out of total enrollment at the responding institutions was between 7% and 1% (at a francophone university with enrollment in excess of 40,000 at the time) (Shabani 1996: 23). A more recent study suggests some improvement in the situation. While it is difficult to establish the number of Ph.D. graduates turned out by sub-Saharan African universities (excluding South Africa), that number is increasing. This is said to be the result of reduced opportunities for Africans to do doctoral work in the usual western institutions, combined with increased pressure, especially on academics, to obtain such qualifications for career purposes. But the report notes that the increase

in locally trained Ph.D.s is from an unacceptably low base; while it is likely to continue, it will do so at a slow pace unless drastic corrective measures are taken (Szanton & Manyika 2001). The implication is that, without such corrective measures, the "stock " or foundation members will remain far below the demand for such capacity.

This sad state of graduate study reflects some of the environmental weaknesses previously identified, if only to the extent that graduate study programs and research are underfunded. The graduate stipend is not enough to support full-time study, and the job market, by and large, does not adequately reward advanced study. Apart from the resulting failure to insure the reproduction of the faculty, the absence of adequate numbers of graduate students at any one time in any institution means, not only the absence of the natural foot soldiers of any research undertaking, but also a severe shortage of the potential teaching assistants needed to help release more of the time of senior faculty for research.

Research Management

The increased recourse to outside funding sources that, by and large, favor larger-scale, more applied projects, has consequences for the nature and scale of research projects and the relationships of researchers with both funders and the university or other home institution. As the focus shifts away from individual choice and as the scale of operation increases, funders tend to move away from informal arrangements with individual researchers and seek the assurance of institutional oversight for funded projects. With the resulting increase in the role of institutions in the procurement, management, monitoring, and certification of projects, the success of research comes to turn increasingly on the effectiveness with which those institutional functions are discharged. This case is particularly true for contract research where, drawing on economies of scale and specialization, it is possible for an institution to develop and provide essential project support, management skills, and services that the individual researcher, or even project team, could not be expected to deploy on his/her/their own. In this sense, the availability of effective research management and support facilities, skills, and systems within an institution have become an important aspect of the research procurement and delivery capability of the institution and its members.

But there is a downside to this trend toward increasing institutionalization of research. As we all know too well, undue bureaucratization and poor institutional responsiveness can be a major drag on research performance. Unsatisfactory recordkeeping, ineffective structures and systems of coordination, unclear specification of the research obligations of academic staff—as well as the

indifferent quality of research support staff reflecting the low priority attached to training and specialization in research management and administration—create negative conditions for conducting research and building research competencies.

The combination of material provision, policies, management systems, and institutional culture described above, speaks to the institutional capability for research support. This capability, together with the more general factors mentioned earlier, constitute the environmental dimension which conditions whether and how far moderate talent is able to develop and realize its potential to do useful research, and whether first-rate talent has the opportunity truly to excel. One of the tragedies of African research is the frequency with which limitations in the research environment frustrate such talent. The brain drain out of Africa owes as much to this factor as to any others.

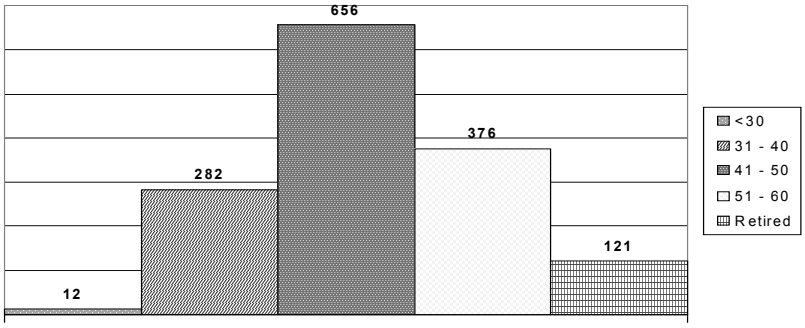
The distinction drawn here between the active and the environmental components of research capacity is not intended to obscure the fact that they interact continuously. The human factor contributes critically to the creation or negation of the requisite environmental conditions, while the environmental conditions enhance or inhibit the development of individual capacity.

Bottlenecks and Problems: The Challenge

Allow me to now set out a series of general propositions that, I believe, should be taken into account in any consideration of research and research capacity development in Africa. Apart from formal training in the conduct of research at institutions of higher learning and research, particularly at the graduate level, individual research capacity develops principally "on the job. " It develops in the course of conducting research, whether this be an individual or team effort and whether it be in an academic or research institution, in industry, government, or in a nongovernmental institution. It is in this process that the skills and insights acquired as part of formal training are sharpened and extended, when research skills and research product are brought into direct relationship. Moreover, ongoing research, particularly when it is collective or networked, provides an irreplaceable opportunity for the experience of each member of a team or network to complement and help raise the capacity of others. For young and mid-career researchers such participation, especially under the mentorship of senior colleagues, constitutes the most effective form of research capacity development. Thus, in the absence of on-going research activity, one cannot talk meaningfully about research capacity building. From this perspective, the most serious bottlenecks to research capacity building in Africa may well be the virtual collapse of research activity during the higher education crisis of the 1980s and the current shortage of team and networked projects.

This situation brings up the question of the mentorship of junior faculty and the supervision of graduate study. One of the most heartening features on the African university scene is the increasingly rare sight of a senior professor (usually one of the few who refused to "brain drain " or one who has "drained " back) supervising graduate students or working with junior colleagues on projects. The continuation of research and graduate study programs during the difficult years of the 1970s, 1980s, and early 1990s owes as much to the commitment of these caring survivors as to anything else. Unfortunately, more typical is the senior scholar who is too distracted by consultancies and project-oriented research to devote much time to graduate supervision or the mentoring of junior colleagues. Moreover, as senior faculty have aged and moved towards retirement, they are not being replaced at the rate required to maintain the appropriate levels of mentorship of junior faculty and leadership of graduate programs. Figure 2 illustrates the phenomenon of faculty aging in African universities.[5]

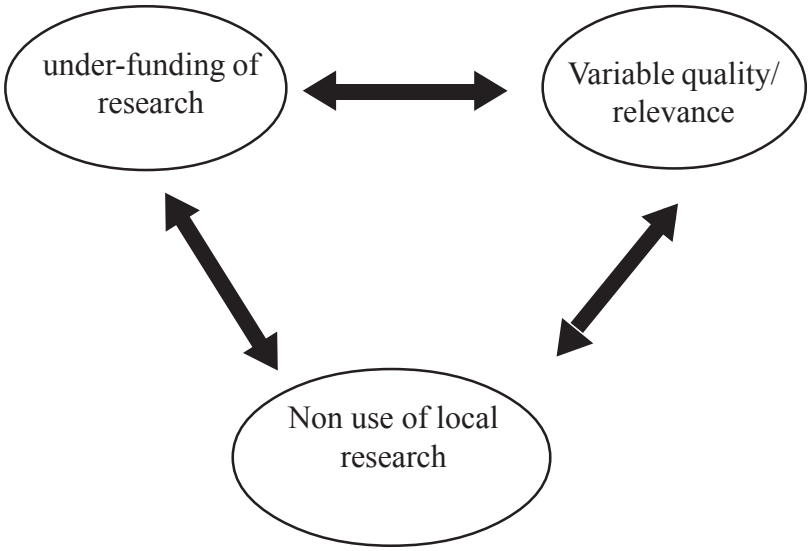
Figures 2: Universities of Ghana: Age profile of faculty (1998)



Against this rather somber general background, a number of challenges to research capacity development in Africa may be identified. The first is the deterioration in the general standard of education in many countries. This condition has apparently depressed the general level of intellectual activity in those countries, reducing the pool of talent from which future researchers are drawn. In the 1970s, 1980s, and early 1990s, political and cultural intolerance and the general discouragement of close probing and questioning of the establishment in many parts of Africa colored the environment for research, especially in the social sciences. A third challenge is the frequently problematic relationship between the variable quality and relevance of much local research on the one hand and, on the other, the limited local utilization and support for research. The variable quality and relevance of local research is used to justify its nonuse and nonsupport. Yet such nonsupport compounds the nondevelopment of research competence. The interactive and reinforcing nature of these factors is highlighted in Figure 3. Clearly this vicious cycle must be replaced by a positive one that involves simultaneous support for, and improvement in, local research and its increased utilization for the benefit of society. The continued dominance of individual rather than team or multidisciplinary work, especially in social science research, tends to limit the capacity of African researchers to undertake fundamental work with the many-sidedness required to achieve breakthroughs in modern science. Although this is a generalization to which there are many and important exceptions, it has to be acknowledged that the general situation represents a bottleneck to research and research capacity develop-

ment. The related weakness of graduate study and postdoctoral training and its effect on the research environment has been mentioned.

Figure 3. Interactive Bottlenecks: The Challenges.



Another problem area is the response to pressure to undertake "end-user friendly " research. Such pressure can arise either from a concern to be socially relevant or from the need to satisfy a client, as in the various forms of contract research. Given the overwhelmingly public support for most research in Africa, the concern to be socially responsible is entirely understandable, while the low levels of researcher incomes make recourse to outside funding, especially contract research, irresistible. Whatever the motivation, however, there is a tension between user-friendliness and two of the key drives for research excellence: (a) the scientific interest of the researcher and enthusiasm for the subject of inquiry, and (b) inspiration from theory or other research. Wherever the concern for direct relevance and applicability overrides either of these drives, sustainable, creative research is unlikely to result, nor is research capacity development likely to be enhanced.

This is not to say that consultancies and other commissioned work are necessarily inconsistent with research capacity development. The core elements of data gathering, analysis and, to some extent, verification are common to both academic research and good consultancy work. Properly regarded and

managed, consultancies and other contract work help strengthen both institutional and individual research capacity. This is particularly important where such work directs attention to areas of urgent social and economic demand, brings in or provides access to equipment and facilities not otherwise available to researchers, or supplements the incomes of the institution and the researcher. The critical task is to find the appropriate mechanism and balance for insuring a positive and mutually sustaining relationship between consultancy work and contract research on the one hand and, on the other, research capacity development, both individual and institutional.

Negative institutional conditions such as poor infrastructure (equipment, laboratories, libraries, and so forth) and lack of funding impose clear limitations on research and research capacity development. Moreover, full advantage has yet to be taken of the new electronic forms of communication for research and research capacity building in Africa. By speeding up communications and opening up access to knowledge and research findings worldwide, these developments present exciting opportunities for plugging African researchers into a flexible knowledge system and enabling them to leapfrog to the frontiers of knowledge. At the same time, they widen the gap between those with access to the new means and those without. But access alone is not enough. Researchers must be equipped with the appreciation and skills for accessing and appropriating such worldwide knowledge.

Other problem areas exist and exacerbate those already mentioned. Faculty carry heavy teaching loads without the benefit of modern teaching aids nor even the traditional support of teaching assistants. Given the overall resource constraints, involvement of academic staff in nonacademic activities is a common means of supplementing low official incomes. These debilitating distractions from core teaching and research tasks are reinforced by poor incentive systems, including slow promotions arising in part from the limited access to publishing outlets and international conferences and seminars, as well as the absence of mentoring by senior colleagues and a critical mass of other researchers.

The cumulative effects of all these trends and factors have fallen disproportionately on what has been termed “the third generation ” of African scholars (Mkandawire 1995, p. 7). The “first generation, ” educated mostly in the 1960s and earlier, were generally trained to the highest international standards at public expense, both at home and abroad, and had embarked on academic careers under conditions that respected and provided adequate means for the cultivation of knowledge. The “second generation ” came of age in the 1970s and early 1980s, when it was still common to supplement local degree work with graduate study abroad. But so harsh were economic conditions at home that

almost anybody who could remain abroad after graduating did so. They are the brain-drain generation. By the mid-1980s, access to opportunities for study abroad, especially in Europe, had so diminished that most had to undertake their entire education, from first degree to doctoral studies, at home. This occurred at a time when the range and currency of library holdings, as well as the quality of teaching and research at most African universities were in decline. It is this "third generation, " currently staffing our universities, that has borne the brunt of these severe declines.

Given all these challenges, it is time to turn to strategies and possible answers. Let me underline the fact that any strategy for reviving and building up the research culture in African universities must insure the continued reproduction and revitalization of the academy in Africa by targeting the third generation in a decisive manner.

What Answers?

The response to the challenges of research capacity building in African universities must involve improvements in the *environment* for research and research capacity development, both institutional and general. It must include, in addition, programs focusing directly on the *active* or human component in order to raise the capacity of individual researchers and build a critical mass of competent researchers. In what follows, I consider among the possible measures for improving the research environment, the issues of funding, strategic planning, and improved research management, the strengthening of graduate study and areas of strength, and collaboration with off-site research centers. While graduate study and sandwich programs bear on the human dimension of capacity development, I mention also staff development and other measures directly targeting the third generation.

Initiatives Targeting the "Environment Component " of Research Capacity Development

Funding

The base problem is that of funding. There are not enough resources, public or private, devoted to research and research capacity building. Excluding the one fully graduate institution, the AAU study found that, by 1993-1994, none of the responding universities spent even 4% of their recurrent budgets on research. The range was from 0.33% to 3.78%. To be sure, much research is funded by donor grants. But it still remains a matter of concern, recognized and lamented by all, that universities are willing to devote so little of their budgets to research. Shabani's (1996) data make all too clear how severe the problem is. (See Table 2.)

Table 2: Research budget allocation from rercurrent budget for the period 1989-1994

University	Amounts in US Dollars ('000)					Percentage of Operational Budget				
	89-90	90-91	91-92	92-93	93-94	89-90	90-91	91-92	92-93	93-94
1. Antananarivo (Madagascar)		29.87	na	26.3	91.2	48.59	0.98	na	0.6	1.57	0.75
2. Enugu State University of Science and Technology (Nigeria)		na	na	na	na	na	na	na	na	na	na
3. Zimbabwe		na	1223.41	1104.67	1176.93	1079.75	na	4.29	4.75	4.14	3.78
4. Malawi		na	na	na	na	na	na	na	na	na	na
5. Yaoundé 1 (Cameroon)		na	na	na	291.02	272.26	na	na	na	2	1.77
6. Ouagadougou (Burkina Faso)		15.05	7.08	na	na	na	1.37	0.5	na	na	na
7. Université Nationale de la Côte D'Ivoire		174.02	na	na	na	na	0.98	na	na	na	na
8. Ghana—Legon		na	na	na	na	na	na	na	na	na	na
9. Uyo (Nigeria)		0	0	30.3	10.27	na	na	na	0.72	0.24	na
10. Suez Canal University (Egypt)		298.4	94.31	81.78	70.26	73.75	0.69	0.30	0.41	0.32	0.33
11. International Center Insect Physiology and Ecology (Kenya)		6300	3900	4600	4600	5000	55.26	34.21	65.71	54.76	55.55

Source: Juma Shabani, *Research Management in African Universities* (1996), Table 11.

In light of the underfunding of research and considering the strategic importance of local research capacity, it is necessary to insist on the indispensable role of public intervention, direct and indirect, as well as donor support for the revitalization of our institutions, and the upgrading and maintenance of local research and research capacity. In this connection, there is welcome evidence that external sponsorship of higher education and research in Africa is once more assuming increasing significance.[6] What is important is to insure that such support does not compound the problems of undue individualization and informalization discussed earlier. This requires greater emphasis on channelling resources and support through the university and other research institutions. It cannot, however, be stated too strongly that while such external support for research will provide a welcome respite in many cases, it cannot come anywhere near making up for the dramatic declines in public funding and, in any case, could not possibly substitute for genuine long-term public support for research in Africa. The strategic initiative belongs properly with the state.

At the same time, a major obligation rests on the higher education and research institutions themselves to do more to attract support and funding for research. They have to demonstrate to their range of constituents—from government to parents, from local communities to business firms—the relevance and importance, long-term and more immediately, of higher education and local knowledge generation. They have to develop a clearer focus on the question of relevance in contemporary circumstances. At least as important, there will have to be better communication and explanation of what is already being done. Despite the strictures of commentators about the lack of relevance in the research being conducted by African institutions, a glance at any listing of projects at any of our institutions will show much evidence to the contrary. Work is being done on agricultural products and systems development; control of any number of infectious diseases, including malaria, tuberculosis, and HIV/AIDS; food and energy conservation; economic policy; as well as social and humanities issues of all sorts and at all levels. While not all this research can claim to be of the highest quality, the problem is less that of relevance of theme than of connectedness to the appropriate constituencies and impact on policies, actions, and outcomes.

On this general question, I may refer to an innovative suggestion made in a study conducted as part of the AAU's "Study Programme on Higher Education Management in Africa. " The researchers found that most of the government departments they reviewed had funds for conducting a range of studies in support of policy or for monitoring its effect. Should university researchers adopt a more proactive posture, they could help departments identify their research needs, formulate appropriate research proposals, and contract to do the re-

search (Djangmah & Anyimadu 1997). This way, the government departments would benefit from research as a basis for policy making and advice, and researchers would get funds to do research in their fields of interest and earn some income without departing from academic work.

While applied research and consultancy work will be necessary, a good case can and should be made for more basic intellectual production and its relation to the destiny of our societies, now more than ever. Our institutions of higher learning should activate and work with constituencies within society in support of their mission and production. Much could be learned from preuniversity institutions, which have for decades taken advantage of this possibility.

Strategic Planning

At the institutional level, the goal should be the restoration of research to its proper place in the strategic plans and actual expenditure patterns of all universities including the improvement of research infrastructure of all types, the provision of appropriate materials, and professional incentives. There can be little doubt about the enormous difficulties such a project entails in the face of the parlous condition of most university budgets. It is, nevertheless, essential to keep emphasizing that, without ongoing research, meaningful research capacity building in Africa is inconceivable; and in the absence of such capacity, the generation and application of new knowledge—the condition for all development—will continue to fall short of the requirements of the 21st century.

Some of the concrete programmatic initiatives for consideration and adoption through strategic planning are discussed below. These include the strengthening of graduate study programs; the identification of institutional areas of strength in combination with a strong push for regional cooperation—enabling institutional specialization, the concentration of resources, and the interinstitutional pooling of resources on a regional scale; and the facilitation of collaboration with off-site nonuniversity research efforts as a means of faculty and institutional development. Other measures are the promotion of research management as a specialized field to strengthen management capacity, and the provision of a "soft landing " for young faculty as well as staff development opportunities to address the special problems of the third generation of African faculty.

Graduate Study

Turning away from the big issues of a more strategic positioning and better resourcing of research and research capacity development and sustenance, a number of specific, more limited measures suggest themselves. An obvious

measure for improving both the institutional and the human aspects of research capacity development has to be the revitalization of graduate study. This goal calls for a variety of measures including substantial improvements in library holdings, both specialized and general; expanded access to current literature; a widening of Internet access and use, especially by graduate students; and the provision of appropriate incentives to senior scholars to devote attention to the supervision and mentoring of graduate students. Further, avenues for the dissemination of Ph.D. (and master's) dissertations should be expanded. In addition to conventional journal and monograph publications where severe weakness constrains all research, electronic publication as contemplated in the AAU's "Database on African Theses and Dissertations " (DATAD),[7] can help to ease the dissemination bottlenecks facing African graduate research results. Not only will this project provide an incentive to graduates by exposing their work to a wider readership, but it will also make African graduate research products more readily available to African and international researchers and users.

Given existing resource constraints, graduate study in African universities could be enhanced by increased recourse to split-site or "sandwich programs " for doctoral studies, combining work at the graduate's home institution of the graduate with periods spent on research, reading, or course work at another institution. Such programs, which are already in operation in many institutions, have advantages (as well as disadvantages!) over full-time doctoral study abroad, including, among the most obvious, increased local relevance of themes and topics, reduced likelihood of brain drain, and lower costs.

Areas of Strength and Regional Cooperation

Few African institutions are in a position to excel in more than two or three areas of research specialization. It has therefore been suggested that individual institutions identify and concentrate on building up special institutional capacities in a limited number of areas of strength, actual or potential. Concentration of graduate study in the selected areas may then be expected to facilitate the building of the necessary critical mass. Unfortunately, in the past, this commonsense approach has proved difficult in practice. There is enormous pressure to teach all approved disciplines despite conditions of scarce resources, and few universities are able to negotiate the turf jealousies inevitably sparked by any move that appears to favor one discipline or department over others. The elaboration and implementation of strategic plans in many African universities, which could have facilitated the necessary trade-offs, do not appear to have altered the situation much.

It remains the case, nevertheless, that in combination with regional cooperation arrangements crafted to insure effective complementarity and sand-

wich graduate programs sponsored by member institutions, the areas of strength option holds particular promise. Apart from a further lowering of costs and the facilitation of regional networking, the combination promises mutual strengthening of such areas by bringing in extra resources and contributing to the creation of a critical mass of graduate students in the areas across institutions. This is exactly the thinking behind the AAU's project for Regional Cooperation in Graduate Training and Research. Briefly, this project, still in its pilot phase, has supported the formation of six clusters of institutions to collaborate in research and training in specialized areas selected by the cooperating institutions themselves.[8] Though only in its second year of full operation, the experiment shows much promise.

Off-Site Collaboration

The threat posed to university research by the emergence of off-site research centers has been noted. This threat is balanced by the consideration that the diversification of sites offers considerable potential for collaboration and synergy. The potential for the pooling of talent and resources and for the productive division of labor and complementarities cannot but benefit research in general and the underresourced universities in particular.

Research Management

With the increasing recourse to project research, research management has to be better organized and more professional. Appropriate policies, systems, training schemes, and incentive structures must be devised to encourage and facilitate large-project development and implementation, care being taken to preserve the core values of university-based research. In other words, research should be concept led and teaching related. Matters to be tackled include guidance of staff about opportunities for funded research and how to access them; development of expertise in such matters as contract development; intellectual property and ethical issues; and the marketing of research capacity to the appropriate public. It has been suggested that this might best be done by establishing a central research management facility within an institution and by making research management a profession (Association of Commonwealth Universities 2001). On this latter point, attention should be drawn to the unfortunate practice of heads of departments and senior faculty appropriating to themselves all invitations to international seminars and conferences.

Soft Landing and Staff Development

Together with a renewed emphasis on local graduate programs, it is necessary to create conditions for a soft landing for new appointees to the faculty (the

third generation), through initially lighter teaching loads, special support services, and, wherever possible, attachment to senior colleagues as mentors. Younger faculty members should be motivated and given incentives for constant self-improvement and the widening of horizons. Other measures might include their insertion into research groups led by senior scholars, as well as support for conference attendance and short foreign attachments.

Such actions would call for a deliberate policy of forbearance on the part of senior colleagues, directing as many international and developmental opportunities as possible to younger faculty, and helping them prepare adequately for effective participation. Such an approach should go some way toward making up for the generally weaker preparation of younger faculty members for academic work and reducing the danger of undue parochialism. The aim should be, in the first instance, to help the new entrants survive the shock of reentry without being demoralized to the point of leaving the institution or joining the ranks of the "living dead, " i.e., academics who for one reason or other do no research. Additionally, they should be strengthened to survive and transcend the often anti-intellectual environment into which they are thrust.

Special Initiatives Targeting the Active

Component of Research Capacity

Some significant initiatives have been developed at both the regional and national levels in recent times, aimed directly at the development of the active or human element in research capacity—that is, the skills and attitudes required of good researchers. The following instances provide illustration.[9]

Study Programme on Higher Education Management in Africa

In response to a perceived absence of African scholarly input into the search for solutions to the higher education crisis on the continent, the Association of African Universities (AAU), with financial support from the Dutch and Swedish governments, introduced the Study Programme on Higher Education Management in Africa in 1993 (http://www.aau.org/studyprogram/). The aim was to help develop local capacity within the association's member institutions for undertaking systematic research on issues of higher education policy and management and to increase the indigenous knowledge base of African higher education policymaking. Under a "Research Grants Scheme, " which is run in phases, the Study Programme has awarded grants for research on such themes as information and data gathering; resource mobilization and allocation; institutional culture; decision-making processes; higher education and work; higher education costs and financing; university management for quality and equi-

table access; graduate and employer survey; privatization of higher education: issues, factors, and trends, and student living and learning conditions.

A special feature of this scheme is that experienced resource persons supervise the research projects and that grantees are given intensive, often personalized, training in various aspects of higher education research through workshops and seminars. Participation in these training workshops is a condition for disbursement of tranches of the grant. When appropriate, grantees have undertaken short attachments at recognized centers for higher education research in Europe to help raise the quality of their work. In addition, grantees, particularly after the completion of their projects, are selectively sponsored to participate in international higher education conferences as part of their professional development.

Phase 1 of the Study Programme ran from 1993 to 1998 and was followed by Phase 2, which started in 1999 and ended in 2003. Altogether, 126 individual researchers have been trained and 43 research reports and 41 essays produced on aspects of higher education in Africa. These researchers are increasingly engaged in advising governments and universities, publishing on higher education issues, participating in international meetings, and generally contributing knowledge and insights on higher education issues in Africa. Proposals for Phase 3, scheduled to begin in 2003, have been under consideration.

Working Groups and Summer Institutes

The Council for the Development of Social Science Research in Africa (CODESRIA) (http://www.codesria.org/) contributes to capacity building in the social sciences with the financial support of a pool of donors by running the following programs: Multinational Working Groups (MWG), National Working Groups (NWG), Small Grants Programme for the Writing of Dissertations and Theses, and Training Institutes. The MWG brings together between 10 to 20 researchers from various disciplines and different countries within Africa, chosen through a rigorous selection process, to work on a competitively and specially selected common theme. In contrast, the NWG are self-constituted groups of researchers in a country, working on a theme of their choice.

Under the Small Grants Programme for the Writing of Dissertations and Theses, laureates are competitively selected and given small grants to help them complete their graduate theses or dissertations. Since this program's inception in 1988, more than one thousand grants have been awarded. Of these, 419 had been completed by 1995.

Under the Training Institutes Programme, between 10 and 20 young researchers are brought together from all over Africa for a five to seven week

intensive interactive session with experienced resource persons. The themes of the institutes include: democratic governance, gender, and children and youth.

While the AAU and CODESRIA programs outlined above have so far covered only limited numbers and have relied heavily on donor support, their value has been in pioneering approaches that, with appropriate modifications and improvements, show what could be done by African regional institutions.

Capacity Development Programme

The Centre for Science Development (CSD), a division of the Human Sciences Research Council (HSRC) of South Africa, pursues a "redress program " aimed at strengthening the research capacity of historically disadvantaged individuals and institutions, in response to imbalances in social research capacity created during the period of apartheid. The program provides funding for research grants and graduate scholarships in the humanities and social sciences. In addition to running workshops on research processes, women in research programs, and internship and fellowship programs, the CDS supports collaborative regional research training, promotes the use of research information systems, and encouragement more intensive use of technology.

The National Mathematical Centre (NMC)

The NMC of Nigeria was established in 1988 to train and develop experts in the mathematical sciences for Nigerian and African institutions, to serve as a national and international focal center for advanced research in the mathematical sciences and their applications, to enhance collaboration between young Nigerian scientists and experienced local and international scientists, and to establish a visiting program for mathematical scientists. Its students have come from countries like Benin, Côte d'Ivoire, and Togo, while faculty have been from all over the world.

Conclusion

As the 20th century drew to a close, the countries of Africa were making a concerted effort to reposition themselves to meet the challenges of development and social advancement in the context of accelerated globalization. The consolidation of democratic governance and the stabilization and reform of economic systems at the country level was complemented by increased cooperation and mutual support at the subregional and continental levels. A major hurdle remains in the development effort. This hurdle is the knowledge deficit arising from the limited capacity of indigenous institutions for generating and applying modern knowledge to production, management, and social life in gen-

eral. Both history and more recent political and economic developments account for this unfavorable situation.

One of the tragedies of the last two decades of the 20th century was the running down of the education systems as part of the general decline in the economic and social conditions in most African countries. Especially paradoxical was the underfunding of higher education at the very moment of the rise of the knowledge society and its spread throughout the globe. These factors only exacerbated the knowledge deficit. Thus, the reversal of policy, combined with deliberate support for the revitalization and strengthening of indigenous knowledge institutions must be part of the drive to reposition Africa favorably in the current global dispensation.

Against that background, the current refocusing on the regeneration and redirection of Africa's universities and other institutions of higher education and research by both governments and donors gives cause for hope. Crucial elements for the success of this general effort include improving the calibre of researchers at these institutions and the conditions under which they work. In this connection, particular attention needs to be paid to the enhancement of the capacity of researchers, working individually or in teams, to undertake essential research and maintain a positive culture of inquiry and innovation. But just as important are measures for the sustained reproduction of this cadre, its retention on the continent, and its full and effective engagement in knowledge production for the benefit of society. What this implies, and what does not receive enough attention, is an enabling macro environment within which universities and research institutions could operate effectively and within which they could achieve positive conditions, thus enhancing what I have called the environmental component of research capacity.

In discussing the key challenges and possible responses, I have identified the continuing resources squeeze as the core problem, as it colors all policy making and many of the other conditions as well. The solution to this problem, to the extent that it turns upon the health of national economies and public allocation policies, is far beyond the scope of this discussion. My concern has been with what can be done under current conditions. For a start, the resource limitations should serve to concentrate the mind, highlighting the need to prioritize in order to give due weight to research and research capacity development in the revitalization process and to identify and focus on those aspects likely to yield the most effective results under current and prospective conditions. The second point of note is the crucial importance that African universities and other institutions should themselves take up those aspects of the revitalization process that lie within their purview and which could be undertaken with a minimum of additional resources. I have mentioned, in particular, mea-

sures aimed at the strengthening of and selectively concentrating on graduate studies and the providing of incentives for attracting and retaining young faculty members.

None of the measures outlined and discussed above could by themselves transform the research scene in Africa nor remove the knowledge deficit. Yet together they will not only arrest the decline in research performance but, indeed, yield substantial immediate gains. Such gains could include regional collaboration in more vigorous graduate study programs; renewal of the faculty through the attraction, development, and retention of younger members; and improvements in the productivity of research through more efficient management and promotion. For the longer term, these measures could build into a momentum for development that, with improvements in the macro environment, could contribute to the maintenance of a knowledge generation and application base adequate to the needs of Africa in the 21st century.

Appendix: Makerere University

Funding Cutbacks

Makerere's financial resources from both public and external sources declined dramatically in the 1970s and 1980s . . . at the same time that the university was experiencing increasing pressure to expand enrolment. Makerere responded by admitting more students, but with fewer resources than it had had previously for smaller numbers.

The most obvious consequence of the decline in financial resources in the 1970s and 1980s was a sharp deterioration in the quality of teaching and learning. Makerere became a place of bare laboratories, empty library shelves, chronic shortages of scholastic materials, and overcrowded halls of residence.

The financial crisis had a major impact on teaching staff. Lecturers were demoralized by salaries that were not only meagre but often came late. . . . Many lecturers took other jobs, both within and outside of Uganda. . . . The lecturers who remained moonlighted as tutors, taxi drivers, or went into business in order to survive, using university facilities as their operating bases. Although many gave the odd weekly lecture, they had little time for seminars, tutorials, or one-to-one student contact, let alone research or intellectual debate.

There was virtually no application of information technology to either teaching and learning or institutional management during this period. Students remained without exposure to advances in information technology, and overall impact on the faculty was minimal. Administration and management processes remained almost totally manual.

Impact on Research

The university's research infrastructure and output suffered substantially. The university had built up a substantial research infrastructure whose outputs received international acclaim. In the first years after independence (1962–1970), political stability and the hopes created by independence brought new research initiatives to the university. Of particular note were the East African Institute of Social Research, which became the Makerere Institute of Social Research (MISR), the University Farm at Kabanyoro, the Medical School research program at Mulago Hospital and the Faculty of Science, especially in Botany, Chemistry, Physics, and Zoology. Under the regime of President Iddi Amin, most expatriate scholars and researchers left the country, donor agencies and other external financiers disengaged themselves, and collaborative research projects between Uganda and regional or overseas institutions were terminated. The government's preoccupation with economic rehabilitation and suppression of internal civil strife left research institutions and programs running on a maintenance-only basis. By the mid-to-late eighties, a few active research programs came to life with the sporadic return of external support, notably at the Veterinary Faculty, Faculty of Social Sciences, Faculty of Agriculture and Forestry, and Faculty of Education. However, this was funding for specific projects, generally in areas of the particular donor's interest, which did not improve the research situation of the university as a whole.

Small allocations for research resulted in poor facilities, limited access to publishing facilities, a limited research database, low output, and absence of a research culture. Other consequences were lack of appreciation of the importance of research, lack of skills to undertake research, lack of experience in research, low priority given to research at the university, and, in other public institutions, lack of centrally initiated and managed research and emphasis on financial gain as a motive for undertaking research. (Excerpted from Musisi & Nansozi 2001)

Notes

1 The author acknowledges the very thoughtful comments and advice on earlier drafts received from Tade Akin Aina, Amina Mama, Liz Lange, and David Szanton.

2 Paul Schultz's (2001) contribution to the same conference at which my paper was presented (Yale Center for International and Area Studies, African Studies and Economic Growth Center Conference on International Higher Education and African Development) provides useful illustrations from the fields of agriculture and public health of the importance of local adaptation, control interventions, and policy evaluation in ensuring the successful transfer of research results. Schultz's article also appears in this issue.

3 There is always great risk of oversimplification in talking of Africa as if it were a homogenous unit. I believe, nevertheless, that there are enough common elements to justify the general observations made in this paper.

4 This section draws substantially on a paper I delivered as the keynote address to a seminar on Social Science Research in West Africa organized by the Netherlands/ Israel Research Project in Accra, Ghana, November 19–20, 1997. The earlier address was published as "Bottlenecks to Research-Capacity Building in African Universities " (1997), in H. J. Masterbroek (Ed.), Social Science Research in West Africa: Seminar Proceedings (pp. 3-10) (Accra, Ghana: n.pub. (Netherlands/Israel Research Project).

5 The problem of aging faculty is reported from several universities, including Edouardo Mondlane University (Mozambique) (Mario et al. 2001), University of Dar es Salaam, Tanzania (Mkude et al., 2000), and Makerere University (Uganda) (Musisi & Nansozi, 2001).

6 Notable among these is the "Four Foundations Initiative, " by which the Carnegie Corporation and the Ford, MacArthur, and Rockefeller Foundations have undertaken to provide substantial amounts to support innovative programs in selected African universities. But full credit must be given to the few donors, including Swedish International Development Agency/Department for Research Cooperation with Developing Countries (SIDA/SAREC), the government of the Netherlands, and the Ford Foundation, which, against the trend, maintained support for African higher education and research right through the 1980s and 1990s.

7 The Database of African Theses and Dissertations Project (DATAD) of the Association of African Universities aims primarily at (a) building capacity in African institutions for the collection, management, and dissemination of theses and dissertations, and (b) increasing the visibility and accessibility of African scholarly work through publication on the Internet and on CDs. A project summary can be found at the Website of the AAU: http://www.aau.org/datad/.

8 A project description is included in the AAU's "Core Programme of Activities, 2001B04, " available at http://www.aau.org/coreprog/0104/themes.htm.

9 More detail appears in an appendix to the original paper presented at the conference, available from the Yale Center for International and Area Studies (YCIAS) Working Paper series: http://www.yale.edu/ycias/publications.htm.

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