

Developing Creative Research Environments in Least Developed Countries

- Strategies for International Cooperation

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Research for Development

Summary of Issues

Can poor developing countries justify spending on research? Many have eloquently answered a definite *yes* to this question. The solid arguments were recently summarized by Abegas (1995), Nilsson (1995) and Thulstrup (1995a), who concluded that research capacity is essential for the development of all societies. It has even been argued that the ability to make informed choices is particularly indispensable in th (1991), "Africa has

to *think* itself out of its current predicaments". Thus, they cannot afford to abstain from research.

While, in principle, there is a consensus that it is necessary to cut the vicious circle of expensive short-term measures and invest in research capacity for the long-term, it has been difficult to put this into practice. Some doubt the feasibility and affordability of building research capacity in the less affluent countries¹, and it needs to be demonstrated that there are appropriate mechanisms and means of doing so. This conference provides a welcome op-

portunity to review the options for research training, one of the key elements in strategies to develop national research capacity

My presentation will focus on ways of utilizing international cooperation as a *means* for research development *within* least developed countries. It will discuss the *institutional context* in which research training is considered, financed and organized. It will argue:

- that resources for research should be selectively directed towards a *limited number of institutions*;
- that *national universities* are pivotal institutions for the development and maintenance of capacity for research;
- that the most critical investment is to strengthen a proper *basis for research* before, or parallel to, the gradual buildup of capacity for *post-graduate programs* and research training in some key areas;
- that this requires a *highly selective use of resources*, rethinking of some present expenditures, as well as *strict aid management*.

A purposeful use of external support requires:

- criteria for accepting support, for engaging in research cooperation and linkages, and for utilizing foreign training opportunities.
- a clear understanding of the interests, intentions, limitations and conditions of external agencies and partners.

The Institutional Context

Research Policy and Dual Financing Systems

Research policies, in addition to discussing priority areas for research, deal with national research organization and financing strategies. This is a matter of balancing resources for concentration and coverage. Concentration is the logic of the hyper-specialization needed to advance frontiers and gain competitive advantages in high technologies. A broad basis is required for the emerging knowledge society, for higher education and for the analytical capacity increasingly needed for various functions in society. Innovations and

breakthroughs are not only generated by big science, but also arise from the work of the many research groups pursuing their own ideas or engaging in problem solving.

Resources for research are usually allocated along two major Unes. Core funds are allocated to institutions, (faculties/departments) to secure a basis for research. Special grants are awarded to strengthen front Une research or knowledge development in a specific field or problem area. The proper balance between such funds is constantly debated. The recent trend in the North has been to decrease government core funds for research and increase competitive and targeted funds.

This has led institutions to review rules and conditions for accepting funds and engaging in cooperation. Overhead charges have become substantive. Their function is not only to cover administrative costs, but to supplement the institutional funds required to maintain a basis for research. Research training is usually financed from resources controlled by the university, even if research grants may include additional resources².

The African Scene

African universities³ also operate with core funds and additional grants. A major difference is, however, that many universities depend on external, usually foreign, support for their basic core functions⁴. Few can count on grants from national research councils or foundations for research, and some universities depend entirely on foreign funding for the execution of research.

A major problem related to research in some African countries is obviously a lack of resources. Problems related to the use of available resources may just be as important. The lack of balance between core resources and special projects stands out. There are institutes and university institutions where meager resources are exhausted when salaries are paid, and extremely limited funds remain for libraries, research equipment and the execution of research. At the same time, funds are available from other sources, usual aid, for commissioned studies, applied and problem focused research in fields of immediate interest to development efforts. However, the two do not meet in a balanced and fruitful way. The institutions are often weak and lack both the academic and administrative base required to make full use of external offers for support or cooperation. Criteria for accepting grants are not set, overheads are rarely charged. In fact, much of the external

support awarded to the institutions for research or other needs is managed by the granting agencies or by cooperating partners.

A Simplified Model

It may be useful to illustrate a dual research funding structure with two interlocking triangles (Fig 1). The model serves to illustrate various scenarios. Fig. 2a pictures an institution with a well developed basis for research which benefits from grants awarded to individual researchers and groups. Fig. 2b, on the other hand, shows a situation with an underdeveloped research base. Special projects may consume resources rather than strengthen the institution. A project which would contribute to the academic life of a developed institution may occupy an disproportionate share of institutional resources and other areas suffer. There is also a danger that qualified staff engaging in the project may become alienated from the institution. Strong institutions can control such risks. They have the necessary research environment, as well as the management capacity to state conditions for accepting (or allowing staff to accept) the project, and charge overheads. Weak institutions have neither, and risk being eroded.

Fig 1. Model of Dual Avenues for Research Funding (Olsson 1995a)

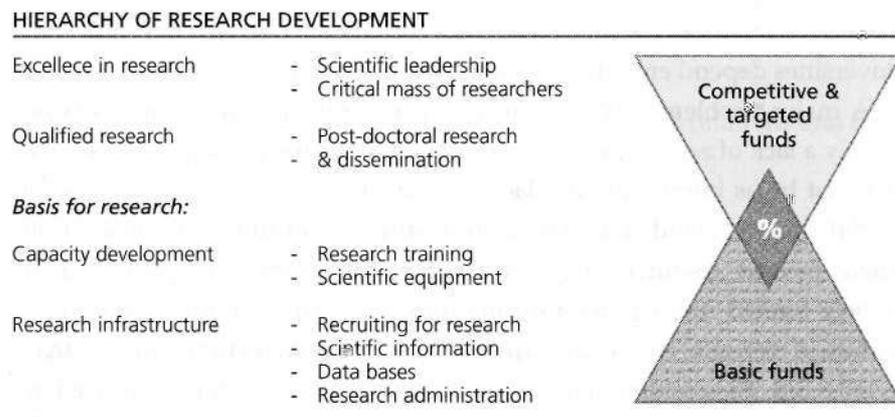
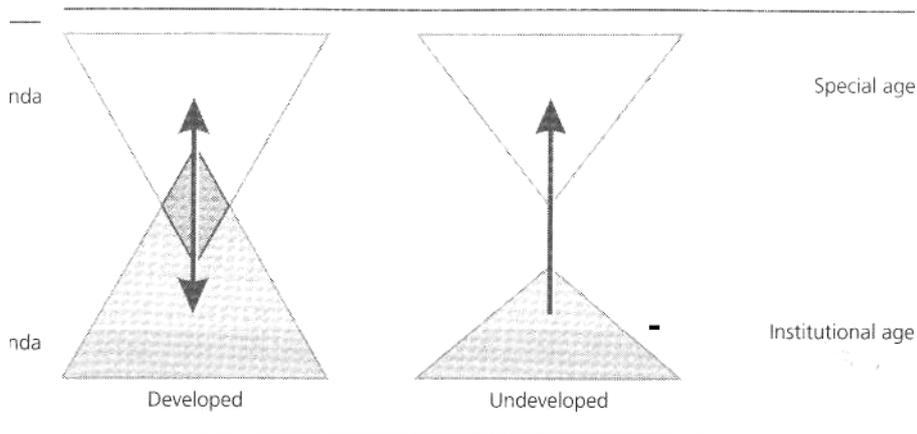


Fig. 2. Impact of Targeted Grants On Developed and Undeveloped Institution



- a) shows a situation with a developed research base financed by core funds. Research grants from research councils, foundations etc. may be utilized productively to strengthen the institution.
- b) pictures a weak institution with an undeveloped basis for research. Special projects may absorb capacity and resources.

Strategies for Research Development

Focus on a Few Institutions

This paper will argue that it is necessary to strengthen a broad institutional basis for research combined with concentrated efforts to build a critical mass of competence in some selected priority areas. In order to do so, it is necessary to concentrate the available resources for research, national as well as foreign support, to a limited number of institutions.

The glaring contradiction between needs and resources, compounded by a lack of overall policy for organization of research, has often brought about dilution of resources at a multitude of institutions. A number of ministerial institutes may be mandated to carry out research, although they have neither competencies nor resources to do so. Higher education institutions are almost automatically expected to do research, regardless of their orientation and level⁵.

Although many of these institutions lack conditions to actually engage in research, the expectations propel their staff into seeking opportunities for research training. Salary scales of civil servants in many countries are linked to

research degrees, also in positions which are not research related. Thus, there may be a fair number of people with research degrees in the country, but only some of them are linked to institutions actually engaged in research. While it is positive that academic achievements are awarded, and analytical competence is useful in many positions, it may be a very expensive practice. A strategic approach requires concentration.

Some institutions have managed to find research grants from international research programs. Some have received grants from supporting agencies in order to develop research, usually in priority fields like environment, population, etc. In addition, aid agencies and foundations have helped establish new institutes which are independent in the sense that they have no regular national budget. These institutes are not bound to follow government pay scales and can attract qualified staff. Some have a regional mandate and some have strong links with research groups outside the country. They may produce important research. However, they may be poorly integrated in the local research community and totally depending on external funds for their subsistence.

Although not engaged in direct funding, national authorities should also take account of such resources. Even if they are aid-financed, they are meant to support the country or the region. Alternate use of funds must be considered by the countries expected to share the benefits and, ultimately, the costs to maintain them. In many cases, such resources could be more constructively used for the development of existing institutions integrated into a national research system.

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Universities

A national university should be the top priority for research capacity building efforts. The importance of universities for research may be obvious for participants in this conference. Universities train researchers and are the main institutions for the basic sciences, which are indispensable for any research application. In many countries, including the US, important parts of government research funds are channeled to universities. In other countries, like Japan, close links are maintained between research institutes and higher education. Such vital connections are less obvious to many decision makers in developing countries and supporting agencies.

With some exceptions, African universities have been neglected in terms of research funding. After the era of development optimism in the 1960's and

70's, when universities were seen as strategically important institutions, the economic crisis and adjustment programs prompted public sector cuts and emphasis on basic education. The relevance of universities has been questioned and governments have been encouraged to institutionalize university reforms where the state "off-loads"⁶ its responsibilities. Students should increasingly carry the cost as "consumers" of higher education. The shortcomings of such policies have been extensively criticized (Buchert and King 1995). Their implementation may imply that some countries will find it even more difficult to sustain a properly functioning university, which may be disastrous for research development at large.

It may be worthwhile for gatherings like this to underline as part of their recommendations the importance of universities for research development.

An Indispensable Basis for Research

The most strategic need is probably to strengthen the institutional basis for research. This includes capacity for research administration, as well as a minimum of research facilities, capacity for maintenance of scientific equipment, libraries, and, most importantly, qualified academic staff. Without such a basis, research activities cannot be sustained beyond the lifetime of a project where services are provided by a foreign institution.

University faculties need to have a minimum research capacity in order to sustain qualified teaching, carry out research, and retain qualified staff. An academic environment needs to be built around the key disciplines - including the basic sciences - needed for the applied research demanded by society. The ability to benefit academically from research cooperation and visiting scientists also depends on a minimum of existing capacity. Otherwise, local staff risk being used merely as facilitating research assistants to the foreign research leader, as in some Mozambican institutes described by Olson (1995a).

The Key Role of National Research Training

If the strengthening of an institution-wide basis for research is the first step, concerted efforts to develop research-oriented postgraduate programs⁷ in some key areas is the second important part of a strategy to establish university research. Scientific contacts and a critical group of colleagues are necessary to create a research environment. University staff usually have time allocated for their own research, promotion structures are linked to academic

performance, and many engage in projects which are feasible with available equipment and resources. However, few can sustain a research interest in isolation. A quantum leap usually occurs when postgraduate studies and research training is undertaken.

This is also the stage where the investments begin to pay off in terms of capacity to substitute training abroad. In fact, if the ambition is to develop independent research, the ability to reproduce its own capacity is a crucial criteria, and support programs should aim for such development. It would involve the gradual phasing out of assistance for research training and continued support for postdoctoral exchange and regular scientific cooperation.

Postgraduate programs require a substantive concentration of staff and resources and it is often proposed that they develop with a regional mandate. Such division of labor exists in all parts of the world. It develops in a process where interesting researchers attract colleagues and students as well as funds. Similarly, African universities may identify strengths and invest in some selected areas and cooperate on a regional level for research training.

The notion of regional "centers of excellence" has been very popular among aid agencies, which also favor a multi-disciplinary approach for applied research. Levy (1992) discusses the expansion in Latin America of such independent centers, financed by external agencies eager to support the most relevant studies: "The most valid critique regarding relevance is not its insufficiency. It is that its primacy has been pressed to the point that academic and disciplinary development is hampered ... (as is), the development of next generation of scholars". Abegas (1995) suggests that postgraduate programs, based in university faculties, firmly anchored in the methodologies of the disciplines, may chose to deal with problem fields of high relevance without losing in academic rigor.

Options for Research Training

In the following discussion, we will review modalities for research training involving foreign institutions. To what degree is research training abroad, training within comprehensive support programs and within research cooperation projects suitable, not only for the individual candidate, but for the institutional development of research? To what degree can the institution

plan for and utilize such opportunities, and to what degree can the institution influence alternate use of resources?

Research Training Abroad

Overseas training was one of the key elements in university development plans envisaged by the newly independent African states in 1961⁸. Upon their return, the graduated academics would successively replace the foreign staff brought in to fill the gap. The major ex-colonial powers, France and the UK, allocated a substantial part of their aid budgets for training in their universities. Many African leaders, civil servants and university staff were trained and contributed to the build up of the independent states. However, the system has also provided excellent recruiting possibilities for training institutions, and the brain drain problématique at large is well known.

Another new problem is the emergence of special programs designed for foreign students. Mc Mahon (1992) points to a related aspect. Overseas Ph.D. candidates studying in the US have difficulties in obtaining part-time research or teaching assistantships - accompanied by the usual tuition and fee waiver for the third and fourth year of the program - which are common for US candidates. Thereby, they miss out on the essential research apprenticeship and teaching apprenticeship experiences, and costs are above the amounts necessary.

Supporting agencies have started to question the relevance of the instruction, and budgets for scholarships have been reduced in most aid systems. At the same time, tuition fees for foreign students have increased. In fact, training of overseas students is now seen as a major source of income for US and British universities, as well as an important part of foreign trade. This trend is spreading. The commercialization of training opportunities has made it difficult for African institutions to send candidates. Few can afford to pay the full cost. Nevertheless, a substantial number of African students study abroad in spite of the high costs involved (Table 1).

Table 1. Number of African Students Studying Abroad
Based on UNESCO statistics from 62 host countries (UNESCO 1993)

Host country	1980	1990
North America	36,000	20,000
Europe/former USSR	58,000	73,000
Other	22,000	27,000
Total	116,000	120,000

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individual candidate, but for the wider context of the institution or part of it. The support may involve a combination of material support for equipment and literature and training of support staff, in addition to the research training of one or more academic staff members.

In many cases, the sandwich type training provides the best opportunities for the candidate to pursue active research when the project is phased out. He/she is familiar with the equipment, conditions and obstacles of the environment and has established links for continued research cooperation. Home-based research training with visits to the institution of a collaborating supervisor, who in turn comes for short visits, has many advantages. The capacity for independent work is important. Another advantage is the contribution of the candidate to the daily life of the institution - she/he serves as a role model for students and may involve students in small studies as part of their diploma work, teaching benefits, etc. Finally, the orientation of the research is likely to fit the needs of the institution and society.

The close involvement of a foreign institution may also lead to continued cooperation after the end of the project span. The experience enables the university to select suitable partners when assistance is sought to build post-graduate programs.

The major drawback of the comprehensive support programs is that they are limited to developing country institutions or departments which have been selected and invited to present an application. There are few cases where an institution or department can initiate such a program, find collaborating partners and a funding agency to support it. Once targeted for support, however, there is usually room for dialogue and some flexibility in relation to the orientation and form of the support. Thus, while the support form represents a superior alternative to training abroad, the benefit to the institution depends on how well the proposed program fits its overall situation and needs. Although most agencies offering such support respond to requests from the developing countries and their priorities, the range of options is usually limited by policies set by the supporting agency. The degree of choice varies. Sometimes the modalities are streamlined according to the overall experience of the agency, rather than in relation to the situation of the specific institution, sometimes the subject area is already defined by the agency, and sometimes a cooperating institution in the financing country has even been selected.

In such situations the institution/department is left with the option to ac-

cept or decline the offer. In most cases, developing country researchers cannot afford to reject training and cooperation opportunities even when institutional needs and priorities become distorted. It is interesting to follow the course of the negotiations pursued by the University of Eritrea. The University has developed a tight plan for what they can engage in and how they can link with external institutions. Although the university has been targeted for support by a number of agencies, some agreements have not been concluded⁹. Agencies which, in principle, say that they appreciate tight plans have problems when this forces them to rethink their support orientation and modalities.

Aid Management

Another dimension of support programs is the degree to which they contribute to the capacity for research management and institutional management in general. In weak institutions, assistance may be needed for all kinds of practical tasks, like procurement and maintenance of equipment and supplies, travel arrangements and management of funds, in order for research activities to be carried out. It is not uncommon that the management of support programs is trusted to the foreign institution. However, such assistance should only be temporary and efforts should be geared to help the institution shoulder the tasks. Like researchers in the North, those in African institutions will have to find ways of dealing with the practical hang-ups and develop a practice of being accountable to the institution for the use of funds. Assistance to develop aid management is therefore a central element of comprehensive support for research development. It is also important that those engaged in the projects respect the institutional management structure.

Obviously, capacity to plan for and organize research development is an important aspect of research management. Here, we deal with another chicken and egg problématique - without research capacity, research leadership can hardly be expected to develop. A comprehensive support program may encourage such aspects and help institutionalize systems for peer review for promotion, selection of research candidates etc., and systems for reviewing grant applications, allocating small grants and accepting external offers for research cooperation.

Aid management is not only the art of dealing with an external agency, it is the art of dealing with a number of such agencies and partners. The pluralism of advice obtained in the process may be useful, but the process of re-

ceiving missions may be very time-consuming. Wiold (1995) has studied the diverse and changing reporting requirements put forward by supporting agencies, and suggests that universities produce one annual report integrating contributions from different sponsors. Serious efforts in this direction have been attempted by the Eduardo Mondlane University in Mozambique, but it remains to convince agencies to accept such reporting.

Research Cooperation

International cooperation is part and parcel of research development in all parts of the world. Researchers work across borders and collaborate, each partner contributing its share. The intellectual reasons are obvious - the opportunities to share and debate ideas from different perspectives, and the pooling of resources.

Naturally, such opportunities are used also by developing country researchers. However, as less affluent partners, they depend on being invited and financed by external sources. Their involvement may be of service character, such as helping to providing material or specific data from the country. Some multi-center studies may be designed to collect information from different areas for comparative analysis at a center. They may, nevertheless, contribute to skills by providing methodology courses and, in exceptional cases, provide full research training opportunities.

Research cooperation financed by aid may have two types of primary ambition. It may be financed to strengthen the research capacity in a specific developing country institution, as earlier discussed, or primarily be intended to enhance knowledge in a specific(ma) Tli5

Science Aid or Research Cooperation

In the above, care has been taken to discuss programs from the point of view of support for a developing institution. This is in line with a clear ambition to distinguish science aid from scientific cooperation, as also suggested by Oldham (1994). However, such a clear distinction is not favored by most researchers or agencies which emphasize the importance of mutual interest for the success of the ventures. I refer to the excellent overviews and analysis of existing research support programs recently produced by Manor and de Kadt (1990), Veldhuis (1993), Gaillard and Thulstrup (1994) and Gaillard (1995). In addition to the need for long-term financing, most agencies underline the need for joint interest, joint application, joint participation, publishing, etc.

This concern may, in part, be derived from the dangers of asymmetry in cooperation between developed and undeveloped researchers and institutions, as highlighted by Bhagavan (1992), and represents a concern for the interests of the less developed institution. However, there is also a danger that the insistence on jointness masks the differences in interest. Olsson (1995) discussed the multipurpose nature of linkage programs and a need for "deconstruction" of the aims and interests of the cooperating partners for the evaluation of efficiency of the programs.

In the cases of weak institutions, assistance may be a necessary stage to reach a situation where they can engage in proper cooperation. Assistance should have clear goals related to the development of an institution and be time-limited. This defines the role of the assisting institution, and the criteria for success are related to the degree of *independent* capacity developed. Asymmetrical cooperation, where the stronger partner, instead of supporting, permeates special service functions and takes over responsibilities, is a failure in this context.

On the other hand, when the ambition is to develop, say, a malaria vaccine, the institutional outcome is secondary. Other "self-interests" are also legitimate, such as the ambition to internationalize universities *vis à vis* the Third World. Such interests are clear and can be handled. The confusion arises when the primary purpose is obscured. There are some programs for cooperation where the applying institution is the,

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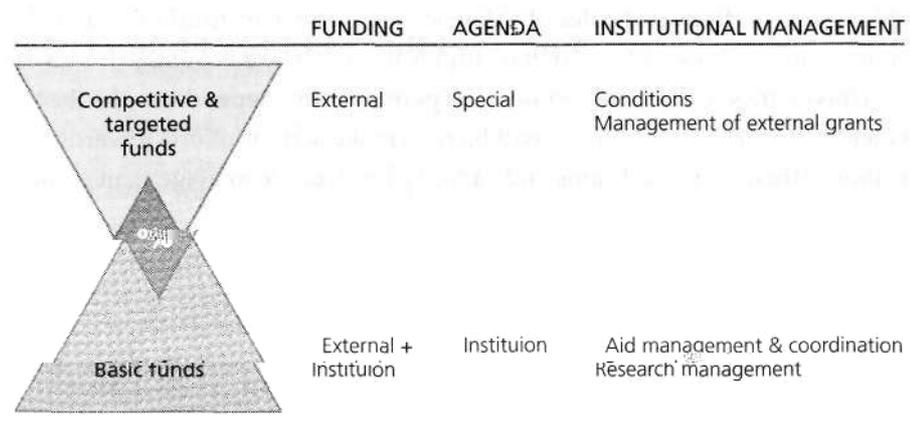
To the degree this is classified as assistance it is extremely tied aid. The developing country institution can neither decide on alternate use of funds, nor select another partner. As cooperation it is extremely asymmetrical and encourages paternalistic rather than collegial relations. Both institutions have reason to question such terms for cooperation.

Ethics - the art of mutual self protection

One may suggest that the strong partner should be particularly sensitive to the special ethics of research cooperation in asymmetrical relations. Researchers engaged in ventures where each partner contributes resources appear to agree on invisible laws on ethics in scientific cooperation in general. However, whenever grants have been awarded to a joint project, other conflicts may arise, unless the researchers and their institutions have agreed on how to share funds and equipment used by the project.

Similarly, in asymmetric relations, there are no detailed rules and regulations for how to be a good pal. One could even question if the strong should be more considerate and benevolent, or if such behavior leads to undesired paternalism. In practice, ethics is mutual self-protection. In true cooperation, both partners have legitimate rights and each partner is able to assert her/his own interests.

Fig 3. Model for Ideal Conditions in Relation to Aims and Management of External Funds to Institutions



The institution sets conditions for accepting grants allocated for special purposes. Developing countries which depend on external funds for core functions will have to develop tight aid management in addition to regular management of research.

Institutional Management of External Cooperation and Grants

This brings us back to the model for channeling of resources to institutions. It is highly legitimate to demand that science aid is actually shaped in line with the interests of the institution, according to the logic of an institutional agenda (fig 3). As earlier discussed, this requires a tight aid management.

It is also legitimate to offer participation in research and research training projects, programs, networks, etc. defined from a special agenda, e.g. that of a subject or problem area. Such resources belong to the external offers, represented by the upper triangle in fig 3.

In order to manage such offers, weak institutions should study the practice of more developed ones. They usually have strong mechanisms for self-protection, they select carefully what they want to engage in and state their conditions. Usually, conditions vary for different types of offers. High overheads are charged for commissioned studies and services, sometimes with a different rate for profit-making and non-profit-making customers. Other levels are charged for research grants. Universities in the North also streamline their reporting structure and may refuse to comply with specific time consuming demands¹⁰.

It may be timely to encourage developing country institutions to develop and implement similar practices in relation to aid financed support and offers for cooperation. The corresponding plea to agencies and external partners may be less to reform and adjust, but to clarify their interests and objectives. A second requirement is that agencies and cooperating institutions respect the conditions and rules of a developing country institution as they do *vis à vis* universities and research institutes in a developed country.

Universities in Africa should not permanently depend on the benevolence of their partners. They will have to make serious efforts towards developing their own conditions and capacity for decisive management of aid.

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Notes:

1. As pointed out by Thulstrup (1995b), only 10% of World Bank lending to higher education goes to Africa, and only a fraction of this to research.
2. Postgraduate degrees and research training have become part of the educational system and not only a means of recruiting for a research career.
3. Recognizing the wide spectrum of different situations, this discussion refers to the least developed African countries in relation to the developed countries in the "North".
4. The major universities in Mozambique and Tanzania depend on foreign funds for more than 50% of their total expenditures, of which only a small part concerns research.
5. A draft policy for education in Tanzania listed some 140 tertiary training institutions, stating that all of them were expected to engage in scientific research.
6. This term is developed further by Neave (1992)
7. The term postgraduate may be used for a variety of different studies, some of which are course-based or leading to professional specialization. Here, it refers to programs covering research methodology with a thesis requirement and is used as a synonym to research training leading to Masters or Doctoral degrees.
8. UNECA & UNESCO: Final Report on Conference of African States on the Development of Education in Africa, Addis Ababa, 15-25 May, 1961.
9. Wolde Ab Yisak, personal communication 1995.
10. Ironically, the reporting expected by SAREC from developing country institutions is much more elaborate than the ones made available from the administrative offices of Swedish universities.