

Untapped Research Capacities? Mobility and Collaboration at the Intersection of International Development Aid and Global Science Regimes

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Abstract:

This article aims to offer some thoughts that go beyond mere bibliometric and scientometric evidence, by empirically and comparatively exploring the conditions for, and the experiences of research and international research collaboration of African PhD holders who graduated with support from development cooperation/aid. The article explores the constraints on research, international research mobility and collaboration, at the intersection of development cooperation and global science regimes. Taking Swedish development cooperation as an example, the article focuses on preconditions and constraints that scholars from Mozambique and Tanzania, in their current positions, experience in their research, with special attention on international mobility and cooperation.

Cet article a pour objectif de proposer des réflexions qui dépassent les simples preuves bibliométriques et scientométriques, en explorant empiriquement et comparativement les expériences de recherche et de collaborations scientifiques internationales de docteurs africains ayant reçu une aide au développement pour leur doctorat. Cet article explore les limites auxquelles se heurtent la recherche, la mobilité internationale et la coopération scientifique internationale, à l'intersection entre la coopération au développement et les programmes scientifiques mondiaux. En prenant pour exemple la coopération au développement suédoise, cet

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article se focalise sur les conditions et les contraintes que les académiques du Mozambique et de Tanzanie, au sein de leur emploi actuel, rencontrent dans le cadre de leur recherche, en portant une attention particulière sur la mobilité internationale et la coopération.

1. Introduction

This article explores constraints on research, international research mobility and collaboration, at the intersection of development cooperation and global science regimes. Taking Swedish development cooperation as an example, the article focuses on preconditions and constraints that scholars from Mozambique and Tanzania, in their current positions, experience in their research, with special attention on international mobility and cooperation.

Since the 1970s, Swedish development cooperation for research has pioneered a particular approach to institutional research capacity building, by focusing on research training as a prime component to achieve competitive and sustainable research environments at national universities in collaborating African countries (Sida¹ 2003). According to the so-called ‘sandwich model’—designed to help scholars maintain links with their home institutions during training—mobility and collaboration are placed at the core of knowledge transfer from universities in Sweden to their African counterparts; gradually, this is to result in enhanced international collaboration and the establishment of local PhD training programmes. In Mozambique and Tanzania, these programmes have been in operation for over 35 years, and a considerable number of PhD graduates have been trained within the framework of a fairly steady constellation of institutional collaboration (Sida 2003; 2010). Over the years, confidence in the model has been so high that it has overshadowed the need to examine the long-term effects of the support, in terms of frequency, patterns and conditions for mobility and collaboration among the participating researchers, and in terms of how—and to what extent—these effects are linked to structures of inequality in the relationship with international, non-African researchers and institutions (Felllesson and Mählck 2013).

In the absence of systematic studies on the outcome of these programmes, this article aims to offer some thoughts that go beyond mere bibliometric and scientometric evidence, by empirically and comparatively exploring the conditions for, and experiences of research and international collaboration after graduation among Mozambican and Tanzanian beneficiaries. This involves identifying their current positions (geographically and academically), the resources at their disposal for research after graduation (in terms of time and funding), and patterns and experiences

1 Swedish International Development Cooperation Agency

of international mobility and research collaboration. It is also important to discuss research results critically, both in relation to the policy framework of research partnership programmes and to previous research on institutional conditions for research in low-income African countries. The results are also discussed in the light of previous research on post-colonial knowledge relations. The field of 'post-colonial knowledge relations' has made an important contribution to the way in which contemporary knowledge relations and conditions for research can be theoretically conceptualised (Spivak 1990; Hountondji 2002, Harding 2009, Migniolo 2012). Building on this research, the article will make a contribution to the field by providing empirical research in the social sciences.

The specific research questions that are dealt with are: what are the premises for research in terms of finance and time for the selected group of PhD graduates? What are their patterns and experiences of international mobility and research collaboration? How can the answers to these questions be understood, in relation to the policy framework of the partnership programme, and in relation to previous research from a post-colonial perspective on institutional conditions for research in low-income African countries?

The article is structured as follows. First, some general background is provided in terms of the role of highly skilled individuals (PhD graduates) and the state of international research on mobility and international collaboration. This is followed by an overview of the institutional regime of international development cooperation, explicitly in the area of support for research capacity building, which will be framed within theoretical conceptions on institutional and postcolonial theory, examining Global North and South relations. This part will be supplemented by brief insights into current developments within the global science regime and national policy priorities in higher education and research. The next part outlines the methodology and the sample, followed by empirical findings. Conclusions and policy recommendations are provided at the end.

2. Swedish Development Cooperation for Research Capacity Building in Low-Income Countries

Several international development partners have a long record of supporting capacity building at research institutions in Africa, but there are significant differences among them in terms of scope, design and ownership, arising from different views on institutional capacity building (Velho 2004 ; Jones et al. 2007). Swedish development cooperation has supported research capacity building in low-income countries for more than 40 years. The principal rationale behind this support is that each country should have at least one university capable of being a resource for the establishment

and expansion of national research and higher education (Sida 2006). For this to materialise, the Swedish support is comprehensive: support to individual research projects is an integral part of a wider support effort to the national research system, with provisions for institutions and facilities such as research councils, research policies, administrative resources, libraries and laboratories. The training of PhD graduates constitutes a core component in keeping with this approach. Over the years, the modality for support has remained relatively unchanged, based on the basic principle that each country should be able to identify its own areas of research and have the capacity to carry out that research.

Since the early 1970s, the ability to engage, and take active part in international research collaboration has been clearly highlighted in the Swedish conceptual framework of research capacity (SAREC: 1977: 10; 1986: 11; 1992: 10; Swedish Government 2010: 12; 2014: 2). The conceptual understanding of research capacity has largely been built around a linear assumption of progression from knowledge production to societal application, development and eventually poverty reduction (Velho 2004).

As mentioned above, a core activity in the Swedish approach has been the training of PhD graduates using a research partnership model (the ‘sandwich model’), also designed to counteract brain drain: ‘A major intention of the “sandwich model” is that the successful candidate will continue to stay in his home institution after graduation, researching in an environment with a much improved research infrastructure as a result of the support provided by SAREC over the years’ (Bhagavan 1992: 21). This approach, which provides operative policy guidance, is believed to promote capacity building efforts more holistically, moving beyond the individual researcher, by gradually transferring responsibilities, administratively and substantively, from the Swedish counterpart to the partner in the collaborating country.

Relational premises between Swedish and collaborating institutions in the Global South have rarely been dealt with in policy documents governing the support for bilateral research collaboration. One of the most profound thoughts on this could be found in an early policy document:

‘Limitation processes and lack of development relevance together with dominant political and economic forces have generated a tremendously powerful transnational intelligence industry, of which the Western research community and many of its branches in the third world are integrated parts. As many other multinationals—it imports raw material, not least from the third world. Huge amounts of raw material in the form of students are processed and transformed into ‘intellectual Barbie dolls’ and re-exported, thus guaranteeing the suc-

cessful continuation of centre dominance and mimetic development strategies' (SAREC 1977: 14, quoted in Brodén Gyberg 2013: 127).

A more recent formulation on this issue could be found in the Swedish government's policy for research covering the period 2010–2014:

'The relationship between Swedish researchers and researchers from developing countries is basically unequal in terms of resources. This is also reflected in an imbalance between researchers and research groups as regards their ability to influence the formulation, implementation and reporting of research. Swedish research support is to be designed in such a way that it helps prevent the development of a superior and an inferior status in this relationship' (Swedish Government 2010: 19).

In the recent government research strategy, the relational condition is reduced to a few vague words: '... promote equal research relationships' (Swedish Government 2014: 3).

This overview shows that cautionary notes were sounded early on about power imbalances in the collaborative relations between the stakeholders, and that this awareness has been preserved in recent government policies/strategies, though the phrasing has been toned down. But the model has remained generic and has failed to produce practical guidelines to improve implementation.

Swedish development support for research capacity building dates back to 1978 in Mozambique and 1977 in Tanzania. Since the late 1980s, support in both countries has mainly targeted capacity building through training, in accordance with the research partnership model. Approximately 150–200 individuals have graduated with a PhD in each country (Fellesson and Mählck 2013; Sida 2014). Swedish university departments have played a substantial role as partners providing supervision, coursework, research facilities and graduation. According to a 2003 Sida evaluation of the Mozambique programme, however, this intention has not been effectively fulfilled: 'Most of the training programmes under Sida/SAREC cannot be classified as "sandwich" type, since the candidates return only to teach or to do administrative work and not least attend to other job commitments to secure an adequate income. Too little time is spent on research at home' (Sida 2003: 22).

The level of government funding for research is low in both Mozambique and Tanzania, with less than 0.1 percent of GDP spent on research (UNESCO 2010). Funding from international development partners and foundations makes up more than 90 percent of the research funding at Eduardo Mondlane University (UEM, Mozambique) and Dar es Salaam University (UDSM, Tanzania), which are the focus of this article. The greater part of these funds goes to research training and infrastructure for

research (administration, library, ICT, laboratory facilities); only a minor part is set aside as support for individual research projects, distributed internally at the universities or by the national research councils (Sida 2003; 2009; 2010).

3. Previous Research on International Mobility and International Collaboration among African Researchers

Although many sub-Saharan countries have begun to recognise the importance of investing in science and technology (S&T), their efforts are countered by many factors: the current trend toward mass higher education, or ‘massification’ (Altbach 2008); global, policy-driven internationalisation of research and higher education, expressed by the increasing number of private institutions; and the demand from other sectors of society for skilled individuals, leading to a competition for top researchers within the international research community (Teferra and Altbach 2004; Bloom et al. 2005; Mamdani 2007; Teferra and Greijn 2010).

Despite economic growth, expanding higher education sectors and demographic prospects, the great majority of African countries are excluded from international data-collecting initiatives to map academic mobility, which concentrate on researchers in the Global North (Ackers 2005; Auriol 2010; MORE 2010; Franzoni et al. 2012; Appelt et al. 2015). Existing studies primarily discuss mobility in relation to statistical estimates of student mobility and outflows, excluding the PhD level (UNESCO 2012).³ Systematic statistical studies and qualitatively based studies of PhD graduates are virtually non-existent (Tremblay 2009; Felleson and Mählck 2013). Considering the current state of the African research community, the absence of research on mobility and collaboration is particularly worrying. Sub-Saharan countries’ share of global scientific output is just over 1 percent (UNESCO 2010).⁴ This figure correlates with low national expenditure on research in most African countries, which in turn affects access to the most valuable resource for research production—the pool of researchers.⁵ Compared with countries in the Global North, the proportion of research-

3 For example, in Project Atlas, a collaborative, data-sharing initiative involving six world regions, only South Africa is a listed partner (Project Atlas 2011).

4 This figure masks significant variations between countries. South Africa accounts for almost half of the scientific articles, followed by Nigeria (11.4 percent) and Kenya (6.6 percent). These three countries alone produce two-thirds of the total scientific output among sub-Saharan countries, which implies a bleak picture of scientific production in other countries (UNESCO 2010).

5 Only South Africa is close to reaching the 1 percent gross domestic expenditure on research and development (GERD)/GDP ratio recommended by UNESCO and the African Union. According to the data, the GERD/GDP ratio in most sub-Saharan countries ranges from 0.1 to 0.4 percent (UNESCO 2010: 280). Measuring the GERD/GDP ratio has proved difficult because of lack of data. Many countries have no record of the share of GDP to R&D (UNESCO 2010: 280–281). Nigeria and South Africa host the largest absolute number of researchers, but proportionally Botswana, Senegal and Guinea are above or at the same level. What is striking is the significant proportional variation between countries, ranging from 8 researchers per million inhabitants in Niger, to 942 per million inhabitants in Botswana (UNESCO 2010).

ers per million inhabitants in most African countries is exceptionally low. Excluding South Africa, one finds an average of 57.5 researchers per million inhabitants in sub-Saharan countries, compared to an average of 3,656 researchers per million inhabitants in OECD countries (UNESCO 2010).

Regarding international collaboration—in terms of volume of scientific papers published—a similar picture of uneven distribution emerges. The bulk of research, which is dominated by scientometric studies on networks of co-authorship, centres on global core providers (all in the Global North) of scientific production (Schrum et al. 2007; Abramo et al. 2008; Elsevier's SciVal Analytics/Science Europe 2013). Despite the fact that African countries share many of the problems associated with global challenges (climate, environment, energy, migration, communicable diseases), sub-Saharan African countries belong to the periphery of global network research collaboration, as illustrated by scientometric maps.⁶ Studies indicate that researchers from low-income countries are also heavily under-represented in publications grounded in research conducted in these countries (Dahdouh et al. 2003). In Central Africa, about 80 percent of articles are co-written with researchers from outside the region (Boshoff 2009, in Brodén Gyberg 2013).

There is a proven correlation between international research collaboration and scientific productivity (Lee and Bozeman 2005; Mairesse and Turner 2005; Abramo et al. 2008). Generally, the number of collaborating researchers is a strong predictor of productivity and higher average citation rates, and top-cited publications are found among countries with higher international collaboration rates. The role of mobility in this nexus is as yet unclear (Appelt et al. 2015: 5–6).

4. Mobility and International Collaboration Through the Lens of Institutional Development and Global Coloniality

It is possible to understand patterns of academic mobility and international collaboration with the help of spatial relations of scientific practice and interaction (Jöns 2007). This is because various intersecting formal and informal normative institutions determine the prerequisites for mobility and collaboration in global academic production. However, institutional variations in academic production (concepts, problems and methods) are not fixed or universally true, and instead relate to shifting paradigms (institutional changes) over time (Kuhn 1962). The recognition and application of these paradigms take place in a network of nodes, bound together by transactions of resources such as ideas, people, funds

6 In maps showing nodes of international cooperation, based on the logarithm of fractionally counted coauthored papers, including countries with more than 500 papers, only South Africa is included. See <http://www.leydesdorff.net/intcoll/intcoll.htm>

and artefacts, among others (Latour 1987). A culture of mobility and collaboration—‘spaces-in-motion’ in Gregory’s (2000) phrase—is intimately linked to this interconnecting process (Gregory 2000; Livingstone 2003).

In this article, we follow this rationale, but argue that the connection between cultures of travel and spatial formations of knowledge is largely determined by the position (rank) of the nodes in the network. The rankings of the nodes not only form understandings of scientific concepts, methods and problems, but also determine the degree of inclusiveness and participation in the interaction.

If institutional development and research capacity building through international development cooperation are construed as a path-dependent process (Libecap 1989; Ostrom 2005)—meaning that institutions observed at any point in time are functions of current and historically precedent institutions—how are relational power conditions and positions in the mobility and collaboration of African researchers understood? To what extent are historical and current institutions associated with development cooperation determining the conditions for mobility and collaboration, and how are these played out among African researchers situated on different locations?

Post-colonial theory asserts that independence from colonialism does not mean liberation and that colonial subjects remain morally and intellectually colonised through market-driven economic and technological domination (Fanon 1968; Shaobo 1997; Altbach 2004; Sawyerr 2004). Accordingly, mobility and research collaboration between universities in the Global South and North are largely based on the priorities and needs of the universities that are in the strongest position in terms of economic and academic resources. This inequality in research collaboration takes different forms, but generally includes a transfer of research data to the Global North for publication, with minimal input from partners in the Global South. These types of collaboration can be viewed as semi-colonial, since they mostly benefit researchers from the Global North (Costello and Zumla 2000). This represents a challenge for development partners trying to promote equal terms between partners. Bradley argues that:

‘Even the most innovative partnership funding strategies cannot resolve all of the tensions and inequalities that characterise collaborative agenda-setting processes. Using North-South partnerships as a “default” funding modality not only adds an extra layer to agenda negotiations, but also creates a problematic starting point for articulating common research goals’ (Bradley 2007: 4–6).

As in the colonial era, the premise behind research capacity development in most African countries is set by asymmetric, long-term dependency

relations with international development partners.⁷ Preconditions for mobility and collaboration are hence extensively linked to policy agendas of the Global North, which, by their control over resources, exert influence over the power of participating researchers to inform national and international research agendas, and ultimately over their positioning in the international research system.

Also of relevance is the way in which higher education and research have come to be viewed as preconditions for development and positioning in a knowledge-driven society. Alongside a country's macroeconomic incentives and institutional setup, its ICT infrastructure, its national innovation system and the quality of its skilled workforce are major determinants for positioning (European Union 2010). The position of PhD graduates, who are both products and agents of the knowledge society, is naturally central, not least as a key resource for innovation and innovation systems.

5. Methodology

This article builds on a mixed methods approach. It comprises both quantitative and qualitative data, collected to map general patterns/tendencies, as well as actual experiences of academic mobility (Allwood 2004). The methodological approach makes it possible to triangulate findings and validate results (*ibid.*) Some attention has been devoted to tensions between tendencies revealed by large-scale mapping (questionnaire) and nuances highlighted in the personal stories (in-depth interviews). Furthermore, the methodological design is cross-sectional, containing a retro-perspective approach. This means that respondents are asked to answer questions on their individual mobility histories from the date of entry into the PhD programme up to the present.

The methodological design is inspired by George Marcus' understanding of 'multi-sited ethnography', which is suitable to investigate how people who belong to the same group move between different sites (Marcus 1995: 106). By investigating how researchers who graduated from the same type of PhD programmes move and experience different academic workplaces in different geographical locations, we analytically explore the degree of contextuality of transnational academic mobility. The comparative analysis is informed by 'cautious comparativism' (Loomba 2009: 518). This means that large patterns of similarity—as well as inconsistencies, ruptures and differences within and between the samples and contexts—are regarded as important results.

The data cover PhD graduates and candidates in Mozambique and Tan-

7 Available statistics on proportions of support for research (S&T) in individual African countries show that the greater part of research activities at many national universities is funded by external actors, predominantly international development partners and foundations (Jones et al. 2007).

zania with Sida funding, during the period 1990–2013. The year 1990 is chosen as a starting point because it marks the beginning of major changes associated with commodification, privatisation and massification in African higher education and research systems (GUNI 2008). The total data set consists of 291 individuals (159 in Mozambique and 132 in Tanzania), mainly traced through alumni lists; registers and supervisors at relevant institutions and departments in Sweden and South Africa⁸; and social and professional networks of graduates in different disciplines.

A web-based questionnaire was sent to all 291 individuals. The response rate was 51.6 percent (82 individuals) in Mozambique case and 65.9 percent (87 individuals) in Tanzania.⁹ Data were processed using SPSS Statistics. From the sample, 38 PhD graduates were strategically selected for in-depth interviews, which were conducted as ‘mobility biographies’, designed to map and explore researchers’ trajectories over time, space and place (Kenway and Fahey 2011). Additional information was gained from ‘informant interviews’ with staff in strategic positions at university and in government in Mozambique, Tanzania and Sweden.

6. Results

The results are presented below in three sections: the first aims to contextualise the conditions governing mobility and collaboration, by displaying the results for two basic factors in research production—funding and time for research. The second and third sections deal with the frequency, features and premises (experience of relational conditions) of international mobility and research collaboration of the selected graduates.

6.1 Funding and Time for Research as Determinants of International Mobility and Collaboration

Built into the notion of institutional research capacity building is the assumption that the amount and quality of research activities and collaboration will develop with the gradual expansion of research capacity. The supply of trained researchers is a core premise, but for this capacity to result in increased research activities and output, it needs an enabling and supportive environment. Funding and time for research are crucial components.

Among the respondents who reported having conducted research, 4.3 percent of the Mozambican and 6.1 percent of the Tanzanian PhD graduates said they had been funded by the government. International

⁸ South Africa has also been a partner country for PhD training for the Mozambican PhD students. Still, funding comes from Sweden—Sida)

⁹ To compare, the response rate for similar studies of European PhD graduates has been much lower (11 percent in the MORE project).

development partners and foundations seem to be the main providers of funds for research in both countries: 11.3 percent in Mozambique and 14.5 percent in Tanzania. Private-sector funding is negligible in both cases, but fees from consultancy outside academia is reportedly a major source of funding. The extent of third-party funding (i.e., neither government-source nor international development partner funding) is not covered by the survey; but regardless of funding source, respondents from science, technology, engineering and mathematics (STEM) fields (especially from science and medicine) account for the largest share of recipients (64.5 percent). Own savings cover a significant part of the cost of research (for 56.7 percent of respondents in Mozambique and 44.3 percent in Tanzania).

The great majority of respondents in both countries (82.4 percent in Mozambique and 86.7 percent in Tanzania) continued to do research after graduation; but our findings show a remarkably weak correlation between completion of PhD training and increased research productivity, measured in time allocated to conduct research.¹⁰ Some 67.3 percent of respondents in Mozambique and 59.5 percent in Tanzania report that the PhD training has not resulted in an extension of time scheduled for research activities. Generally, this has nothing to do with a lack of willingness or engagement to do research, but with the increasingly heavy workload in other duties, such as teaching, supervision and administration:

‘I’m aware of the expectations on my role as a trained researcher. Entering into the Sida PhD programme was of course very personal to me, but I knew that I was part of a bigger plan to create better conditions for research at the university (...) Because of the Sida support we are now quite a few PhD holders at my department, but I have to say that research activities have not increased substantially and this is not because of lack of engagement, we all really want to do research. No, the main reason is the heavy teaching load put on all of us (...) The current situation of mass intake of students and the administrative burden following on this is really working against the building of the research capacity at this university’ (Mozambican PhD graduate in Social Science).

The vast majority of respondents in both countries (94.1 percent in Mozambique and 93.2 percent in Tanzania) spend 25 percent or less of their time on research (table 1), with notable variations between the countries and between scientific disciplines. Graduates in social science and the humanities report spending significantly less time on research than graduates from other disciplines, in particular from medicine and science.

¹⁰ It may be self-evident, but in any scientific context and in a capacity building context, as described in this article, time allocated for research, in particular, is a basic prerequisite for the development of successful research. The time factor is involved in all parts of the research process (from formulation and application to implementation and publication).

Lack of longitudinal data prevents us from doing a quantifiable analysis of the development over time, but during interviews, respondents frequently mentioned a gradual reduction in time for research after graduation.

Table 1. Time for research after graduation, by country and scientific discipline (in percentages)

Discipline/ Country/ Percentage of time	Not at all	Less than 25% of full-time	25% of full-time	50% of full-time	75% of full-time	Full- time
Science MOZ	3.1	34.6	52.6	7.3	1.3	1.1
Science TZA	2.1	26.3	63.2	6.3	2.1	0
Medicine MOZ	2.2	38.5	51.9	6.1	1.3	0
Medicine TZA	1.4	26.3	58.1	9.4	3.3	1.5
Social science MOZ	5.7	49.8	43.2	1.3	0	0
Social Science TZA	4.9	44.8	46.3	4	0	0
Humanities MOZ	6.4	51.3	41.2	1.1	0	0
Humanities TZA	3.1	53.7	40.6	2.6	0	0
Technology MOZ	5.2	26.3	61.3	7.2	0	0
Technology TZA	3.6	34.5	55.4	5.3	1.2	0
Agricultural science MOZ	2.2	22.8	65.8	6.9	2.3	0
Agricultural science TZA	2.9	23.9	67.8	5.4	0	0

Note: MOZ = Mozambique; TZA = Tanzania.

UEM and UDSM, two flagship institutions, were originally selected by Sida as offering the best breeding grounds for research. The results of this study reveal instead increasing constraints against the strengthening of their research capacity, such as ‘massification’. This in turn seems to be a powerful argument against the basic idea of capacity development through the training of researchers, as promoted by Sida and other development partners.

6.2 International Mobility

The international mobility of researchers, defined as physical mobility from one country to another, is recognised as making a significant contribution to the diffusion and improvement of scientific knowledge, both on a national and a global basis (OECD 2010). It is also known that highly skilled individuals exhibit particular mobility patterns (Appelt et al. 2015).¹¹ Still, mobility does not follow on naturally as a function of the position as PhD graduate, but is contingent on geopolitical pre-conditions for international research production, which can determine access to international academic positions, and positioning in the competition to access them. Mobility may also be a factor in the establishment of international research collaboration, since mobility potentially increases researchers' exposure to new research contacts. To some extent, this view is contested by the approach taken by the Swedish development support, which prefers graduates to remain in their home institutions, so as to build up a critical mass of researchers there.

The results of our surveys show a low degree of international mobility. The great majority of PhD graduates in both countries have remained at the same university since graduation. Among the Mozambican graduates, 14.3 percent have been internationally mobile since graduation. The corresponding figure for Tanzanian graduates is 11.1 percent. In both countries, graduates in medicine, science and agricultural science report a slightly higher frequency of mobility compared to other disciplines, with social science and the humanities at the bottom of the frequency scale. Because of longitudinal limitations in the data, it has not been possible to deduce variations in the international mobility of PhD graduates from different time periods of graduation; however, the data show a higher frequency of international mobility among graduates from 2000 and later, than from the 1980s and 1990s.

¹¹ The results of the OECD/UNESCO study (which features no researcher in sub-Saharan Africa) show that an average of 14 percent of individuals with a doctorate degree had been internationally mobile in the previous ten years (Auriol et al. 2013).

Table 2. Frequency of international mobility after graduation, by country and scientific discipline (in percentages)¹²

Discipline/ Country/ Frequency	No mobility	1 time	2 times	3 times	4 times	5 times	< 5 times
Science MOZ	83.4	10.3	3.3	1.7	1.3	0	0
Science TZA	88.7	9.1	1.8	0	0.4	0	0
Medicine MOZ	81.9	12.7	3.4	0.5	1.5	0	0
Medicine TZA	83.3	12.4	2.1	0.4	0	0.6	1.2
Social science MOZ	88.2	7.2	2.1	1.8	0.7	0	0
Social science TZA	89.1	8.7	1.5	0	0.7	0	0
Humanities MOZ	93.4	4.5	2.1	0	0	0	0
Humanities TZA	96.1	3.1	0.8	0	0	0	0
Technology MOZ	85.1	7.1	1.9	4.6	1.3	0	0
Technology TZA	88.4	4.7	4.2	0	2.1	0	0.6
Agricultural science MOZ	83.4	9.5	1.9	1.6	0	0	0.6
Agricultural science TZA	84.3	10.4	3.1	1.1	1.1	0	0

Note: MOZ = Mozambique; TZA = Tanzania.

Africa and Europe are dominant as the regions of destination for most PhD graduates who report international mobility. Notable variances can be observed at the discipline level: as a destination, Europe is twice as common as Africa among graduates in medicine and science, while the opposite holds true for social science and humanities. Mobility to Latin America applies exclusively to graduates from Mozambique. Despite a growing Asian economic presence in Mozambique and Tanzania (primarily from China and India), mobility to that region is still peripheral, with some notable exceptions in the disciplines of technology and science.

¹² In the table, 'time' refers to a temporary stay of at least three months in another country.

Table 3. Geographical direction in international mobility since graduation, by country and scientific discipline (%)

Scientific discipline/ Country/Region	Africa	Europe	North America	Latin America	Asia
Medicine TZA	33.8	56.6	4.3	0	5.3
Medicine MOZ	27.1	64.5	1.3	7.1	0
Science TZA	32.3	59.6	3.9	0	4.2
Science MOZ	23.9	66.3	1.2	7.3	1.3
Social science TZA	54.4	38.7	3.6	0	3.3
Social science MOZ	66.4	24.4	1.3	7.9	0
Humanities TZA	71.3	24.2	3.3	0	1.2
Humanities MOZ	73.2	22.1	0	4.7	0
Technology TZA	43.2	44.1	5.1	0	7.6
Technology MOZ	57.1	33.5	0	5.5	3.9
Agricultural science TZA	52.1	43.2	3.3	0	1.4
Agricultural science MOZ	65.5	30.1	0	4.4	0

Note: MOZ = Mozambique; TZA = Tanzania.

6.3 International Collaboration: Frequency, Patterns and Premises

Presumably, limited funding and time for research, along with low international mobility, has affected the graduates' ability to engage in different types of research collaboration. Some 47.3 percent of surveyed graduates in Mozambique and 43.4 percent in Tanzania report some form of collaboration with partners outside their countries. As displayed in table 4, Africa and Europe are very much at the centre of research collaboration, regardless of type; collaboration with partners in North America and Asia is infrequent. Not surprisingly, there is a higher frequency of collaboration with partners in Latin America among the Mozambican PhD graduates.

Table 4. Type of collaboration, by country and region of collaboration (in percentages)

Type of collaboration/Region/Country	Africa	Europe	North America	Latin America	Asia
Working on joint publications MOZ	62.1	22.3	1.3	11.1	0
Working on joint publications TZA	64.5	22.6	4.1	0	2.5
Collaborating at distance on a joint research project MOZ	69.1	25.6	5.6	3.5	0
Collaborating at distance on a joint research project TZA	59.8	22.4	2.2	0	2.2
Fund-raising collaboration MOZ	68.8	29.4	0	2.2	0
Fund-raising collaboration TZA	63.2	20.6	2.5	0	0

Note: MOZ = Mozambique; TZA = Tanzania.

While these figures provide an insight into geographical destinations for mobility and preferred regions for collaboration, they do not provide information on the relational context of the graduates' in this dynamics, hence the need for qualitative data. The specific experiences of the respondents vary with respect to the conditions of international collaboration, but there is a general feeling of relative subordination. Regardless of the type of collaboration, respondents report that they often embark on international collaboration with fewer resources compared to their counterparts—in terms of funding, time and academic merit (publications)—and that this fact determines their position with regard to influence, role and consequently rank in the collaborative relationship, for example in relation to academic output (publications).

The consequences of this imbalance in terms of resources are particularly noticeable in collaboration with partners in Europe and in North America. In these cases, the Mozambican and Tanzanian researchers are more often assigned to a predetermined role in the collaboration project, with little or no opportunity to shape the terms of their own involvement. They are instead invited to accept (or not) a role envisioned for them by the ostensibly more influential (non-African) partners. The following two quotations aptly capture the conditions for research and collaboration expressed by several respondents:

'As an African researcher you have to actively search for collaboration opportunities, they are rarely offered [to] you. We are not on the international radar for research collaboration' (Mozambican PhD graduate in science).

'In some of my international collaboration projects I have not been able to assert much influence. For example, in a project together with

German and Dutch partners I was invited to be part of an application for funding where my role was already set, I just had to accept. And you say yes. Of course it is flattering to be invited, but sometimes the role and motives are unclear and don't really fit your interest. It makes you wonder about the intentions' (Tanzanian PhD graduate in social science).

The frequently unclear and inferior basis for participation in international collaboration projects awakes feelings among participants of being collaborative hostages—reduced to the status of a kind of 'token presence' in Global North research projects on Africa. Because of more prosperous funding opportunities, many of the projects originate with partners in the Global North, which accordingly places the responsibility and control for the collaborative project with those institutions. Consequently, knowledge of, and access to funding opportunities become an early determinant in the 'pecking order' of the partners involved in the collaboration. The African researchers' lack of insight and access to funding opportunities in the Global North significantly reduce their ability to influence and control the shaping of collaborative research projects. The impression of being a hostage also originates from an awareness of policy-induced requirements of many research funding agencies in Global North countries, to increase internationalisation in higher education and research there. Demonstrating collaboration with an African partner has thus become a reinforcing component of applications for research funding.

'All these endorsements of research collaborations. You sign but you rarely hear from them again. In many cases I have a feeling that there is no genuine interest for collaboration, it's just a formality in application processes' (Tanzanian PhD graduate, dean).

Collaboration for African partners sometimes entails idly waiting for instructions from partners in the Global North. Respondents report that active participation is commonly limited to phases in the process that contain practical tasks such as data collection and field work—for example, bureaucratic procedures for research permits, hiring research assistants to carry out interviews, or collecting samples. Once data collection is completed and research enters the phases of analysis and writing, the respondents' roles become more blurred and peripheral. Responsibility and finalizing activities progressively move to the collaborating institutions in the Global North, on the grounds of greater research capacity, a stronger international position and greater access to international dissemination channels, as justified by collaborating institutions in Sweden, for example.

This situation, which has elements of an autocratic relationship, does not, however, encounter any pronounced opposition among the African PhD graduates. The interviews show that they actively manage and regulate

the unequal terms of the collaboration because—given the weak research capacity at their home universities—they see individual advantages to being associated with institutions in the Global North. Many respondents say they are willing to accept what they see as an inferior research position in a collaboration project, for the sake of their individual academic careers. In some cases, the same motivation has been visible in the reluctance of PhD graduates to transfer their training programmes from institutions in the Global North to institutions in the Global South (which is the basic idea of the capacity-building approach). The basic argument has been that a Swedish PhD degree confers higher status (Felleesson and Mählck 2013).

7. Conclusions and Policy Implications

The long-term external support to raise research qualifications among university staff at UEM and UDSM has not resulted in any notable expansion or intensification of research activities, measured in time and resources (funding) for research, compared to what they were able to do while benefiting from the Sida programmes. According to our analysis, the lack of resources for research after graduation and increasing pressure to teach are the two main impediments. This study is limited to analysing the variables of time and resources (funding) in research production. It does not take account of capacity development efforts of the national research and higher education systems of the two countries in other areas, nor does it address matters of institutional leadership, mission or administrative infrastructure to support a greater focus on research. Still, the results require a reconsideration of the context in which external support for research capacity development operates. Specifically, the holistic view of support for PhD training as a basis for research production needs to be supplemented by a context-specific understanding of the conditions for research after graduation. In that context, this article situates research development and relations in development cooperation within the larger framework of post-colonial knowledge relations (Altbach 2004). From this perspective, the low level of international academic mobility after graduation among Africans needs to be understood as more than a mere consequence of Sida's policy on capacity building, which is based on the premise that postgraduates should return to their home academic departments. It can also be understood from the perspective of how post-colonial power relations inside and outside a nation state are reflected in its institutions and people, and how this creates unequal conditions for international academic mobility and research collaboration (Mohanty 2003). Furthermore, a post-colonial perspective on mobility and research collaboration clarifies the various positions and power relations of the researchers involved. This is an under-researched aspect of actor-network-oriented research. Accord-

ingly, the researchers' readiness to participate in research collaboration based on unequal conditions can be understood as a strategy that allows a marginalised research population to overcome barriers within the transnational research context (see also Mohanty 2003).

The results of this study do not clarify whether the low level of international mobility is a result of the premise on which the 'sandwich model' is based, of a lack of international opportunities and offers, or of a lack of a general commitment to the idea of building a strong national university. Regardless, low international mobility should not be regarded as unequivocally beneficial to strengthening the research capacity of universities; it also has counterproductive implications, and results in a loss of competencies, experience and contacts. Mobility is an important conduit to expand collaboration networks. It has been suggested that the mobility of researchers is an indicator of their competence and flexibility (MORE 2010).

Despite long-standing research capacity development at UEM and UDSM, inequality in international collaboration persists, perpetuating the inferior position of African PhD graduates. Essentially, the inequality stems from unequal conditions for research production; these prevent PhD graduates from initiating and leading international collaborative research projects. Our results do not suggest any deliberate intention among partners in the Global North to control and dominate; but they indicate a prevailing, institutionalised post-colonial relationship of knowledge (Hountondji 2002), in which the role of the PhD graduates is that of informants rather than research partners. This illustrates an inherent dilemma for the Swedish development programmes for research. On the one hand, they are altruistically geared to increase the capacity for local knowledge production and international participation, based on needs defined by the partner country; on the other hand, this mission is largely pursued in a context informed by the Global North science regime, and inevitably reproduces institutional structures of superiority and subordination. However, thanks to the long-term support of the programmes, relationships have gradually become normalised. The results also suggest that the policy commitment of the two universities to their educational mission runs counter to research capacity development, which in some instances is even declining. This policy priority represents a major threat to investments made so far by development cooperation to prepare individuals to become researchers.

In conclusion, a process of critical assessment to overcome the determinants of relational order and structure in these programmes is imperative. Furthermore, postdoctoral opportunities, which could provide both mobility and research leave (from teaching), are instrumental to the development of a sustainable research capacity.

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