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Research Funding Issues in African Universities: Penalties and Pathways

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Abstract

Funding challenges, lack or shortage thereof, impede the institutionalisation and development of research e.g., doctoral studies in higher educational institutions (HEIs). In this paper, an appraisal of the state-of-the-art and fallouts arising from the lack of funding for PhD and institutional research in Africa's HEIs is undertaken, following which the sustainability of existing research funding mechanisms is questioned. Of the fallouts, three issues are prioritised—brain drain, poor research output and depletion of supervisory capacity. In terms of brain drain, it is clear that Africa continues to suffer the loss of its 'best and brightest brains' because the research support structure needed to reintegrate or retain them is either weak or non-existent. With the exception of South Africa, a very low research throughput is generally breeding across the region because of unsustainable research funding mechanisms, mainly championed by international funding agencies. Then with a growing number of PhD intakes, the available supervisory capacity is equally being stretched to its limits with no hope in sight, granted that the rate at which the necessary PhD manpower is being produced is non-commensurate. Based on the highlighted fallouts, the overarching redress may lie in the sustainable enterprising and localisation of the huge funding potentials already coming from willing international donors so that it aligns with research problems prioritised by the continent's political class.

JEL Code: O33 (Technological Change: Choices and Consequences; Diffusion Processes), O35 Social Innovation, O43 (Institutions and Growth)

Keywords: Africa, doctoral education, higher education institution (HEI), knowledge economy, PhD, research

1 Introduction

In recent times, the need to improve the quality of higher education has become a leading a factor which drives both institutional and national development. But beyond just improving the quality of higher education, producing high output of doctorates is also accounted a means through which the economic progress of nations are being assessed, the so-called 'knowledge economy'. In fact, it appears there is a trend which suggests that first-world countries, as well as some high-ranking developing countries, are able to yield high economic development index at a rate commensurate to the production capacity of PhD graduates (Mouton and Frick 2018; Cyranoski et al. 2011, 276).

In Africa, a different scenario is being played out so much as it is not surprising to note that most countries in the region continue to lag behind economically due to a dismal throughput in terms of the number of PhD graduate output as highlighted by Friesenhahn (2014), although this type of correlation has, in the past, been questioned e.g., in Cloete, Mouton, and Sheppard (2015, 178), in terms of the 'African context'. Notwithstanding, it is compelling to note that many of the challenges being faced within the continent such as high-level poverty, population outburst, infrastructural degradation, chronic unemployment, outbreak of epidemics and diseases, energy insecurity, political instability, growing insecurity, etc., could be addressed through tailor-made solutions from high-quality PhD research, and sustained by the PhD graduates upon completion of their programmes.

To this end, the lack of quality higher education in areas of science, technology, engineering and medicine (STEM), among others, makes it challenging to address the continent's problems. Moreover, the situation is even worsened by the fact that PhD research in universities in Africa is being haunted either by the lack or shortage of funds. In fact, this funding crisis, coupled with other debilitating factors, have been implicated in the 'de-institutionalising' of science in Africa, thus resulting in high international mobility of Africa's brightest and indigenous researchers (Mouton 2018, 7). It is on this

basis that this study is undertaken to appraise the key relationships and outcomes of lack or shortage of funding for PhD research in universities located within Africa, while also providing a redress by way of suggestions in terms of future strategic action plans.

2 An Overview on Funding for PhD Training and Research

Today, there still exist a couple of challenges encountered in the development and promotion of doctoral education in Africa, one of which is funding. Some studies have traced the genesis of the problem to a time when African governments began investing more in basic education at the expense of higher education through the so-called structural adjustment programmes (SAPs) in between 1980 and 1990 (Friesenhahn 2014; Mouton 2018, 6). Meanwhile, funding of PhD research, as well as research generally conducted in higher education institutions (HEIs) in Africa, should be seen as an avenue through which the various national governments' can meet their developmental pursuits while at the same time increasing their global competitiveness (Nakweya 2018). Among other things, it is communicated in Report – IAU-ACUP Seminar on doctoral education (2012, 19-20) that paucity of funds for both doctoral candidates and institutions is the main issue to overcome in order to improve Africa's quest for increased doctoral training and output. Insufficient funding in African HEIs is further blamed for the low enrolment and completion rates of PhD students, escalating to the decline in future PhD supervisors (Mouton and Frick 2018; Report – IAU-ACUP Seminar on doctoral education 2012, 20).

However, looking at the general HEI climate and PhD research in Sub-Sahara Africa, South Africa appears as an exception. In one study, it is held that South Africa is the continental leader in terms of scientific publications, doctoral output, PhD student enrolment and number of public universities compared to the rest of Africa (Quintana and Calvet 2012, 17). As a matter of fact, looking at Figure 1, it can be seen that the growth rate of South Africa is very encouraging compared to the average global. It is actually not surprising that South Africa has been able to achieve so much going by its doctoral programme per research output index, given that HEIs in South Africa are guided by a

strategic national agenda for research and doctoral training. It is on record that the national agenda for research and PhD training carries the backing of the government through policy documents and government initiatives that are well funded (Herman and Sehoole 2018, 24). As examples, South Africa formulated the new Generation Academics Programme (nGAP) policy which was designed to increase PhD supervision and research capacity, while there is also a national funding framework (NFF) to support the production of more research (DHET 2018). Another policy of note is the National Planning Commission (NPC) which ensures that research done in South Africa concentrate on providing local solutions for economic development, global competitiveness and knowledge delivery to South Africa and the world at large (Our future – make it work 2011). Consequently, through the agency of government funding for doctoral study and research, universities in South Africa are being steered towards national research priorities, thereby enabling them (the universities) to align their action plans towards critical government policies as highlighted by Herman and Sehoole (2018, 24-25).

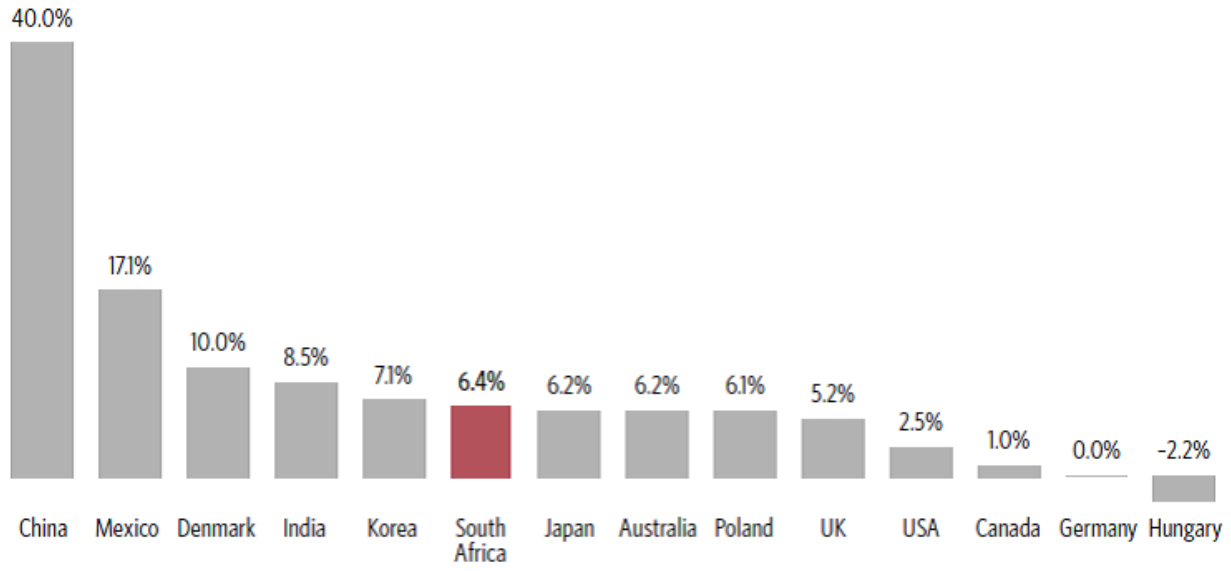

Figure 1: Growth rate of doctoral output (1998-2006) (Source: Cyranoski et al. 2011).

On the other hand, the same cannot be said for the other countries in the Sub-Sahara African region, whose research are largely dependent on international funding from agencies, institutions and governments as depicted in Figure 2. Consequently, research works on doctoral training from these institutions have little to do with priorities of the institutions not to mention their host countries (Quintana and Calvet 2012, 15; Mouton 2018, 7). A 2008 UNESCO draft regional report on national research systems in sub-Saharan Africa summarised it properly by faulting the approach of international funding agencies to research projects conducted in universities hosted in African countries as follows (Quintana and Calvet 2012, 18-19):

- such research funding not patterned to the interests of the host African countries,
- such research funding have short-term calendar,
- such research funding have little connection to PhD programmes or existing research centres,
- such research funding reinforce academic and individual research paths,
- such research funding are inefficient and not very effective given that it does not allow to get much out of the accumulated experience,
- such research funding make coordination difficult between researchers, research groups and centres, and universities, and
- such research funding prevents the sustainability of the research process.

Similar to the aforementioned issues, is the depth of international funding to impact research after completion of the grant cycle. Because these funds are mostly 'one-way', it becomes increasingly difficult for research sponsored in Africa's HEIs to outlive their stipulated timeframes. In Nature Editorial (2019), it is referred to as "a problematic paradox in international development", which imposes a level of nonchalance from beneficiary African governments towards improving research capacity or being seen as equal stakeholders. Together, these prevailing funding mechanisms to research in HEIs in Africa is inimical to sustainable development.

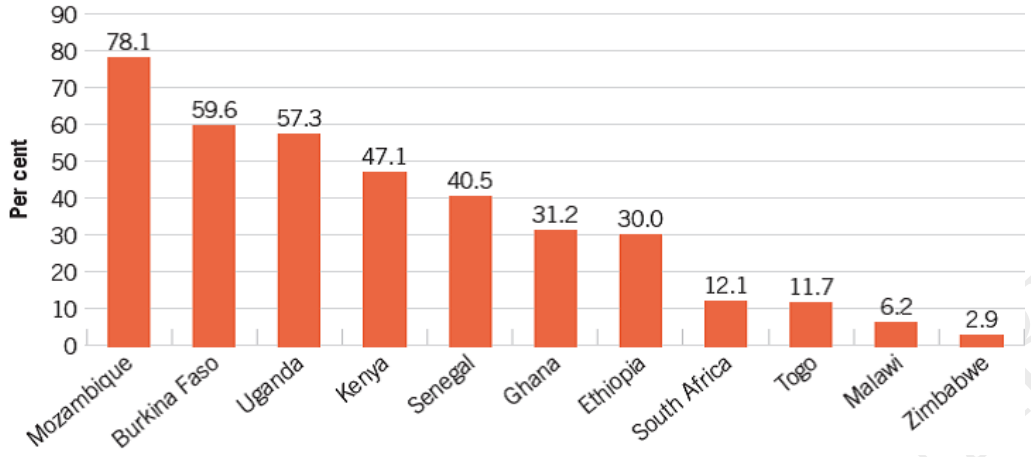

Figure 2: International funding rates on R&D among selected Africa countries (Source: Mouton 2018).

But recently, international funding agencies such as the World Bank, United Nations and UNESCO have begun to encourage the development of postgraduate training which focuses more on public policy priorities as a way of boosting local economic resource. In their opinion, the new paradigm shift is necessary to facilitate the pursuit of the millennium development goals (MDGs), create socioeconomic empowerment, develop the knowledge economy, promote active completion of doctoral programmes, and increase scientific and technical innovations (Quintana and Calvet 2012, 14; Nordling 2018, 16).

To this end, the existence or absence of national frameworks, the so-called 'national level research agenda" (Herman and Sehoole 2018, 13-14; Akudolu and Adeyemo 2018, 12; Barasa and Omulando 2018, 16; Nega and Kassaye 2018, 14-21) depends to a large extend on how research funding issues are being tackled in Africa. In terms of specific of countries within the continent, it is acknowledged, for example, that in Nigeria, challenges bothering on lack of funding, low quality of programmes, inadequate and underqualified staffing, and poor research infrastructure are factors nauseating the progress of PhD training and institutional research (Akudolu and Adeyemo 2018, 5;

Dimunah 2017, 51). But an overarching issue in funding of research in Nigeria's HEI is the lack of a strategic priority national policy on research funding and training. Although, the Tertiary Education Trust Fund (TETFund) was created to address this problem through its National Research Fund (NRF), but the accessibility, functionality and scope of the latter has been dwarfed by operational and multifaceted goals of the former. In some other cases, research funds granted to beneficiaries are either deployed wrongly or retired prematurely (Agha and Udu 2019, 92-93).

As further examples, in Kenya and Ethiopia, the outlook appears to be slightly different (Barasa and Omulando 2018, 23; Nega and Kassaye 2018, 28). Kenya boasts of growth in terms of the availability of PhD training, which is primarily being motivated by market-driven demand for highly trained manpower and a national agenda for expansion on doctoral education. Notwithstanding, it (Kenya) is encumbered with limited sources of funding, which sometimes mean that students are made to fund themselves or seek individual scholarships. But when available at institutional levels in Kenya, grants or scholarships are strictly set aside for in-house faculty members to pursue their PhDs (Barasa and Omulando 2018, 20). In the case for Ethiopia, presence of both national and institutional research agenda is improving its research and PhD training capacity; however, lack of funding and inadequate human resources constitute major stumbling blocks (Nega and Kassaye 2018, 8).

Based on the reports by Akudolu and Adeyemo (2018) and Barasa and Omulando (2018) which are excerpts from a broader study involving six African countries comprising Ethiopia, Kenya, Ghana, Nigeria, Senegal and South Africa, with a focus theme on doctoral training and research in sub-Saharan Africa, it is summarised that, "all countries need to significantly expand their pool and increase their rate of production of PhD graduates" while with "substantial increases in investment in doctoral education are essential, including state investment" (Synthesis Report 2018, 23). This clearly establishes a case of inadequate funding for doctoral study and research across HEIs in Sub-Sahara

Africa, while highlighting the nexus between institutional output and national development.

Taking it a step further, it is argued that while pursuing the MDGs, higher education was largely overlooked, and it would be fatal to repeat same with its successor, the United Nations' Sustainable Development Goals (SDGs). Higher education encompasses research, teaching and community development, and it is on this basis that research itself plays a unique role in producing new knowledge required for addressing global challenges and making informed public policies (O'Malley 2019). To this end, the lack of or inadequate funding in HEIs in Africa yields a dilemma, first in not producing the research dividends necessary for tackling the SDGs and also in terms of making the research output process unsustainable.

It is on this premise that an attempt will be made next to highlight the most daring penalties of poor funding for PhD training and research in African universities, while at the same time appraising some remedial pathways necessary to offset them. Three key issues resulting from funding challenges for PhD training and research in HEIs in Africa will be prioritised of which their choice is simply based on the overall literature outlook and the researcher's synthesis thereof.

3 Key Highlights on Funding Issues and Suggested Palliative Measures

Considering the current situation in South Africa, it is not being claimed here that the country has successfully dotted all the "*i*'s" and crossed all the "*t*'s" in its drive for PhD and institutional research. As noted in Herman and Sehoole (2018, 19), South Africa's recent GDP spending on research and development (GERD) has been declining, from as much as 0.89 % in 2008 to 0.73 % in recent times, while also recording an imbalance on how research funds are being utilised between research-intensive and low-research institutions. Unlike in Nigeria, the National Research Foundation (NRF) in South Africa, a government-based research funding body, is recognised as the major funding agency of doctoral training and institutional research. Notwithstanding, the NRF's fund

distribution is currently beset with the following challenges (Herman and Sehoole 2018, 25):

- inadequate, especially for black South Africans,
- difficult for international students to access them, and
- usually restrictive based on predefined projects, especially when international collaborators are involved.

By extension, investments in higher education in Africa seem to have improved over the years, both in public and private perspectives, while there is still much more to be done. Actually, the improved funding schemes for research are actually being driven by increased international intervention, leading to increasing number of publications, growing international collaborations and increasing mobility of researchers in Africa (Beaudry, Mouton and Prozesky 2018a, 103-118). As a result, locally generated financial support for doctoral training and institutional research remains dismal within the continent (Atickem et al. 2019, 298).

Take for example the fact that, a vicious cycle is perpetuated by funding challenges in HEIs in Africa expressed by a low headcount of faculty members with PhD qualification, coupled with a very low staff to student ratio, thus limiting the available manpower for research and doctoral training in the continent. Equally tied to the hydra-headed funding impasse among HEIs in Africa, is the poor state of learning infrastructures such as libraries and laboratories, as well as limited funding opportunities for research and training, which collectively impacts negatively on the overall institutional research output. Furthermore, it is not surprising that due to research funding issues, a high percentage of trained PhD manpower prefer to remain overseas after training or in cases where the PhD holder is exceptional and home-grown, they choose to migrate overseas where better opportunities are promised—the so-called 'brain drain' imbroglio (Friesenhahn 2014; Atickem et al. 2019, 300). Hence, in the following sub-sections, three key issues—brain drain, poor institutional research outputs, as well as a declining

supervisory manpower for a teeming population of PhD enthusiasts—will be examined and discussed, alongside some suggested reprieve measures.

3.1 Brain Drain

Brain drain is one of the harsh outcomes of poor funding in terms of doctoral training and research in Africa. It not only undercuts the continent of valuable opportunity to train manpower, but it also short-circuits any prospect of creating a high quality value chain of trainers. It is on record that a growing number of senior faculty members are being lost due to unfavourable policies regarding research funding, among many other (Atickem et al. 2019, 300; Beaudry, Mouton and Prozesky 2018b, 103; Quintana and Calvet 2012, 11-13; Report – IAU-ACUP Seminar on doctoral education 2012, 5). As a result of limited funding and/or scholarship available for doctoral research, majority of prospecting PhD candidates in Africa go to study abroad and then decide to remain there after their study. To affirm this position, young researchers from Africa when interviewed admit that the main career challenges they face are mainly in terms of research funding and funding for equipment (Beaudry, Mouton and Prozesky 2018c, 88).

To tackle the issue of brain drain, it is important for African institutions to boost their scholarship and research funding portfolios while encouraging the internationalisation of research. Some African governments, in an attempt to address the issue, resort to retributions by reducing funding to universities (Quintana and Calvet 2012, 13). However, such stance is to be considered both rash and uninformed since the brain drain in Africa has only recently worsened, say within the last four decades. In the past, majority of trained doctoral scholars were glad to return to attend to developmental goals brewing within the continent because of a promising and supportive atmosphere which encouraged research and teaching by providing continuous financial and human capital development support. Regarding the latter, international mobility of researchers does guarantee a reprieve to the problem of brain drain in Africa. Young African researchers when interviewed admit to the fact that it is one means through which they can have

access to funding, research resources, as well as collaboration and training opportunities (Beaudry, Mouton and Prozesky 2018b, 106-110).

3.2 Poor Research Output

The lack or shortage of funding for doctoral training and university-based research in Africa also results in poor research output. It is on record that though research output from African universities ranks among the worst in the world, e.g., in terms of scientific journal articles and quality of publications, it is improving in recent times (Friesenhahn 2014; Mouton and Prozesky 2018, 146). When compared to the rest of the world, research papers generated from sub-Saharan Africa's stood at 0.72 % as at 2012, with a global citation index was 0.12 % during the same time (Synthesis Report 2018, 8). Normally, bibliometric serve as an important index for measuring funding landscapes (Kozma, Medina, and Costas 2018, 26). Thus, regions where the bibliometric measure is high tend to enjoy better research funding credentials.

Meanwhile, the production of PhDs is considered at par and rewarded similarly to research output, while investment in doctoral training and research is used as an index for gauging time to degree (TTD) (Mouton 2011, 14). As a shown in Figure 3, the production of PhDs in Africa is increasing in recent years but on the average, is dwarfed by outputs from China and other developed countries, mainly due to decline in research funding (Atickem et al. 2019, 298). However, it must be said that demand for increase in doctoral output is also sometimes associated with compromising quality (Cloete, Mouton, and Sheppard 2015, 122).

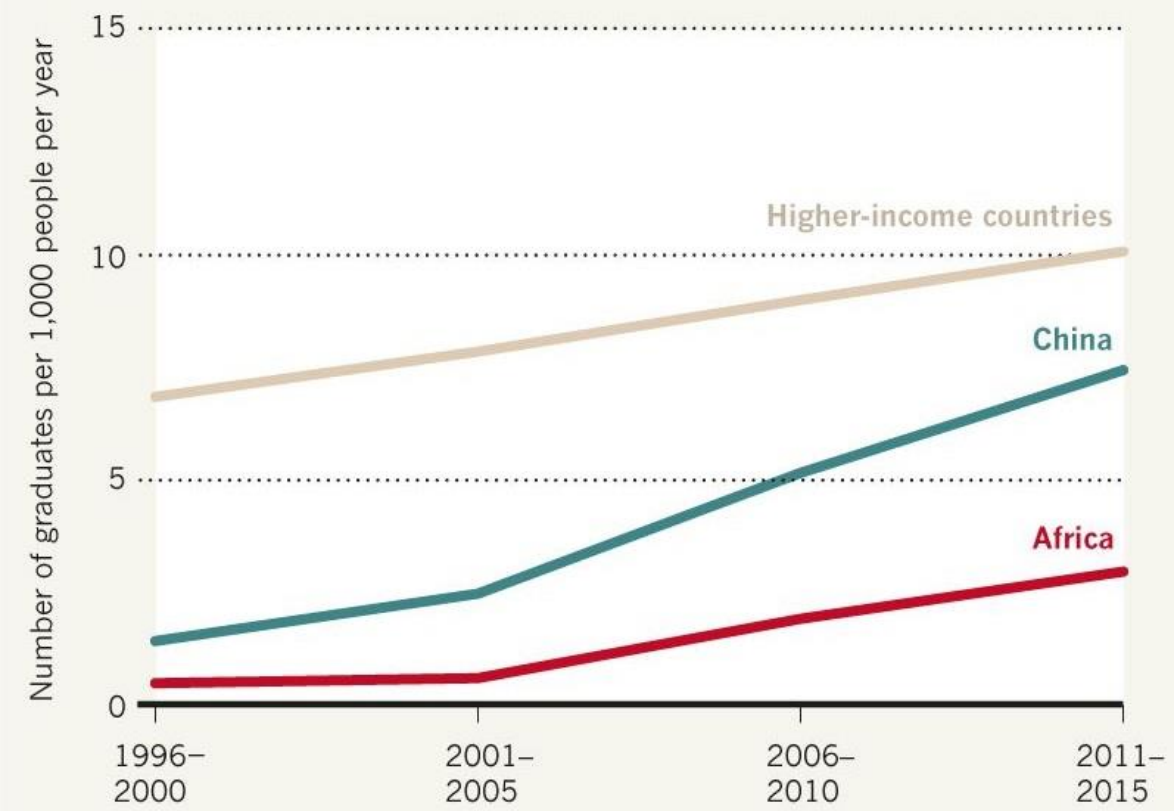

Figure 3: PhD production rate in Africa compared to other parts of the world (Source: Atickem et al. 2019).

By the way, the ripple effect of poor funding also mean that the majority of published research output associated with African universities are based on international co-authorship and collaboration, with a very low count on regional networks among academics and institutions (Synthesis Report 2018, 8). In fact, it is said that higher collaborations suggest the availability of funding and vice versa, but usually in ascending order of priority from international to Africa-only to only-national collaborations (Kozma, Medina, and Costas 2018, 29-34). The situation is such that, for international collaborations, the names and authors' affiliations in Africa in most high-impact publications, yield tell-tale signs that such academic conviviality involves co-authors usually hosted in institutions in Europe, USA or elsewhere.

Ordinarily, what this suggests is that such international collaborations help to increase the visibility of published research output from scholars based in Africa. Suffice

to say that increased international collaborations by African researchers' result in top-class publications with higher citations (Mouton and Blanckenberg 2018, 21-25; Tijssen 2015, 64). Thus, if continued in a more sustainable way, it could yield long-term productivity in terms of making funds locally available for growing research output. In particular, such international collaborations is vital in boosting research output by providing full or part scholarships, funding for in-house infrastructural development, staff exchanges, as well as training for the trainers.

Regarding human capacity development in African universities, many initiatives are already in motion with assistance from international agencies such as the Swedish International Development Agency (SIDA), the Commonwealth Scholarship Commission, the Canadian International Development Agency (CIDA), Newton Fund, Bill & Melinda Gates Foundation, DAAD, WHO, Carnegie, Ford, Rockefeller, to mention a few. It begs the question that if so much is being done to help improve institutions in Africa, why is the research output still not commensurate? The reason may not be far-fetched as many universities in Africa fail to build on existing international collaborations, which make such collaborations unsustainable, thereby not growing, in the long-term, the research output. This is responsible for most academics affiliated to HEIs in Africa, who later grow to become university professors, not being able to build on the research output and academic achievements recorded while overseas for training or study. But if proper measures are put in place at early career or grant stages, senior researchers can continue to access funding to promote local PhD scholarships, with potentials for growing productivity and even source more research funds.

To address issues related to funding for research productivity, it is important for African universities to establish connections with international funding agencies, while prioritising and establishing sustainable partnerships with regional institutions having similar research interests. The possibility is that, along strong research lines, breakthroughs or innovations can occur from which further research funds can be

generated as spinoffs or patented royalties. Otherwise, universities in Africa can seek a more sustainable funding approach from international agencies provided their national governments are willing to commit to matching grants. According to Nordling (2018, 16), research outputs, based on international donor funds, are not being sustained beyond the grant cycle because several African governments neither have existing or functional national research funding mechanisms nor are they willing to commit matching funding.

But unless majority of national governments in Africa take investments in research seriously as being done in South Africa, the potential of universities to breed high-impact research output may only depend on the ability of the universities themselves to attract sustainable funding partnerships with individuals and/or institutions operating within the localised private-sector. Such domesticated and/or matched-funding approach is strongly argued for the sustainability of home-grown research in Africa's universities (Nature Editorial 2019; Atickem et al. 2019, 299-300). Perhaps, African governments may become more financially committed if research themes prioritised by international grantors are streamlined towards addressing technical, societal and economic challenges that are local to their long-term political mandates. Without doubt, increased funding for PhD scholarship and research will lead to improvements in the overall measure of institutional output and innovation in Africa.

3.3 Shortage of Supervisory Capacity

Availability of PhD supervisors is considered a key driving force to increase enrolment to PhD students in Africa. As it is commonly said, "you cannot give what you don't have". To produce more PhD's for the emerging highly-skilled economic and employment landscape in Africa, HEIs should boast of the relevant supervisory manpower who themselves should be PhD holders. For instance, it is noted that Africa needs to increase by a large proportion the number of its PhD holders in the coming years due to a number of reasons: 1) retirement of older academics, 2) proliferation of higher education programmes, 3) increased impact and visibility of research, as well as 4)

subscribing to the knowledge-economy needs (Mouton and Frick 2018; Makoni 2019). In statistical terms, the distribution of academic staff with PhD's in universities across some selected African countries is given as follows (Synthesis Report 2018, 13):

- Ethiopia as at 2016 (8 %),
- Ghana as at 2013 (31 %),
- Kenya as at 2016 (34 %),
- Nigeria as at 2012 (43 %), and
- South Africa as at 2014 (43 %).

Clearly, the demographics above paints a bad picture of the state of PhD-qualified staff in African universities, with all the indicated countries recording less than 50 % qualification rate and much lower in some cases. As captured in Figure 4, the burden created by the shortage of PhD-qualified manpower in many African universities, places an additional burden on the existing supervisory manpower as they become overwhelmed by the growing number of PhD student enrolments (Mouton and Frick 2018; Atickem et al. 2019, 298). This means that PhD supervisors will have less time to commit per student, and are less flexible to take supervisory responsibility in potential research areas where they exhibit limited expertise. Moreover, with the higher supervisory workload comes less or lack-lustre mentoring hours, with ripple effects on the quality of the research outputs, except in some exceptional cases.

The lack and/or limitation of PhD supervisory capacity in Africa has also been linked to poor funding for PhD research and training. In Nigeria for instance, universities provide rebate on tuition for in-house study and study leave for remote study, among other things, to encourage academics to pursue a PhD qualification to conclusion (Synthesis Report 2018, 20). In South Africa, it is projected that 75 % academic staff should have a PhD by 2030, through the granting of scholarships and bursaries. Other countries such as Ghana, Ethiopia and Kenya have given out directives to force their university staff to aspire for the highest qualification in their academic career. These are all

noteworthy benchmarks. But to fully address the conundrum of shortage of PhD supervisors in African universities, availability of research funds for PhD study is not only necessary, but needs a strategic approach for its sustainability so that after the PhD programme, early career academics can progress as expected. Additionally, young academics may need to hone their grant writing skills and try out the numerous grant opportunities that are targeted towards early career development. The idea that international collaborations to early-career African academics should emphasise long-lasting mentoring by established researchers from high-income countries is also noteworthy (Atickem et al. 2019, 299-300). Lastly, the place of adequate mentoring by home-grown senior colleagues and the need for institutional support mechanisms cannot be overlooked, considering their effectiveness (Beaudry, Mouton and Prozesky 2018d, 102).

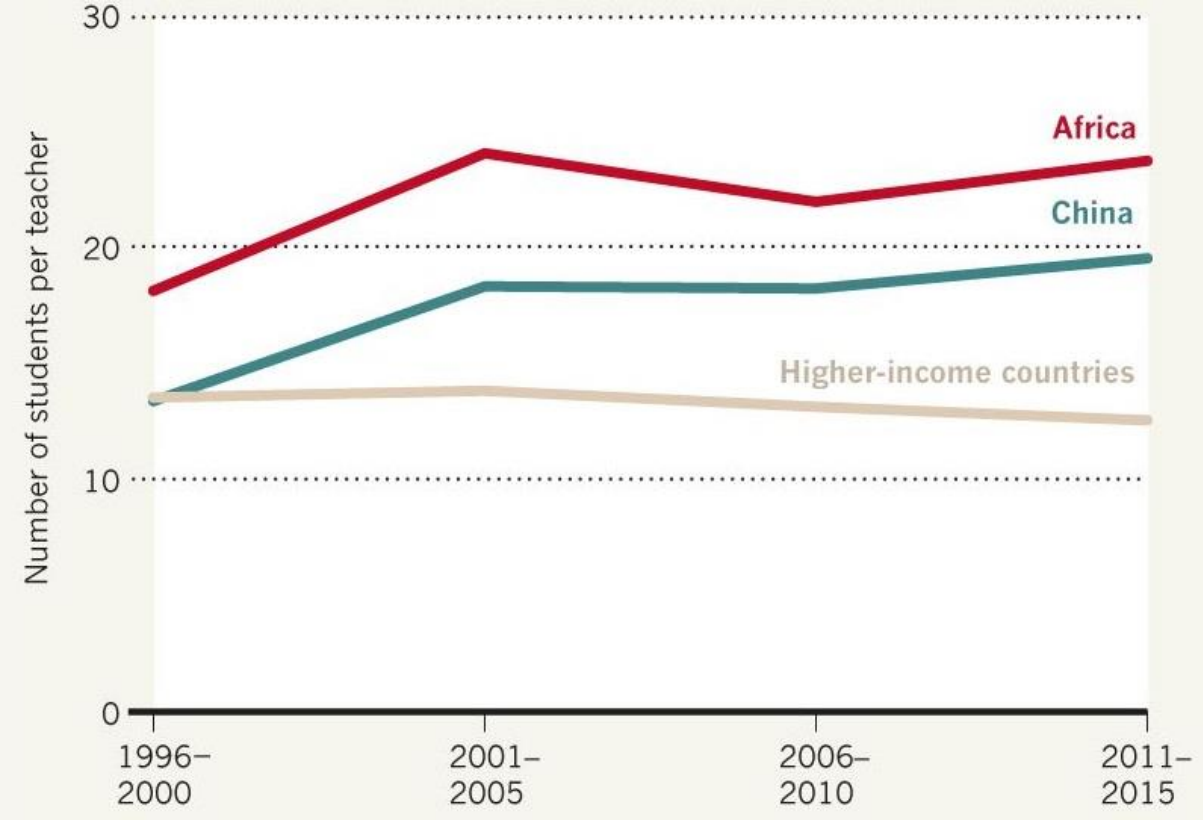

Figure 4: PhD supervisory capacity in Africa compared to other parts of the world (Source: Atickem et al. 2019).

4 Conclusion

In conclusion, the discussion in this paper focused on the consequences emerging from the lack or shortage of funding for PhD scholarship and institutional research in HEIs based in Africa. The unsustainability of the existing research process due to limited funding capacity is established. Fallouts are expressed in terms of three key issues—brain drain, poor research output and depreciating PhD supervisory capacity—all selected based on the author's synthesis of the studied literature. On the issue of brain drain, the exodus of Africa's 'best brains' out of the continent is a recurring problem in recent times, which sabotages its relevant manpower. In terms of research output, an exception is made for South Africa. However, most of the other countries in the region do not only record very low PhD throughput but they are at the mercy of international funding bodies who assist them with funds to undertake research with little or no emphasis towards addressing the local needs. To this end, the research objectives is usually not sustained beyond the grant cycle since the host African governments are not willing stakeholders, *ab intitio*. Lastly, for a teeming population of PhD enthusiasts in the continent, the depletion of supervisory capacity is creating an emergency situation not only within the HEI sector but in the region at large, thereby limiting the number of trained manpower who are supposed to champion the knowledge economy, through the production of highly-skilled PhD graduates. Several suggestions have been made, in context, to address these fallouts, but the main solution may lie in the sustainable development and localisation of existing huge research funding potentials coming from willing international funding agencies to align with recurrent political mandates.

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