Chapter 5

Incentivising research performance at African universities

Incentives can hinder or enhance the productivity of universities in achieving their knowledge-production goals. There are many different strategies for improving research performance, including differentiating the missions and functions of universities, providing research support, doctoral training, and the introduction of faculty rewards and incentives (Balán 2007). One of the interests of the Herana project was on whether and how research is being incentivised at universities in Africa, and what the effects of incentives have been on the research productivity of universities. This chapter therefore focuses on research incentives as an important change lever in aspirant research universities.

Research incentives may be introduced by universities, they may originate from donor agencies, or they may come from governments wishing to incentivise research across the system or at specific universities in a system. Each of these sources of research incentives is discussed in turn in the sections that follow.

University incentives for research

During the second phase of the Herana project, research was undertaken at Makerere University, Eduardo Mondlane University and the University of Nairobi on how financial incentives offered by universities can shape academic productivity, as measured by publications and effective supervision of postgraduate students. This is an under-researched area in higher education globally, but particularly in Africa.

At Makerere University, Musiige and Maassen (2015) found that more could be done to stimulate the development of a stronger research culture in the institution. The university’s human resource policy focuses on
encouraging academic staff with PhD degrees to engage in teaching. The income from tuition fees garnered from privately sponsored students is used to pay lecturers who have additional teaching loads. Tenured academic staff members are not held to account for their research outputs. Musiige and Maassen suggest that and incentives could be used to enhance output production and strengthen an institutional research culture.

Many of the academics themselves ranked individual factors above organisational factors and the impact of funding and research culture on fostering successful researchers. However, in their specific institutional context, funding played a greater role than was acknowledged in shaping the career paths of individual researchers. In addition, the lack of funding from the university for research made it an individualised activity, impeding institutional research ambitions and strategies and disincentivising academic staff from engaging in research.

A different approach was used to study the impact of incentives at the University of Nairobi and Eduardo Mondlane University. The research approach adopted for these two institutions considered whether principal agents delegate tasks to others with specialised skills and knowledge to achieve certain goals (Eisenhardt 1989; Laffont & Martimort 2002). In theory, (monetary) incentives work by increasing effort which, in turn, leads to improved performance. According to Stiglitz (1987), the main challenge in this regard is devising incentive schemes that will trigger maximum effort by the agent.

Since academics tend to have multiple principals, who incentivise different outputs, such as research, consultancy and teaching, the model sought to understand how research-related incentives shaped research behaviour, and how the existence of competing incentives, which often require mutually exclusive responses, have affected the establishment of a robust research culture.

In a higher education context, the use of financial incentives to boost research is regarded by some as anathema. For example, the pursuit of science driven by external, especially monetary, rewards, may be viewed as going against the traditional values of science (Macfarlane & Cheng 2008; Merton 1973). Notwithstanding such objections, monetary inducements can shape the pursuit of core academic activities, such as teaching, the supervision of postgraduate students and research.

There is a common perception that African academics are relatively poorly paid. However, in Mozambique, academic salaries were shown to be generally on a par with, and in some cases better than, those of senior civil servants. At the same time, no direct incentives were offered to encourage research, even though existing policies provided for such incentives (Wangenge-Ouma et al. 2015).
In addition, the often-conflicting interests of multiple principals tended to further undermine the research capacity of already weak higher education institutions. For example, instead of pursuing research within the university and seeking to socialise junior academics and postgraduate students into research, many senior academics seemed to prefer establishing entities outside their institutions, and using these newly created bodies as vehicles to attract funding for research and consultancies. This has contributed to a deinstitutionalisation of science at Eduardo Mondlane University. In this case, incentives for research from international agencies seem to be applied in ways that impede the university’s institutional advancement (Wangenge-Ouma et al. 2015).

At the University of Nairobi, competing incentives provided by different principals – the university itself, the national research council, and NGOs and other entities offering consultancy opportunities – rewarded the production of different outputs, such as teaching programmes; the publication of papers in international peer-reviewed journals; the effective supervision of postgraduate students; and the writing of consultancy reports. While the university placed a premium on research and postgraduate supervision through its promotions criteria, its system of incentives broadly encouraged teaching at the expense of research. In this regard, the academics were confronted with the challenge of understanding and reconciling contradictory duties stemming from conflicting instructions and incentives offered by multiple principals (Shapiro 2005: 267).

The university’s leaders seemed to have failed to establish an incentives regime that both encouraged teaching and supported realisation of the university’s research goals. The incentives, especially those for research, were seen by academics at the university as inadequate and unsystematically applied. The prioritisation of teaching over research at the university stems from the institution’s efforts to raise money as state funding has declined. Fee-paying, evening-school students generate crucial income to sustain the institution, which has led to enrolment beyond the university’s capacity (Wangenge-Ouma 2008, 2012). In order to meet the additional burden – and provide the resources needed to maintain an institution that can, among other objectives, pursue research – academics are incentivised to teach.

The case studies at Eduardo Mondlane University and at the University of Nairobi indicate that, in combination with other material conditions, the incentives for research, which are weak and crowded out by incentives for other activities such as teaching, have failed to encourage a research culture at these institutions. While incentives can be used to leverage research productivity, their effectiveness seems to depend on the presence of an institutional culture that promotes research – be it through the
consistent application of promotions criteria, the mentorship of young academics to become established researchers, research capacity building, or the provision of research funding through the university itself.

**Funding and development aid for research**

Donors have played an important role in funding of African higher education in the post-independence era. Many individual academic staff members have profited from donor funding, which has allowed them to supplement their relatively low salaries. However, and notwithstanding the considerable funds invested by donors in university projects under the heading of ‘research’ (Maassen et al. 2007), such financial support has generally failed to promote the development of research-intensive universities in Africa.

The low salaries, absence of proper incentives, poor infrastructure, and lack of a professional research management system endured by senior academic staff at many African universities, are often blamed on a lack of consistent, adequate research funding. However, this is not only the result of a lack of research funding per se, but rather the kind and source of the income. Musiige and Maassen (2015) interviewed academic staff at Makerere University about the impact of individual and institutional factors, and funding and research culture on research productivity. They found that funding had a major impact on the nature and sustainability of research capacity at the university and productivity in this area. With 80% of the university’s research income coming from donor agencies, mainly on a project–by–project basis, the institution’s leaders lack the funds to build the academic and infrastructural foundations required to help it to become a research–intensive university.

Much of the Herana universities’ research funding comes from donor agencies, implying that the leaders of these institutions have limited or no direct influence over how this money is invested in their universities’ research activities. With the exception of the University of Cape Town, this indicates a broader disconnect between institutional research strategies and the research activities of individual academics. For universities outside of South Africa, this includes a lack of incentives for the supervision of research masters and doctoral students.

Notwithstanding the obstacles posed by the diverse sources of income, the universities themselves can promote the development of a stronger organisational research culture. University personnel policies could stimulate greater involvement of tenured academic staff with a doctoral degree in academic research. For example, each institution could introduce incentive schemes and promotion procedures to reward academic staff for producing research. These could be based on research
productivity data, such as number and quality of academic publications; number and nature of externally funded research projects; and involvement in supervision of doctoral and master students.

The data produced by the Herana project offer an important insight into the nature of research income at the eight flagship universities (Cloete et al. 2011). For example, there is a significant gap between the total amount of research income at the universities and their research productivity. Makerere University has more or less the same level of non-government research income as the University of Cape Town, although its research productivity is much lower than the University of Cape Town’s. In this regard, different sources of, and conditions for, research funding can promote or limit productivity. More than 75% of the research income of the non-South African universities in the Herana project came from foreign (either national or supranational) donors. By contrast, a considerable part of the University of Cape Town’s research income – in line with the model for such funding at the world’s top research universities – is generated by academic staff competing successfully for external research council funding.

As discussed in Chapter 1, the investments of donor agencies in research projects at sub-Saharan African universities have a number of characteristics that contribute to the low research productivity of these universities (Maassen 2012). It was found that there is hardly any coordination among donor agencies in relation to investments in research projects in sub-Saharan African universities. The donor funding tends to be funnelled through individual academics and targeted projects rather than institutions or networks, despite the rhetorical emphasis on capacity building among the donor community. In addition, such funding is not distributed through open, competitive, peer-reviewed processes, nor are the academics who are funded necessarily required to publish. As a result, most donor-funded projects resemble consultancy activities rather than academic research projects. The focus on funding individual academics or projects and the parochial nature of the funding – with up to 80% of such income being donated on the basis of the donor’s own programmes and ideologies rather than the research priorities of receiving institutions and countries – makes it difficult for African universities to realise their institutional research strategies.

Government incentives for research

A dominant ‘globalisation’ and ‘knowledge economy’ discourse has been accompanied by increasingly important roles assigned for research and innovation in development. The knowledge economy takes as a starting point that the leading edge of the economy in developed countries has
become driven by technologies based on knowledge production and dissemination. In general, the key characteristic of a knowledge economy is ‘a greater reliance on intellectual capabilities than on physical inputs or natural resources’ (Powell & Snellman 2004: 199).

In the development of new national ‘knowledge policies’ as well as supranational policies such as the EU Horizon 2020 funding framework, three different science policy approaches are visible. The first is an approach focused on curiosity-driven or basic research, the second is an approach focused on research that leads to practical innovation that will foster economic growth, and the third focuses on the contributions of research to solving the grand, global challenges faced by society. While many governments include all approaches in their science policies, there is also an element of competition between them.

The last two decades have seen concerted efforts in advanced economies to harness innovation toward economic growth and the promotion of societal wellbeing. In turn, the promotion of the various dimensions of innovation has been guided by the innovation systems approach with its emphasis on the importance of linkages among the actors and institutions comprising the innovation system. With innovation understood to arise from systemic interactions, governments seek to monitor and enable the inputs to and processes in the innovation system, with the goal of attaining desired outputs.

In South Africa, the policy frameworks of the 2012 National Development Plan and a 2013 White Paper on Post-school Education describe the purposes of university education: providing people with high-level skills for the labour market, producing new knowledge, finding new applications for existing knowledge and providing opportunities for social mobility. As shown in Chapter 10, the vision, mission and strategic goals of the University of Cape Town are consistent with the national policies on the purposes of higher education.

South Africa was among the first emerging economies to adopt an innovation systems approach and it introduced a range of policy instruments including direct and indirect incentives. In 2003, the Research Funding Framework for universities was revised by government. The funding framework recognises six categories of knowledge production, including articles in journals, books, book chapters, papers published in peer-reviewed conference proceedings, research masters students graduated, and PhD students graduated. Each output attracts a weighted financial subsidy from government, provided that each output meets the required quality criteria set out in the framework. Each output unit attracts the equivalent of approximately USD10 000. To illustrate: a journal article published by a single academic in a journal accredited by the Department of Higher Education and Training would equal 1 unit and attract USD10 000 in subsidy; if the article was co-authored by two
academics from different South African universities, the subsidy would be shared between the two universities. For a PhD graduate, a university receives a subsidy equivalent to 2 units, that is, USD20 000.

The knowledge output subsidy is awarded to the university. How each university chooses to reward the academic(s) responsible for the production of the output is at the discretion of the university. At some South African universities, academics receive a percentage of the subsidy as a cash reward while at others they receive it as funds to be used for research purposes only. At the University of Cape Town, the university that has historically attracted the highest subsidy, a percentage of the subsidy is not allocated to individual academics but instead deposited into a central research fund. Academics apply to this central fund for financial support for their research–related activities with those who have contributed to the fund via their research output subsidies receiving preference when they apply for funding from the central fund.

Figure 5.1 shows the effects of the subsidy on research publications in the South African public university system. While the Research Funding Framework was released by government in 2003, it only came into effect when the incentivisation of knowledge production through financial subsidies were eventually implemented in 2008. Following the introduction of the subsidy, there has been a clear increase in the number of research publications while the number of academic staff employed in the university sector has not increased to the same degree in relative terms.

While Figure 5.1 illustrates considerable increases in both outputs and efficiency, financial incentives are seldom without unanticipated or perverse consequences. Research has shown that there is a concerning

Figure 5.1 Research publications and academic staff at South African universities: 2000–2016

Source: Department of Higher Education and Training (2018), compiled by Charles Sheppard
increase in predatory publications, although the increase is not evenly distributed (Mouton & Valentine 2017). At the traditional research universities (including the University of Cape Town, University of Pretoria, University of the Witwatersrand, University of KwaZulu-Natal, Stellenbosch University and Rhodes University), the proportion of predatory publications to total publication is less than 1%, while at some of the aspirant research universities it is more than 20%. Notable is that the traditional research universities offer more modest, indirect incentives tied to research compared to the direct financial incentives offered to researchers at the aspirant universities.

**Research incentives and a differentiated higher education system**

Incentivising research activities such as the supervision of doctoral students and producing publications is one way of improving knowledge production. But when applied at the system-level, there is the danger that the incentives on offer will entice all universities in the system towards the same goal. Van Vught (2007: 6) has pointed out that tertiary systems around the world have tended to become less diverse and differentiated. He attributes this to a combination of one-size-fits-all government policies which lead to homogenisation, and the ability of powerful academic communities to defend their norms and aspirations. Differentiated systems have several positive effects for higher education, including allowing different universities to fulfil their equally important, often contradictory functions (Castells 2017). The upshot of a differentiated system is that not all universities can and should be research-led universities. At the same time, as the example of South Africa illustrate, incentives should promote a differentiated system.

As pointed out in Chapter 1, Altbach (2013) stated that developing countries need to differentiate the missions of their post-secondary institutions for research universities to flourish, but that few developing countries have managed to do this. Ng’ethe et al. (2008) observed that the expansion of higher education in Africa had not been accompanied by differentiation; instead, they found evidence of institutional isomorphism whereby newly established institutions tended to replicate the dominant ‘flagship’ university. In other words, the impulse was for universities to become increasingly alike, rather than to develop diverse and distinctive missions. This is illustrated, for example, in statements such as the one made by the University of Dar es Salaam in its ‘Five-Year Rolling Strategic Plan: 2008/2009–2012/2013’ which reads that it aspires, ‘to assume a leading role in providing university education and professional or vocational training in centres of learning, and in promoting research’ (University of Dar es Salaam 2009: 6, emphasis added). This process is
further entrenched by government funding frameworks that do not differentiate between undergraduate and postgraduate students and that do not incentivise research.

Government policies aimed at increasing the capacity of the higher education system by establishing new universities have in general adopted one basic university model as the template, with the result that the new universities try to become clones of existing institutions in the sector. In addition, public and private institutions that enjoy levels of institutional autonomy that allow them to develop unique profiles have, in general, adopted similar, budget-maximising approaches (for example, in the form of recruiting large numbers of fee-paying, private students) (Ng’ethe et al. 2008).

Unlike in South Africa where the predominant incentive on offer to a university academic is linked to supervision and publishing, in the other seven countries that are home to participating Herana universities, the predominant incentive on offer is linked to teaching. In none of the systems is there evidence of incentive regimes that encourage different academic activities at different universities. Africa may learn some useful lessons about developing a differentiated higher education from China (see Box 1).

**BOX 1: CHINA: MASSIFICATION AND DIFFERENTIATION**

After 4 June 1989, when the Chinese government sent in troops to end the occupation of Tian’anmen Square by student protesters in the heart of the capital, Beijing moved to quell discontent through increased repression of political activism and further liberalisation of the economy. Policy-makers prioritised the development of higher education, in part to address the problem of protesting youth but also as part of the broader economic development project. The number of students enrolled for undergraduate courses doubled during the 1990s, growing from 2.1 million to 4.1 million, before tripling to a remarkable 22 million during the first decade of the new millennium. In line with this huge growth, the percentage of China’s 18- to 24-year-old population enrolled in tertiary education rose from 3% in 1991 to 24% in 2009 and to 33% by 2016. By 2016 a record-breaking 7 million students graduated from Chinese universities - more than double the number of the graduates in the US that year and ten times as many as had graduated in China ten years earlier (Stapleton 2017). These numbers represent the fastest expansion of any higher education system in history.

At the same time as overseeing this unprecedented massification (in other words, ‘warehousing’ [Castells 2017]), Chinese policy-makers successfully introduced significant differentiation within the system. The increase in the number of postgraduates was greater than the rise in the number of undergraduates.
Graduate enrolments grew from 128,000 in 2000 to over 538,000 ten years later. In addition, China produced 49,000 PhD graduates in 2010, 40% of whom took their doctorates in science, technology, engineering and mathematics (STEM) disciplines. This was more than any other country and represented a tenfold increase over the number of PhDs produced in 1999. Over roughly the same period, from 2000 to 2015, the number of Chinese universities in the top 500 in the Shanghai Jiao Tong rankings rose from 9 to 44.

How did China, a developing country, manage to achieve so much so quickly? In particular, how did it fund the massification and differentiation of its higher education system? The answer is, in part, through an increase in the national higher education budget from 1994, which rose from less than 1% of gross domestic product (GDP) to almost 3%, and, in part, through the introduction of a system of universal tuition fees, tapping into the savings of the rapidly expanding middle class, which was supported by a large-scale, regionally-based regime for issuing loans to assist poor students. The system was implemented through regional credit cooperatives, which were underwritten by the China Development Bank, and offered investment opportunities for the middle class, while issuing student loans which could be paid back over a 10- to 15-year period.

Dong et al. (2018) describe six phases of government driven reform which started during the 1950s with so-called ‘Key Universities Construction’ policy. The process was accelerated in 1994 when the targets and intentions of the 211 Project were specified. The main policy was to develop 100 world-class universities for the 21st century. Then president Jiang Zemin stated that to achieve modernisation, China must have world-class universities (Dong et al. 2018). In many cases, such as in Shanghai, these universities were jointly developed by the central government with local cities and regions. A total of 99 universities were selected from 1,683 public colleges for the project, 34 of which were identified as research-oriented universities. In 1998, during phase four, the 211 Project was supplemented by the 985 Project, which made substantial additional resources available to Tsinghua University and Peking University (Nian Cai Liu in Altbach & Balán 2007). These two institutions were ranked among the top 100 universities in the world in 2016, making them the only universities in the developing world to achieve this status.

The Chinese government’s focus on differentiating its higher education is further demonstrated in the classification system which it developed for the sector in the early 2000s. Combining the Carnegie and the Japanese systems with ‘Chinese reality’, the Chinese higher education system has 39 ‘Project 985’ universities that are designated level 1 universities that receive more funding, and 112 ‘Project 211’ or level 2 universities. To be classified as a research university an institution had to be able to achieve a ratio of at least 0.7 articles in World of Science publications per academic per year (Nian Cai Liu in Altbach & Balán 2007).

However, the most influential classification system that has emerged in China has been that of Shanghai Jiao Tong. This was not originally established as an international ranking system – although this is how it is now widely used – but
rather to assess the progress being made by Chinese universities on their way to becoming world-class. The ethos informing the establishment of this classification system was revealed at the 2013 International Higher Education Research and Policy Roundtable in Shanghai (Siwinska 2013) when, in response to the question why they included Nobel Prize winners in the ranking system when China did not have Nobel Prize laureates, the response given was that to be world-class, you must have a Nobel Prize laureate.

In the Herana Phase 1 study on three systems that successfully linked higher education to development (Pillay 2010), differentiation was achieved through a pact, and we argued that African countries should strive to achieve a social agreement between universities, society and government if they want to enhance the role of universities as ‘engines of development’ (Cloete et al. 2011).

However, what we did not comment on was the unique political systems of these countries. Finland and North Carolina both have strong liberal democracies, while South Korea is a very strong developmental state. In China, the differentiation of higher education (simultaneous with massification and the introduction of fees) was achieved in a very different kind of state, one with a strong central party and a citizenry steeped in a culture that has valued education and meritocracy since the establishment of the oldest education system in the world. The political and cultural configuration of a ‘pact’ provided fertile ground for the centralist government to exploit, by introducing a range of funding and other incentives in support of a meritocratic system. The public has supported the system of a fees-based funding model, with regions and provinces setting the actual fees and loan support through regional credit cooperatives. In turn, the universities accepted performance monitoring based on objective, evidence-driven assessment criteria.

**Conclusion**

Despite national policy documents promoting the importance of new knowledge to advance development, the absence of the state as a primary agent supporting research in Africa has allowed others offering incentives for research to exert greater influence on a range of activities and inadvertently weakening the research enterprise in universities. In at least one university in the Herana group, the application of inadequate and fragmented incentives for research from multiple sources has weakened the research enterprise of the university.

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15 Thanks to Ou Yufang for expert inputs.
In South Africa, where supportive policies and incentives for research are in place, and where there has been an observable increase in research productivity, there are also unanticipated (perverse) factors that have become evident.

A serious challenge for governments in Africa is to create higher education systems in which universities will be strong and dynamic enough to withstand the tensions inherent in their multiple, contradictory functions, while at the same time being able to respond to what they see as their specific mission at any given moment in the history of the system. The fulfilment of different functions, including that of research, cannot be resolved within individual universities alone. Ideally, the functions need to be distributed with particular institutional types undertaking different combinations of functions in response to the suite of incentives on offer. For the eight universities that participated in the Herana project, a differentiated incentive scheme that comprehensively serves all the important functions of the university, is still to be developed.