



Building interdisciplinary research capacity in African universities: insights from the Sentinel project

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ABSTRACT

Interdisciplinary research has emerged as a suitable research approach for addressing complex global development challenges, however, its applicability is still limited within the African research context. To this note, collaborative arrangements between North and South based universities and institutions developed an interdisciplinary project called “Social and Environmental Trade-offs in African Agriculture (Sentinel)” to build capacity of African and UK researchers and their institutions to co-develop interdisciplinary research on the impacts, risks, and trade-offs within and between socio-economic and environmental dimensions of different agricultural development pathways. Building capacity for interdisciplinary research requires an understanding of the research context of African universities to support planning for capacity building activities. This paper provides insights on the assessment of research capacity of African universities through a cross-sectional survey of Principals and Deans who attended the RUFORUM Annual General Meeting in Lilongwe, Malawi in 2017. A survey questionnaire consisting of both open-ended and structured questions was administered to a randomly selected sample of 53 respondents. Quantitative data was analysed using SPSS (V.21) while qualitative data was analysed using thematic analysis. The major themes were summarised into frequencies and/or percentage of the overall number of responses for each open-ended question. Results showed that African universities are engaged in international networks, conduct collaborative research, and take a strategic approach to management, reward faculty for publications, participating in conferences and professional organisations. The study recommends strengthening research support, supervision and mentorship structures and that universities need to evaluate their existing capacities and map out strategic areas of development as key ingredients for fostering interdisciplinarity in African universities.

Key words: Africa, capacity, interdisciplinarity, Sentinel, Universities

RÉSUMÉ

La recherche interdisciplinaire est apparue comme une approche de recherche appropriée pour relever les défis complexes du développement mondial, mais son applicabilité est encore limitée dans le contexte de la recherche en Afrique. Pour ce faire, des accords de collaboration entre les universités et les institutions du Nord et du Sud ont développé un projet interdisciplinaire appelé «Arbitrages sociaux et environnementaux dans l'agriculture en Afrique –Sentinelle en siegle pour renforcer la capacité des chercheurs africains et britanniques et leurs institutions à co-développer de recherches interdisciplinaires sur les impacts, les risques et les compromis de dimensions socio-économiques et

environnementales dans les différentes voies de développement agricole. Le renforcement de capacités de recherche interdisciplinaire nécessite une compréhension du contexte de recherche des universités africaines pour soutenir la planification des activités de renforcement des capacités. Cet article donne un aperçu de l'évaluation de la capacité de recherche des universités africaines à travers une enquête transversale auprès de chefs de sections et des doyens qui ont assisté à l'assemblée générale annuelle du RUFORUM à Lilongwe, Malawi en 2017. Un questionnaire d'enquête composé à la fois de questions ouvertes et structurées a été administré à un échantillon de 53 répondants sélectionné au hasard. Les données quantitatives ont été analysées à l'aide du logiciel SPSS (V.21) tandis que les données qualitatives ont été analysées à l'aide d'une analyse thématique. Les principaux thèmes ont été résumés en fréquences et/ou pourcentage du nombre total de réponses pour chaque question ouverte. Les résultats ont montré que les universités africaines sont engagées dans des réseaux internationaux, mènent des recherches collaboratives et adoptent une approche stratégique de la gestion, récompensent les professeurs pour leurs publications, participent à des conférences et à des organisations professionnelles. L'étude recommande de renforcer les structures d'appui à la recherche, de supervision et de mentorat et que les universités doivent évaluer leurs capacités existantes et définir des domaines stratégiques de développement en tant qu'ingrédients clés pour favoriser l'interdisciplinarité dans les universités africaines.

Mots clés: Afrique, Capacité, interdisciplinarité, Sentinel, universités

INTRODUCTION

Universities in Africa have been called upon to spearhead Africa's development Agenda (Adipala and Egeru, 2018). This is a daunting task given the various challenges that are currently affecting the Higher Education sector. For instance, universities are faced with high "massification" rates, limited staff capacity particularly at PhD level, limited infrastructure and equipment, weak monitoring and evaluation frameworks, and generally low investment (Nakayiwa *et al.*, 2016). These African universities have a mandate to contribute to national, regional and global development by performing three key functions namely; teaching, research and outreach (Nampala *et al.*, 2017). Although research has received greater attention over the years in African universities, statistics however show that Africa continues to lag behind all other continents in terms of its contribution to global research knowledge. Recent findings for instance indicate that Africa

contributes less than 3% of the world's research output (Confraria, 2013; Nakayiwa *et al.*, 2016; Duermeijer *et al.*, 2018). On the other hand, development challenges are becoming more complex which now requires that problems are tackled from an interdisciplinary research perspective (Siedlok and Hibbert, 2014). A continued push for interdisciplinarity requires, particularly the one that focuses on combining knowledge from the natural and social sciences that scientists "collaborate across disciplinary, epistemic and methodological boundaries" (Lyall and Meagher, 2012). Interdisciplinary research is defined as research that involves a combination of two or more disciplines (Siedlok and Hibbert, 2014). The application of interdisciplinary research methodologies to address complex development challenges has been widely used in parts of the global North such as in the UK (Lyall, Meagher and Bruce, 2015), but its applicability is still limited within the African research context. African

universities are striving to move beyond the disciplinary focus of its inherited colonial higher education system to a post-colonial era of the 21st century where knowledge forms the cornerstone of the economic progress and where knowledge production is based on the aggregative power of collaboration, partnership and cooperation across disciplines, countries and regions (Zittoun *et al.*, 2007; Huutoniemi *et al.*, 2010; Wu, Baggio and Janssen, 2016) . Accordingly, African universities are in a state of transition in developing systems, nurturing processes and strengthening interdisciplinary research focus. There is a dearth of information on the institutional and organisational gaps that require to be addressed in this transition.

It is within the above context that the collaborative arrangements between North and South based universities and institutions developed a project called the “Social and Environmental trade-offs in Africa Agriculture (Sentinel)”. This project addresses the challenge of achieving ‘zero hunger’ in sub-Saharan Africa, while at the same time reducing inequalities and conserving ecosystems. The project enhances the capacity of UK and African researchers and their institutions to co-develop interdisciplinary research on the impacts, risks and trade-offs within and between social, economic and environmental dimensions of different agricultural development pathways. This will contribute to achieving the Sustainable Development Goals (SDGs) on zero hunger (SDG 1), reduced inequalities (SDG 10) and ecosystem conservation (SDG 15). The project tackle these goals through a programme of collaborative research and learning, training and mentoring of junior staff, and direct engagement with senior university managers. Capacity building was embedded throughout the programme as an integral part of the research agenda. Sentinel works towards achieving these development goals in three African countries – Ethiopia, Ghana and Zambia. Research capacity

needs assessment was the foundation for the development of the capacity building. A key component of the capacity building strategy is the assessment of the organisational/institutional capacity in the context of African universities. A supportive environment or context is particularly important in fostering interdisciplinary research by providing the necessary infrastructure, administrative support, an organisational culture, platforms for interdisciplinary discussion and eradicating barriers to interdisciplinary research (Technopolis Group, 2018). Morse *et al.* (2007) argue that interdisciplinary research should work across disciplines as an entire research process that is not bounded by institutional barriers. In addition, interdisciplinary research is considered fully operationalised when the research users are fully engaged through definition of the research process and the research agenda, monitoring and evaluation as well as facilitating the processes of knowledge co-creation, co-production and co-generation (Bridle *et al.*, 2013; Lyall *et al.*, 2015) . The key researcher indicators of interdisciplinarity addressed under Sentinel include working across disciplines, professional development, mentoring for interdisciplinary research, linking research to teaching and curriculum development, co-designing research with research users and writing proposals to answer funding calls to address global challenges, people management, monitoring and evaluation, collaboration and networking, communication and advocacy across stakeholder groups (Chausson, 2018). In terms of research context, the study identified research capacity issues in six key areas including: strategic approach to research management and identification of research priorities, engagement in international networks and collaborative research, research capacity evaluation and identification of priority areas, research support and mentorship structures for researchers, structures and procedures for dissemination of research knowledge and university policies for promoting knowledge transfer.

METHODOLOGY

A cross-sectional survey design was employed for this study. A randomly selected sample of 53 RUFORUM Principles and Deans who attended the RUFORUM Annual General meeting in Lilongwe, Malawi took part in the survey. A survey questionnaire consisting of structured and open-ended questions was designed, drawing on the Vitae framework and the Higher Education Institutional Capacity Assessment tool (IREX, 2016). The Vitae framework (www.vitae.ac.uk/rdf) identifies areas of research capacity in four (4) domains, 12 sub-domains and 63 descriptors. It includes knowledge, intellectual abilities, techniques and professional standards to do research, personal qualities, knowledge and skills to work with others and ensure the wider impact of research, research governance and organization, Engagement, influence and impact. The Vitae methodology is focused on individual research skills. Meanwhile, the IREX tool provides information on institutional strengthening. Based on these two frameworks,

the survey questionnaire obtained data that facilitated the formulation of a Likert-scale scoring matrix based on the following items: mission, vision and strategic planning, senior management governance and accountability, data and institutional research, finance, staff and faculty management, academic operations, workforce development, students and alumni engagement, research, knowledge transfer and external relations, facilities equipment and learning resource, quality assurance and enhancement. Descriptive statistics (frequencies) were used to analyse quantitative data in SPSS (v.21). In addition, qualitative data was analysed using thematic analysis. The major themes were summarised into frequencies as percentage of the overall number of responses for each open-ended question.

RESULTS

Organisational research capacities of African universities. Figure 2 presents a summary of the assessment of the organisational capacity



Figure 1. Part of the vitae researcher development framework showing domains and subdomains

Source: <https://www.vitae.ac.uk/vitae-publications/rdf-related/researcher-development-framework-rdf-vitae.pdf/view>

of universities in research. Results show that universities are engaged in international networks, conduct collaborative research, and share experiences; universities take a strategic management approach to research management, identify areas of institutional strength; encourage and reward faculty members for publications in professional journals, presenting at conferences and taking part in professional organisations. However, there were slightly weak levels of agreement that universities provide strong support, supervision and mentorship structures for researchers; and that universities have evaluated existing research capacity and have identified areas of strategic development.

Research management, research priorities and Incentives that encourage university research. Figure 3 shows that Strategic planning at the university, national development priorities and needs assessment surveys emerged as the major ways by which universities identified their research priorities. Seminars, workshops, policy

review forums were not seen as important avenues for identifying research priorities in African universities. From Figure 4, the key incentives identified by respondents in the survey include availability of research grants, career promotion of university scientists and monetary rewards for research publications. Very few respondents indicated that Intellectual property rights, staff leave time and decentralized management of research as incentives that encourage university research.

Perceived factors influencing conduct of research. Figure 5 shows the factors that limit faculties or universities from expanding their research. The main barriers to faculty and the universities expanding their research included: limited research funding, low staff capacity to conduct research, poor research infrastructure and heavy teaching load for university researchers. To a smaller extent, poor internet connectivity and inadequate strategic networks as barriers to expanding research in African universities.

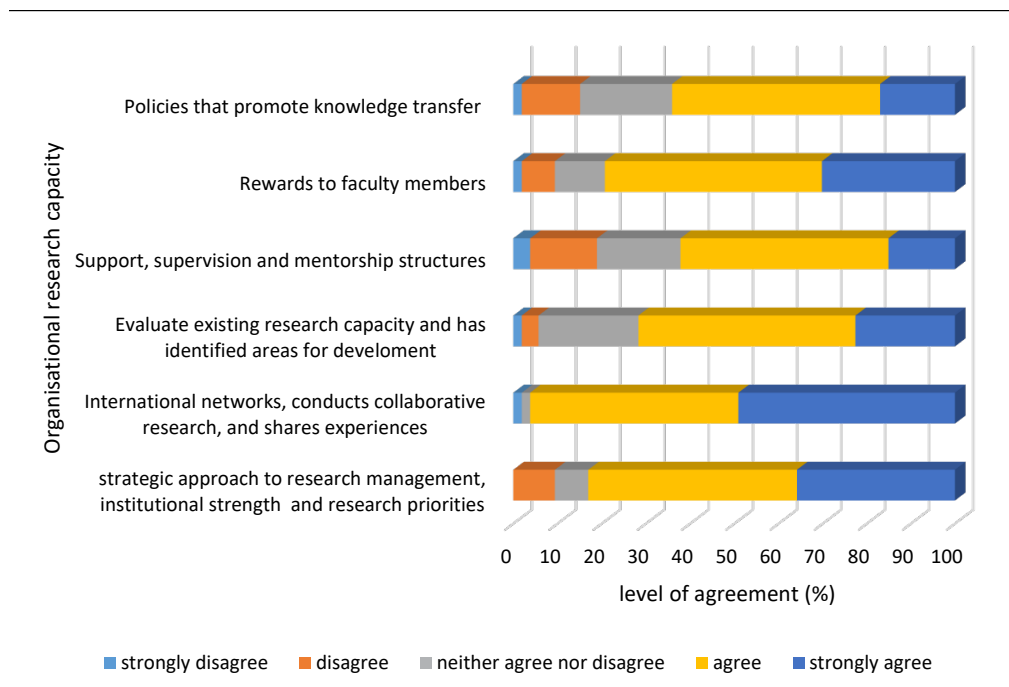


Figure 2. Individual assessment of organisational research capacity in African universities

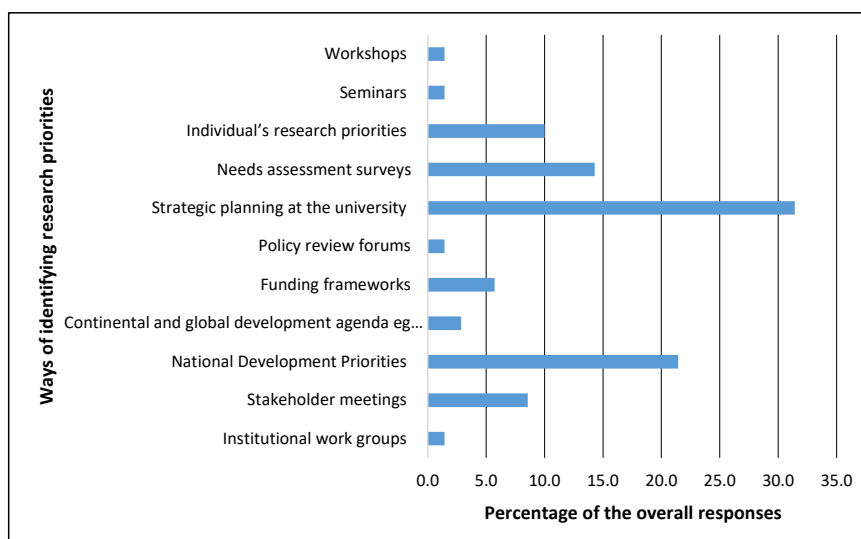


Figure 3. The ways of identifying research priorities in African Universities

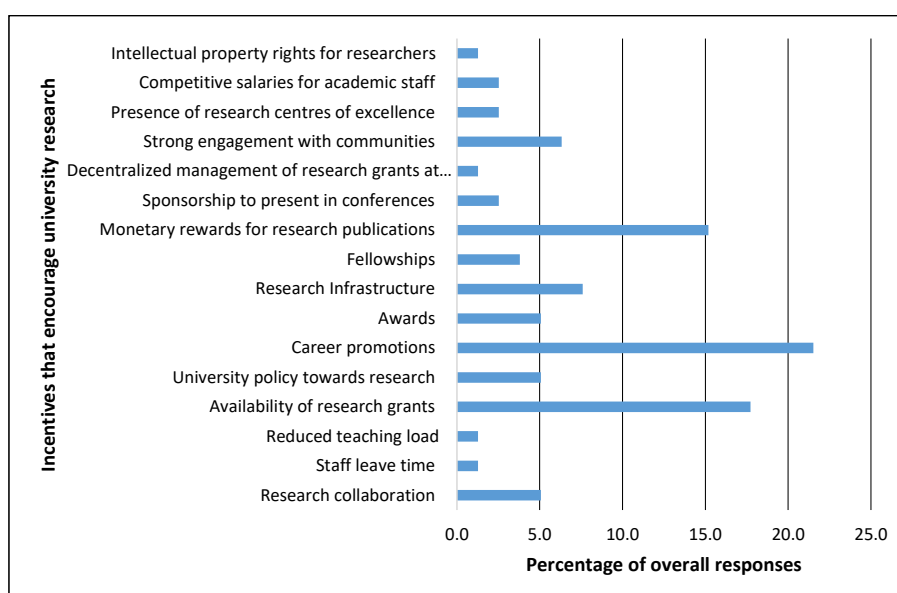


Figure 4. Incentives that encourage university research in African Universities

Engagement in international networks, collaborative research and shared experience

Results indicated that universities under the RUFORUM network are highly engaged in collaborative working relationships, research and networking. As shown in Figure 6, most respondents indicated that their universities enter relationships with other institutions mainly through signing Memoranda of Understanding (MoUs), partnerships, and research

collaborations involving faculty and students. Very few universities entered relationships through service contracts. Universities at the same time had some partnerships with the private sector. In terms of engagement with the private sector, 90.6% of the participants indicated RUFORUM member universities engage with various private sector institutions including farmer cooperatives, banks and other industry actors.

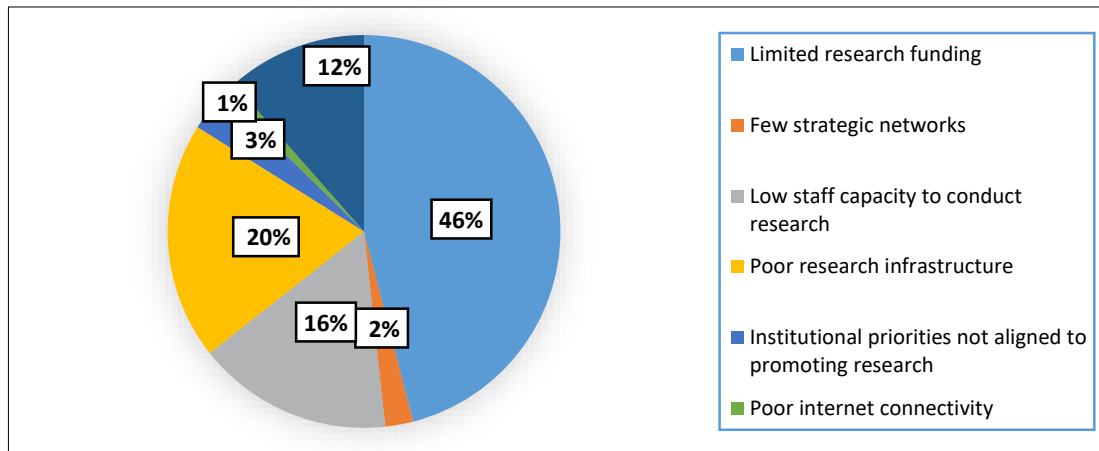


Figure 5. Factors limiting faculty/universities from expanding their research

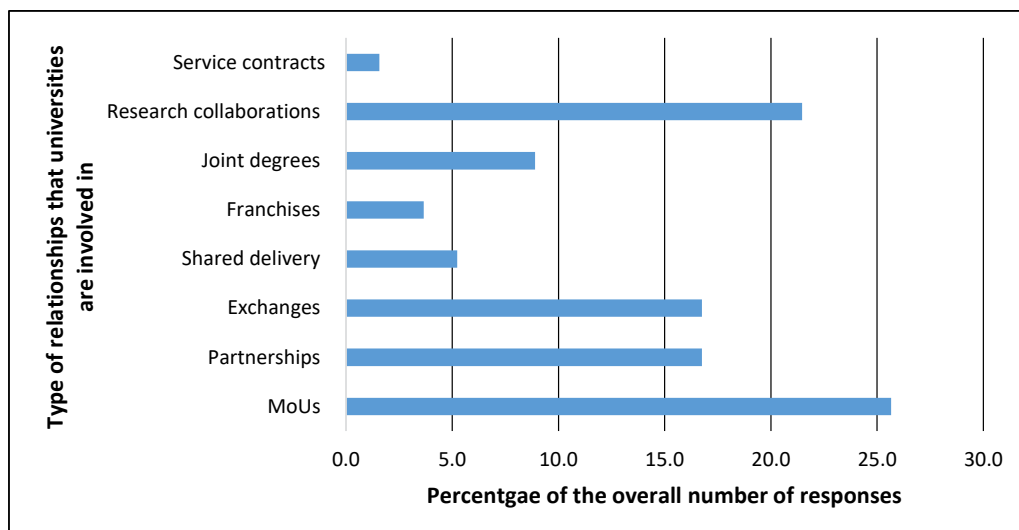


Figure 6. Type of relationships that universities are involved in

Research capacity and research priority areas. Results (Figure 7) revealed that most participants indicated that grant proposal writing and research proposal writing are the areas of capacity in greatest need of development. This was for both the research proposals and competitive grants proposal development and skills development in transdisciplinary research approaches. Further grants management, fund raising for research, and research priority identification are some of the skills that the university managers and administrators deem fit to be developed (Figure 8).

Research support, supervision and mentorship structures for researchers. For results shown in figure 9, the majority of the respondents indicated that the core types of support provided to faculty members to encourage research activities are provision of research funds, training to write for publication and training in research proposal writing. In addition to research support, supervision and mentorship, universities provided an array of channels through which university researchers communicate their findings and inform policy debates with the government are workshops, conferences, research publications and newspapers as shown in Figure 10.

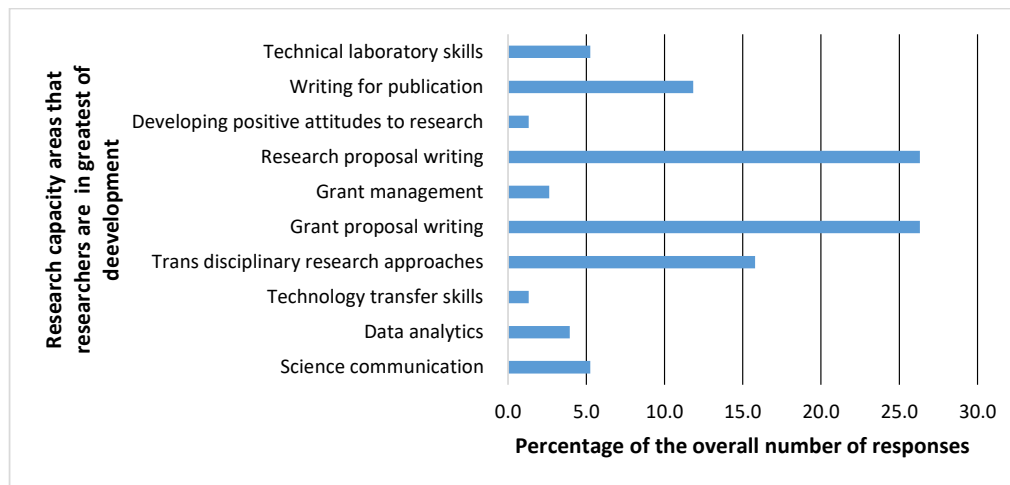


Figure 7. Research capacity areas that African universities are in greatest need of development

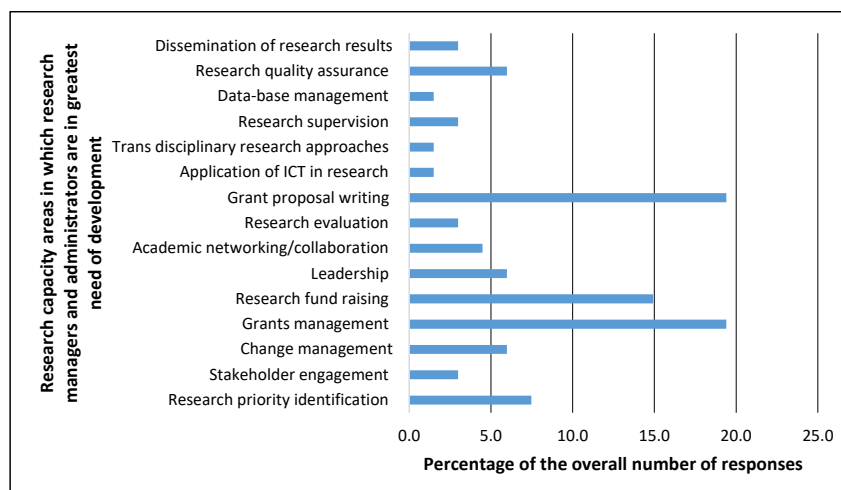


Figure 8. Research capacity areas in which research managers and administrators are in greatest need of development

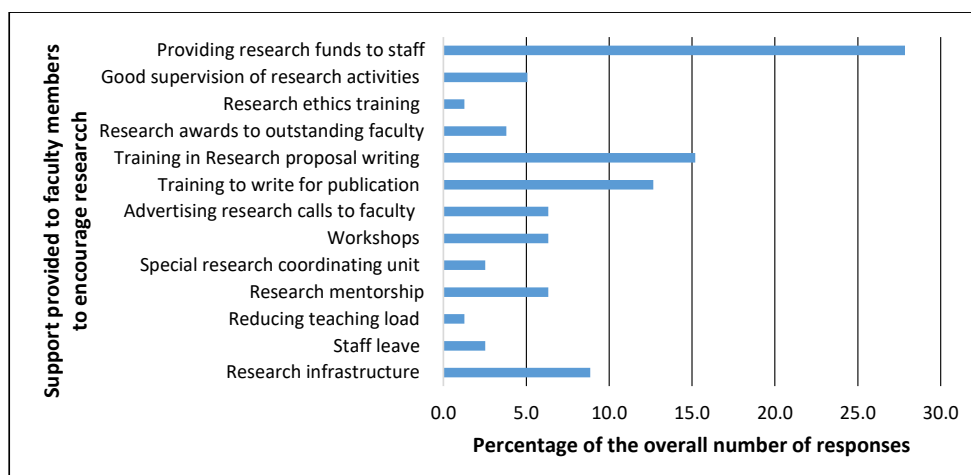


Figure 9. Type of support provided to faculty members to encourage research

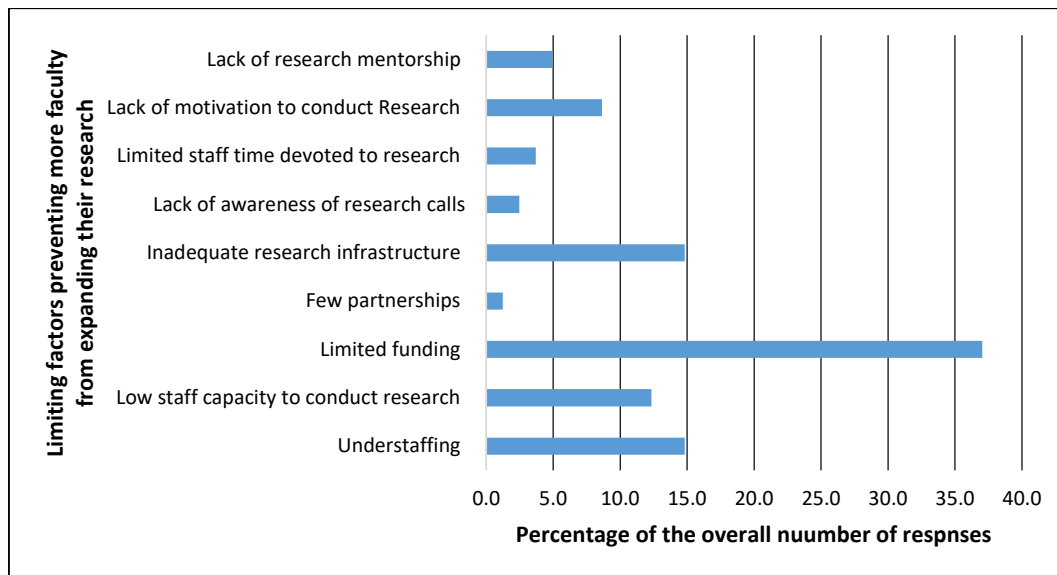


Figure 10. Channels for communicating research findings and informing policy debates with government

DISCUSSION

Engaging in international networks, conducting collaborative research and sharing experiences is useful in developing communities of practice for interdisciplinary research. Networks allow members of the interdisciplinary research community to develop trust, a sense of community and guidelines of conduct (Mansila *et al.*, 2012). Mapping out strategic areas of research focus is useful in advancing interdisciplinary research so as to manage scarce resources and at the same time build formidable communities of practice. The sentinel project aims to increase the research capacity of African researchers to conduct interdisciplinary by engaging with research users such as policy makers, private sector and civil society organisations. Although most of the respondents in this study indicated that their universities engage with the private sector, the partnerships with the private sector in most universities are still few and weak to provide substantial investment in research activities and guiding research agenda. It is argued that for African universities to contribute to national economic development, they have to establish strong linkages with industry including the private sector (Ssebuwufu *et al.*, 2012). In its vision 2030 strategy, RUFORUM seeks to

enhance cooperation with the private sector to leverage scarce resources and enhance creativity and innovation in university research and training (RUFORUM, 2017).

Provision of incentives, both monetary and non-monetary rewards generally increases incentive for Knowledge production (Cloete *et al.*, 2015). These incentives are also necessary in stimulating interdisciplinary research among university faculty. It was surprising that very few respondents indicated Intellectual Property Rights (IPR) as an incentive to expanding research. This is probably due to the limited awareness of the value of IPR in protecting innovations and other creations of the human mind. Studies show that African research institutions are still weak in designing and administering IP systems (Sikoyo *et al.*, 2006; Syam Nirmalya, 2016).

The findings from the study also indicate that mentorship structures are weakly developed in African universities. The limited mentorship capacity is disadvantageous particularly for early career researchers who are trying to find their trade in research. Recent findings also show that research mentorship structures remain

underdeveloped in African Higher Education institutions (Cloete *et al.*, 2015). On the other hand, universities have to identify their research capacities if they are to be competitive in conducting interdisciplinary research. The challenge to decision-making has been limited access to reliable data. RUFORUM is working to address this gap for example through establishment of the Agricultural Science and Technology Indicators (ASTI) portal in collaboration with the International Food Policy Research Institute (IFPRI). The portal provides information on staff and student population in Africa's Agricultural Universities including staff numbers, age, gender, position and discipline. These indicators are useful in establishing research capacities in African universities to guide decision making to aid strategic planning and setting of priorities not limited to the Higher Education institutions but extending to the broader Agricultural Innovation System (Kitone *et al.*, 2018).

CONCLUSION AND RECOMMENDATIONS

The study shows that African universities are striving to improve research capacity in their institutions, but their efforts are still inadequate largely due to limited financial resources. However, the context of African universities provides potential for enhancing interdisciplinary research capacity. Elements like co collaboration, networking and partnerships are being implemented in African universities. These are critical facets for promoting interdisciplinary research. We recommend that African universities should establish strong partnerships with other well-endowed institutions, private sector and international organisations in order to rationalize resource use and build capacity of weak institutions to participate in interdisciplinary research. Additionally, there is a need to strengthen research support, supervision and mentorship structures and universities must evaluate their existing capacities and map out strategic areas

of development as key ingredients for fostering interdisciplinary in African universities.

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STATEMENT OF NO-CONFLICT OF INTEREST

The authors declare that there is no conflict of interest in this paper.

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