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Research Application Summary

A strategic approach for African Agricultural Universities experiencing low human capacity to engage in graduate-level training: Lessons from Gulu University in Uganda

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Abstract

The significance of agriculture in driving Africa's growth and development has greatly gained recognition in the recent past. African universities are expected to play a critical role in African agricultural development process because of their inherent pivotal role in human capital development and agro-technology generation. Many universities in Africa are plagued with low human capacity, a key factor, which has continued to undermine their contribution to economic development in the continent. The most glaring capacity gap is evident at graduate-level training. Therefore, this paper shares lessons based on experience from Gulu University in Uganda on how agricultural universities experiencing human resource capacity gaps can innovatively venture into high quality PhD-level training. The paper describes innovation in curriculum process that led to the development and mounting of a thematic area-based taught PhD program in the Faculty of Agriculture and Environment. This PhD model is considered as an "accommodative strategy" suitable for human resource-constrained universities as it allows for effective use of existing limited human capacity while providing room for expansion within the same curriculum structure concomitant with staff capacity improvement.

Key words: African universities, graduate-level training, Gulu University, human capacity constraint, thematic area-based PhD model

Résumé

L'importance de l'agriculture dans la croissance et le développement de l'Afrique est de plus en plus reconnue. Les universités africaines devraient jouer un rôle crucial dans le processus de développement agricole africain en raison de leur rôle inhérent et central dans le développement du capital humain et la production d'agro-technologie. De nombreuses universités africaines sont confrontées à des insuffisances en matière de ressources humaines, un facteur clé qui freine leur contribution au développement économique du continent. Le besoin en capacité le plus flagrant est au niveau de la formation du deuxième cycle. Ainsi, cet article partage des leçons tirées de l'expérience de l'Université de Gulu en Ouganda sur la façon dont les universités agricoles confrontées à des insuffisances en matière de ressources humaines peuvent s'engager dans une formation de niveau doctoral de haute qualité. L'article décrit l'innovation dans le processus d'élaboration des programmes menant au développement et au montage d'un programme de thèse de doctorat basé sur des domaines thématiques à enseigner à la Faculté d'agriculture et de l'environnement. Ce

modèle de thèse de doctorat est considéré comme une «stratégie accommodante» adaptée aux universités à faible capacité en ressources humaines, car elle permet d'utiliser efficacement les capacités humaines existantes tout en offrant la possibilité d'une expansion à l'intérieur de la structure du même curricula, qui se produit en même temps que l'amélioration de la capacité du personnel.

Mots clés: Universités africaines; Formation du deuxième cycle; Université de Gulu, Insuffisance en ressources humaines; Modèle de formation de Doctorat basé sur des domaines thématiques

Background

The significance of agriculture in driving Africa's growth and development has greatly gained recognition in the recent past (Diao *et al.,* 2010). In essence, African universities should be a critical player in driving African agricultural development process because of their inherent pivotal role in human capital development and agro-technology generation. Due to resource constraints, many universities in Africa are plagued with low human capacity, a key factor, which has continued to undermine their contribution to economic development in the continent. In general, human capacity gaps in resource-constrained African universities occur at all levels. However, the most glaring gap is evident at graduate level of training (Tetty, 2010). Consequently, many universities in Africa are limitedly involved in graduate training.

Gulu University established its Faculty of Agriculture and Environment (FAE) in 2005 to contribute to driving its community transformation agenda through provision of training, research and outreach survives within the wider domain of agricultural and environmental sciences. To achieve this mandate, the FAE needed to develop and implement innovative curricula that are responsive to national, regional as well as Africa-wide development priorities and challenges. This in part entailed delivering high quality academic training at both undergraduate and graduate levels. In keeping with the cherished need to ensure quality, the FAE recognized right from the start that development and implementation of curricula should be in tandem with requisite technical and human resource capability in order to achieve the right development outcome.

At the time of FAE establishment in 2005, human resource capacity in the FAE was too low both in number and quality. There were only 24 members of staff, of which only three were PhD holders (all of whom were retirees from other Universities), only four had Master degree-level training while the bulk had first degrees. It is important to stress here that Gulu University being located in a somewhat rural area and a region that was just emerging from armed conflict (Northern Uganda), found it difficult to attract high caliber human resource. Therefore, the FAE adopted a phase approach to its development, and as such put on halt expansion of academic programs, maintained only the flagship Bachelor of Agriculture Degree program, and concentrated on staff capacity building. By 2014, the academic staff

quality had improved in FAE, the number of PhD holders increased to 15 while the rest had already acquired Masters Degrees. This development led to the introduction of Masters-level training by bringing on board MSc. Food Security and Community Nutrition, and MSc. Agri-enterprises Development. The expected increase in the number of staff with PhD qualification returning and taking into account the need to valorize PhD-level capacity building progressively being achieved, the need for the FAE to move to PhD-level training became apparent, especially considering the demand to train more PhD scholars for Uganda and the region. In addition, based on interactions at national level with various stakeholder groups and with Deans from other 65 RUFORUM Network Universities, Gulu University responded to the demand to develop a PhD level program that would serve not only Uganda but the wider region. The development of the PhD program was also part of the overall growth and establishment of Gulu University to serve as a leading academic institution in the region. Therefore, this paper describes using lessons based on experiences from the FAE at Gulu University, how agricultural universities experiencing human resource capacity gaps can innovatively venture into high quality PhD-level of training.

Strategic approach to development of thematic area-based PhD in the FAE. There are several PhD training models currently in use (Usher, 2010). However, the coursework and research (taught) PhD model is increasingly gaining prominence because of the opportunity it provides such as deepening students' understanding of the subject matter, and instilling in the student skills (e.g., scholarly writing and presentation, data management and analysis) relevant for successful academic development at PhD level (Baglin *et al.,* 2016). A critical look at most taught PhD curricula such as PhD Plant Breeding and Seed Systems, and PhD Agricultural and Rural Innovations at Makerere University reveals that most of them are organized within a narrow field of specialization. As a consequence, delivery of such PhD programs require high concentration of academic staff specialized within a narrow domain of the specific PhD program. Nevertheless, the reality is that there are very few Universities in Africa endowed with the required concentration of academic staff within a specialized field of a restricted taught PhD program.

Taking due consideration of the constraints highlighted above, PhD curriculum development in the FAE at Gulu University took a sequential, phased approach involving discussions at various levels to enable individual and institutional buy-in, and to provide opportunity for generating novel innovations in the design.

First phase-The idea behind introducing PhD level-training in the FAE was preliminarily discussed with RUFORUM at the Deans and Principals meeting held in Khartoum, Sudan in June 2015. The motivation for investment in PhD curriculum at FAE was to position Gulu University to participate effectively in resource mobilization to support research at graduate-level, the core mandate of RUFORUM for which Gulu University subscribe to through the FAE. The outcome of the discussion was that RUFORUM would support through a nurturing grant the development of a taught PhD program focusing on Food Systems and Agribusiness (PhD in Food Systems and Agribusiness), consistent with the already existing two Masters programs (MSc. Food Security and Community Nutrition,

and MSc. Agri-enterprises Development) in the FAE.

The second phase- Involved discussions at the FAE level to enable staff members think through, buy-in and support the proposed curriculum development agenda. The discussion took place in two stages. In the first stage, the curriculum development idea was introduced to staff. In this stage, no discussion was held but staff were given sufficient time (two weeks) to think and internalize the idea. In the second stage, in-depth discussions took place. Following the discussions, a number of issues emerged: (i) because, Gulu University was already running PhD by research, staff demanded to know the advantages the PhD by coursework would bring on board, and the shortcomings of PhD by research to enable buy-in; (ii) considering that the number of staff members holding PhDs was still inadequate and dispersed in various fields, staff became skeptical how a taught PhD narrowed to Food Systems and Agribusiness would be managed; and (iii) Considering that FAE has six departments (Agronomy, Biosystems Engineering, Animal Production and Range Management, Food Science and Postharvest Technology, Environment and Natural Resources Management, and Rural Development and Agribusiness), staff were concerned that the proposed PhD (in Food Systems and Agribusiness) would only be localized in the Departments of Food Science and Postharvest Technology and Rural Development and Agribusiness, hence disenfranchising the remaining four departments.

Regarding the advantages of a taught PhD over PhD by research, members were enlightened and appreciated that taught PhD has become a trend for PhD-level education and that many donors provide support for taught PhDs than those by research. On the issue of lack of capacity to offer taught PhD in a narrow field and the need for departments at FAE to develop together, staff agreed to drop the idea of developing a PhD in Food Systems and Agribusiness, and instead opted to widen the scope of the PhD program to include other fields. This led to adoption of PhD in Agricultural and Applied Biosciences (PhD AAB) based on thematic area approach. The rationale for adopting a thematic area-based taught PhD was that it is accommodative and allows for adjustment with changing circumstances. For instance new thematic areas would be brought on board if staff capacity is realized in certain areas or when new issues come up while some thematic areas can be dropped out the moment they become irrelevant. On this basis, the following thematic areas were agreed upon to constitute the PhD program: Food systems and Agribusiness; Efficiency of Small and Mediul Enterprises (SMEs) and smallholder production systems; Food Security and Community Nutrition; Food Safety and Quality Management; Agri-Policy Analysis; Climate Change and Community Adaptation; Environmental Management and Biodiversity Conservation; Plant Bio-Resources and Stress Management; Sustainable Crop Production and Ecological Management; and Sustainable Animal Production Systems.

These thematic areas were chosen for three reasons: (a) availability of staff with expertise in those areas; (b) some staff were already in advanced stages of PhD studies in those areas, and would return to take them up; (iii) they constitute important development priorities for national, regional and the African continent. On this basis therefore, the PhD program was expected to attract students from across Africa. Key in the design of the PhD AAB

is that students would take all cross-cutting courses (mandatory) and select other courses consistent with the thematic area of interest in addition to research. The matrix of cross-cutting courses is presented in Table 1.

Table 1: Matrix of cross-cutting courses for PhD Agricultural and Applied Biosciences

Cross-Cutting Courses: Semester I	CU	LH	TH	PH	FH	CH
AABC 9101:-Qualitative Research Methods	3	30	-	30	25	45
AABC 9102:-Quantitative Methods and Statistical Applications	4	30	30	30	25	60
AABC 9103:-Scholarly Writing and Presentation Skills	3	30	10	30	-	45
Cross-Cutting Courses: Semester II						
AABC 9201:-Participatory Action Research	4	30	20	45	25	60
AABC 9202:-Ethics, Leadership and Personal Mastery	3	30	-	45	-	45
AABC 9203:-Advanced Research Design and Analysis	4	30	20	60	-	60
Cross-Cutting Course Load	21	-	-	-	-	-

CU: Credit Unit; LH: Lecture Hour; TH: Tutorial Hour; PH: Practical Hour; FH: Field Hour; CH: Contact Hour

Cross-cutting courses are meant to develop capacity of the student to effectively communicate research results (thesis, journal articles, policy briefs) while thematic area courses are meant to enable the student to understand and comprehend current scientific debate in the chosen thematic area of research. The matrix showing thematic area courses is presented in Table 2.

The third phase-involved stakeholder consultation workshop. This workshop was organized to enable buy-in at the University level, and as such drew members mainly from within Gulu University. Of great importance was representation from the Department of Academic Registrar, Directorate of Quality Assurance and Directorate of Research and Graduate Studies, key organs responsible for overseeing academics in Gulu University. Being the first taught PhD program under development, there was great excitement because Gulu University was struggling to meet the SIDA PhD capacity building program implemented in the five public Universities in Uganda (led by Makerere University) which required training institutions to register students only on taught PhD programs. The meeting embraced the proposed PhD AAB program and recommended for development to a fully-fledged program. Discussions were also held with representatives from National Agricultural Research Organization (NARO, Uganda) and Agricultural-oriented University in East African region (Egerton University). The experts consulted strongly supported the thematic area based PhD as a good model for emerging academic institutions with limited staff capacity such as Gulu University.

The fourth phase- involved full development of the program content and approval by the Faculty board and the committee of Deans for onward transmission for accreditation by National Council for Higher Education. Because of staff involvement right from the beginning, they committed themselves and produced curriculum content of high quality within the shortest time (two months). This made it possible for approval at the FAE board (Faculty level) and the committee of Deans (University level) within two months as well

and subsquently submitted to the Uganda National Council for Higher Education (NCHE) for accreditation.

Table 2: Thematic area courses for the PhD AAB program

Thematic Area Courses: Semester I	CU	LH	TH	PH	FH	CH
AABT 9101:-Advanced Econometrics	4	30	20	60	-	60
AABT 9102:-Agri-Policy Analysis	4	30	20	60	-	60
AABT 9103:-Advanced Food Microbiology	4	30	20	45	25	60
AABT 9104:-Advanced Plant Pathology	4	30	20	45	25	60
AABT 9105:-Agronomy and Crop Physiology	4	30	20	45	25	60
AABT 9106:-Applied Bioinformatics	3	30	-	45	-	45
AABT 9107:-Systems Analysis and Simulation	4	30	30	45	-	60
AABT 9108:-Food Systems and Food Systems Analysis	4	30	30	45	-	60
AABT 9109:-Climate Change and Community Adaptation	3	30	10	30	-	45
AABT 9110:-Advanced Ecology and Ecosystem Dynamics	4	30	20	45	25	60
AABT 9111:-Sustainable Ruminant production	4	30	20	45	25	60
AABT 9112:-Environmental and Social Impact Assessment	3	30	-	30	25	45
AABT 9113:-Advanced Plant Breeding and	4	30	20	45	25	60
AABT 9114:-Multicriteria-Decision Analysis in Renewable Energy Industry	3	30	8	18	25	45
AABT 9115:-Bioenergy Resources and Technologies	4	30	20	45	25	60
Thematic Area Courses: Semester II	CU	LH	TH	PH	FH	CH
AABT 9201:-Consumer Behaviour and Agribusiness	4	30	20	45	25	60
AABT 9202:-Macroeconomics and Development	4	30	20	60	-	60
AABT 9203:-Prices and Market Analysis	4	30	30	30	25	60
AABT 9204:-Crop Pest Physiology and Ecology	4	30	10	60	25	60
AABT 9205:-Biodiversity and Ecosystem Service Management	4	30	20	60	-	60
AABT 9206:-Environmental Biophysics	4	30	20	60	-	60
AABT 9207:-Integrated Soil Fertility Management	4	30	20	45	25	60
AABT 9208:-Food Safety and Quality Analysis	4	30	20	45	25	60
AABT 9209:-Advanced Food Chemistry and Toxicology	4	30	30	45	-	60
AABT 9210:-Nutrition and Development	4	30	30	45	-	60
AABT 9211:-Non-Ruminant production	4	30	30	30	25	60
AABT 9212:-Advances in Animal Breeding	4	30	30	30	25	60
AABT 9213:-Advanced Insect Pest Management	4	30	30	30	25	60
AABT 9214:-Life Cycle Assessment of Renewable Energy Systems	3	30	10	30	-	45
Thematic area Course Load*	-	-	-	-	-	-

CU: Credit Unit; LH: Lecture Hour; TH: Tutorial Hour; PH: Practical Hour; FH: Field Hour; CH: Contact Hour;
* The minimum load for thematic area courses is 10 credit units.

The fifth phase-Involved assessment of the curriculum by NCHE. The process was performed in two phases. The first phase involved expert assessment of the content of the curriculum. The outcome of this assessment was that the reviewers were happy with the quality of the write-up, the content, and relevance to national, regional and Africa-wide development and was novel. Therefore the reviewers recommended the curriculum for accreditation after correcting minor errors observed in the document. Reviewer comments were addressed and this led to second phase of the assessment which involved onsite evaluation of capacity (human and technical resources) required for effective implementation of the proposed PhD program. On-site evaluation report was favorable and

the program was finally accredited for ten years effective December 2015. The first cohort of students (six in number; two females and four males) on the program were admitted for the 2016/2017 academic. In this cohort, each student has chosen a distinct thematic area: (i) Food safety and quality management; (ii) Sustainable animal production; (iii) sustainable crop production and ecological management; (iv) Food systems and agribusiness; (v) Environmental management and biodiversity conservation; and (iv) Climate change and community adaptation.

Lessons learned and implications for consideration by other universities

A number of lessons have been learned from the PhD curriculum development process described in this paper. Generally, university academics are known to be resistant to innovations that threaten status quo (Quin, 2011; Deaker *et al.,* 2016). This was clearly observed when the PhD curriculum idea was first introduced to the FAE staff. However, it has become apparent that involving faculty academic staff right from the beginning and allowing time for thinking-through and internalization of the PhD idea provided opportunity for open and constructive discussions which set a foundation for staff to own the curriculum agenda and led to its successful development. A very useful and key strategic direction achieved was that allowing for scrutiny and in-depth discussion enabled the FAE to adopt the thematic area-based PhD model which fitted its staff capacity circumstance.

Relatedly and equally important lesson is that involving key university-level departments holding academic regulatory portfolios (Directorate of Quality Assurance, Department of Academic Registrar and Institute of Research and Graduate Studies) in the preliminary discussions provided opportunity for confidence building on the new curriculum orientation at the institutional level. This high-level involvement is probably responsible for the observed faster approval rate of the thematic area-based PhD curriculum described in this paper. This is in contrast with the far more lengthy processes that curricula approval are generally known to take in most universities (Hurliman *et al.,* 2013). Successful development and mounting of the thematic area-based PhD AAB in the FAE has triggered momentum in other Faculties in Gulu University to develop similar taught PhD programs.

A critical analysis of the mix of thematic areas chosen by the first cohort of students reveals that the thematic area-based orientation of the PhD AAB program provided opportunity for students with diverse interests to access PhD-level education. This would have come as a major limitation instead, had the original idea of the PhD in Food Systems and Agribusiness been adopted. In resource-constrained African universities, human resource capacity suitable for PhD-level training is scattered at very low levels in various areas of specialization. This situation has made it difficult for such universities to venture into PhD-level training. As a consequence, the few highly trained staff cannot achieve academic growth and as a result end-up leaving the institution. This is one of the key factors that have been identified as hindering academic staff retention in African Universities (Selesho, 2014). Thematic area-based PhD model can therefore be considered as an "accommodative strategy" suitable for human resource-constrained universities as it allows for effective use of existing limited human capacity while providing room for expansion within the same

curriculum structure concomitant with staff capacity improvement.

Delivering high quality PhD training requires sufficient financial resources, which is often a challenge in many African universities, and has affected quality of research and completion rates. This is a key bottleneck that is likely to affect the success of the PhD AAB program at Gulu University. To circumvent this situation, Gulu University is aggressively working with other partner institutions within and outside the RUFORUM network to seek funding from various funding sources. Realization of funds from such efforts is expected to provide incentives for staff and students to concentrate on the PhD agenda. On the other hand, Gulu University needs to match admission levels to the staff capacity consistent with the "accommodative philosophy" of the thematic area-based PhD approach in order to maintain quality.

One area of attention will be to develop detailed course content that involves a number of experts and getting the course materials internationally peer reviewed, and some of these transformed into online resources. Accordingly, Gulu University will seek partnership with RUFORUM and its close ally Agrinatura (Network of European Universities) to strengthen the PhD programme at Gulu to support training of PhD scholars from across Africa and globally.

Conclusions

This paper illustrated how Gulu University as an emerging higher education institution experiencing low staff capacity ventured in PhD training in its FAE. The paper demonstrated that constructive engagement of academic staff at the faculty level enabled the FAE to adopt the thematic area-based PhD model which fitted its staff capacity circumstance. It demonstrated also that involving high-level regulatory organs at the university-level enabled faster institutional acceptance, development, accreditation and mounting of the thematic area-based PhD in the FAE. In a broader sense therefore, thematic area-based PhD model can be considered as an "accommodative strategy" suitable for human resource-constrained universities as it allows for effective use of existing limited human capacity while providing room for expansion within the same curriculum structure concomitant with staff capacity improvement. Last but not least, it is very imperative that the FAE aggressively scouts for funds to support student training on the PhD program. Funding such a programme would require a number of key ingredients especially ensuring high quality content and learning outcomes that closely link to market demands. This would require strengthening staff capacity to teach in the programme, and with lectures well prepared in terms of supervision of PhD students. Consequently, Gulu University will seek international partnership to strengthen teaching delivery, enhance capacity for graduate supervision and for infusing in best practices from other universities within and outside Africa. It is also envisaged that a modular approach and online delivery of courses will be incorporated to allow for flexible learning.

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