
Innovating for Skills Enhancement

The centrality of field attachment programs in Agricultural Sciences in Africa

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Regional Universities Forum for Capacity Building in Agriculture (RUFORUM)

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Debate on the centrality of field attachments/work experience to education has gained traction in the recent past, with consensus emerging on the necessity for such experience in order to progress along one's chosen career path (Essential Skills Ontario 2014; Hillage & Pollard 1998; Kristof-Brown, Zimmerman & Johnson 2005). Thus, work-based learning and apprenticeship–dual training systems now play an important role in facilitating employment and increasing economic competitiveness (Cornford & Gunn 1998; Simmons 2009). Traditionally, African universities, in particular departments of agriculture, embedded within their courses field attachment–apprenticeship programs, but these were generally orientated towards fulfilling the curriculum mandate of undergraduate training (Mugisha & Nkwasiwe 2014), while graduate training in most African universities rarely included such apprenticeships. Yet, research dissertations on graduate training programs continued to pile up on university shelves (Goolam 2014; Sawyerr 2004).

The lack of connection between graduate training and research with communities meant that farmers from whom the information was generated lost on three grounds. First, they became simply providers of information to support attainment of higher degrees. Second, their production systems barely improved as there was hardly a functional relationship between farmers, graduate fellows and their knowledge, or between farmer activity and related curricular programs. Third, farmers were denied the valuable partnerships that should come through farm-level research. Despite universities trying to reach farmers, they continued operating within their silos and ivory towers. The university academics were becoming 'a cyclic burden', often seeking information from the communities without providing feedback.

Elsewhere in the world, the above challenges had, in part, been addressed by enhancing outreach activities. For example, in the United States, the land grant agricultural colleges established in 1862 (Christy & Williamson 1992) and the more recent Research and Development University (Reddy 2011) and Research in Development (Douthwaite et al. 2015) concepts

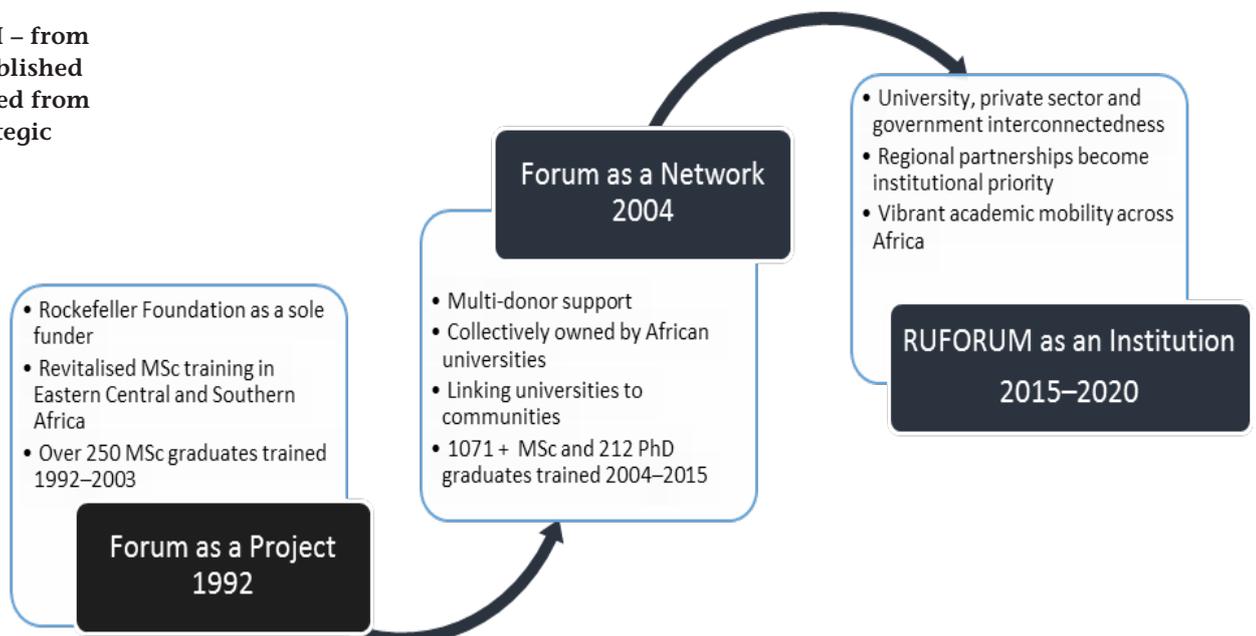
have strengthened the need for greater university research and community engagement, and have negotiated space for this. Despite these models, African universities, inherited from the colonial period and further developed post-independence, have maintained the earlier teaching paradigm and specialty, focusing more or less on theoretical aspects of the curriculum, while giving limited attention to the practicum (Juma 2011). The urgency to address the practical skills gap among university graduate fellows thus remained a challenge; a situation which only worsened as higher education funding became increasingly constricted (Awidi 2014; Jowi et al. 2014; Materu 2007). Successful attempts have been made at the undergraduate level, but field attachments, particularly in the Colleges of Agriculture, are largely absent from graduate training programs. The assumption often is: this is covered through graduate research.

In 2010, the Regional Universities Forum for Capacity Building in Agriculture (RUFORUM) launched the Field Attachment Programmes Award (FAPA) – an innovative strategy aimed at encouraging graduate students at postgraduate level to follow through with the dissemination of their research to enable them to link more closely with communities and agencies working in the area where their research was undertaken. This article discusses the lessons learned during the period 2010–2015 by examining two key areas: (1) the application process and implementation of the awards; and (2) the reported outcomes and challenges for grantees.

THE RUFORUM FAPA PROGRAM

The RUFORUM is a network of 55 universities in 22 African countries. The network evolved from a project supported by the Rockefeller Foundation to a program, and is today an established

Figure 1: RUFORUM – from a project to an established institution (extracted from the RUFORUM Strategic Business Plan)



institution (Figure 1) governed by the Vice-Chancellors of the respective member universities.

The RUFORUM Competitive Grants Scheme (CGS) entails a mix of sub-granting approaches that are targeted to serve different categories of stakeholders at member institutions (Egeru, Nampala & Makuma-Massa 2015). The Field Attachment Program Award (FAPA) is just one among a portfolio of competitive grants offered by RUFORUM. It particularly targets graduate students, and is awarded based on the merit of the proposal submitted by students who have developed a useful intervention, product or service as part of their postgraduate research in agricultural sciences. The FAPA is designed to encourage students to disseminate their research with the communities and agencies working in the geographical area in which their research was undertaken. It is also designed to give students real-world experience and contacts with development and advisory agencies. RUFORUM supports university-wide research in agricultural sciences such as research in commodity value chains of cereals including sorghum, millet, wheat, rice and maize; commodity value of livestock including poultry, dairy, camels, goats and sheep; and the value chain of fish. Research is also conducted in biogeochemical processes, including focus areas such as climatic sciences and atmospheric processes, disaster risk reduction and climate change adaptation, and these form the basis upon which the FAPA projects are constructed.

In this study, we utilised multiple data types and information sources derived from implementation of the 114 FAPA projects undertaken in 17 African countries in the last five years. An online survey was purposively conducted with the FAPA grantees, which achieved a response rate of 35.1 per cent. As a response rate to online surveys, this level is considered satisfactory (Nulty 2008). We also analysed 40 Field Attachment Programme Award reports submitted by grantees as part of compliance to the grant award requirements. These reports included those from 2010–2014 purposively selected for their completeness of filled-out fields and geographic spread. Thematic clustering and inductive approaches to meta-data analysis were used to provide clarity and rigour of information relevant for experience sharing.

The results below are grouped in two main categories for the purpose of sharing lessons learned, adaptations made by the Network, and challenges and next steps. The two main areas are implementation, and outcomes/challenges.

RESULTS

Implementation and Learning Process

The RUFORUM Field Attachment Programme Award has gone through five phases (Table 1) with a growing number of awards over time (Figure 2). The implementation cycles I and II were essentially the pilot and roll-out phase (2010 and 2011). This period was instrumental in initiating institutional processes,

particularly in raising awareness of the field attachment as an additional catalogue of services offered by the RUFORUM Competitive Grants Scheme (CGS). The lessons learnt during this phase mainly involved process and programmatic issues and technical drifts relating to translating research outputs into disseminable information for smallholder farmers, as well as the inefficiencies of transferring small grant amounts through the university systems (Table 1).

Based on the lessons from Phases I and II, Phases III and IV were characterised by a modification to the grants process, which involved the adoption of direct funds disbursement to the students. Increased compliance and completion rates, as well as growth in the number of applications, were observed in this phase. Therefore, it was inevitable that a mechanism had to be devised for processing and administering the rising number of applications in a timely and efficient manner, including application submissions, compliance checks, technical review/evaluation and reporting. Consequently, in Phase V, an online process through the RUFORUM Information Management System (RIMS) was launched. The online system has enabled timely processing of the higher number of applications received. Details of key process and programmatic lessons at each programmatic phase are highlighted in Table 1.

Throughout the FAPA implementation, we maintained an oversight function as a requirement of supervisors at both the university and host institutions (which include primary actor organisations, such as non-government organisations and national research organisations, including Kenya Agricultural Research Institute, Rwanda Agricultural Board, National Agricultural Research Organisation of Uganda and Agricultural Research Corporation of Sudan). Most importantly, this was done to encourage lesson learning between the university and advisory agencies such as the National Agricultural Advisory Services (NAADS) in Uganda and the Department of Agricultural Extension Service (DAES) in Malawi.

Figure 2: Number of FAPA beneficiaries by grant cycle (2010–2015)

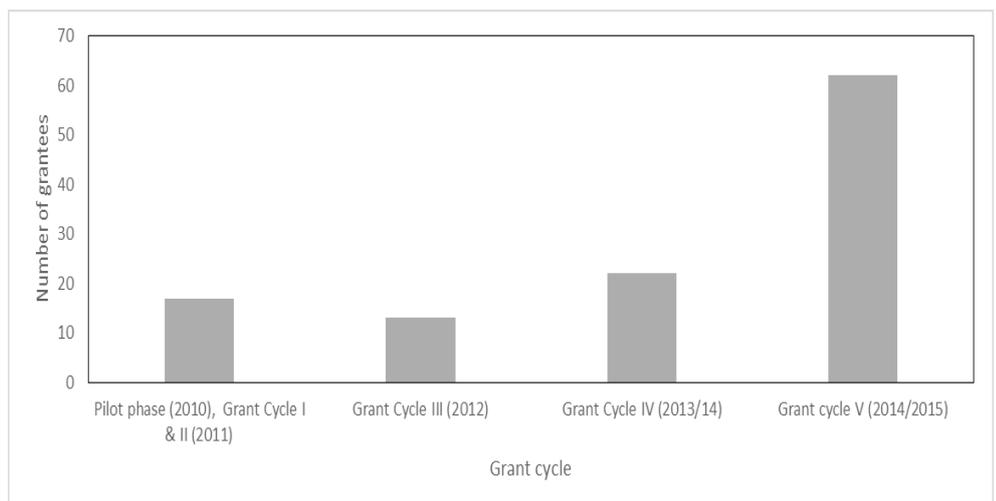


Table 1: FAPA grant cycle, process and programmatic lessons

FAPA implementation	a) Signing grant award letters
Pilot phase and grant cycles I and II (2010–2011)	RUFORUM signed awards letters with the college leadership, with a copy to the student
FAPA grant cycles III and IV (2012–2013)	RUFORUM signed award letters directly with student and representative of the university or host institution, with supervisor as witness
FAPA grant cycle V and online system (2014–2015)	Mixed approach of signing grant awards with both student and mentor; where students were from a regional program and regional project, such as the regional mobility programs, grant awards were through the mentors due to the number awarded in a tranche
Lessons learnt	<p>Signing with the college lessened the responsibility and commitment of the student, resulting in a number of incomplete field attachments.</p> <p>Signing with the student and involving a supervisor ensured a fall-back position if the student was not responding; this included closer follow-up and supervision of the student’s work plan and final report</p> <p>Cases of incomplete field attachments were reduced to zero in 13 students (cycle III) and 2 in 22 students (cycle IV).</p> <p>Mentors are instrumental in successful implementation of bulk awards because they provided in-country supervision and monitoring.</p> <p>Many project proposals received were focused on research rather than dissemination. This signaled challenges in translating research results/ outputs into simplified messages for smallholder farmers.</p>
FAPA implementation	b) Disbursement of FAPA funds
Pilot phase and grant cycles I and II (2010–2011)	Full grant amount transferred to student via university college/faculty account
FAPA grant cycles III and IV (2012–2013)	Disbursement in two tranches directly to FAPA student account
FAPA grant cycle V and online system (2014–2015)	Direct disbursement to students account continued
Lessons learnt	<p>Students receiving the full grant amount at one time during the pilot phase reduced their incentive to submit all deliverables at the end of attachment. The grants unit registered three students who did not complete the FAPA.</p> <p>The transfer of small grant amounts through the university system is inefficient. It can result in delay in grantees receiving the money and, in cases where the grantee has left the university, there is no way the university can transfer the money to them.</p> <p>Disbursement in tranches and tying the second disbursement to submission of all deliverables ensured a 99 per cent completion rate. Part disbursement increased transaction costs but ensured success of the grant.</p> <p>Students respected the fact that a disbursement would be affected if their report was incomplete or substandard.</p> <p>Disbursement directly to student accounts reduces institutional bureaucracy associated with release of funds and institutional overheads on small grants.</p>

FAPA implementation	<i>c) Incorporating an incentive to supervisors</i>
Pilot phase and grant cycles I and II (2010–2011)	No incentive to supervisors
FAPA grant cycles III and IV (2012–2013)	Incentive to supervisors incorporated in the grant amount
FAPA grant cycle V and online system (2014–2015)	Incentive to supervisors maintained and transferred with the last tranche of funds after successful implementation and reporting had been undertaken
Lessons learnt	<p>Disincentivised, the supervisors were not held responsible for incomplete attachment programs.</p> <p>Incentivised, the supervisors were expected to review the FAPA work plan before commencement. They were also expected to review the report and to submit a one-page brief on the performance of the student.</p> <p>The quality of the FAPA greatly improved with the introduction of the supervision component; but this also requires close monitoring.</p>
FAPA implementation	<i>d) Introducing a standardised application form and reporting template</i>
Pilot phase and grant cycles I and II (2010–2011)	No application form or reporting template
FAPA grant cycles III and IV (2012–2013)	Students completed application form and reporting templates
FAPA grant cycle V and online system (2014–2015)	Application call reviewed and an open call introduced, running throughout the year; the call now circulated every week through the RUFORUM weekly digest
Lessons learnt	<p>Review of applications when the application form was introduced was much simpler and faster.</p> <p>Use of a reporting template made provision of feedback and review of FAPA outcomes much simpler.</p> <p>The number of applications has increased due to the open call and frequent reminders to the network members.</p>
FAPA implementation	<i>e) Introducing online application</i>
Pilot phase and grant cycles I and II (2010–2011)	No electronic application
FAPA grant cycles III and IV (2012–2013)	No electronic application
FAPA grant cycle V and online system (2014–2015)	Online application submission implemented through the RUFORUM Information Management System (RIMS); includes pre-designated budget and proposal structure templates
Lessons learnt	<p>Online submission has increased the speed and ease of processing including review and communication of the review outcome, monitoring and candidate reporting.</p> <p>Better organised and more focused proposals and budgets.</p>

Table 2: Skills gained by the grantees during field attachment and realities that need to be taken into consideration.

Skills category	Skills and competences gained
Initiative and leadership	<ul style="list-style-type: none"> —Ability to execute part of the research components —Developing innovation platform plans —Negotiating with producer and marketing value chain actors on better supporting farmers —Developing farmer community-based organisations —Bringing different farmer groups together to pool resources and manage bulk produce —Identifying gaps for PhD research —Engaging with development partners leading to the award of PhD scholarship —Influencing primary schools to introduce practical agriculture in the curriculum through school gardening —Focusing on patenting the product outputs of the research with the support of the university intellectual property policy
Flexibility	<ul style="list-style-type: none"> —Methodological adaptation during implementation, including trying out new methods never used before —Ability to manage conflict among different stakeholders during implementation —Strategic decision making
Good communication	<ul style="list-style-type: none"> —Respecting and understanding cultural differences —Considering equity, equality and justice/fairness during meetings —Demonstrating knowledge transfer from research to practice —Speaking motivationally to different stakeholders within the same audience
Analytical skills	<ul style="list-style-type: none"> —Discerning farmer challenges —Conducting situation analysis —Understanding gender-based perspectives —Recognising farmer ingenuity in handling complex challenges with simpler solutions —Recognising result variations and difficulty in farmer adherence to scientific practices —Conducting comparative analysis of costs for farmer inputs (e.g. locally produced rations are cheaper than commercially produced rations)
Teamwork	<ul style="list-style-type: none"> —Working with farmers —Working with development actors and other partners —Understanding work ethics: organisation, time-keeping, filing and receptiveness
IT skills	<ul style="list-style-type: none"> —Developing farmer-based websites —Gaining competence in new skills in geographic information system (GIS) —Maintaining and populating websites
Technical knowledge and competence	<ul style="list-style-type: none"> —Participatory process management —Obtaining indigenous farmer knowledge and ways of doing things —Developing plans with farmers —Budgeting and organising of events —Providing technical support to community-based organisations and civil society organisations on proposal development and alignment —Developing training materials, e.g. brochures, pamphlets, books —Undertaking commodity value-chain mapping —Determining molecular sequencing during international laboratory level practice —Reviewing and evaluating scientific proposals

Skills category	Skills and competences gained
Network and advocacy skills	<ul style="list-style-type: none"> —Matching farmer needs to research needs —Mobilising communities —Developing farmer value systems —Engaging with policy and decision makers —Gaining facilitation skills —Jointly preparing for and working with development partners and community development officers —Undertaking fundraising via competitive grants and other fund-raising events
Reality checks arising from implementation of FAPA and skills development and attainment	
Realities that need to be taken into consideration	<ul style="list-style-type: none"> —Smallholder farmers are profit oriented but have limited appreciation of unit cost investment to increase yield output —Entrepreneurial abilities of smallholder farmers need to be strengthened —Smallholder farmers adopt and adapt technologies that directly address their production challenges —Smallholder farmers have indigenous knowledge that is non-static —Smallholder farmer buy-in is easy when the study is conducted with direct farmer participation from the beginning —Smallholder farmers still have challenges with record keeping —Timing of the dissemination activities; for example, it is difficult to gather farmers together in the morning hours during the wet season —Curriculum inadequacy at university level to tackle practical agriculture —Attention to institutional processes needed

Skills and Shared Experiences Gained by the Beneficiaries

A majority (93 per cent) of the beneficiaries recognised the important role field attachment played in their acquisition of field-based experience of working at the community level and engaging with communities at various levels. Grantees enumerated a range of competences and skills, particularly cross-cutting skills, which they gained during the exercise (Table 2). These skills can be categorised into eight sub-groups: initiative, flexibility, good communication, analytical skills, teamwork, ICT skills, technical knowledge and competence, and network and advocacy skills. Further, grantees provided several reality checks (Table 2) that need to be carefully taken into consideration when engaging with smallholder farmers as these have the potential to influence farmer perceptions of and receptiveness to the technologies and knowledge being disseminated.

DISCUSSION

The Field Attachment Program Award (FAPA) is an innovative program designed as a graduate internship to link thesis research findings with recommendations for application and use at community level. The FAPA grants are intended to provide opportunities for dissemination of research outputs with a view to informing policy development and honing students' skills in participatory problem identification and articulation of complex research. The FAPA has evolved since 2010 and now reflects a learning process for all stakeholders involved. For the graduate students, the FAPA presents an opportunity to participate in a

real-life industrial working environment with hands-on exposure to the world of work immediately after completion of graduate training. It serves to enhance theoretical skills gained and helps graduates blend these through practical application in a community setting. Indeed, some of the skills gained, including leadership and teamwork, are not key components of agricultural graduate curricula. The FAPA underpins the importance of incorporating personal mastery and soft skills in curricula tailored to postgraduate students in the agricultural sciences. A study by Mugisha and Nkwasiwe (2014) on capacity development for modernising African food systems notes that graduate students appreciate field attachment and strongly recommend it be adopted in the training process.

The FAPA model has also made a significant contribution to rethinking relevant curricula at several member universities in the RUFORUM network. For example, arising from the FAPA experience and collaboration with EARTH University facilitated by RUFORUM, Gulu University in Uganda and Egerton University in Kenya collaboratively engaged to revamp their field attachment programs (Kalule et al. 2016). The current internship models at these universities mimic the RUFORUM model, although some slight modifications have been made to suit local and country-specific conditions. Other universities within East Africa have also reviewed these models and appreciate the potential advantage of including practical and experiential learning in graduate training programs (Kathuri-Ogola et al. 2015).

From the RUFORUM perspective, the evolution of FAPA since 2010 demonstrates attributes of the learning organisation, as defined by Senge (1996). The RUFORUM has facilitated through FAPA learning for its members (the 55 member universities) and has continuously transformed itself to serve the needs of the various stakeholders in the agriculture and higher education sectors. Member universities have embraced the FAPA and institutionalised it, with improvements, within their undergraduate programs as well as introducing the concept of field attachments to the curricula of other postgraduate programs (Kalule et al. 2016; Okello & Otieno 2016). The RUFORUM has also adapted its competitive grants scheme (CGS) to allow for the evolution of FAPA to meet the needs of students, host institutions (university and field attachment) and faculty. These adaptations include adjustment to the implementation time from three to six months, flexibility in community prioritisation and the grant amount provided for implementation.

Further, the reality checks identified by the grantees have produced other core lessons for RUFORUM and the wider network. One important example is that smallholder farmers, while profit oriented, have limited appreciation of unit cost investment. For example, smallholder farmers do not cost their labour hours or record other input costs and, as such, the price they receive for their produce is non-reflective of the total operational costs incurred in the production process. Further, farmers drawn to the better

prices offered by urban markets for their produce often do not cost transport and other opportunity costs incurred in getting their produce to market, resulting in limited or nil net gain to the farmers. Therefore, farming as a business is still a challenging concept among smallholder farmers in Africa (Eicher 1999), indicating that the entrepreneurial abilities of smallholder farmers need to be strengthened. Evidence available from the innovative programs that have been developed at Gulu University and Egerton University based on earlier lessons from the FAPA show that it is possible to develop these skills among graduate students and that they are vital in facilitating students' effective engagement with these communities (Kalule et al. 2016; Okello & Otieno 2016). On the other hand, it emerged that smallholder farmers are proficient in adopting and adapting technologies that directly address their production challenges and often possess an indigenous knowledge base which they rely on to adjust to evolving circumstances. Thus, technologies that increase returns and promote the integration of value chains are highly appreciated by these farmers (Mirembe, Obaa & Ebanyat 2016).

The FAPA implementation also revealed the need for researchers to pay close attention to cultural and household calendars in the communities because the success of the dissemination exercise depends on appropriate scheduling and timing of dissemination meetings at the community level. For example, grantees noted that, during the wet season, it was difficult to gather farmers together in the morning as this was when they attended to their gardens, whereas female participants could not attend in the afternoon as this was when they completed household chores after garden work. Therefore, appropriate scheduling of dissemination meetings is pivotal to successful dissemination. This calls for universities to ensure their graduates are trained to be flexible and innovative so they are better able to engage effectively with the communities. It also calls for grantees to pay close attention to the cultural norms and value systems of the various communities as well as institutional processes that may facilitate or hinder their engagement.

CONCLUSION AND WAY FORWARD

The RUFORUM field attachment program has shown that closer engagement with farmers delivers technically skilled and adaptive graduates who are able to innovatively address the complex challenges of smallholder farmers. It also facilitates innovation, technology transfer and process modification to suit farmer needs.

Through the program it has been possible to bridge the skills gap between undergraduate and graduate level training. In addition, mutual and cross-cutting benefits have emerged from the student-farmer interactions, and these benefits strengthen community-university linkages.

However, there are challenges for the program:

—The overwhelming demand for FAPAs as awareness of the program has grown has implications for RUFORUM. The network needs to

mobilise more funds to service this need, which in turn will require the universities to increase their budgets to cover the costs of field attachment and to reform their billing system, a process that is often prolonged by institutional bureaucracy.

- Both graduate students and faculty still have difficulty turning thesis-type recommendations into accessible non-scholarly publications such as policy briefs, brochures and factsheets that can be used for broad dissemination of the research. It is therefore vital that skills enhancement courses that build the capacity of graduate students and faculty to decode scientific recommendations and effectively communicate them to end users, including farmers, decision makers and development partners, are introduced. In this regard, initial efforts are being made by RUFORUM through a partnership with African Women in Agricultural Research and Development (AWARD) to train graduate fellows in research communication.
- The FAPA is a small grant, but the overheads associated with managing it are quite high. However, the impact of this small grant is substantial and the FAPA model can be leveraged by universities to enrich and expand their outreach activities.

Moving forward, it is vital that RUFORUM continues to implement the field attachment program with its current flexibility as this allows for collaboration, learning and adapting of approaches. The field attachment program has demonstrated its value as an innovative way to fill the skills gap among graduates; develop mutual benefits for students and farmers; and strength community-university ties. It is also important that RUFORUM continues to engage with industry and to further strengthen ties that will facilitate field attachment programs as a way of leveraging the costs of placement, which are currently borne by the RUFORUM Secretariat. More broadly, it is important that universities strengthen field attachment programs as part of their graduate training processes, particularly in the agricultural sciences.

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