



Regional Universities Forum for Capacity Building in Agriculture

BUILDING AFRICA'S CAPACITY TO TRAIN FOR AFRICA

RUFORUM@15 SUMMATIVE OUTCOME EVALUATION

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ACRONYMS & ABBREVIATIONS

AAU	Association of African Universities
ACBF	African Capacity Building Foundation
ACE	African Centres of Excellence
ACI	Africa Capacity Index
ACP	Africa, Caribbean and Pacific
AFS	Aquaculture and Fisheries Science
AGM	Annual General Meeting
AGRA	Alliance for a Green Revolution in Africa
AHESTI	Agricultural Higher Education, Science, Technology and Innovation (African Universities Agenda for)
AHEW	Africa Higher Education Week
AI	Artificial Insemination
AICM	Agricultural Information and Communications Management
ARC	Agricultural Research Corporation (Sudan)
ARE	Agricultural and Resource Economics
ARI	Agricultural and Rural Innovation
ARF	Agricultural Research Fund (Netherlands)
AR4D	Agricultural Research for Development
ASARECA	Association for Strengthening Agricultural Research in Eastern and Central Africa
ASTI	Agricultural Science and Technology Indicators
AU(C)	African Union (Commission)
AU-C10	African Union Committee of Ten Heads of State and Governments
AWARD	African Women in Agricultural Research and Development
BMGF	Bill and Melinda Gates Foundation
BSc	Bachelor of Science
CAADP	Comprehensive Africa Agricultural Development Programme
CAES	College of Agricultural and Environmental Sciences
CARP	Community Action Research Project
CBSD	Cassava Brown Streak Disease
CcIPA	Capacity Centred Impact Pathway Analysis
CGS	Competitive Grants Scheme
CMD	Cassava Mosaic Disease
CoE	Centres of Excellence
COMESA	Common Market for Eastern and Central Africa

CTA	Centre for Tropical Agriculture
DfID	Department for International Development
DRM	Dryland Resource Management
EDULINK	Education and Science Linkages Programme
EU	European Union
FAPA	Field Attachment Programme Awards
FARA	Forum for Agricultural Research in Africa
FORUM	Forum on Agricultural Resource Husbandry
FSN	Food Science and Nutrition
GDP	Gross Domestic Product
GO4IT	Graduate Opportunities for Innovation and Transformation
GRG	Graduate Research Grant
GTA	Graduate Teaching Assistant (ship)
Ha	Hectare
HAE	Higher Agricultural Education
HAEIs	Higher Agricultural Education Institutes
ICRISAT	International Crops Research Institute for Semi-Arid Tropics
ICT	Information, Communication Technologies
IDA	International Development Association
IDRC	International Development Research Council (Canada)
IFAD	International Fund for Agricultural Development
IFPRI	International Food Policy Research Institute
ISG	Institutional Support Grant
Kg	Kilogram
LUANAR	Lilongwe University of Agriculture and Natural Resources
MaRCCI	Makerere Regional Centre for Crop Improvement
MDAs	Ministries, Departments and Agencies
MCF	MasterCard Foundation
MOU	Memorandum of Understanding
MSc	Master of Science
M&E	Monitoring and Evaluation
NAIS	National Agricultural Innovation System
NARES	National Agricultural Research and Extension Systems
NARIs	National Agricultural Research Institutions
NARS	National Agricultural Research System
NEPAD	New Economic Partnership for Africa's Development

NG	Nurturing Grant
NGO	Non-Governmental Organisation
OECD	Organisation for Economic Cooperation and Development
OP	Operational Plan
PBB	Plant Breeding and Biotechnology
PBSS	Plant Breeding and Seed Systems
PhD	Doctor of Philosophy
PIs	Principal Investigators
PRSPs	Poverty Reduction Strategy Papers
RECs	Regional Economic Communities
RILs	Recombinant Inbred Lines
R4D	Research for Development
R&D	Research and Development
RM	Research Methods
RTP	Regional Training Programme
RUFORUM	Regional Universities Forum for Capacity Building in agriculture
SADC	Southern Africa Development Community
SANBio	Southern Africa Network on Biosciences
SBP	Strategic Business Plan
SHAEA	Strengthening Higher Agricultural Education in Africa
SP	Strategic Plans
SSA	Sub-Saharan Africa
STI	Science, Technology and Innovation
STISA	Science, Technology and Innovation Strategy for Africa
S&T	Science and Technology
SUFACE	Strengthening University Farming Community Engagement
SWM	Soil and Water Management
ToC	Theory of Change
ToR	Terms of Reference
TVET	Technical and Vocational Education and Training
UCE	University Community Engagement
UK	United Kingdom
USA	United States of America
USAID	United States Agency for International Development
US (D/\$)	United States Dollar

1: BACKGROUND AND CONTEXT

RUFORUM, the Regional Universities Forum for Capacity Building in Agriculture (www.ruforum.org), is a membership network of universities – the fundamental institutions of the higher education system – with a passion for agriculture. The strategic objectives that guided the implementation of RUFORUM interventions essentially define the functions of the network into three core areas:



a) Marshalling resources and strategically allocating them for transformative growth of member universities responsive to national aspirations and conditions through intensive knowledge-sharing and collective action;

b) Developing quality human resources and capacity required to intensify and increase Africa's agricultural productivity; and,

c) Ensuring the products, processes and knowledge developed through university research reach down to value chain actors in the agri-food system to catalyse transformation.

The purpose of the 2018 summative outcome evaluation was to provide

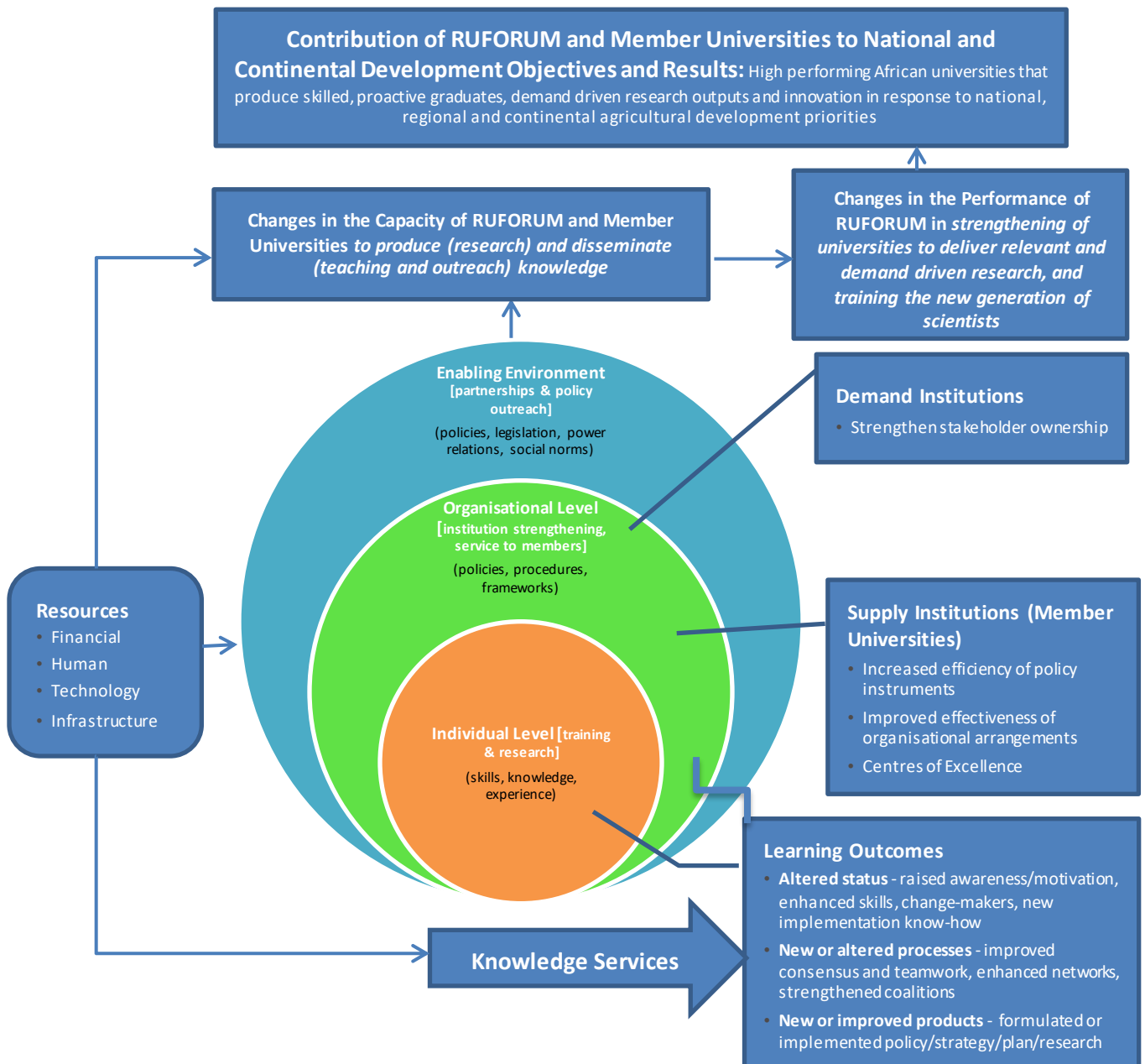
available evidence about the degree to which RUFORUM has had an effect in *“strengthening the capacity of African universities to deliver relevant and impact orientated research and training - producing skilled and proactive graduates, and demand driven research outputs and innovation in response to national, regional and continental agricultural development priorities”*. It was to assess whether RUFORUM has been effective in meeting its objectives; how well its programmes have worked; the extent to which the programmes have been implemented as designed; whether the programmes were accessible and acceptable to the target beneficiaries; and the accrued benefits to universities and communities as a direct or indirect result of RUFORUM interventions on agriculture as a scientific discipline. As much as was practically possible, the evaluation tried to quantify the benefits RUFORUM has generated to justify continued support.

The evaluation findings and recommendations are meant to help RUFORUM improve its decision making, the implementation of its Vision 2030 Strategy, and programming initiatives for capacity development and institutional strengthening of its member universities. The evaluation provides evidence and proof of concept for the benefits of collaboration to the member universities, the national governments, and the regional and continental development agendas, in the areas of higher education, agriculture and science, technology and innovation in broad terms. It provides accountability for development partners' support and aid spending on RUFORUM and generates learning on why and how RUFORUM initiatives have been successful (or not). The overall approach of the evaluation was grounded in a general theory of change for capacity development and the results frameworks of RUFORUM interventions supported by various partners.

The analytical framework that was used in the evaluation to assess the RUFORUM outcomes has two dimensions: first, it uses the logic of a results chain to unpack the different changes that were

expected to occur as a result of RUFORUM intervention; second, it distinguishes between three different levels at which capacity change can occur: individual (knowledge, technical skills, motivation), organisational (policies, processes, systems, structures, incentives, resources, practices) and the enabling environment (policy, legal, social and economic context and other factors external to the organisation). The results chain distinguishes between three types of change: changes in the capacity of individual beneficiaries, RUFORUM member universities and partners; changes in the performance of RUFORUM as a network, and the contribution of RUFORUM to longer term development results at national, regional and continental levels (Figure 1).

Figure 1: Analytical framework for assessing RUFORUM’s interventions



2: RUFORUM PROGRAMME STRUCTURE AND DESIGN

RUFORUM stakeholders comprise: 1) member universities who receive direct support in form of grants, students, staff training and other special services reserved for members; 2) employers of the “new graduates,” who pay for employees in the market as private goods; 3) users of knowledge products and research outputs that shape the productivity and policy environment of Africa’s agricultural and higher education sectors; and 4) regional, continental and global partners, who are intensive users of “global public goods” generated by RUFORUM’s understanding of university systems, value chains and market demands for African agriculture and skilled human capital. RUFORUM satisfies the needs of its members by providing common products and services that help them be more relevant or productive, and mitigating risks and challenges through collective responsibility and economies of scale and scope.

RUFORUM programmes and projects were based on a general theory of change (Figure 2) and broadly consisted of five interrelated intervention areas albeit with a varying degree of focus: (a) developing and/or supporting regional academic programmes; (b) integrating research as a tool for quality graduate training; (c) institutional support to member universities; (d) enhancing capacity of universities to engage with industry and community; and (e) programme management and coordination of partnership and networking activities (Figure 3). The programme structure was premised on the innovativeness of the universities in three basic areas that constitute higher education - teaching, research and service to the community and local economy. The design was majorly composed of Masters and Doctoral regional training programmes; competitively selected agricultural science & technology related research and innovation activities that could be addressed in collaborative partnerships; and institutional strengthening. The synergy between the production (research) and dissemination (teaching and outreach) of knowledge formed the backbone of the characteristics and strengths of the programmes. The Secretariat, through effective governance structures and continental advocacy, acted as the knowledge and coordination hub to support this.

Figure 2: The RUFORUM Theory of Change, 2004 - 2018

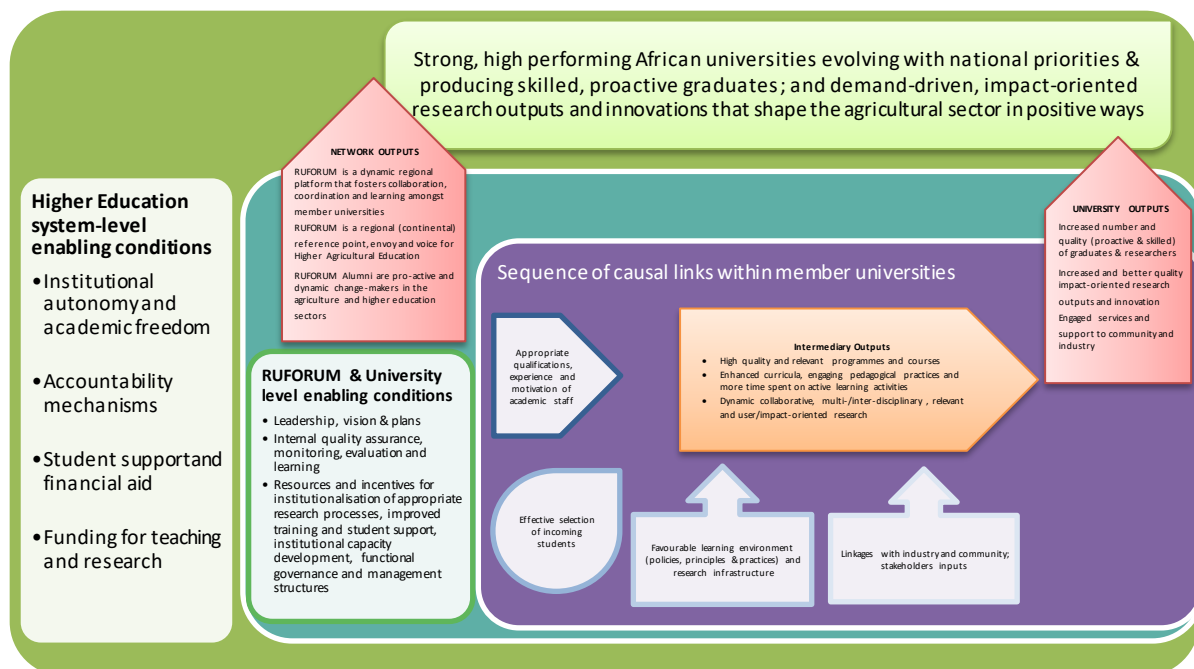
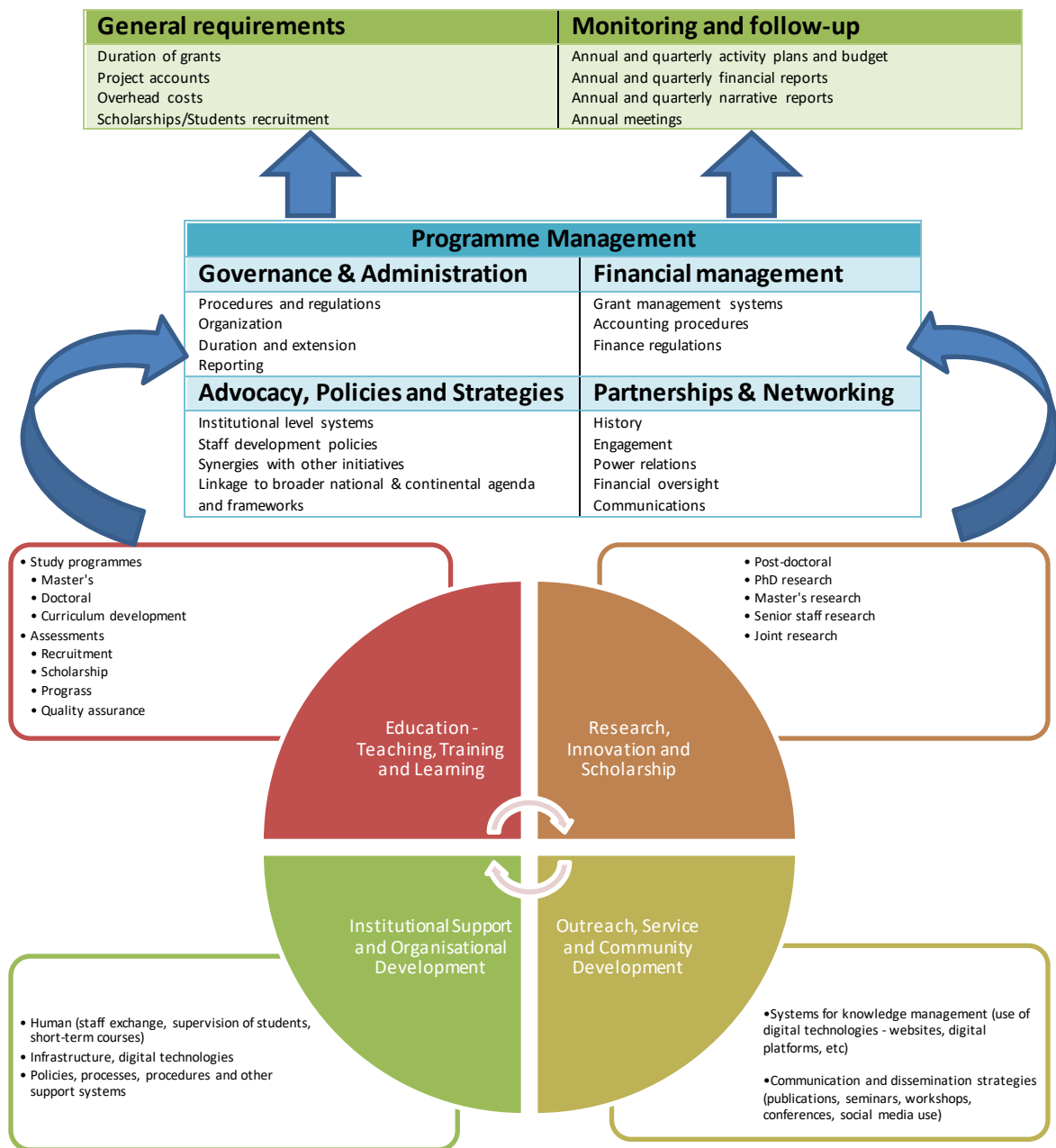


Figure 3: Programme organisation, management and implementation arrangements



RUFORUM envisions a vibrant agricultural sector linked to African universities which can produce high performing graduates and high quality research responsive to the demands of Africa's farmers for innovations and able to generate sustainable livelihoods and national economic development. RUFORUM's mission is to strengthen the capacities of universities to foster innovations responsive to needs of small-holder farmers through the training of high quality researchers, ensuring that graduates will have the skills and know-how to be attractive to potential employers, and the output of impact-oriented research that will result in agricultural policy and practice reform.

The RUFORUM interventions aimed to improve higher agricultural education programmes; expand local teaching and research capabilities; enhance the existing knowledge base; and strengthen capacities of higher agricultural education institutions, their academic staff and their graduates to apply practical approaches and context-appropriate solutions to the current and future challenges of national and Africa's economic growth. By supporting emergence of strong, high performing

universities with solid research capacities, innovative pedagogical approaches, and participatory academic management practices, RUFORUM directly contributes, in the short-term, to: (a) expanded, qualified workforces suited to local, national, regional and continental development challenges; (b) increased knowledge and better knowledge management systems; (c) evidence-based policies and decision-making; and (d) enhanced gender equality and inclusion. The long-term impact in the partner countries is sustainable and inclusive agricultural and socio-economic development. The impact and outcome statements and the output statements as they appear in the RUFORUM theories of change for SP 2006 and SBP 2016 are summarised in Table 1 below.

Table 1: The RUFORUM Results Statements

	Strategic Plan 2006 – 2015	Strategic Business Plan 2016 – 2020
Vision	A vibrant agricultural sector linked to African universities which produce high-performing graduates and high-quality research, responsive to the demands of Africa's farmers for innovations, and able to generate sustainable livelihoods and national economic development.	A vibrant agricultural sector linked to African universities that can produce high-performing graduates and high-quality research, responsive to the demands of Africa's farmers for innovations, and able to generate sustainable livelihoods and national economic development.
Mission	To strengthen the capacities of Universities to foster innovations responsive to the demands of smallholder farmers through the training of high quality researchers, the output of impact-oriented research, and the maintenance of collaborative working relations among researchers, farmers, national agricultural research institutions and governments.	To strengthen the capacities of Universities to foster innovations responsive to the demands of smallholder farmers and value chains through the training of high quality researchers, the output of impact-oriented research, and the maintenance of collaborative working relations among researchers, farmers, market actors, national agricultural research and advocacy institutions, and governments.
Impact Statement	High Performing African universities that produce skilled, proactive graduates, demand driven research outputs and innovation in response to local, regional and national agricultural development priorities	High Performing African universities that produce skilled, proactive graduates, demand driven research outputs and innovation in response to national, regional and continental agricultural development priorities
Desirable Outcomes (SBP 2016)	Member Universities:	
	<ol style="list-style-type: none"> 21st century curriculum and pedagogy Strong universities evolving with national priorities Increased mobility, collaboration and regional integration Solid cadre of field trained African professionals to instruct next generation of African scientists 	
	Science and Technology Research Sector	
	<ol style="list-style-type: none"> Greater applicability of the flow of new agricultural knowledge Increased smallholder adoption of innovations and management practices Skill enhancement of individual researchers 	
	Agribusiness Sector	
<ol style="list-style-type: none"> Critical mass of entrepreneurial graduates Impactful sector responsive to smallholder farmers' needs Expanded knowledge base and partnerships to enhance smallholder access to value chains 		
Higher Education Policy Environment		
<ol style="list-style-type: none"> Credible evidence to influence Higher Education policy Agricultural policy and practice reform Increased capacity to influence global Africa Agricultural debates 		
Wider Network Outputs	RUFORUM is a dynamic regional platform that fosters collaboration, coordination and learning amongst member universities	RUFORUM is a dynamic regional platform that fosters collaboration, coordination and learning amongst member universities
	RUFORUM becomes a regional reference point for agricultural research and higher education	RUFORUM becomes a continental reference point for agricultural research and higher education
	RUFORUM member universities are strong institutions that shape the agricultural sector in positive ways	RUFORUM member universities are strong institutions that shape the agricultural sector in positive ways
	RUFORUM alumni are pro-active and dynamic change-makers in the agricultural sector	RUFORUM alumni are pro-active and dynamic change-makers in the agricultural sector
Member Universities	Focus faculties produce more relevant and user oriented research	RUFORUM member faculties produce more relevant and user oriented research

	Strategic Plan 2006 – 2015	Strategic Business Plan 2016 – 2020
Outputs	Focus faculties produce proactive and skilled graduates	RUFORUM member faculties produce proactive and skilled graduates
	Universities institutionalize enabling policies, principles and practices	Universities institutionalize enabling policies, principles and practices
	Spill-over effects beyond focus faculties	Universities mainstream new approaches in pedagogy and academic management
Secretariat Outputs	RUFORUM Secretariat facilitates the institutionalization of appropriate research processes in focus faculties	RUFORUM Secretariat enables the institutionalization of improved training and research in member universities
	RUFORUM Secretariat facilitates the institutionalization of improved training in focus faculties	RUFORUM Secretariat builds university capacity to work with research, business and development partners to transform ideas into innovations
	RUFORUM Secretariat facilitates the development of capacity at university to support SO1 and SO2	RUFORUM Secretariat serves as a key actor in platforms for national and continental integration of R4D and as a backbone for university interaction
	RUFORUM Secretariat facilitates functioning and governance of RUFORUM	RUFORUM serves as an envoy of higher education and a voice for wider attention to agriculture through convenings, publications and evidence-based policy papers.

3: RELEVANCE OF OBJECTIVES

The theory of change underlying the RUFORUM programme was that competitively awarded graduate research grants, scholarships for Master’s and Doctoral training and direct support to create new or upgrade and reform existing training programmes could result in graduates with the appropriate skills set as well as more relevant research. Furthermore, it was assumed that institutional strengthening grants and community action research grants, given to university researchers to work more closely with industry and communities, would bring the two groups together to: solve areas of mutual interest; enhance training and mutual learning; allow industry and communities to utilize research and graduates to enhance agricultural productivity; and, increase overall productivity, performance and visibility of universities within the country, regionally and globally. The outcomes of RUFORUM would be traceable through changes in the people and the organisations that its programmes would come into contact with, and the changes in the environment in which RUFORUM operated. The programme objectives, component interventions, and outcome measures were generally logically linked.

Most importantly, RUFORUM was about universities doing things differently. Getting money to invest in scholarships and training programmes would not be sufficient to address Africa’s challenges. Producing graduates that can function in the “new” world where knowledge is easily available requires imparting the skills to apply and create and use it in new ways. Universities needed to change the way they work, and focus on providing experiential learning to students. Community based participatory research integrated university teaching and research, linked universities to industry through agribusiness and entrepreneurship schemes, and linked universities to communities through outreach and student-centred extension and advisory services. These were RUFORUM-led initiatives designed to transform the role of universities in changing Africa’s agricultural ecosystem. This is what was unique about the RUFORUM approach and why having a regional network that mentors and promotes transformation is important.

Science, technology and innovation are priority for the African continent and national governments as they aspire to build knowledge-based economies and accelerate inclusive growth. RUFORUM derived and/or aligned its strategic objectives and agenda largely from/to the continent-wide policy frameworks as they evolved, specifically: Agenda 2063-the Africa we want; the Comprehensive African Agricultural Development Programme (CAADP); the Science, Technology and Innovation Strategy for Africa (STISA), 2014-2024; Continental Education Strategy for Africa (CESA), 2016-2025;

the Africa Agricultural Education and Skills Improvement Framework (AESIF), 2015-2025; the Continental Technical and Vocational Education and Training (TVET) Strategy; and the Science Agenda for Agriculture in Africa (S3A).

RUFORUM also took into consideration the policy frameworks of Development Partners on revitalising higher education and agriculture in Africa, and the long-term vision/development paths and strategies of the AU member states. The long-term frameworks of most African countries envisage sustainable development and socio-economic transformation through strengthening competitiveness for sustainable wealth creation, employment and inclusive growth. Investment in higher education to increase skills and knowledge of the labour force, and in research & development and increasing innovation capacity to enhance entrepreneurship and agricultural value chains are key pillars in many of these.

In light of this, the RUFORUM suite of interventions remains highly relevant in supporting Africa's development objectives through institutional initiatives, training graduates, and enhancing quality of higher agricultural education. RUFORUM pursued seven strategic objectives that strongly focussed on building an Africa-owned network of universities to collectively marshal and strategically allocate resources to strengthen capacity of the member universities to: i) produce more and better qualified graduates, men and women, relevant to identified human capacity and skills gaps; ii) produce more and better knowledge and research outputs relevant to identified priority areas; and iii) develop capacity to access existing stores of global and locally generated knowledge and adapt it to local use.

4: EFFICIENCY: IMPLEMENTATION AND OUTPUTS

4.1 *Academic and research collaboration and networking*

The RUFORUM network expanded in a controlled phased manner from 10 member universities in 5 countries in Eastern and Southern Africa in 2004 to 105 universities in 37 countries spanning the entire African continent by 2018 (Figure 4). This brings together more than 30,000 faculty and non-academic experts; and, a large body of students - the future agricultural service providers and leaders. Collaboration with other education and research institutions of the North, helped raise the standards of member universities through exposure to teaching, research, services and management methods. International cooperation, experience and exposure enabled young researchers and educationists to expand their work, publish it in recognised professional journals, and present it at professional meetings. At the student level, institutional collaboration allowed for an exchange of students that benefited both from the faculty exposure as well as academic culture and environment. Subscribing to partnership approaches spurred better relations with industry, local businesses, and local communities. Close ties with communities made universities more responsive to their needs, such as identifying their most-needed areas of education, developing relevant curricula and pedagogy that directly benefit communities, as well as providing research solutions for local concerns. The most significant benefits to members as indicated by the current deans and principals are summarised in Figure 5.

Figure 4: Growth in RUFORUM Membership and Subscription

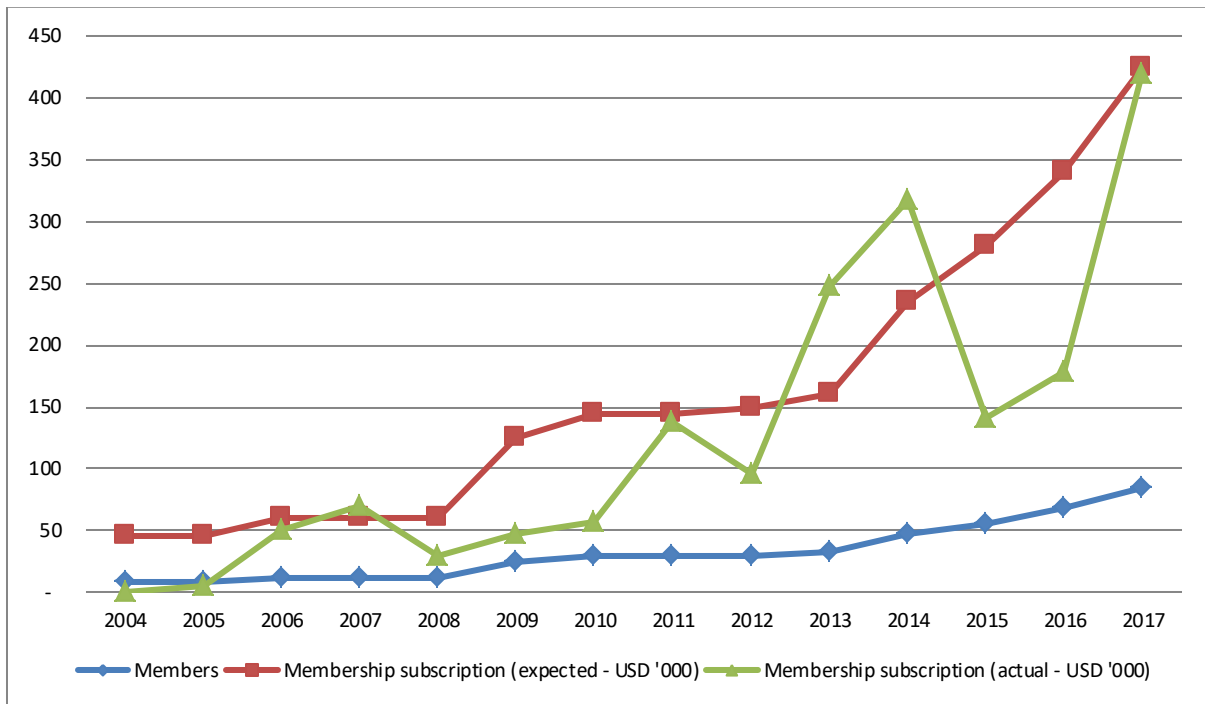
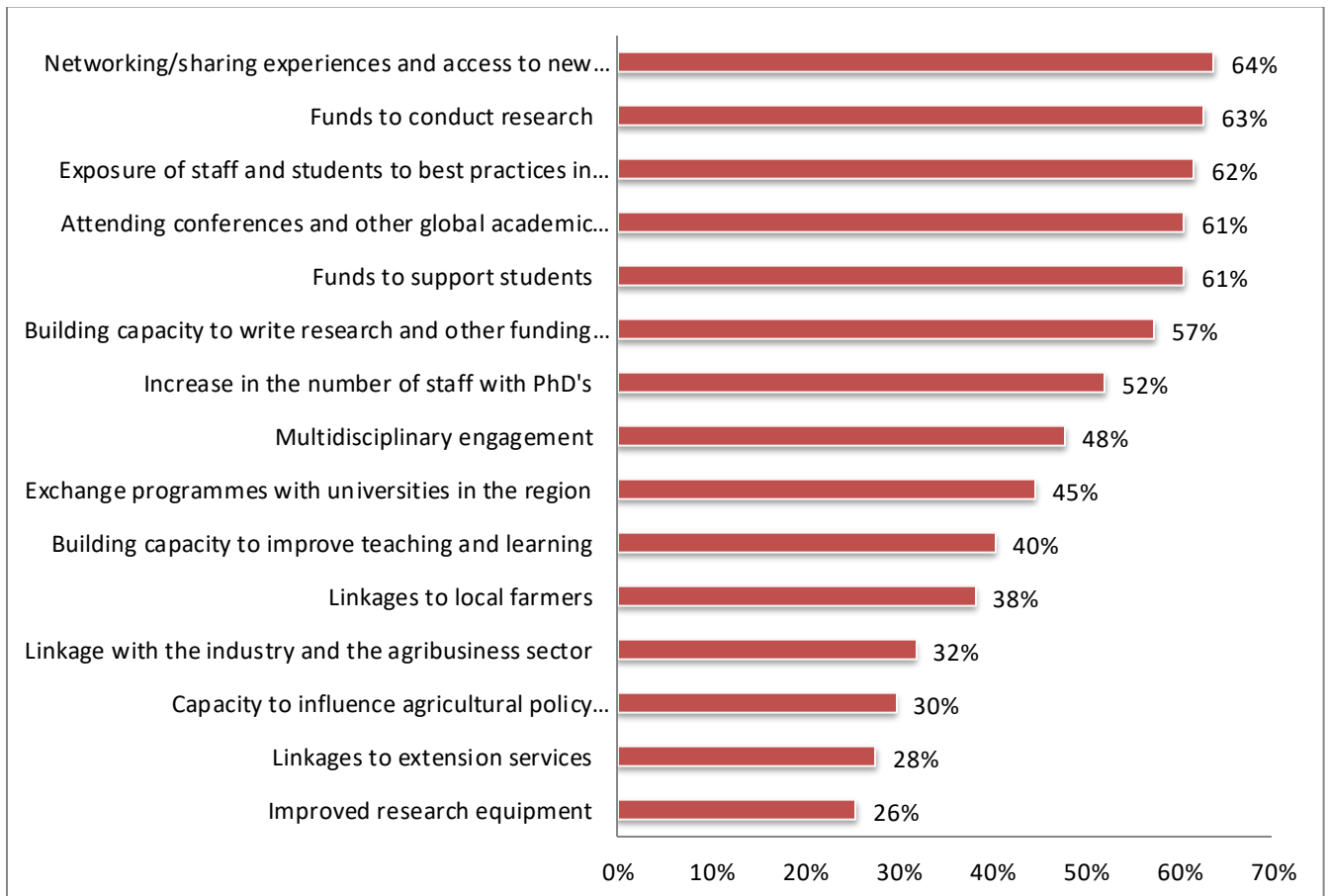


Figure 5: Most significant benefits from RUFORUM membership: Deans and Principals perspective



4.2 Marshal and strategically allocate resources for transformative impact

Advocacy, networking and exposure of the importance of investment in HAE have resulted in much higher profile for universities and greater recognition of their role in all aspects of national development. The RUFORUM networking arrangement and partnerships have been very beneficial and influential in attracting grant funding to the member universities from other sources such as industries, foundations, and international organisations. The number of projects implemented directly under the RUFORUM umbrella grew from one in 2004 to 91 in 2018, with a total funding of US\$ 200.7 million supported by multiple donors (Figures 6 & 7).

Figure 6: Resource inflows to the RUFORUM Network

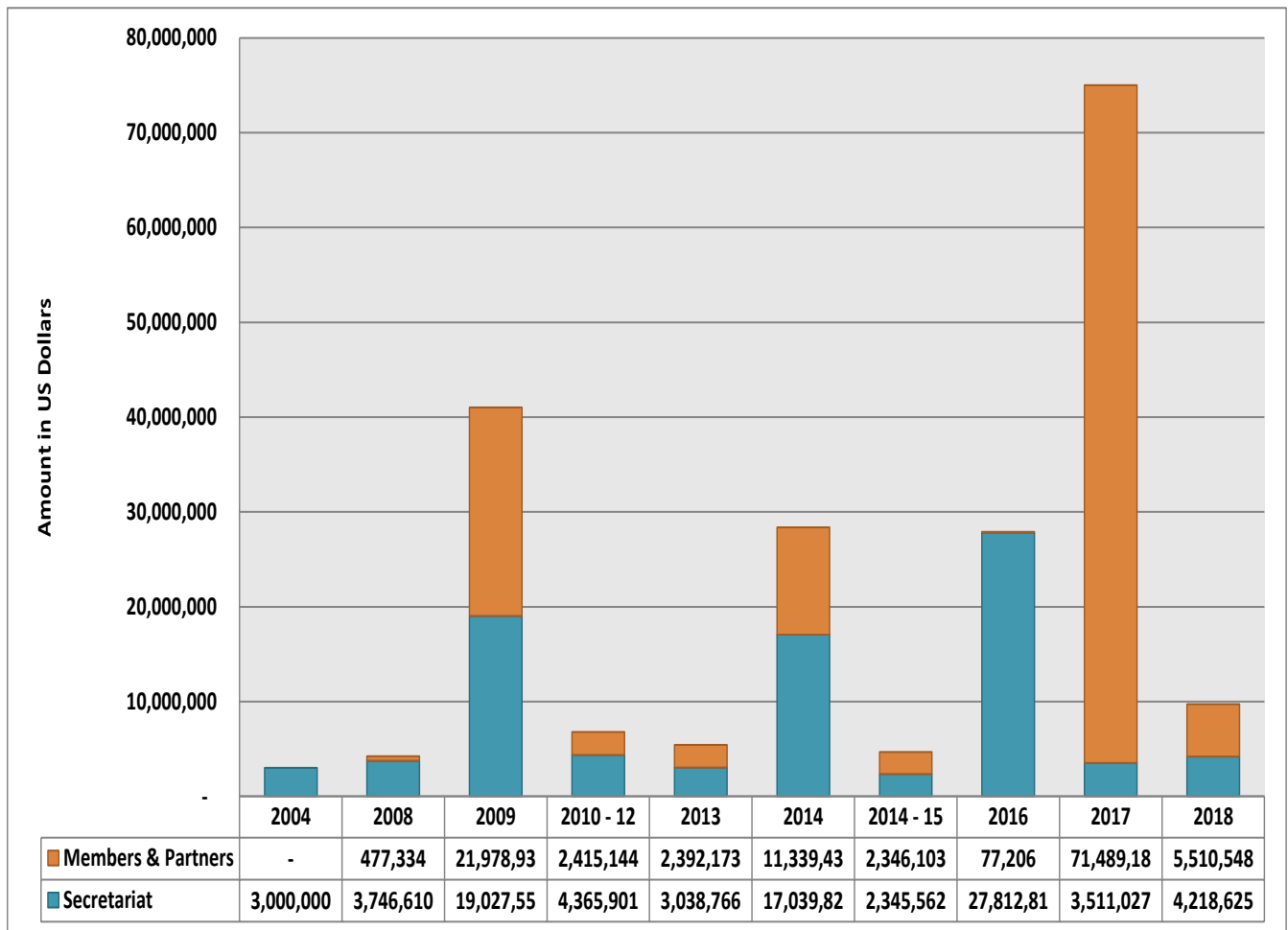
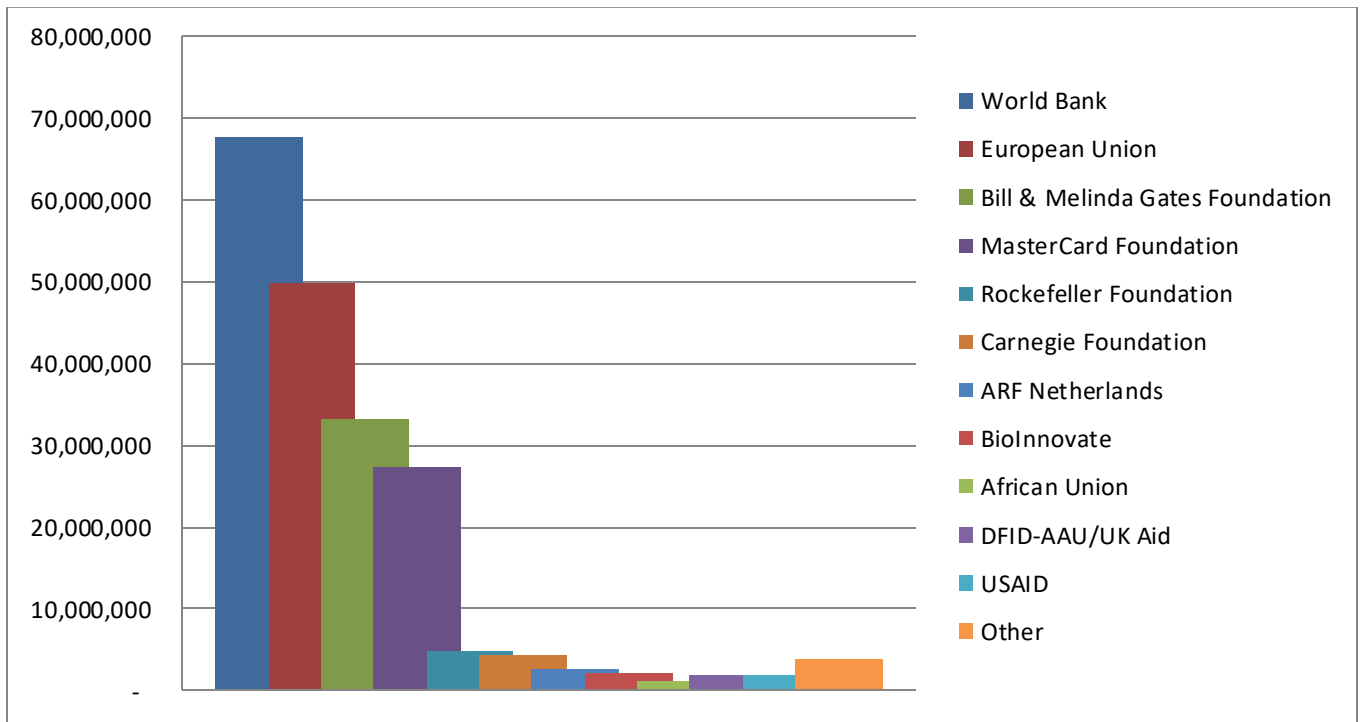


Figure 7: RUFORUM Donors and Contributions (US Dollars), 2004-2018



The secretariat directly mobilised US\$ 85.1 million for 40 of the projects, of which approximately US\$ 64 million (75%) was channelled as grants to member universities. The grants went towards regional PhD (29%) and MSc (15%) training, graduate and post-doctoral research (11%), community action research and field attachment (7%) and institutional strengthening (3%). Other grants accounted for 10% leaving US\$ 21.1 million for partnership, networking and knowledge management coordination and support (17%), advocacy and governance, and staff salaries and costs (Figures 8 & 9).

Member universities have committed to support improved faculty qualifications and skills within the network under the Graduate Teaching Assistant fellowships scheme. The estimated value of the GTA is US\$ 13.7 million - with the fees waived by the receiving host university, travel and stipends funded by the sending university and RUFORUM committing to solicit external funding to help support the research component. RUFORUM assisted members to write grant proposals through writeshops, as well as other facilitation, raising US\$ 17.6 million in the form of funded collaborative projects and US\$ 66 million for 11 Centres of Excellence.

Figure 8: RUFORUM Investment and Resource Allocation

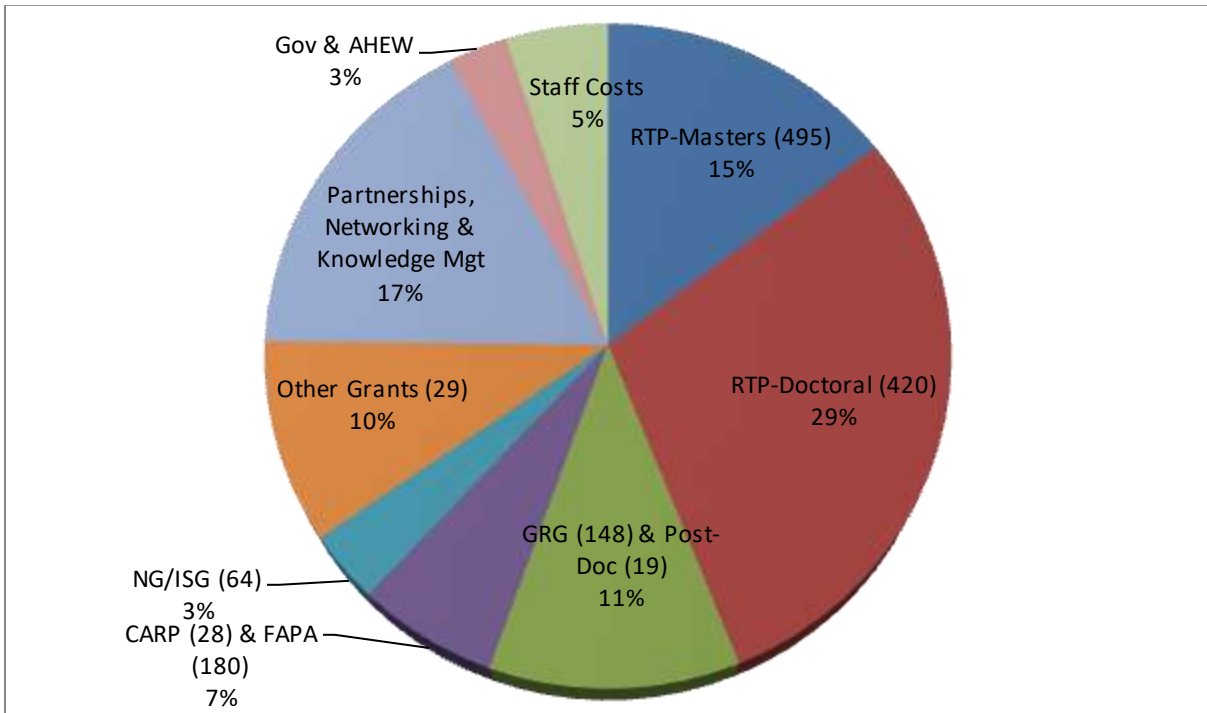
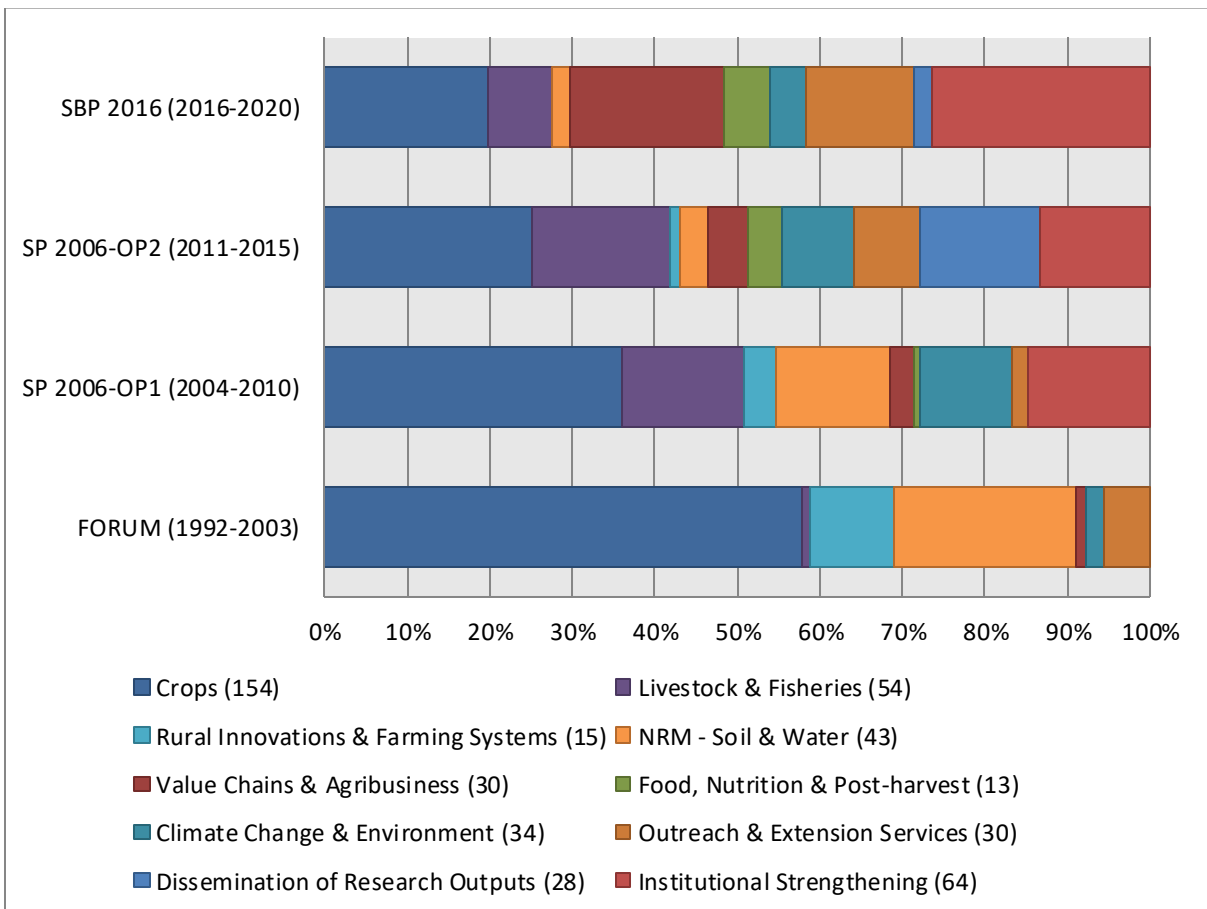


Figure 9: RUFORUM Investment by Thematic Focus - % Number of Grants



4.3 Produce more and better qualified graduates

RUFORUM supported the design and participatory development of more than 20 curricula; and the establishment of 7 PhD and 3 MSc regional training programmes at six lead universities. These were informed by eleven evaluation studies and reviews that established the skills and competences gaps and stakeholder needs. Curricula revisions addressed design issues including: (i) modification to increase focus on research, (ii) incorporating new pedagogical approaches, (iii) increasing use of technologies and online course delivery mechanisms, and (iv) adjustments in credits given to specific courses; and adaptation of existing academic courses to include emerging topics in their own disciplinary areas.

A total of 2,386 graduates have been trained (1,883 MSc and 503 PhD) through the regional training programmes (420 PhD and 495 MSc), and the grants mechanisms (83 PhD and 1,388 MSc) (Figures 10 & 11). An additional 99 PhD (out of 325 pledged) have been successfully placed and reported for studies; 7 have been admitted at receiving university and contractual agreements are being prepared; and 131 have been nominated, pending admissions and contractual agreements, under the graduate teaching assistantship staff development scheme. Training at regional institutions generated capacity for the lower levels in the agriculture training value chain. Undergraduate and Master programmes at the lead universities, over and above RUFORUM support, benefited from the new technologies, benchmarks and academic development associated with the RTPs.

Figure 10: MSc students trained through RTP scholarships and other grants

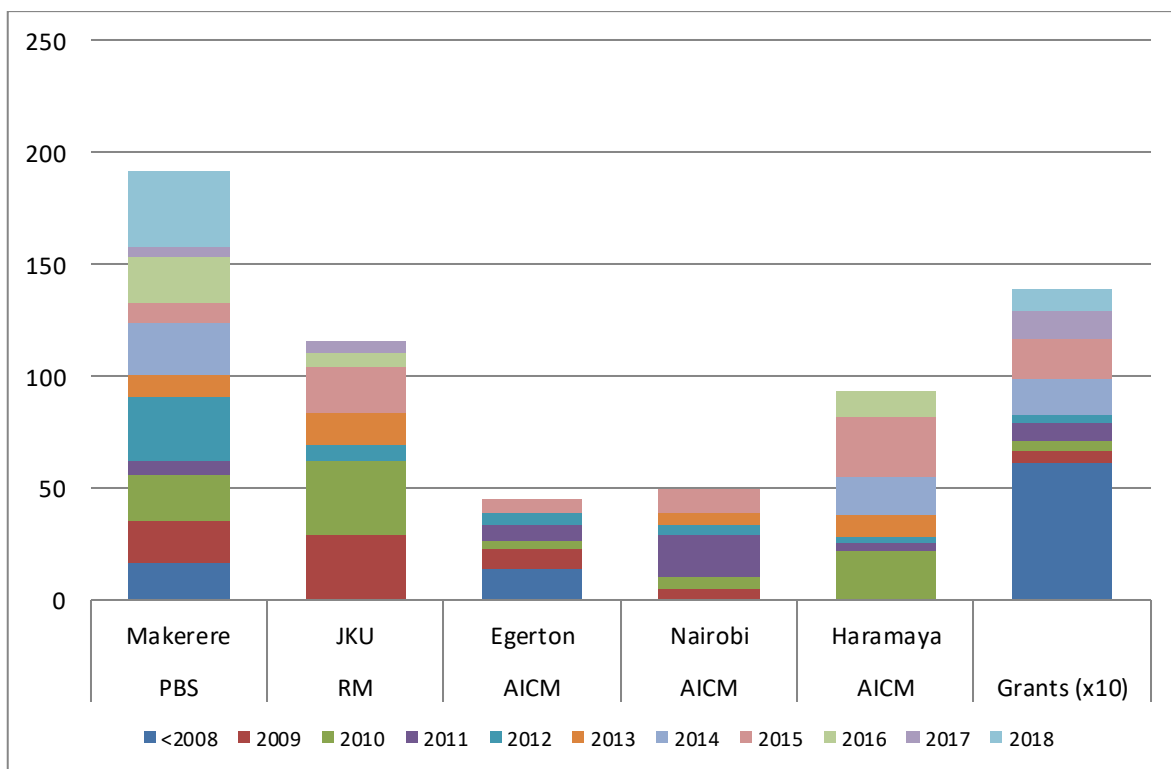
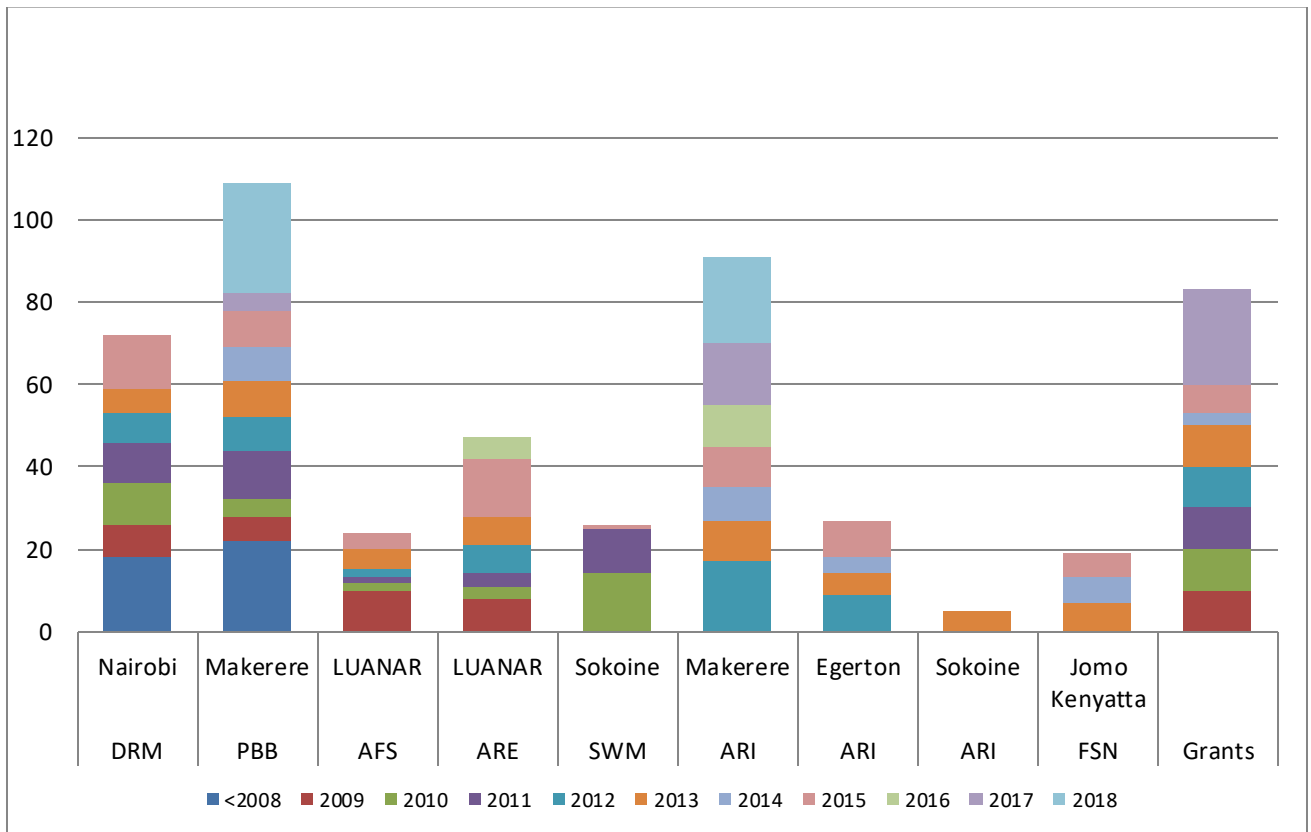


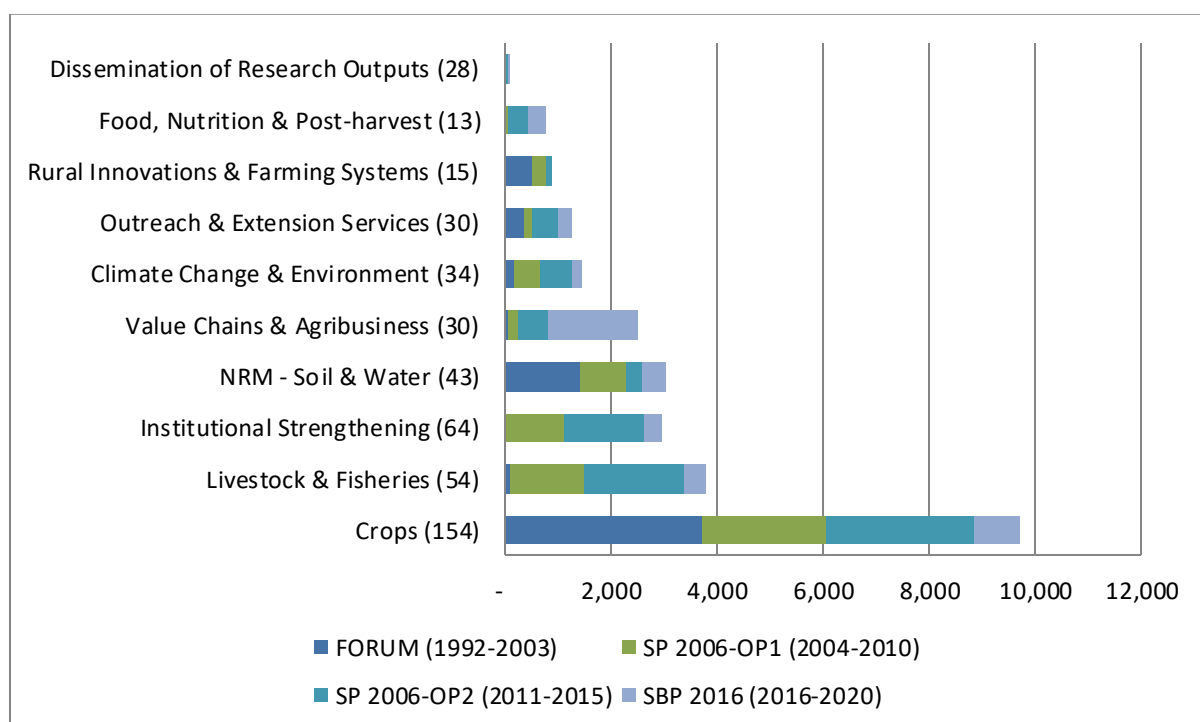
Figure 11: PhD students trained through RTP scholarships and other grants



4.4 Produce high quality relevant research outputs

RUFORUM maintains a competitive grants programme that includes graduate research grants (GRGs), the Community Action Research Programme (CARP), and the Field Attachment Programme Awards (FAPA) and post-doctoral grants. A total of 468 grants worth US\$ 26.6 million were awarded for research and dissemination of technologies and innovations on crops (184 grants, US\$ 13 million), livestock and fisheries (65 grants, US\$ 4 million) and institutional strengthening (64 grants, US\$ 3 million) and other cross cutting and emerging research and outreach areas (Figure 12). Key advances have been made in the areas of crop improvement and pest/disease control with focus on cereals, roots and tubers and grain legumes across the African region. RUFORUM had a specific focus on small holders targeting rural innovations and framing systems, value chains and agribusiness as well as food, nutrition and postharvest handling. The scientific outputs are largely in the form of publications in peer reviewed journals, theses in university repositories, crop varieties, and productivity-enhancing practices and recommendations.

Figure 12: RUFORUM Investment by Thematic Focus – Grant Values in US\$'000



5: EFFECTIVENESS: ACHIEVEMENT OF OBJECTIVES AT THE OUTCOME LEVEL

The benefits of RUFORUM training include knowledge, skills, wage premiums and better job prospects to the individual; increased productivity and reputation to the university and other employing organisations; and a qualified and adaptable labour force that is generating economic growth and other benefits to society, countries and Africa. The new knowledge generated has, in a number of cases, led to significant returns to direct beneficiaries and/or is being adopted in the development of new technologies and business enterprises. The adoption and use of research outputs is generating visible economic benefits to communities and agribusiness entrepreneurs. The economic justification and value for money for the investment in RUFORUM is most visible in the positive returns of training within Africa in terms of lower training cost, shorter course completion periods and higher retention rates of graduates.

5.1 Economic and financial efficiency - training high quality graduates at a relatively low cost

The evaluation did not conduct an economic or cost-benefit analysis. An input/output based analysis revealed that the investment cost of training for a 2-year MSc course through RUFORUM was US\$ 25,150 as compared to US\$ 90,800 in North America, US\$ 83,840 in Australia, and US\$ 54,218 in Europe, largely due to higher tuition and fees charged by the universities. Doctoral-level training lasts 4 academic years in USA/Canada, Australia and Europe at a cost of US\$ 242,680, US\$ 181,680 and US\$ 147,088 respectively, and 3 academic years through RUFORUM at a cost of US\$ 59,400 (Figure 13). This implies that it costs approximately 4, 3 and 2.5 times more to train in USA/Canada, Australia and Europe respectively, than using the RUFORUM arrangement. Africa and the development partners providing the scholarship grants saved US\$ 258 million by not training all the 1,883 MSc and 734 PhD (503 through RTPs/Grants and 231 Graduate Teaching Assistantships) graduates in North America, US\$ 200 million in the case of Australia and US\$ 119 million for Europe (Figure 14).

Figure 13: Average costs of MSc and PhD training for RUFORUM and alternatives

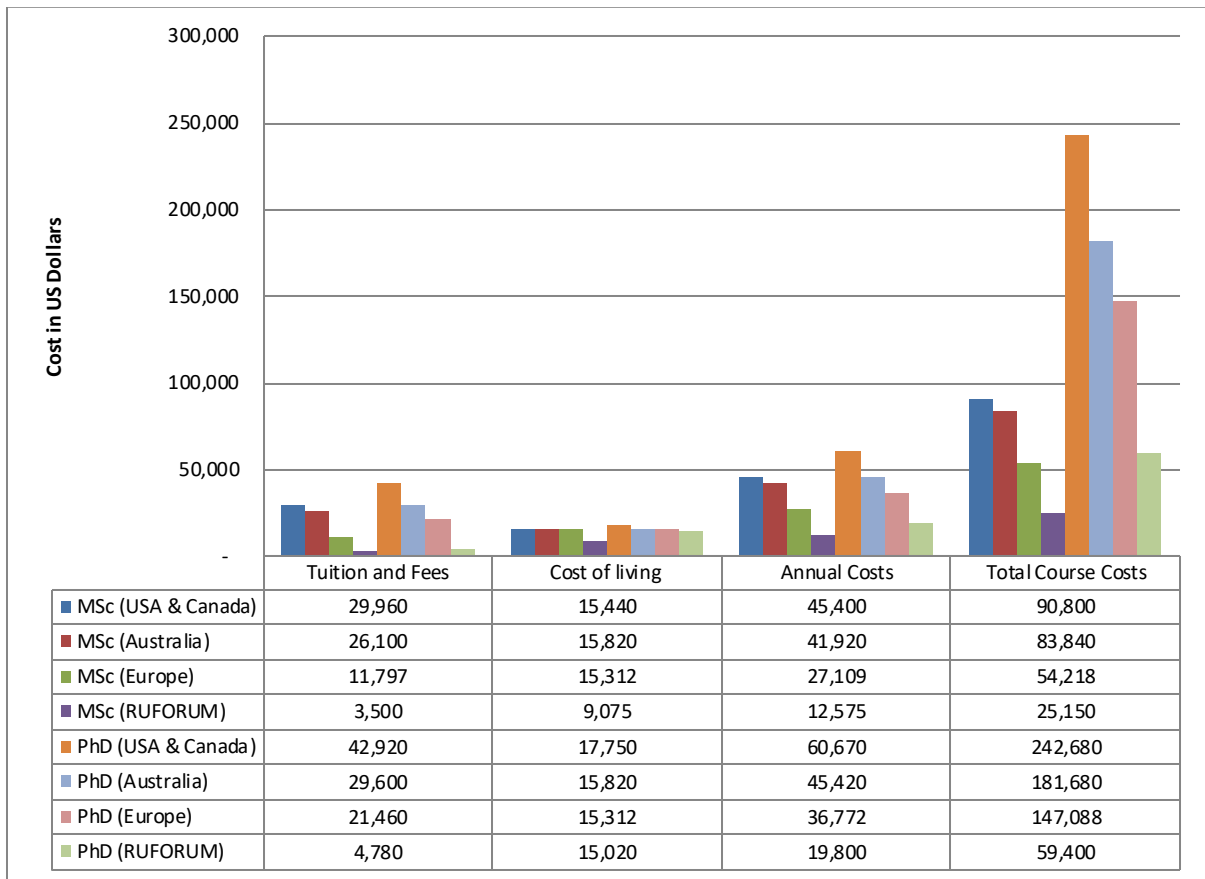
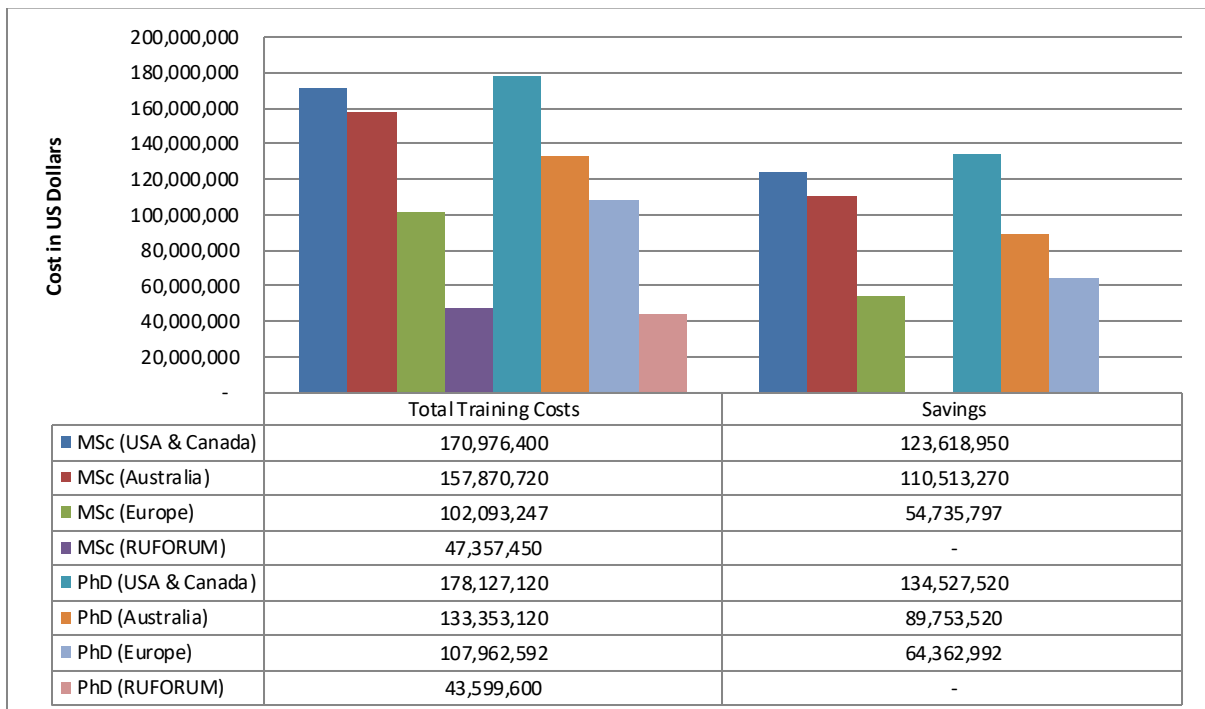


Figure 14: Total training costs through RUFORUM (1,883 MSc & 734 PhD) and the alternatives



5.2 Knowledge, skills, wage premiums and better job prospects for graduates

RUFORUM training involves experts working with learners to transfer to them knowledge, skills and attitudes to improve their effectiveness. General responses from alumni reveal that performance, innovation, tacit knowledge, adaptive expertise, confidence and self-management skills of graduates increased due to the training received. Because of the focus on more than just information transfer and the support to soft skills and networking, the multi-dimensional qualities of graduates from RUFORUM training programmes means they not only get employed in highly competitive job sectors that also offer better remuneration, but also generally move rapidly through the promotion ladders in their career paths. Results from a 2014 tracer study indicate that 75% of RUFORUM graduates found employment within 6 months of completing their studies, 73% were on permanent or long-term contracts, and 56% occupied positions of influence at regional, national or local government levels. Reports from Lilongwe University of Agriculture and Natural Resources, Malawi and the National Crop Resources Research Institute confirm the rapid advances in career and role of RUFORUM trained graduates.

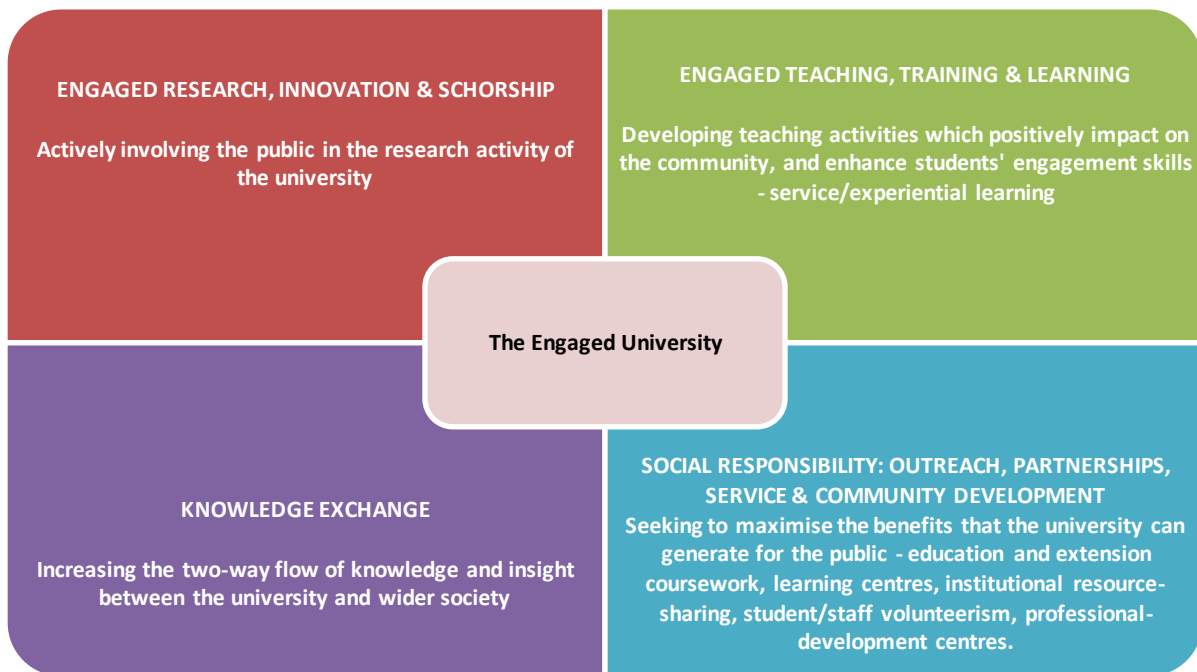
5.3 Boosting the performance of African Universities

The performance of universities was boosted through increased numbers of staff with higher qualifications and better pedagogical and research skills. However, with the proliferation of new universities, this increase in numbers is starting to get eroded. Increased exposure of students to more and better prepared academic staff ultimately increases the academic, research and field potential of graduates. For universities hosting the regional training programmes, their effectiveness and reputation increased, in addition to other dimensions related to these two aspects that also got largely amplified. This further increased their prospects and ability to attract more students to the training programmes. Participating universities as a whole benefitted from training in the form of performance, productivity, revenue as well as other direct or indirect outcomes.

All RUFORUM supported initiatives at the universities are required to have activities in place which incorporate community and/or industry engagement into their research, knowledge exchange, teaching, and social responsibility (Figure 15). Member universities are encouraged to embed a commitment to public engagement in their institutional mission and strategy, and to champion that commitment at all levels. They are further encouraged to actively involve staff, students and representatives of the public; and use their energy, expertise and feedback to shape the engagement strategy and its delivery. Member universities use differing forms of engagement. These include various forms of work-based learning, industry placement programmes, and student volunteer projects. Outreach and community engagement programmes help to promote understanding and appreciation of real life problems, and reciprocal learning for students, faculty and industry/community.

The RTPs are further designed to enhance the quality of university education, both to improve life chances of individual graduates for making a positive contribution to their workplace, and also to contribute to the broader development of society, fostering innovation and strengthening citizenship. They facilitate senior and emerging researchers and academics to conduct relevant, high-quality scientific and technological research closely connected to graduate training and engagement with community and industry. They are at the forefront of creating or upgrading graduate programmes in agriculture and related sciences at member universities, and facilitating firms and researchers to solve problems of direct interest to industry through technology and innovation platforms and formal internships for students.

Figure 15: RUFORUM University-Community Engagement Strategy



5.4 Graduates more relevant for solving Africa's problems and labour market needs

Apart from much lower costs compared to international study, training in the local environment and through their research during their training, students find solutions that are applicable in the local context and thus contribute to improving livelihoods of rural communities. Furthermore these graduates are retained on the continent on course completion to transfer this knowledge and their innovations to society. A 2014 tracer study confirmed that, unlike graduates trained outside the continent, 98% of RUFORUM graduates stay on the continent (94% work in their home countries while 4% work elsewhere in Africa). Although a detailed economic analysis was not undertaken, the research conducted by faculty and students and the participatory manner in which it was done, has resulted in significant benefits to many rural communities as evidenced from documented accounts and testimonials of a cross section of beneficiaries.

RUFORUM graduates have gone into academia, research and development sectors, produced relevant knowledge products, and have become change makers in their various specific fields of expertise and in national development. RUFORUM training has greatly contributed to rebuilding of staff numbers, skills and competencies for teaching and research at member universities; National Agricultural Research Institutes; Government Ministries, Departments and Agencies; and Non-State Actors. The 2014 tracer study indicates that about 39% of RUFORUM graduates were employed within the university system, while the agricultural research institutes took up 27% and the civil society and industry employed 10% each.

The effectiveness and productivity of individual graduates ultimately helps elevate the universities and other organisations they join as staff to higher thresholds of performance. Enhanced experiential training led to greater innovation and amplification of knowledge, and task performance: (i) MSc graduates have excelled in international-calibre PhD programmes; (ii) PhD graduates have become Heads of Departments, Deans and Principals in various universities and Heads of national and regional agricultural research programmes; (iii) graduates who are teaching in universities are positively influencing research and learning approaches in use; (iv) those in research

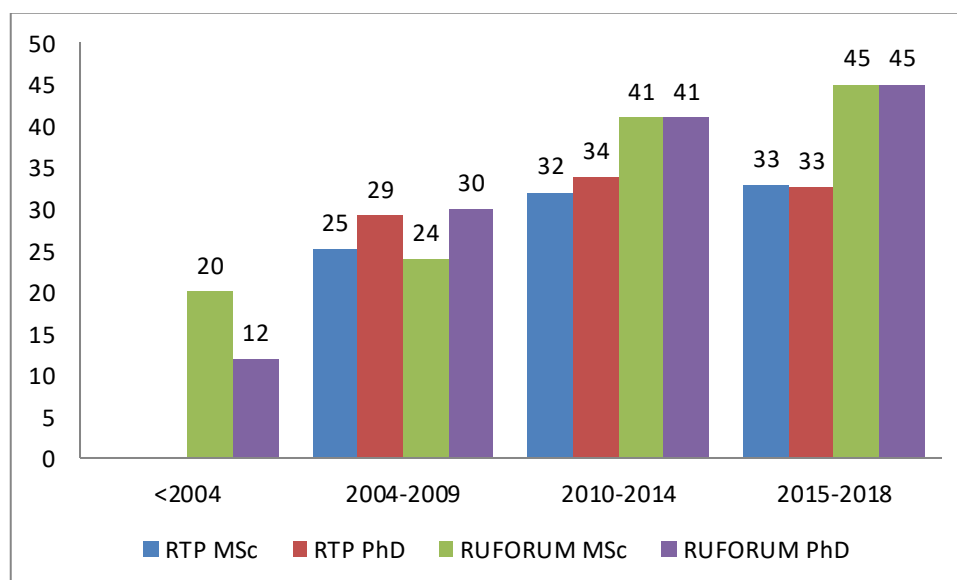
institutes are contributing to improved quality of research; and, (v) employees in government ministries, departments and agencies have a say in shaping the policy environment.

5.5 Ensuring parity among women and men in sharing the benefits of HAE and research

One of the strategic objectives of RUFORUM is to enhance participation and voices of women in education/training, research, and production and marketing of knowledge. Guidelines for student recruitment, award of grants, and scholarships give special focus to support for female students. The RUFORUM policy on gender targeted increasing women enrolment in MSc and PhD programmes and participation in agricultural research to 40% by 2015. At the initiation of RUFORUM in 2004, only 20% of the MSc students trained with FORUM support were female, while those trained at PhD level were 12%. The overall female students’ recruitment under the MSc regional training programmes increased to 25% by 2009 and 33% by 2018. The corresponding figures for the PhD programmes were 29% by 2009 and 33% by 2018. The proportion of female students fully supported by RUFORUM for PhD training more than quadrupled from 12% in 2004 to 45% by 2018; the ratios for MSc increased from 20% to 45% in the same period (Figure 16).

By building and engaging communities of researchers equipped with the skills, knowledge, and support systems to develop and implement gender-responsive projects, RUFORUM helps advance gender-responsiveness as the norm and standard for higher agricultural research and training. RUFORUM played a significant role in the launch of the Forum for African Women Vice Chancellors, in August 2016, as a platform for networking, lesson learning and mentorship among the female Vice Chancellors while tackling issues affecting the low number of women in science, technology, engineering and mathematics.

Figure 16: Female graduates (cumulative %age) – overall & RUFORUM supported



6: RESEARCH OUTPUT AND IMPACT

6.1 Research effort and focus

RUFORUM invested 11% of US\$ the 85.1 million mobilised by the Secretariat into graduate research and post-doctoral grants and 7% into community action research and field attachments. Overall, crops research accounted for 36.6% of the funds invested in research and institutional strengthening and 33% of the grants awarded. The RUFORUM footprint is greater in the traditional staple crops

with cereals, roots and tubers and grain legumes receiving the highest number of grants and resources invested in research and dissemination of crop-related technologies and innovations. In the animal sector, fisheries and aquaculture, cattle and poultry were the main areas of research effort (Figures 17 - 20).

Figure 17: RUFORUM Livestock and Fisheries Footprint – Number of Grants

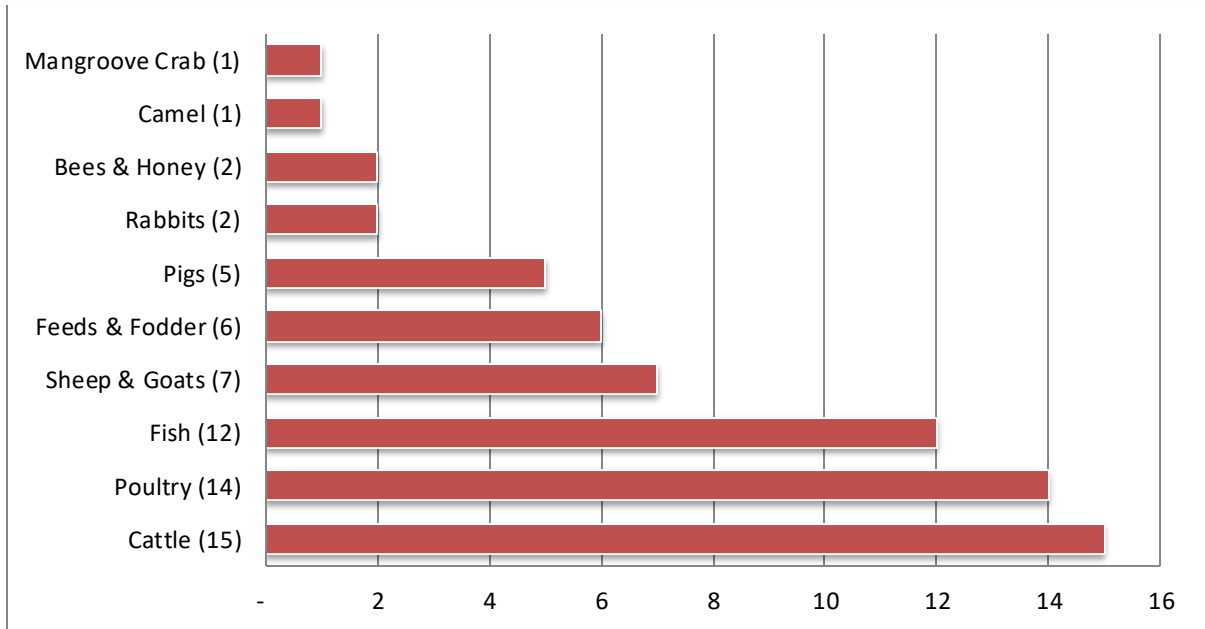


Figure 18: RUFORUM Livestock & Fisheries Footprint – Grant Values in US\$

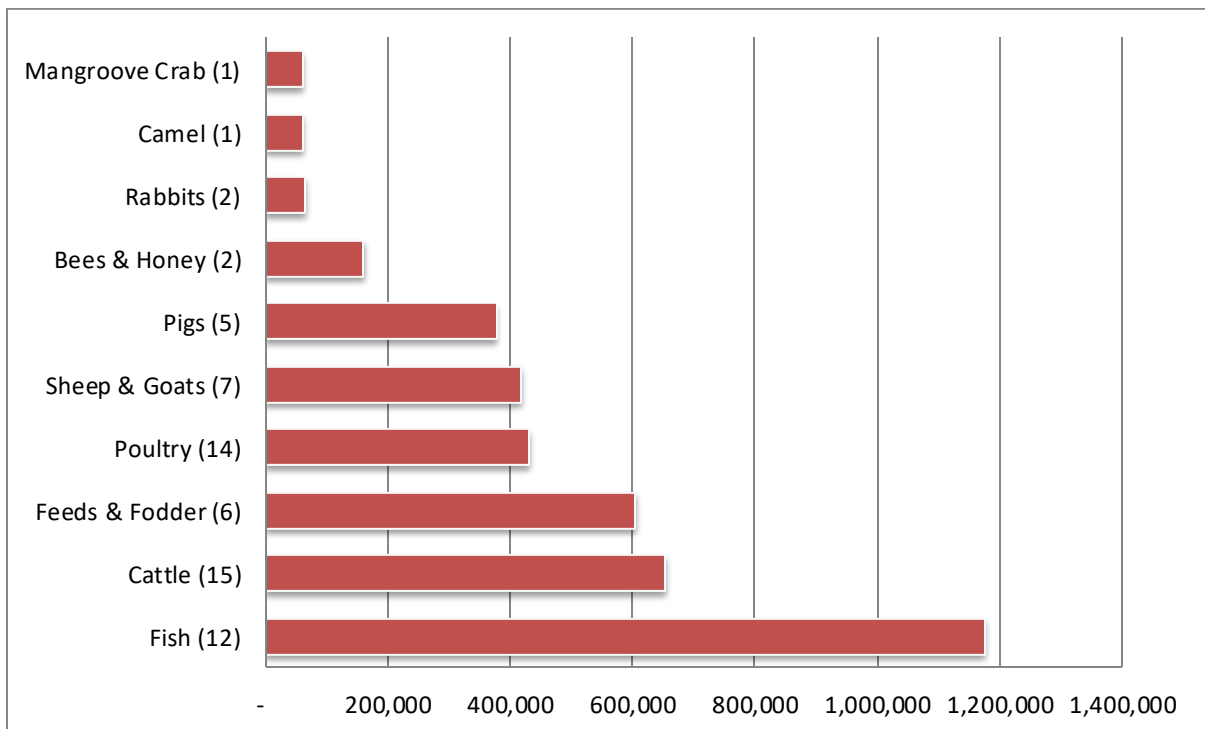


Figure 19: RUFORUM Crop Footprint – Number of Grants

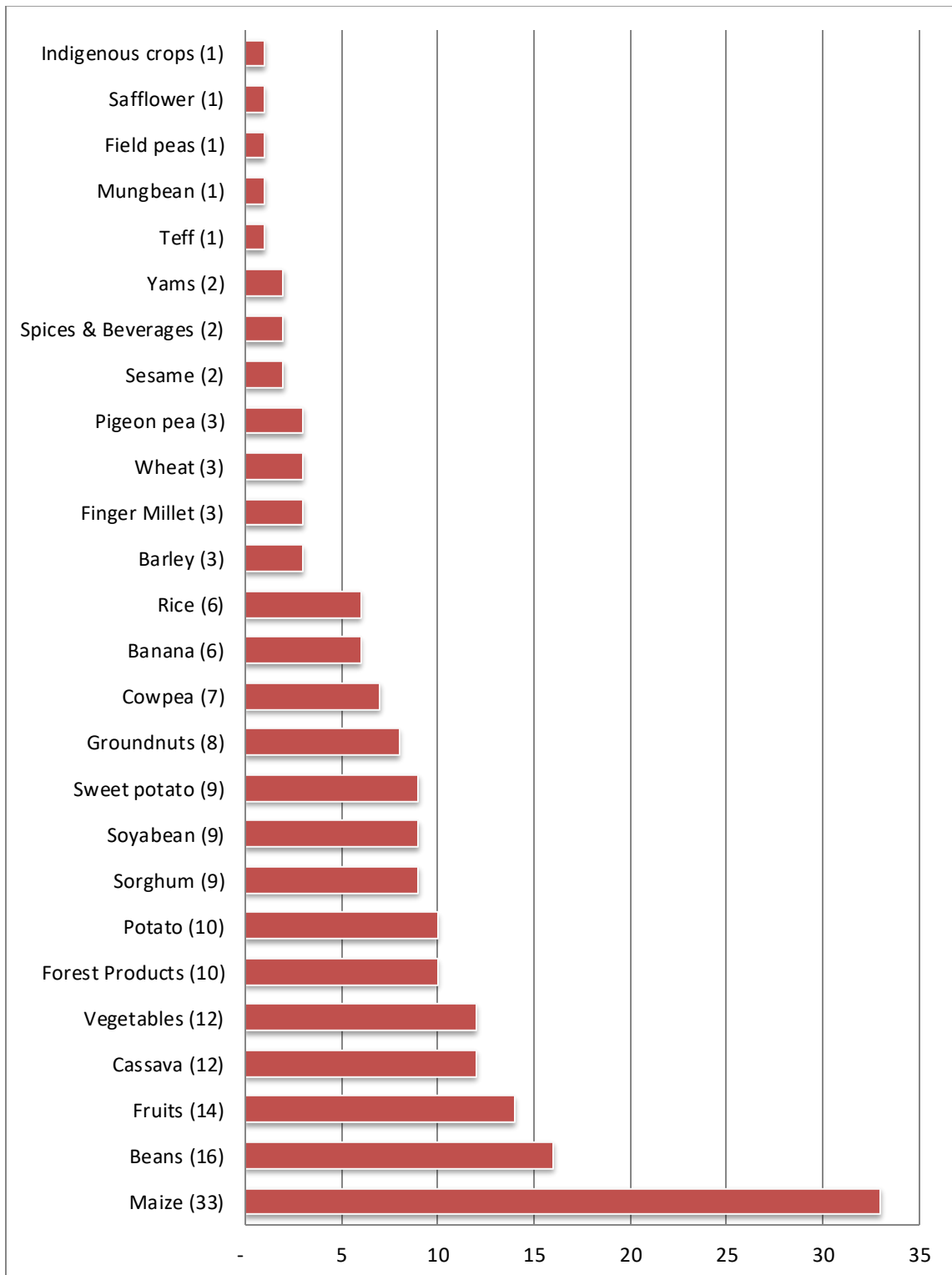
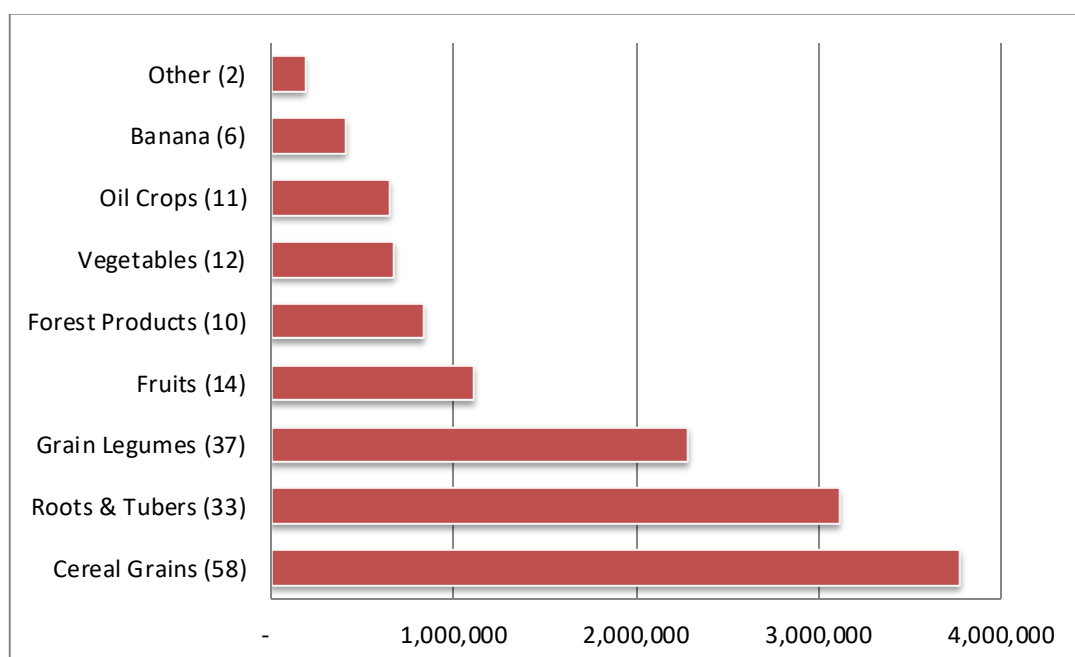


Figure 20: RUFORUM Crop Footprint – Grant Values in US\$



6.2 Research processes

Grant requirements for intra- and inter-institutional collaboration as well as inter- and multi-disciplinary research processes have brought together specialists of different skills to work together and bring their scientific abilities to achieve answers to significant questions. This not only accelerates the progress of university research, but also enhances the quality of the work as well as extending the repertoire of the partners.

RUFORUM brokered partnerships among researchers have ensured that their knowledge, skills and techniques are available more broadly to mutually benefit the participants and the network. The more the researchers collaborate, the greater the chances for success and problem solving, the prospects for acquiring and sharing knowledge and experience, and also in making equipment, facilities, and laboratories available to other researchers even if they belonged to another institution. Participatory research has increased adoption rates of new methods or technologies by farmers and communities involved in the design and execution of the research programmes due to the increased sense of ownership over the processes and products, as well as the reassurance that the outcomes are intended to suit the community needs and preferences.

6.3 Technology generation, adoption and use

The major outcome of RUFORUM supported research is knowledge and technologies generated that have been passed on to the national agricultural research and extension systems for scaling up. Research initiated through graduate training has engineered development of elite varieties of drought tolerant indigenous crops and contributed to approaches for sustainable use of natural resources for enhanced livelihoods in the region. Adoption of new crop varieties and commodity production practices from the research has contributed to improving livelihoods of smallholder farmers. The spread and impact of RUFORUM technologies is documented in several project reports and RUFORUM documentaries.

RUFORUM estimates that the assortment of technologies generated have reached over one million beneficiaries through extension, seed systems and supportive policies.¹ Adoption of new crop varieties and commodity production practices from the research has contributed to improving livelihoods of smallholder farmers and solving real community problems. Examples of some of the successful technologies from RUFORUM-supported research include:

- (a) The aquaculture technologies CARP at LUANAR, Malawi, focused on increasing fish production and rural incomes through application of aquaculture innovations in the value chain. The project linked fish farmers to Innovative Fish Farmers Network Trust, a group of fish farmers at national level that aim at training and empowering fish farmers with different techniques. Eighty fishponds were constructed or maintained and 110,000 fingerlings of *Oreochromis shiranus* (80,000 improved strains, 40,000 local strains) were stocked. Pond yield increased by 69%, from 750 kg/ha/year to 1,266 kg/ha/year. At an average price of US\$2.7/kg, average gross income of about US\$1,688 was realised from a 1ha pond per year.
- (b) Research teams at the University of Zimbabwe, Makerere University and Kenyatta University worked to revamp the soybean industry in Africa. Research on promiscuous soybean initiated at the University of Zimbabwe demonstrated that integrating soybean in smallholder mixed farm enterprises could significantly improve soil fertility. Makerere since 2002 released varieties with commercial value, and established a seed company that has successfully linked with private sector and industry to multiply and enhance use and adoption of 6 varieties Namsoy 4M, Maksoy 1N, Maksoy 2N, Maksoy 3N, Makoy 4N, Maksoy 5N now grown widely in Africa and have attracted interest from various seed companies in Kenya, Sudan, and Ghana.
- (c) The wetland delineation criteria developed by graduate students and faculty at the National University of Lesotho on a project to determine the wetland functioning criteria using hydrological characteristics, hydric soil indicators and isotopic signatures has found wide application. Policy makers have used recommendations from this research to develop a range management policy that presents guidelines for grazing plans. The
- (d) The University of Namibia has identified several indigenous forage legumes with potential to improve nutrition of ruminants and build resilience in dryland ecologies for increased livestock productivity and livelihoods. The project has facilitated transfer of knowledge on propagation methods for forage legumes, fertilization requirements, legume utilization approaches (hay, silage, fodder banks), formulation of supplements, forage legumes seed production, and biodiversity conservation.
- (e) The Cassava CARP team in Uganda has been instrumental in the fight against cassava mosaic disease (CMD) and cassava brown streak disease (CBSD). The project team used the phenomenon of recovery in cassava to produce virus-free planting materials and developed a suitable fermentation protocol for improving quality in locally produced ethanol. Makerere University and NGO partners also developed an outreach framework for strengthening university-farming community engagement codenamed the SUFACE Model. Under the SUFACE Model a number of ICT tools have been developed and deployed, moving knowledge from the university to empower smallholder farmers to improve their productivity, access markets and enhance dissemination of farming practices.
- (f) The team at University of Abomey-Calavi, Benin, has developed techniques for the grafting of the baobab tree and for food fortification using moringa leaf powder and baobab fruit pulp. The team has worked with women groups to integrate baobab production into farming systems; use cost-effective, environmentally-friendly and sustainable methods of baobab leaf production; and

¹See: (http://repository.ruforum.org/ag_dlios-by-doctype/12799/RUFORUM%20Research%20Briefs;
<https://www.youtube.com/watch?v=bbs6aMwiamQ>; <https://www.youtube.com/watch?v=ot1xTnYM0MQ>

use baobab products in the diets of rural households as a key source of both micronutrients and macronutrients.

- (g) Other technologies include: Cost-efficient technologies for micro-propagation of banana and sweet potato, now available on commercial scale in 5 countries, groundnut inoculant that improves productivity in strongly acidic soils in Western Kenya, Artificial Insemination (AI) system for pigs developed through student research in Uganda now available in at least 2 countries, Striga tolerant varieties selected together with farmers, a school gardening programme that imparts knowledge to pupils and contributes to food in schools, sorghum varieties released throughout Eastern and Southern Africa, passion fruit disease control methodologies now available in 3 countries, tomato curly virus control in 2 countries, beneficial mycorrhiza in sugarcane in 2 countries, biofortified foods in 6 countries, and sustainable intensification technologies of soil fertility enhancement, “mbili” intercropping, and enhanced legume rotations.

RUFORUM started, in 2017, producing a popular science publication titled “Bringing Science to Communities” that showcases the on-ground impact of research and scientific work of RUFORUM-sponsored graduates. The publication highlights the role of science and its application in simple ways to solve bigger problems using stories and photographs. The inaugural issue featured the research of 13 RUFORUM Alumni whose work has had direct impact on a particular community or a particular industry. The topics covered ranged from fighting chronic malnutrition using indigenous and alternative foods such as insects, to deploying innovative technologies to reduce post-harvest losses in the horticultural sector. Other topics have implications for health as well as economic and environmental stability.

6.4 Responding to environmental and climate change challenges

RUFORUM supported research focusses primarily on food and environment security and encapsulates a number of innovative research projects that address natural resource management, sustainable agriculture issues, changes to climate and environment, and food and water shortages. For example, the interventions by the Soil and Water Management programme are putting emphasis on indigenous drought tolerant crops coupled with enhancing soil fertility through promoting use of nitrogen fixing leguminous crops, appropriate crop rotation, intercropping, optimized fertilizer rates and use of planting pits to improve water use efficiency. Thus, the initiatives are responding to emerging environmental challenges especially climate change and declining soil fertility and will result in technological innovations with immense potential to boost agricultural productivity and promote food security in the region.

7: SECRETARIAT FUNCTIONS - PARTNERSHIPS, NETWORKING AND ADVOCACY

RUFORUM run a spirited advocacy campaign with a clear value proposition – educating the next generation of African scientists, and combining the power of online activities with the potential of offline activities to reach out and advocate for increased investment in higher agricultural education. RUFORUM engaged its members and supporters, grew its network of advocates, and targeted the right people and organisations that could help it in its efforts. The grand prize of this sustained advocacy was the establishment by the African Union in 2016 of the Committee of Ten Heads of State and Government championing Education, Science and Technology in Africa. The Committee was instituted after noting that education, science, technology and innovation remain the primary instruments that will enable Africa to effectively implement its long-term vision of a transformative Agenda 2063.

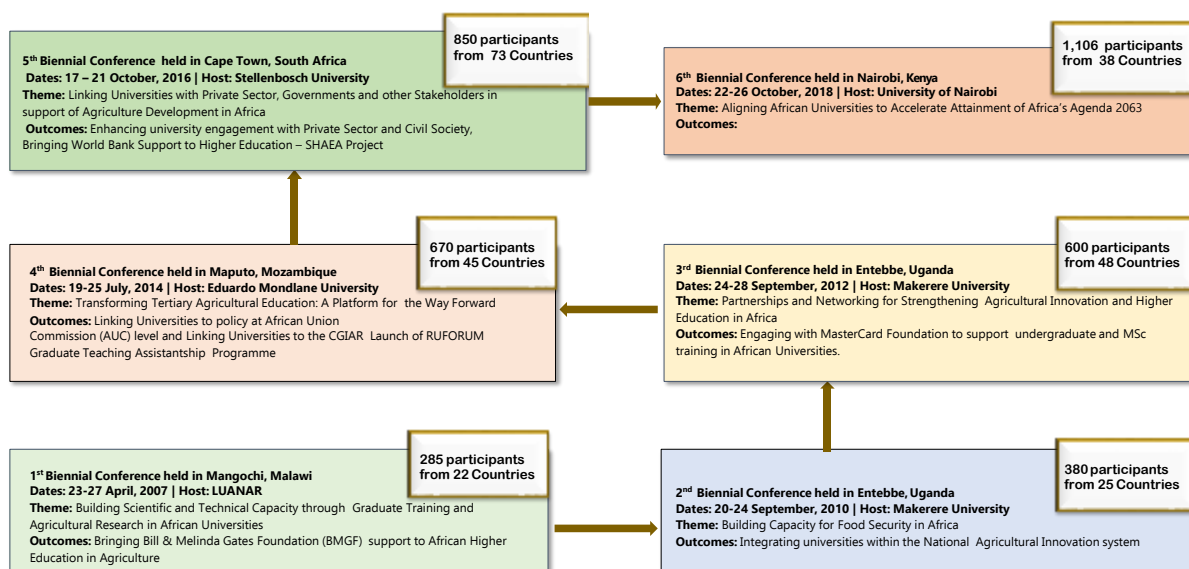
RUFORUM networking events provided great opportunity to students and faculty for networking with other industry and academic professionals, in addition to providing invaluable insights into their

chosen fields. More than 450 networking events have been convened, including 16 Annual General Assemblies and 6 biennial events over the last 15 years. The biennial conference and Africa Higher Education Week (AHEW) is RUFORUM’s most comprehensive meeting for its diverse stakeholders in both agriculture and higher education sectors. Initially dedicated to graduate students and their supervisors, grantees in RUFORUM member universities, and alumni, it was a platform for peer review, quality control, mentorship, networking, and shared learning.

The AHEW has transitioned from being primarily a scientific event focused on mentorship of graduate students to an academia-policy-development interaction platform providing space for niching shared perspectives and visions for development with the active participation of universities. It has demonstrated the convening power of RUFORUM and the capacity to bring together key actors to address common HAE goals. Participation in the biennial conferences has increased from 285 participants from 22 countries in 2007 to 850 participants from 73 countries in 2016. The 6th meeting held in Nairobi, 22-26 October 2018 attracted 1,106 participants from 38 countries, and representing a diverse array of affiliations extending to high profile policy makers from government, regional agencies and development partners (Figure 21). RUFORUM has enabled the establishment of channels among member universities that allow effective communication, stable partnerships, and networking between academics.

The RUFORUM electronic online- and internet-based communication tools and knowledge repositories broadened cooperation opportunities available to both faculty and students. Volumes of information can be accessed, transmitted and discussed at the same time using the various online portals. In particular, the online data portals on agricultural higher education capacities in Africa offer free user-friendly data on teaching staff and student populations in agricultural higher education in African countries. Access to this detail of data will help decision makers identify gaps, plan, formulate policy, and set priorities and benchmarks for higher agricultural training, as well as measure progress toward goals.

Figure 21: The RUFORUM Biennial Conferences and African Higher Education Weeks



8: MONITORING AND EVALUATION - DESIGN, IMPLEMENTATION AND UTILISATION

RUFORUM maintained a compendium of standard indicators based on its theory of change, in addition to the results framework of the different projects. There is good evidence of adaptation and learning during the implementation of various interventions, especially the use of output data for

day to day management. Reviews and evaluations commissioned at the end of different funding phases have been influential in informing subsequent phases of strategic planning. Programme implementation was adapted based on experiences and lessons learnt. The collection of robust outcome data on how capacities and performance is changing, and measuring outcomes and impact of RUFORUM using the standard indicators was however limited. This limits the ability of RUFORUM and partners to manage interventions and processes according to what is working and what is not.

9: KEY LESSONS, CONCLUSIONS AND RECOMMENDATIONS

The evaluation has identified a number of factors that help explain RUFORUM's success. It has also identified other factors that pose a risk to RUFORUM performance. On the basis of these, a number of recommendations have been suggested.

- 1) The ultimate success and value addition of RUFORUM has been (will continue to be) based on how its studies and assessments, capacity development initiatives, graduate research outputs, and knowledge management activities have translated into: (i) uptake and/or integration of tools and products into the teaching and research processes; (ii) public and private sector investment and entrepreneurship, and, (iii) improved public sector management of the Africa's education ecosystem. RUFORUM has been generally effective in terms of simultaneously carrying out activities in several countries and its progress towards achievement of stated results. The challenge, however, has been how to decide which ideas should become priorities for action in the face of many demands and requests for cooperation. ***It is therefore important for RUFORUM not to be swamped with the boundless ideas that keep cropping up, but narrow down to credible, meaningful and actionable programmes, interventions and policy options that create the most benefits to the majority of members.***
- 2) The establishment of RUFORUM, and its continuous progressive growth in membership from 10 universities in 5 countries to 105 universities in 37 countries, was (and still is) an expression of collective goals and shared needs, as documented in the various decisions of the general assembly and governance organs. Everyone knows it's important to build a network. But once a connection is made, how do we maintain it over the long haul so that we can call on the member when we need help or a task done? How frequently should we be in touch with each other? And how do we balance efforts to bring in new members while staying in touch with those we have known for a while?

The diversity in institutional capacities, cultures and policy environments, and the extent to which individual and collective capacities have been transferred or institutionalized in the member universities varies considerably. The member universities and the countries to which they belong and/or operate from are at different development levels, with differentiated capacities and needs - financial, human capital, infrastructure, scientific and technological. RUFORUM has proved to be a functional networking system that is built on strong transnational collaborative approaches that utilize Africa's diversity, range of existing capacities and expertise, while leveraging international cooperation.

Nonetheless, the expansion and diversity stretches the ability of the Secretariat to manage and service the network, and meaningfully engage with the policy agenda at the national level. With diminishing resources, there is a danger of RUFORUM spreading too thin and leaving an unremarkable footprint in the member universities and countries. ***The RUFORUM expansion is a success that needs to be carefully managed so as not to become a risk. As a pan-African network, RUFORUM has to continue to add new members to the network in order to access as many resources (expertise and facilities) as possible, while maintaining the continued interest of the old members through appropriate services, staying in touch and activating the***

appropriate expertise when the network has work that needs to be done. Members should work towards taking full responsibility for the costs of operating the Secretariat.

- 3) RUFORUM as a network and its programme structure and design have been and are still highly relevant at various levels—global, regional and country levels. In addition to RUFORUM being an outcome of a resolute action of member universities, its activities have been co-financed by multiple development partners. Additionally, RUFORUM is aligned with various continental frameworks and agendas and with national higher education policies and investment plans. ***The RUFORUM approach and having a regional network that mentors and promotes transformation is important and justifies continued and increased support from national governments, the African Union and Development partners. However, RUFORUM has to ensure continued alignment to the pan-African high level agendas and response to member demands to remain relevant.***
- 4) RUFORUM has successfully mobilised resources and provided grants to member universities, albeit on a competitive basis resulting in an even distribution of activity and associated benefit to members. Initially RUFORUM attracted only a few development partners. Positioning itself as a facilitating mechanism for the universities and working with its members to design strategic initiatives attracted a more diverse array of funders, and in particular national governments committing to investing and borrowing to support higher education and research. ***Moving forwards, RUFORUM is likely to be more successful in raising more funds not by “doing it on behalf” of participating universities, but “doing it with” participating universities. The network should also consolidate and secure commitments from government sources to fund RUFORUM to ensure sustainability.***
- 5) The flexibility of RUFORUM’s main funders, specifically their willingness to change plans, scale up efforts and fund discreet activities as needs arose was central to enabling RUFORUM implement its activities in a way that was adaptive and responsive to the local context. The long term commitment of these development partners and long duration of support allowed strong trusting relationships to form, which allowed ongoing and collaborative engagements about evolving and emerging capacity needs and for success to be built upon. Nonetheless, there is a need for ***RUFORUM to not only reach out more to a wider array of donors but also ensure their coordinated approach to supporting higher education and agricultural research in Africa.***
- 6) RUFORUM has an efficient and effective governance and management structure. The Secretariat has always been on track on disbursement and budget utilisation within the time frame with activities being carried out in several participating member universities and countries. About 75 percent of the RUFORUM funds are allocated to grants to member universities and 25 percent to advocacy, partnerships and networking, and overall coordination of activities. The Secretariat is overstretched. ***The current governance arrangements enhance ownership and should be maintained, but be fully financed by members. RUFORUM should consider carefully and evaluate option to either: increase staff and expand function, increase automation and/or outsource, or decentralise into sub-regional offices and/or cede of some responsibilities currently handled by the Secretariat to members.***
- 7) Two critical issues remain regarding RUFORUM’s management and M&E capabilities to measure outcomes and impact of the programme using its standard indicators. The first issue relates to ensuring the measurability of the quantitative standard indicators by refining their definition and level of measurement. This requires ***identification of existing weaknesses on the indicators, revising and implementing the revisions for the subsequent reporting periods in a timely manner.*** The second critical issue is the need for improving the quality of reporting by project implementers, grantees, students and alumni. This is partly related to the weak definition of

indicators and can be improved by **revising the reporting tools**. On the other hand, RUFORUM **partners and beneficiaries should be encouraged to improve the quality of data** in their reports by recognizing the value and relevance of good reporting for the purpose of demonstrating their achievements.

- 8) RUFORUM has increased awareness and capacities of national, regional, continental and global stakeholders in higher agricultural education through successive and successful events organized in various countries, and a strong focus on multi-institution transboundary activities. Stakeholders reached included policy makers, technical staff of government departments and agencies, research institutions, development partners, farmers and other agricultural value chain actors. **Discussions and effort has shifted from universities merely producing graduates and research outputs to productivity and the applicability and relevance of these products, thus bringing a more holistic perspective to higher agricultural education, training and learning. RUFORUM effort to integrate universities with communities through student-centred extension services is a positive step in meeting the demand for knowledge and capacity development at the individual farmer and community levels. These efforts should be consolidated and scaled up.**
- 9) RUFORUM's commitment to a partner-led networking approach helped build strong members' ownership of the processes and its programmes (curriculum, training programmes, community action research projects), and created the space for partners to play a formative role in deciding the priorities for support and take a lead role in implementation, in line with their growing capacities. Having competitively selected implementing partners for areas where they had relatively well-developed expertise, facilities and comparative strengths, together with twinning and staff exchange/mobility arrangements, created opportunities where the few first generation universities in relation to the number of years since their establishment took leadership and were able to provide newly established members with high quality, highly technical, and oftentimes difficult to find, skills and expertise.

The networking opportunities created by RUFORUM have helped member universities in fragile states, where political or economic conditions were unfavourable, to keep operating at the highest possible standard, build their depleted staff capacities and re-establish their systems. **This is a best practice regionality principle that should be maintained. RUFORUM should carefully balance between equitable sharing of work as a capacity building tool and the sharing of benefits delivered by a few of the more capable members (centres of excellence/leadership) on behalf of the entire network.**

- 10) Graduate training, built on a strong synergy between the production (research) and dissemination (teaching and outreach) of knowledge, has been and will remain at the core of RUFORUM. The establishment of post-doctoral and field attachment opportunities has been useful in helping young researchers raise their professional profiles and broaden their access to opportunities. Linking training and learning to working with communities has been instrumental in: (i) moving university generated knowledge and research outputs swiftly and efficiently from the laboratory to farmers' fields on a broad scale; (ii) facilitating the mutually beneficial exchange of knowledge and resources in a context of partnership and reciprocity; (iii) enriching scholarship, research, and creative activity; (iv) enhancing curriculum, teaching and learning; and, (v) enabling the training of well-educated and engaged graduates eager and prepared to address critical societal issues and contribute to the public good. **RUFORUM should therefore further consolidate its undisputed leadership as the pan-African network of higher education institutions with a passion for agriculture, using research as a powerful training tool while delivering developmental benefits.**

- 11) Strengthening research infrastructure and practice is widely recognised as one of the key challenges facing African universities and the establishment of robust, transparent, accountable and trusted mechanisms to fund research must be a critical consideration in any debate around strengthening research capacity. Although the spread of competitive funding mechanisms underpinned by peer review has been driven by arguments centred on quality and fairness, implementation comes with a wide set of challenges, which are especially acute where research communities are relatively small and the culture of peer review is not firmly established. The competitive granting mechanism not only improved the focus on quality and impact but also the emphasis is on inclusion and openness – making the best use of talent and resources for the benefit of improving the livelihoods of rural communities and the capacities and performance of member universities.

Enhanced engagement, networking and coordination among member universities, with institutions of national agricultural research and extension systems, and with international organisations created the basis for agricultural research and outreach systems that addressed quickly and effectively the needs of communities, opened new opportunities to them and to faculty and students, and created uptake pathways for rapid scaling up of knowledge products generated from universities. The focus on participatory adaptive and applied research involving farmers, emphasis on developing collaborative working relationships with other agricultural development stakeholders, and the shift from highly disciplinary research to multi- and inter-disciplinary type projects helped facilitate a more holistic approach to problem solving, linked funds more clearly and effectively to the quality of outputs, and facilitated demonstration of impact. ***RUFORUM should maintain the competitive funding mechanism as an institutional capacity building and research management tool enabling universities to function better to support researchers in the production and dissemination of high-quality research outputs.***

- 12) The RUFORUM regional training programmes focus on more than just information transfer. Support to soft skills and networking, and the imparting of multi-dimensional qualities makes graduates from RUFORUM supported programmes more suited to employment requirements. Many jobs today, and many more in the near future, require a combination of technological know-how, problem-solving and critical thinking, as well as soft skills and practical experience. The days of staying in one job, or with one company, for decades are waning. The new generation of graduates has different aspirations, viewing their employment ideals and options in self-employment, especially with the dwindling conventional public and private sector job opportunities.

A significant shift can be observed towards entrepreneurship and social enterprise, and aspirations towards careers involving a combination of public, private and self-employed work amongst the RUFORUM graduates. The convergence of trends in technological change, globalization, demographic shifts, environmental sustainability, urbanization, increasing inequality and political uncertainty will likely result in a world where work requires specific knowledge and skills, especially complex thinking and interpersonal capabilities. ***RUFORUM through its supported programmes and engagement with member universities should continue to champion demand-driven education merging work and learning to develop the human skills that matter, focusing on ensuring graduates are job-ready, hireable, and have access to rewarding careers over the course of their lifetime by ensuring career-long alignment between education and the job market.***

- 13) RUFORUM has provided opportunity and grant funding to experts from across the member universities to work together to explore sustainable approaches to how best to adapt to the changing climate - understanding the drivers and pressures of climate change, the state of and impacts on systems affected by climate change, managing responses to climate change, etc.

RUFORUM should, without diverging from its core mission, continue working towards these types of arrangements that deal with critical and/or emerging issues in a multidisciplinary fashion.

14) Networking has been beneficial in fostering research collaboration, mobility exchange and curriculum improvement. Inter- and intra-institutional collaborations have been of imperative importance, especially for the development of the younger universities - consolidating their academic environment and accessing better trained faculty to improve the quality of their teaching and learning. Staff and student exchanges facilitate the learning of new teaching and research tools, increasing the breadth of their knowledge, learning different approaches to solving Africa's problems. Mentoring programmes aided students and early-career staff to connect with peers, colleagues and other academic and professional contacts that provided insights and opportunities in career paths. The biennial conference and AHEW has demonstrated the convening power of RUFORUM and the capacity to bring together key actors to address common higher agricultural education goals and challenges. ***These (research collaboration, mobility exchange and curriculum improvement) have been the most important benefits derived by members and all effort must be made to secure resources to maintain and/or expand these services.***

15) Sustainability of RUFORUM is mixed:

- a) The holistic networking perspective introduced by RUFORUM and the individual capacities developed will continue. However, there is a strong conviction amongst members that the key benefits are the research grants and scholarships they receive from the Secretariat. This has long-run negative consequences. Whereas this was tenable while the members were still few, this expectation is likely to erode the network support with a rapidly expanding membership in the face of reducing resources.
- b) The knowledge products created by RUFORUM will be referred to in the future. However, the integration of RUFORUM processes and recommendations into institutional practices, processes and policies, and into national and continental policies, and attracting investment to use the human capital and research products from RUFORUM and its member universities is critical for long-term sustainability and impact. A multi-level, multi-disciplinary perspective suggests that the RUFORUM support to universities to impart training and document it has enabled these universities to move away from viewing training as a cost centre to one that is value driven - producing skilled, proactive graduates to lead and guide Africa's accelerated agricultural growth and transformation.
- c) Partnerships with the core agriculture faculties within member universities at the country level have worked relatively well, but other partnerships are at diverse stages in different countries. Infusing the good practices adopted in the agriculture faculties to other units in the university will ensure strategic policy shifts at the institutional level.
- d) Partnership with development partners and the private sector is an important area for improvement. RUFORUM and member universities have to strive to be more embedded in country sector mechanisms and in continental frameworks where all investors come together. There is scope to manage the country process time more efficiently and effectively to sustain the interests of national stakeholders.
- e) RUFORUM has been involved in regional, continental and global events on higher education in terms knowledge sharing and advocacy. There is still scope to be strategically involved in various regional events to share knowledge and raise the profile of RUFORUM, Universities

and higher education. As a facilitator and knowledge broker, RUFORUM should ensure linkages with various initiatives and platforms that address components of higher agricultural education.

- f) The advent of the digital technology wave has radically changed the business environment and climate, even for education and agriculture. Brokering closer engagement between disciplines, the member universities and other research institutes to create a more vibrant research culture that matches academic rigour with practice to solve the present and future agricultural research needs, is one of the many sure ways of maintaining relevance and sustainability.
- g) RUFORUM has an ever widening alumni membership. The network should tap into the larger alumni network to facilitate ongoing programmes, through mentorship and active graduate level and community engagement programmes. RUFORUM needs to make a clear-eyed determination about who in its network it want to prioritize, for example, current members and partners, potential members and partners, influential and powerful members and partners, and “friends who are real connectors”, and then figuring how best to allocate your attention. RUFORUM needs a good crop of ambassadors to sell its brand attract support and investment both within the countries it is operating in and globally.
- h) Sustainability of RUFORUM itself depends on membership, government and development partners finance. Apart from seeking to transform into a continental organ largely supported and funded by African governments for its Secretariat operations, RUFORUM should look at options where it can provide fee-based services to increase income, and seek potential sources of passive income (for example through leveraging partial royalties from intellectual property). Many of its younger/smaller member universities and the communities engaging with them, for example, have limited knowledge about intellectual property rights and/or do not have the resources to effectively patent their inventions and RUFORUM could take collective responsibility on behalf of the members and derive income from royalties accrued.
- i) The business model of RUFORUM should propel the organisation into remaining as an effective pan-African facilitator providing public goods and being a knowledge broker. While continuing the policy process approach to integrate universities into national and continental policies and strategies, RUFORUM should also strive to evolve and consolidate itself as an evidenced-based advocacy and knowledge management platform on higher agricultural education in Africa. This will require significant investment in the RUFORUM knowledge platforms and mechanisms for monitoring.