Effective and Transformed Higher Education for Agriculture and Life Sciences

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“a prosperous Africa based on inclusive growth and sustainable development... where poverty is eradicated in one generation.”

Agenda 2063
Expectations of Science on Agricultural Transformation

- **Increasing expectations from agriculture in a more challenging environment**
  - Produce more food on less land, water, chemicals, waste, GHGs
  - Produce safer, healthier more nutritious foods
- **Science can and should drive transformation of agriculture and society in Africa**
  - Productive, Competitive, Sustainable, and Inclusive
- **Recommitment to CAADP—sustaining the CAADP momentum**
- **Agenda 2063**
  - Science, Technology and Innovation Strategy for Africa (STISA-2024) has prioritised food and nutrition security
- **Science Agenda for African Agriculture**
  - The S³A provides a collective vision for science in agriculture in Africa, through a framework and set of guidelines
- **Stage set for increased investment in agriculture, agro-industry**
  - Apex of high level political and economic commitment
  - Trajectory of economic growth → more resources available
  - Increasing role of continental and international NETWORKS
Africa in context: Higher Education

- **Enrol more students, but limited funding to invest**
  - 13% of young people in Africa are enrolled in tertiary education (global average = 33%)
  - Funding is inadequate to grow to competitive levels

- **Produce significantly more PhDs**
  - Only 9.7% of the enrolled students are in PG programmes
  - Only a limited number of universities offer PG programmes
  - PG programmes have historically been underinvested in

- **Higher education staffing crisis**
  - Shortage of academic staff, particularly with advanced degrees
  - Low proportion of staff under 40
  - Brain drain has slowed down, but some universities understaffed by 40%

- **The gender agenda continues to be a core priority**
  - Globally the ratio of women to men in education rose from 0.74 in 1970 to 1.08
  - The picture is different in sub-Saharan Africa where men still dominate
Africa in context: Higher Education

- **Pressing and urgent need for curriculum reform and skills development**
  - To combat growing graduate unemployment and meet industry needs
  - Degrees awarded do not necessarily align with promising career paths
    - For example telecommunications, engineering, agriculture, and biotechnology
  - Universities traditionally prepared students for public sector
  - As Africa’s population and economies grow, this will become untenable

- **Stimulate transformational entrepreneurship**
  - 10 to 12 million young newcomers to the labour market each year
    - Only 3 million find decent, sustainable work
  - African youth need to identify their potential to be job creators
  - Africa reports the most positive attitudes towards entrepreneurship globally
    - BUT African businesses have some of the highest global rates of discontinuance
  - Countries in Africa still typically lack the regulatory good practices needed to effectively stimulate business, particularly in the vital agribusiness sector
PARTNERSHIPS ARE CRITICAL
### Key roles: governments

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<td>Keep the ship steady, ensure predictable, stable funding in line with commitments.</td>
<td>Foster enabling environment for the business sector to support responsible, inclusive and sustainable business.</td>
<td>Leverage tax revenues &amp; incentives, including considering tax benefits for businesses investing in higher education.</td>
<td>Facilitate mobility on the continent between business and academics.</td>
<td>Support and participate in structured dialogue.</td>
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<td>Key roles: universities</td>
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<td><strong>1</strong> Redefine the role of the university as a critical pillar of the development agenda and acknowledge the potential of partnerships in realising this vision.</td>
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<td><strong>2</strong> Establish advisory boards which include executives from relevant industries to position for relevance, and to create a space for dialogue.</td>
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<td><strong>3</strong> Pilot innovative models that stimulate partnerships with the private sector and international partners to drive cutting edge curriculum.</td>
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<td><strong>4</strong> Focus on strong leadership Employ staff who understand business, and incentivise academics to bridge the gap between the private sector and higher education.</td>
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<td><strong>5</strong> Strategic partnerships Innovative partnerships with international universities to enhance capacity for graduate supervision.</td>
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## Key roles: private sector and development partners

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<td>Invest financially in high potential research and infrastructure projects.</td>
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<td>Support and engage in dialogue platforms that explore the benefits of collaboration.</td>
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<td>3</td>
<td>Invest time and expertise by serving on advisory boards or science business innovation councils.</td>
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<td>Collaborate to create opportunities that promote real world engagement and impact.</td>
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<td>Invest in loans &amp; bursaries through financial contributions and offering mentoring opportunities.</td>
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Rethinking Research Contributions
A ‘crisis of research effectiveness’

- Traditional definitions of research excellence and training do not automatically resolve the complex problems facing the future of society and the planet.

This ‘crisis’ highlights the need for transdisciplinarity as a new frontier.

Requires a fundamental institutional and cultural reorientation

- Institutional innovations and structural optimisations.
- Whilst at the same time preserving the traditional strengths of disciplinary excellence and scientific rigour.

Slippers, et al. 2015
Developing Research Capacity

- Rapid expansion in world scientific output is not reflected in African universities
- Institutions lack capacity to produce knowledge at the requisite rate
  - The PhD is a key driver for knowledge production
  - Requires radical rethink of doctoral education
  - Effective capacity development programmes address three dimensions
    - identifying appropriate beneficiaries & partners
    - strengthening networking
    - optimizing skills that will be strengthened/transferred
  - Any interventions must
    - reform the delivery of doctoral education
    - “achieve the pipeline imperative”
    - increase financial resources for students
PhD Production

Continental: 4 imperatives = policies and instruments

Translation and mediation by institutions

Supervisory practices

Quality | Quantity | Efficiency | Transformation

Institutions + Scientific disciplines

Supervisor ↔ Student

Mouton, 2014
NETWORKS
Networking to enhance….

- Generating economies of scale
- Building of credibility and legitimacy
- Promoting quality assurance
- Strengthening links
- Building a critical mass of female scientists
- Regional collaboration present opportunities for reducing costs of research and training and avoiding duplication

➤ RUFORUM, AAUN, ARUA, SHAEA
➤ Role of science granting councils
Example 1: Multi-country funding (LEAP-Agri)

**LEAP-Agri Consortium:**
19 Countries (9 African, 9 European) with 30 funding agencies

**African Countries:**
Algeria, Burkina Faso, Cameroon, Egypt, Ghana, Kenya, Senegal, South Africa and Uganda

**European Countries:**
Belgium, Finland, France, Germany, Netherlands, Norway, Portugal, Spain and Turkey
Example 2: ACIAR-IDRC (Cultivate Africa’s Future Fund)

- Improving agricultural productivity, supporting expanded roles for women and youth in agribusiness
- 24 innovations used by 25,000 SHFs

Southern Africa:
Zambia, Malawi, Zimbabwe, Kenya, Uganda
Catalysts for Impact

There is still a shortage of spaces that encourage and enable collaboration of scientists from different disciplines. Robust networks address this need by creating an enabling environment for global research partnerships.

- **Partnerships, strategic alliances and networks** that harness collective strengths and facilitate resource sharing
- **Diversified funding sources** that enable critical connections to policy and practice towards impact
- **Cutting-edge communication and engagement strategies** that inspire, educate and transform
- **Reduced risk** that promotes of sustainable and efficient investment impact
- **Boundary-spanning leadership** that bridges divides and disconnects between stakeholders

[ logos and branding]
EFFECTIVE APPROACHES
International Lessons

Latin America/Asia
- Public investment in robust country-level institutions critical to strengthening AET systems

China
- Expansion of postgraduate programmes to invigorate research/researcher production

Vietnam/India/Japan
- Smallholder farmer-led agriculture

US/Japan/India/The Netherlands
- Land grant-style institutions

EARTH University
- Institutional-level change
The Wageningen approach: biological

Gene/Molecule → Cell → Organism → Ecosystem → Planet

Food, Water, Energy, Materials → technologies

Kropff, 2012
Systems Innovation is essential to facilitate the translation of scientific innovations into societal impact.
CASE STUDY
Revitalising Agricultural Education and Training in South Africa

Supportive Environment

- Strategic priority for agricultural & rural development
- Sufficient & sustainable funding for AET institutions
- Secondary school supply

Right institutional mix

- Universities
- Agricultural colleges
- Other

With adequate resources

- Academic staff
- Relevant curriculum
- Facilities/Resources
- Research capacity

Graduates with appropriate skill mix and levels

- PhD
- MSc
- BSc
- Diploma/Certificate

In adequate numbers to meet sector demand for

- Researchers
- Academic Staff
- Policy makers & bureaucrats
- Managers & entrepreneurs
- Extension agents

To fill needed roles in the sector, with direct benefits for farmers

- Researchers
- Academic Staff
- Policy makers & bureaucrats

... & indirect benefits for farmers:

- Research & knowledge creation
- Policy analysis & development
- Teaching & training

With strong linkages to and feedback mechanisms from:

- SHF’s
- Researchers
- Agribusiness
- Extension workers
- Policymakers

Linked to and supported by regional and global institutions, networks and collaborations
Secondary school
- Strengthen secondary school-level

Address system barriers through extension & research
- Improve agricultural innovation system coordination
- Strengthening funding platforms

Agricultural technical and vocational training (Colleges and Other Providers)
- Government commitment to the sector
- Government policies aligned to sector needs

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Linked to and supported by regional and global institutions, networks and collaborations

Build AET capacity
- Expand/ create new programmes
- Improve quality and alignment with needs
- Contribute towards the knowledge economy

Strengthening regional/global initiatives through networking
- Regional AET initiatives
- Access to information
- Research collaboration

National coordination
- Collaboration between all system actors (teaching, research extension)

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Overview of Key Findings

- There are numerous historical, continued challenges in AET

- AET operates in a largely disenabling environment

- Relevant institutions and adequate resources are urgently needed to address core challenges
  - Articulation and integration
  - The inverted pyramid
  - Lack of adequate financial resources

- AET does not produce enough graduates, and they are not appropriately skilled for the modern day challenges
  - Curriculum reform needed to focus on transferable skills and the use of ICTs
  - Better trained and increased number of educators is a priority
Linkages and feedback mechanisms need to be intentionally strengthened

- **The Knowledge Triangle**: linkages between research – teaching – extension are poor

- **Research and research support**: Greater cooperation between the ARC and NRF is urgently needed

- **Research and education to extension**
Thank you