Geopolitics and science in Sub-Saharan Africa

The regional approach of the African Centres of Excellence

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DZHW
German Centre for Higher Education Research and Science Studies

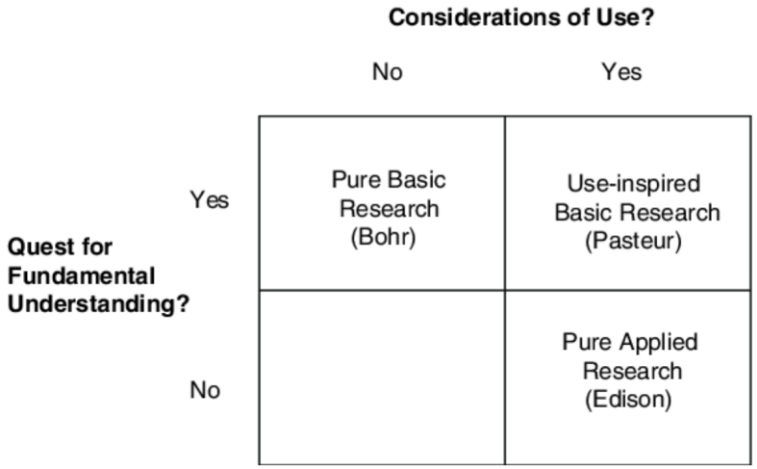
Overview of the presentation

1. Context of higher education development
2. Overview of the African Centers of Excellence (ACE) programs
3. Assessing ACE outcomes and experiences
4. Reflections on regional approaches to higher education development

Context: How does science matter for Sub-Saharan Africa?

For science to serve the needs of SSA, SSA must have strong science and be tied in with global scientific networks.

In line with this, the African Union (AU) aims for the region to contribute **at least 10% of global scientific research output** by 2033, with at least 50% of this translating into innovation and production (13)



Pasteur's Quadrant (14)

Regional approaches to science in Sub-Saharan Africa

Advantages

- International competitiveness – Focus on the strongest performers competing globally, rather than nationally
- Shared capacity – Enable countries to coordinate capacity development in key domains of common relevance across the region
- Political insulation – Provides license for governments to resist political pressures to distribute funds differently

Common practices

- Regional higher education institutions
  - Several in West Africa including the Institut international d'ingénierie de l'Eau et de l'Environnement (2iE)
  - Some private not-for-profit institutions such as the African Institute for Mathematical Sciences (AIMS)
- Centres of Excellence (CoEs)
  - The Pan African University (African Union)
  - World Bank African Centers of Excellence
  - African Research Universities Alliance (ARUA) CoEs
  - OUEMOA CoEs

The African Centers of Excellence (ACE) programs

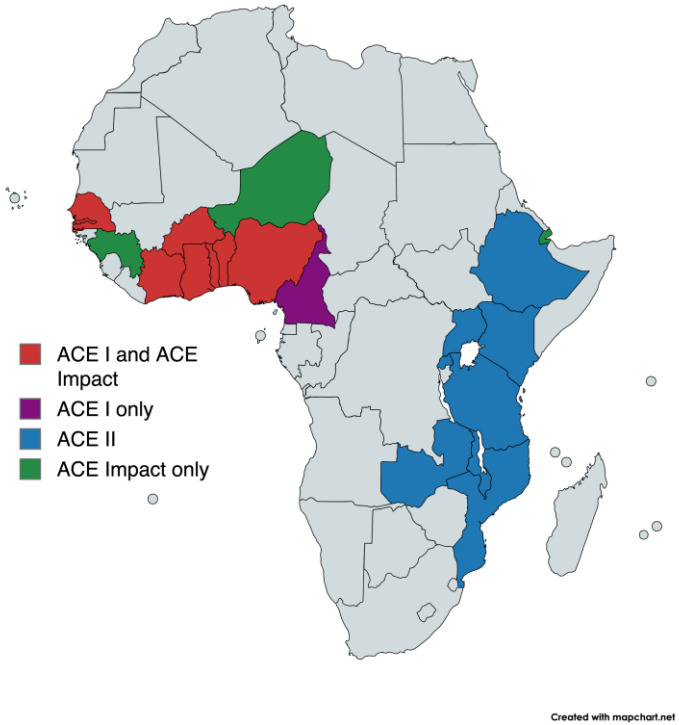
- Flagship regional programs of the World Bank
- Competitively selected graduate schools supported to provide Master's and doctoral education (as well as short courses), and to conduct research in key areas of focus:
  - Health
  - Agriculture
  - STEM (e.g., water, energy, mining, etc.)
- Results-based funding (RBF) meant that centres had to secure results to receive funding
- Financing to national governments primarily in the form of loans, with some grants for regional institutional development and coordination

ACE programs overview

Program	Years	Max amount	Centers
ACE I	2014-2020	$316 million	22
ACE II	2016-2025	$218 million	29
ACE Impact*	2019-2025	$589 million	54

*Note that ACE Impact had 43 ACEs on the model of ACE I and ACE II as well as other centers. The project was also divided in two parts and the AFD provided additional funds.

Sources 17, 18, 19, 20, 21



ACE programs achievements

Major project outcomes	Results
PhD students	5,892*
Master's students	23,692*
Regional learners	17,346
Female learners	17,727
Internship or exchange participants	12,998
Internationally accredited graduate degree programs	87
International peer-reviewed publications	7,217
Externally generated funds	USD 158 million

Key specific examples

ACEGID (Nigeria) sequenced 250 Ebola virus genomes and the Lassa virus genome, and patented rapid diagnosis kits for each virus

WACCI (Ghana) now producing more graduates in plant breeding than any other institution in the world, and has developed 90 improved crop varieties

CEA-SAMEF (Senegal) has conducted research informing the national committee responsible for vaccines, and evaluated healthcare for newborns to identify needed policy changes

Sources 17, 18, 19, 20, 21

Assessing the regional model

Successes

- Enrolment of regional learners
- Development of regional partnerships
- Examples of science of regional relevance (e.g., ACEGID, WACCI)
- Exchanges and joint learning

Challenges

- Challenges with regional enrolment (e.g., financing) and employability
- Translating research for local relevance is difficult, let alone regional relevance
- How do you develop regional faculty complements?
- Inequities between jurisdictions – no magic bullet

Take-away reflections

1. How can regional approaches facilitate learning and change in national higher education systems?
2. In small jurisdictions, especially facing resource constraints, are the advantages of regional approaches to basic science insurmountable?
3. How do you build regional scientific institutions and durable political buy-in for these?
    - Do regional approaches require regional funding?
    - Are regional approaches even more difficult to sustain in an era of increased geopolitical instability?

Thank you!

Any further thoughts or questions are welcome by email at: williams@dzhw.eu.

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Why does science matter for Sub-Saharan Africa?

Health

Powerful potential of health sciences – e.g., breakthrough HIV treatments (1) and COVID-19 vaccination (2)

Yet, documented 10/90 divide in global health research (3)

Example: Neglected Tropical Diseases affect ~500 million Sub-Saharan Africans (4), but R&D is very modest (5, 6)

Agriculture and environment

Crop improvements offer important benefits for economic development and food security (7)

There is significant need for research to inform climate change mitigation and adaptation (8)

Global agricultural science focuses disproportionately on Northern agriculture (9)

Why does science matter for Sub-Saharan Africa?

Broader economic development

Prevailing notion of "technology leapfrogging" may miss inappropriateness of technologies from advanced economies for African contexts (9, 10)

Difficulty in developing and retaining top quality talent, with national benefits from emigration possibly not outweighing losses (11)

Governance and public policy

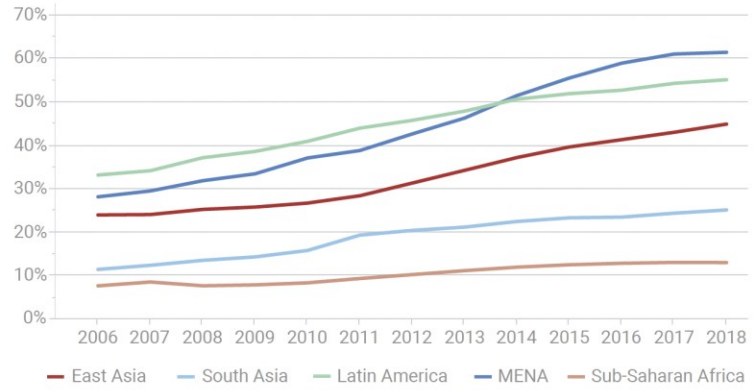
Social science also matters – improved health, agriculture, environmental sustainability, and economic development in part a function of public policy.

Critical importance of effective social science to inform policy, which is grounded in local realities (12)

Context: System development

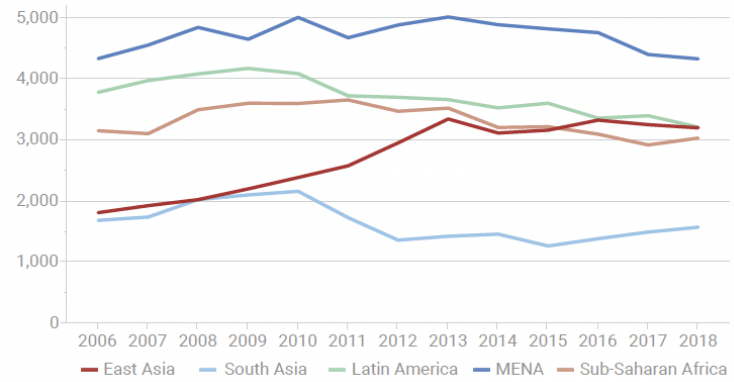
The challenge of raising higher education participation…

FIGURE 1.12 — *Gross enrolment rates by region in the Global South, 2006-2018*



while also raising quality.

FIGURE 4.10 — *Total public spending on higher education per student by region in the Global South, 2006-2018 (in 2018 USD at PPP)*



Source 15

Present context of science in Sub-Saharan Africa

Scientific activity in SSA relative to population (16)

Measure	Share
Share of global total population (2018)	13.6%
Share of gross domestic expenditure on R&D (2018)	0.4%
Share of researchers (2018)	0.7%
Share of scientific publications (2019)	1.8%

Further contextual challenges

- Universities as a locus of societal instability
  - (Over-)emphasis on student financial aid partly in response
- Focus on low-cost study programs (e.g., social sciences)
- Historical emphasis on education over research
- Administrative weaknesses