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Network Innovations: Building the Next Generation of Agricultural Scientists in Africa

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Introduction

Institutional networks unimpeded by geography play a central role in enhancing post-graduate training and strengthening universities in Africa. In essence, only a few masters and doctoral programs exist in African universities and this poses challenges to knowledge production and application. These dilemmas are particularly pronounced in the long neglected field of agriculture, where the majority of single universities lack the funding, research, and delivery capabilities required to solve problems on a sufficient scale.

Where objectives are complex and long-term in nature, success generally involves multiple partners from different institutions. However, the lack of clear guidelines for setting up or managing such networks only adds to these challenges.

This article reviews the network concept, how networks actual operate, the obstacles they encounter and what accomplishments can be reasonably expected. The article is based on a chapter from a forthcoming *IFPRI publication entitled Agricultural Research in Africa: Investing in Future Harvests*¹.

Background

The network concept offers great appeal as a vehicle for fostering advanced knowledge and knowledge applications, and for extending limited resources. It creates enduring institutional relationships based on a common mission and standard of effectiveness and relevance.

The Advantages—and the Nuances

Similar reasons have led to recent calls for large-scale investment in “centers of excellence,” which are also intended to build economies of scale in producing qualified staffing and facilities. Such initiatives can be attractive to funders as they hold the promise of sidestepping the high transaction costs of bringing together different actors and institutions with diverse capacities. However, when such centers are created as *insulated* regional entities, as many were in the past, they often present difficult problems of long-term financing once external funding disappears, and they can undercut genuine buy-in by national institutions.

In contrast, well-designed institutional collaborations can have a longer shelf life. Solid network approaches—especially those backed by world-class overseas universities or high-quality African institutions serving as regional postgraduate collaborative hubs—may have the edge in the long-run in attracting funding from African governments and the private sector on the basis of unlocking innovation customized to the dynamics of the national environment.

Five models of strategic networks making progress toward the stated goals of bolstering university-based training and research, and enhancing the productivity of the agricultural sector were explored. These models, while different in their composition, offer key principles and approaches of networks that are scalable and have the potential to be sustained. Each has a base secretariat or management group within a host institution that provides coordination and technical assistance, and promotes the use of low-cost (and in some cases, more advanced) information technologies. Each network is primarily based on one or more disciplinary fields but offers an array of subject matter that encourages systems thinking.

Each network provides professional career structures necessary to develop a stable cadre of African research leaders, and each creates network services that build economies of scale. These networks are fortified by linkages to local stakeholders, such as the private sector, nongovernmental organizations (NGOs), and government bodies; to continental alliances, such as the African Union (AU), Forum for Agricultural Research in Africa (FARA), and Comprehensive Africa Agriculture Development Program (CAADP) under the auspices of the New Partnership for Africa’s Development (NEPAD); and to global agricultural entities, such as the CGIAR Consortium, world-class universities outside the region, and international markets.

Notable Examples

There are several others networks to consider, but these stand out in terms of their scale, scope, and potential for replication and sustainability. They are:

1. Regional Universities Forum for Capacity Building in Agriculture (RUFORUM)

Status: NGO

Coverage: 55 universities in 22 East, Central, Southern and West African countries

2. Collaborative MSc Program in Agriculture and Applied Economics (CMAAE)

Status: Program of the African Economic Research Consortium (AERC), an NGO

Coverage: 17 universities in 13 East and Southern African countries

3. Education for African Crop Improvement (EACI)

Status: Program of the Alliance for a Green Revolution in Africa (AGRA)

Coverage: 10 MSc universities and 2 PhD training centers at the University of Ghana (West African Center for Crop Improvement) and the University of Kwa-Zulu Natal (African Center for Crop Improvement) serving 16 countries

4. Biosciences eastern and central Africa (BeCA)

Status: NEPAD–endorsed Initiative hosted and managed by the International Livestock Research Institute

Coverage: One central hub and six institutional nodes serving 18 African countries

5. Partnership to Enhance Agriculture in Rwanda through Linkages (PEARL), 2000–2006/Sustaining Partnerships to Enhance Rural Enterprise and Agribusiness Development (SPREAD), 2006–2011

Status: Rwanda Institutional Partnership

Coverage: National University of Rwanda, Kigali Institute of Science and Technology, National Institute of Agriculture Research, NGOs that target agricultural cooperatives with over 15,000 member farmers

In general, these networks concentrate on problems requiring collective action, pool their talents to reach critical mass and synergy, and realize creative solutions. Africa's next generation of agricultural scientists will need to be *scientist entrepreneurs*—*technologically* sophisticated people capable of bold thinking with a primary question in mind: how can *high*-impact innovations be adapted to the growth of agriculture with a view to poverty alleviation and environmental sustainability. To achieve this end requires thinking differently about institutional arrangements and reconsidering not only the creation of economies of scale, but also how advanced learning centers can serve as pivotal supports in local knowledge and innovation systems.

Network Characteristics, Principles, and Challenges

Network formation in Africa has been a relatively autonomous process. The result has been important differences in their format and use. There are, however, a number of prerequisites for building capacity under fragile institutional circumstances that boost quality and relevance and lay the foundation for sustained expansion of the pool of qualified researchers.

Network Characteristics

Fundamentals generally fall into three categories:

1. *Quality, Access, and Relevance:*

- a. comprehensive view of problems and solutions;
- b. mechanisms for quality assurance;
- c. skills for entrepreneurship, management, and leadership;
- d. increased participation of women and the disadvantaged;
- e. cost-effective information technology; and
- f. economies of scale/collaborative research/training.

2. *Systems Orientation:*

- a. horizontal integration/links across local stakeholders;
- b. vertical integration/linking global and local innovations;
- c. regional platforms for policy advocacy and public education and
- d. transition mechanisms between university and work.

3. *Scalability and Sustainability:*

- a. embedded in university system or strategy with normal administration and faculty oversight;
- b. nested in/or linked to broader research or action programs;
- c. building on professional communities;
- d. solid network leadership, management, and financial planning and
- e. principal African ownership.

The five agriculture training and research collaborations selected for closer examination offer demonstrations of key mechanisms for fast-track training and for building research capacity through collaborative arrangements among better endowed institutions and those less well-off in Africa. Together these collaborations reflect a remarkable change in learning strategies by cash-strapped African universities.

Underlying Principles and Challenges

Despite an array of strong agricultural postgraduate and research networks, the networking concept is still evolving. All too often emerging networks fall short of meeting their promise to advance higher learning and ultimately agricultural performance. Drawbacks include a still small number of qualified universities for advanced training, rushed planning, frustration in failing to create added value for all members, and the non-strategic use of assets to produce significant public goods.

The shortcomings of many networks provide the backdrop for a set of general principles underlying the construction and improvement of postgraduate training and research collaborations in agriculture. Specific actions include the following:

- a. Aligning vision and mandate with national aspiration;
- b. Sticking to core competencies and comparative advantage, while avoiding inefficient opportunism;
- c. Mainstreaming new approaches in academia within the university system;
- d. Increasing the participation and voice of women, along with mentoring and career development;
- e. Investing in appropriate information technologies, especially low-cost technologies supporting decentralized learning and knowledge sharing;
- f. Adding value to the full range of the network's clientele by differentiating their demands and willingness to pay for services;
- g. Designing strategies for cost-recovery and growth at a manageable scale;
- h. Contributing to enhancement of the policy environment, particularly by channeling cross-country experience into policy deliberations;
- i. Building strong management and governance involving efficient and transparent board and advisory structures, lowering transaction costs and treating overheads as legitimate costs; and
- j. Fostering sustainability through a common brand of excellence, solid evaluation, a practical business plan, and reliable risk mitigation strategies.

Major Agricultural Sector Results

RUFORUM:

- a. Over 300 technologies developed in cooperation with national agricultural research institutes (NARIs), farmer associations, and the private sector reaching over 1 million farmers
- b. US\$70 million resource mobilized in direct support of the commitment to bring African universities to farmers.

CMAAE:

- a. New AERC Forum of African Governors of Central Banks provide core support as reflection of value in executive policy making guidance
- b. Robust, influential policymaker career pipeline

EACI:

- a. PhD research leading to the release of 110 new crop varieties with national/international research institutes for farmer cultivation
- b. Start-up capital for over 90 seed enterprises and training 10,730 agro-dealers for input provision
- c. Over 15 million farmers using improved seed varieties

BecA:

- a. Many effective bioscience projects on crops, livestock and food safety
- b. Patented discoveries and numerous cutting-edge publications that feed the work of CGIAR, NARIs, other research institutes in Africa

PEARLS/SPREAD:

- a. About 400,000 coffee farm families making over three times what they earned prior to these programs
- b. Over 160 U.S. European, Asian and Australia companies like Starbucks, Costco buying almost 5,000 tons annually, directly from the growers
- c. Program absorption into the National Agricultural Innovation System of Rwanda.

Future Considerations

In future, network strategies will need to accommodate global market forces given that scientists are more likely in their professional lifetimes to move from place to place, or work for multiple employers simultaneously. Many networks are already helping their members to initiate reforms, especially in terms of institutional flexibility and innovation that will position them to face new competitive challenges. Major trends and directions incorporate:

- a. Unique institutional forms, including catchment zone for PhD training, hubs and docking units;
- b. Course harmonization across universities;
- c. Embrace of a business school *optique* in all disciplines;
- d. Video-in lectures;
- e. Teaching caravans without walls;
- f. Joint facility electives in advanced subject matter and methodologies;
- g. On-campus agribusiness incubators;
- h. Lecturers based in non-university settings such as government, NGOs, NARIs, private business, think tanks;
- i. Dramatic adjustment to populist movements toward tackling inequities and exclusion;
- j. Accommodation of emerging complex fields (such as climate change) that demand overcoming disciplinary barriers to problem-solving; and
- k. World trade in academic talent and education services.

Conclusion

A successful professional network will, in the long-term, be characterized by its ability to keep researchers in Africa scientifically active and focused on making measurable contributions to the broader system of innovation in the agricultural sector. Professional networks cannot take full responsibility for the rejuvenation of universities and research institutes. Networks support and complement, but do not replace, these essential institutions. The crucial role of networks over the next decade is to ensure that the bond between higher education and practical, problem-solving science and technology capacity in Africa is a sturdy one backed by expanded access to technical resources, peers, reliable finances, and genuine local buy-in for sustained political support.

¹. *This article is an extract from IFPRI publication entitled Agricultural Research in Africa: Investing in Future Harvests, Chapter 10. Mook, J. 2016. "Network Innovations: Building the Next Generation of Agricultural Scientists in Africa." In Agricultural Research in Africa: Investing in Future Harvests, edited by J. Lynam, N. Beintema, J. Roseboom, and O. Badiane. Washington, DC: International Food Policy Research Institute.*

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