

Partnerships in Agricultural Innovation Systems: An African Researchers' Perspective

Moses Osiru, International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Bamako, Mali¹

Lead article for the CTA S&T knowledge website

Introduction

National agricultural research systems (NARS) in African countries have evolved since independence was gained in the 1960s (Hazell *et al.*, 2003). Structural adjustment in the 1980s and partnerships with institutions in the north and the south have guided further development. Within recent times, the NARS concept was expanded to the agricultural knowledge and information system (AKIS) and subsequently the agricultural innovations system (AIS) concepts (Table 1). Many African institutions have grappled with the change processes necessitated by this evolution and incentivised by much-needed funding support (Lynam *et al.*, 2004). The guiding principles influencing research funding were often crafted at global level, with the assumption of their relevance or adaptability for all African NARS.

In many African countries (late 1990s and early 2000s) reforms to NARS were aimed at decentralisation of authority and responsibilities, separating public funding from implementation, cost sharing, farmers' empowerment, participatory research, enhancing linkages between research and extension and joint learning, monitoring and evaluation of Multi-stakeholder approaches including the private sector, civil society (including farmers and farmers organizations and NGOs) and development partners were promoted (Mbabu *et al.*, 2004). The value chain approach has gained traction for directing research agendas. AIS approach highlights that multi-stakeholder interaction is key to innovation and is now widely accepted in Africa and beyond. It contrasts with the traditional vertical research to innovation pipeline in which researchers generate new knowledge and extension actors 'pass on' knowledge products to end-users, usually farmers. At the same time, extension has shifted from the 'Train and Visit' model promoted in the 1980s to accepting that multiple actors are engaged in the provision of extension and advisory services and pluralism is now accepted (Anderson and Feder, 2004). In this article, issues governing partnership with African agricultural scientists who must engage with multiple actors, in the generation, diffusion and adoption and adaptation of knowledge, are explored.

Table 1: The evolution of the agricultural systems- NARSs, AKIS and AIS

Defining feature	National Agricultural Research Systems	Agricultural Knowledge and Information Systems	Agricultural Innovation Systems
Primary actors	Research organizations	Research, extension and education organizations	Potentially all actors in the public and private sectors involved in the creation, diffusion, adaptation, and use of agricultural knowledge
Outcome	Technology invention and technology transfer	Technology adoption and innovation in agricultural production	Different types of innovation – technological and institutional
Organizing principle	Using science to create new technologies	Accessing agricultural knowledge	New uses of knowledge for social and economic change
Mechanism for innovation	Technology transfer	Knowledge and information exchange	Interaction and innovation among stakeholders
Role of policy	Resource allocation, priority setting	Linking research, extension and education	Enabling innovation
Nature of capacity	Infrastructure and human	Communication between	Strengthening interactions

¹ The personal views expressed here do not represent those of ICRISAT.

strengthening	resource development	actors in rural areas	between all actors; creating an enabling environment
---------------	----------------------	-----------------------	------------------------------------------------------

Source: Anderson and Roseboom, 2009.

Competitive Grants - Partnership drivers

African researchers recognise that partnerships are important for boosting local research capacities if they are to provide solutions to farmers' problems and new insights for innovation within any value chain. This can be done through leveraging, local, regional and international collaboration. North-south and south-south research partnerships and local, regional and international research networks are seen as important for enhancing the flow of ideas and knowledge among actors, reducing transaction time and costs and improving access to national and external funding (an important incentive and driver for forging partnerships).

Funders (governments and development partners) are drivers of multi-stakeholder partnerships, particularly for fostering alliances with advanced institutions and other actors including the private sector.. Scarcity of funding to NARS and dependent institutions became apparent in 1995 in Latin America and Africa (Byerlee and Alex, 1998). Funders, including the World Bank (WB), introduced competitive grant schemes (CGS) and other mechanisms to expand research funding opportunities and promote the involvement of multiple actors and partners in research priority setting and implementation. The success of participation in CGS increased the attractiveness of as those offered by the European Union² and the African Union³. However, achieving sustainability in funding remains challenging for African institutions especially when research programmes are built on a series of (often very inflexible) restricted funding mechanisms, given research requires flexibility (Box 1).

The European Union funded ACP Educational linkages programme (EDULINK) is a CGS that has engaged north-south and south-south partnerships². The competitive programmes in general required that researchers and university staff partner not only across countries but also with northern partners to implement agreed activities. Table 2 presents the winning research and education partnerships under the third EDULINK call for proposals. The 15 winning projects/consortiums involved 2-14 partners each, averaging five per proposal. European-led proposals generally comprised more partnerships per proposal than the African- or West-Indies-led proposals. Secondly, nearly half were led by European-based institutions. Typically, European-led proposals were 24 months, compared to 36 months for Southern-led projects.

² Through the African, Caribbean and Pacific Secretariat in Brussels, the EU has funded programmes that target ACP actors in particular, such as EDULINK, the Science and Technology Programme (S&T) (<http://www.acp-edulink.eu/>) and the various Framework Programmes for research.

³ With European Union support, the African Union runs a competitive funding scheme on Science and Technology, with similar rules to the EU ACP S&T programme (include AU ST website link).

Box 1: Why Research is Different from Many Public-Sector Activities!

1. Research (especially basic and strategic) is a creative process with highly uncertain outcomes and cannot be micro-managed from day to day. Good scientists require considerable flexibility and some degree of independence over a long period of time to achieve results.
2. Recruitment and promotion of scientists requires different standards than those for civil service employees. Scientific skills are highly specialised and scientists require opportunities for advancement in rank and salary within their specialised areas. In a competitive international market, special incentives and rewards are needed to attract and retain the best scientists.
3. Research often requires lumpy recurrent and capital costs (e.g., setting up an experiment) that demand considerable flexibility in financial and procurement arrangements. A missed operation or input due to rigid procurement rules or financial stringency can wipe out seasons of experimental work!
4. Research managers need flexibility to shift resources among the major budget categories of operating costs, capital equipment, and salaries in order to ensure overall efficiency and adequate operating costs.
5. Research institutions require flexibility to diversify their funding support by soliciting funds from various ministries, the private sector, or internationally and by commercialising research products.
6. Diverse stakeholders (government, producers, agro-industry, the broader scientific community) should be actively involved in setting the research agenda. When research is controlled and managed directly by public institutions, many stakeholders tend to be marginalised from these processes.

Source: Byerlee and Alex (1998)

The European Commission supported programmes require a contribution from participating partners. Such contributions in the EDULINK III varied across institutions and regions. Nonetheless, proposals with lead partners from West Africa had the highest average contributions (€279,381) compared to contributions from Europe (€195,895), East Africa (€118,801), West Indies (€90,772) and Southern Africa (€87,521). Most African institutions received inadequate financial management support for EDULINK and ACP S&T programmes and experienced particular difficulty in co-financing projects. Often researchers undertook financial functions beyond their expertise. African institutions also struggled to manage the time input required by the multi-partner projects. Financial management divisions of participating African institutions need support to meet the financial reporting requirements of funders and to build staff capacity to manage multi-partner projects.

Table 2. Research partnerships for funded projects under the EDULINK Programmes third Call for Proposals

Title	Lead Partner*	No. of partners	Duration (MThs)	Average duration by region	Budget (Euro) EDULINK	Total Project budget	Partners contribution	Average contribution by region
PREPARE PHD	EA	4	36	36	484,180	571,372	87,192	118,801
CCAU	EA	4	36		470,033	552,980	82,947	
ERESA	EA	5	36		495,905	583,418	87,513	
ARIS	EA	5	36		499,558	717,108	217,550	
AFOM	Europe	4	24	29	420,682	494,920	74,238	195,895
Globalisation	Europe	11	24		340,355	420,056	79,701	
ICT4D	Europe	7	24		447,575	535,826	88,251	
Excellence PhD research	Europe	3	36		485,911	598,111	112,200	
Value-lead	Europe	2	36	36	489,691	695,489	205,798	87,521
Internationalisation	Europe	14	24		459,753	554,431	94,678	
Scientific excellence network	Europe	4	36		500,000	1,216,400	716,400	
Research Capacity	SA	2	36		319,550	407,071	87,521	
Economic PhD	WA	5	36	36	500,000	750,103	250,103	279,381
Master	WA	3	36		497,501	806,160	308,659	
Complimentaire	WA	3	36		497,501	806,160	308,659	
FSUWI	WI	7	24	24	430,619	521,394	90,775	90,775

Average

5.33

*EA- Eastern Africa; SA- Southern Africa; WA- West Africa; WI- West Indies

Information communication technologies, research networks and research effectiveness

Massive structural investments and the rapid changes in information communication technologies (ICT) in Africa are instructive and allow for increased networking and partnership opportunities. By mid-2010 90% of all African telephone subscribers were mobile users, with landlines largely abandoned. Africa has a mobile penetration of 80% of its population and internet use has increased 80-fold since 2002. However, internet services remain expensive and less reliable than in the north.

Improved internet availability for African NARS researchers has not translated into increased research effectiveness for various reasons. Firstly, south-south cooperation aligned to strategic visions has been slow due to limitations in level and duration of funding. African institutions have been weak at initiating partnerships across countries within the confines of their own public resources. Sub-regional organisations (SROs) such as the Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA), Center for the Coordination of Agricultural Research and Development in Southern Africa (CARDESA) and West and Central African Council for Agricultural Research and Development (**CORAF/WECARD**) have facilitated networking and contributed to strengthening in-country capacity and inter-regional capability to identify and undertake multi-country research. Together with SROs, the regional economic communities have, in some cases, provided policy support and facilitated processes to improve the availability of research products such as improved seed and planting material that can easily be traded within a region. However, this has also primarily been driven by external funding. Secondly, Africa is split into Portuguese, Francophone and Anglophone blocs, based on colonial relationships, making it easier for NARS researchers to link directly with northern partners than some southern partners for cultural and linguistic reasons. Effectively managed and strategic partnerships can achieve high impact, but ineffectively managed projects can distract from core responsibilities and research undertakings, with considerable time spent at partnership events. Researchers in Africa recognise the importance of multi-stakeholder partnerships, but are constrained in developing and sustaining balanced partnerships without development partners' funding support.

NARS staffing and implications for partnerships

Capacity of NARS in Africa is weak. Pardey and Beintema (2001) showed that agricultural research resource stock, as a proportion of value of agricultural output, was over 12-fold greater in the USA than in Africa. Partnerships across institutions that vary greatly in capacity – in skills, financial and human resources and incentives – are often weak (Lele *et al.*, 2010). Research initiated without adequate groundwork in the target beneficiary country may make long-term sustainable impacts less likely. This impacts decision making, team leadership, incentives and credit for the results. The 'team' may need to change composition depending on the particular challenge being faced. Initially, teams may agree to tackle a broad problem such as tapping into a market for a commodity, but other challenges (some new, some outside the understanding of team members) may emerge, requiring team changes. In unbalanced partnerships, such changes result in further marginalisation of African partners. Innovation brokers have been suggested to support and balance multiple actors in research partnerships.

African NARS institutions are understaffed. India (with a population of 1.27 billion) had 16,500 full-time equivalents (FTEs) in 2003 compared with 12,120 and 5,376 in 2008 for entire sub-Saharan Africa and Brazil, respectively (Beintema and Stads, 2011). Often, one African researcher works across several programmes and commodities: i.e., a breeder often has responsibility for a range of crops that in advanced institutions would involve many breeders. In addition, African researchers lack the necessary teams (of breeders, pathologists, entomologists, agronomists etc.) to enhance their breeding work for most crops. Many crops, usually those unimportant in the north, such as cowpea (*Vigna unguiculata*) or fonio (*Digitalis exilis*) are under-researched. Although various capacity-building programmes, including those of Regional Universities Forum for Capacity Building in Agriculture (RUFORUM), African Centre for Crop Improvement and West Africa Centre for Crop Improvement have striven to enhance PhD training in Africa, attrition and other factors keep numbers low. Secondly, the weak capacity of technicians at research institutions, often lacking relevant training, particularly for use of efficient research tools, slows progress. Thirdly, research infrastructure cannot support high-quality research in many institutions and public sector investment is inadequate. Incentives systems could be improved.

Non-research actors in research partnerships

Non-research actors include many stakeholder groups (private, public, civil society organisations), and are often thought to overlook the importance of research for improving efficiency of their processes. However, the International Research Institute for the Semi-Arid Tropics' (ICRISAT) partnership with the National Smallholder Farmers Association in Malawi (NASFAM) highlights the importance of research based on the demands of non-research actors. Although groundnut and other legumes have previously been grown in Malawi, challenges with yields, management and aflatoxin contamination had limited exports. Farmers depended on maize and tobacco for food security and incomes. ICRISAT, NASFAM and Twin Trade (Private sector firm of a farmer's cooperative in the United Kingdom) developed a partnership in the early 2000s. ICRISAT through research developed improved groundnut varieties with market-preferred traits and disease resistance. ICRISAT shared knowledge on management technologies such as appropriate plant spacing and aflatoxin quantification and management technologies. ICRISAT's low cost ELISA (enzyme-linked immunosorbent assay technology) was used to reduce aflatoxin quantification costs (to close to \$1 per sample) and enhance access.). As a result, Malawi groundnut producers belonging to NASFAM sold products into markets in Europe, particularly the UK, at a higher price. In addition, farmers have benefitted from eating nutritious groundnuts. In 2005, Mchinji Smallholder Farmers' Association (MASFA), an association of NASFAM, initiated marketing their groundnuts, which are now available in UK supermarkets. The premium earned by MASFA farmer members has been paid back to farmers. In addition, the association has taken part in social responsibility with increased incomes, including building structures at hospitals.

According to Dyborn Chibonga, CEO of NASFAM, 'MASFA is using the premiums collected from the fair-traded peanuts to build buying centres and NASFAM would like to see the partnership with ICRISAT continue. ICRISAT has helped us with varieties; new seeds and we are now interested in enlarging the partnership with other legumes, including pigeon peas.'

Conclusion

Partnerships are critical for harnessing available knowledge and ideas to enhance research priority setting, implementation and output, increase effectiveness and sustain agricultural innovation.. Researchers in Africa have difficulty developing and sustaining balanced partnerships in the absence of reliable sources of long-term funding. Many African NARS have limited institutional capacity to effectively drive and lead partnerships. African governments and financial institutions working in collaboration with development partners are encouraged to contribute to strengthening north-south and south-south partnerships through targeted programmes and favorable funding mechanisms and conditionalities that allow African institutions to build capacity and negotiate greater leverage in areas where they have comparative advantage .

References

- Anderson, R.J. and Feder, G. 2004. Agricultural Extension: Good Intentions and Hard Realities. *The World Bank Research Observer* 19 (1): 41 –60.
<http://documents.worldbank.org/curated/en/2004/12/17554248/agricultural-extension-good-intentions-hard-realities> [accessed 5 December 2013]
- Beintema, N.M. and Stads, G.J. 2011. African Agricultural R&D in the New Millennium: Progress for Some, Challenges for Many. IFPRI, Washington, D.C., USA.
<http://www.ifpri.org/sites/default/files/publications/pr24.pdf> [accessed 5 December 2013]
- Byerlee, D. and Alex, G.E. 1998. Strengthening national agricultural research systems. Policy issues and good practice. World Bank. Washington, D.C., USA

- Hazell, P., Haggblade, S., Kirsten, I. and Mkandawire, R. 2004. African agriculture: Past performance, future imperatives. 2020 Focus 12, Brief 1. IFPRI, Washington, D.C., USA.
http://www.ifpri.org/sites/default/files/publications/focus12_01.pdf [accessed 5 December 2013]
- Lele, U., Pretty, J., Terry, E. and Trigo, E. 2010. Transforming Agricultural Research for Development. Report for the Global Conference on Agricultural Research (GCARD) 2010. Global Forum on Agricultural Research (GFAR), Rome, Italy.
<http://www.egfar.org/content/transforming-agricultural-research-development-report-gcard-2010-global-author-team> [accessed 5 December 2013]
- Lynam, J. and Elliott, H. 2004. Organizing agricultural research: Fitting institutional structure to the research agenda. In Ndiritu, C., Lynam, J.K. and Mbabu, A.N. eds., Transformation of agricultural research systems in Africa: Lessons from Kenya. Michigan State University Press, Ann Arbor, Michigan, USA. pp. 145-169.
- Manyika, J., Cabral, A., Moodley, L., Yeboah-Amankwah, S., Moraje, S., Chui, M. et al. 2013. Lions go digital: The Internet's transformative potential in Africa. The McKinsey Global Institute, Johannesburg, South Africa.
http://www.mckinsey.com/insights/high_tech_telecoms_internet/lions_go_digital_the_internets_transformative_potential_in_africa [accessed 5 December 2013]
- Mbabu, A.N., Matt, D., Curry, J. and Kamau, M. 2004. Evolution of Kenya's agricultural research systems in response to client needs. In Ndiritu, C., Lynam, J.K. and Mbabu, A.N. eds., Transformation of agricultural research systems in Africa: Lessons from Kenya. Michigan State University Press, Ann Arbor, Michigan, USA.
- Pardey, P.G. and Beintema, N.M. 2001. Slow Magic: Agricultural R&D a Century After Mendel. IFPRI, Washington, DC, USA.
<http://www.ifpri.org/sites/default/files/publications/fpr31.pdf> [accessed 5 December 2013]