

Research Application Summary

**Developing capacity for change of students and staff in Higher Education to
enhance the potential of innovation in agriculture**

Ekong, J.¹, Nichterlein, K.², Grovermann, C.², Moussa, A.S.² & Hawkins, R.¹

¹International Centre for development oriented Research in Agriculture (ICRA), Lawickse Allee 11,
6701AN Wageningen, The Netherlands

²Research and Extension Unit, Food and Agriculture Organization of the United Nations (FAO),
00153 Rome, Italy

Corresponding author: Julia.Ekong@icra-edu.org

Abstract

There is a compelling need to transform Africa's agriculture as embodied in the aspirations of the Comprehensive African Agriculture Development Programme (CAADP). To achieve broad-based improvements in agricultural productivity, competitiveness and markets, there must be functional agricultural innovation systems (AIS) to spawn innovations. The AIS perspective recognizes complexity inherent in the agricultural landscape and that the desired changes in the sector are necessarily emergent - the outcome of dynamic interactions among the network of actors. Recognizing patterns of interaction and underlying structures that shape emergent patterns of system behaviour is a precondition to strengthening the AIS. Regional assessments of innovation systems in sub-Saharan Africa were undertaken by the Tropical Agriculture Platform (TAP) and its partner Forum for Agricultural Research in Africa (FARA) in 2013. These assessments revealed that although universities and other tertiary agricultural education institutions could and should contribute to agricultural innovation (through research, involvement in policy dialogues and capacity development), they do not fulfil these roles because they are: a) insufficiently connected to local agricultural sector actors, b) lack the resources and capacities to fully operationalize training for agricultural innovation systems (AIS); and c) hardly embed in national innovation strategies which consider the role of and accordingly fund higher education and research. The Tropical Agriculture Platform advocates for more coherent, efficient and coordinated AIS capacity development (CD) interventions that address individual, organisational and institutional capacity needs. This strategy requires improving the capacity of institutes of higher education and research to become active and relevant players in the AIS process. This paper presents the common framework on CD for AIS developed by TAP and points to the relevance of meta-learning and the importance of "functional capacities", if higher education institutions and their graduates are to become active players in the agricultural innovation system. The Framework was developed through an inclusive, participatory and multi-stakeholders approach with contributions by TAP Partners, including FARA and the Global Conference on Higher Education and Research in Agriculture. The Common Framework consists of a conceptual background document, a synthesis paper and a guidance note on operationalization of the

Framework. In January 2016, TAP partners approved this Common Framework which is now being applied in eight countries in Africa (4), Asia (2) and Central America (2) with support of the EU-funded Capacity Development for Agricultural Innovation Systems (CDAIS) project, jointly implemented by AGRINATURA and FAO in collaboration with local partners from 2015 to 2018.

Key words: Agricultural innovation systems, AGRINATURA, capacity development, meta-learning, tropical agricultural platform

Résumé

Il existe un besoin impérieux de transformer l'agriculture africaine incarnée dans les aspirations du Programme Détaillé de l'Agriculture Africaine de Développement (Comprehensive African Agriculture Development Programme (CAADP)). Pour obtenir des améliorations à large échelle de la productivité agricole, la compétitivité et les marchés, il doit y avoir des systèmes d'innovation agricoles fonctionnels (AIS) pour créer les innovations. La perspective d'AIS reconnaît la complexité inhérente dans le paysage agricole et que les changements souhaités dans le secteur sont nécessairement émergents - le résultat d'interactions dynamiques entre le réseau d'acteurs. La reconnaissance des modèles d'interaction et des structures sous-jacentes qui fondent les modèles émergents de comportement du système sont une condition préalable au renforcement de l'AIS. Les évaluations régionales des systèmes d'innovation en Afrique sub-saharienne ont été entreprises par la Plate-forme d'agriculture tropicale (TAP) et son partenaire, le Forum pour la Recherche Agricole en Afrique (FARA) en 2013. Ces évaluations ont révélé que, bien que les universités et les autres établissements d'enseignement supérieur de l'enseignement agricole pourraient et devraient contribuer à l'innovation agricole (grâce à la recherche, à la participation à des dialogues politiques et au renforcement des capacités), ils ne remplissent pas ces rôles parce qu'ils sont: a) insuffisamment reliés aux acteurs locaux du secteur agricole, b) manque des ressources et des capacités pour opérationnaliser pleinement la formation des systèmes d'innovation agricole (AIS); et c) à peine intégré dans les stratégies nationales d'innovation qui considèrent le rôle, et donc le financent de l'enseignement supérieur et de la recherche. Le Plateforme Agricole Tropicale milite pour un développement plus cohérent, efficace et coordonné de la capacité de développement d'AIS (CD), des interventions qui portent sur les capacités des besoins individuels, organisationnels et institutionnels. Cette stratégie exige l'amélioration de la capacité des établissements d'enseignement supérieur et de la recherche à devenir des acteurs actifs et pertinents dans le processus AIS. Ce document présente le cadre commun sur CD pour l'AIS, développé par TAP et souligne la pertinence de méta-apprentissage et l'importance des «capacités fonctionnelles», si les établissements d'enseignement supérieur et leurs diplômés veulent devenir des acteurs actifs dans le système d'innovation agricole. Le Cadre a été élaboré grâce à une approche globale, participative et multi-parties prenantes avec des contributions de Partenaires TAP, dont le FARA et la Conférence Mondiale sur l'Enseignement Supérieur et de la Recherche en Agriculture. Le cadre commun se compose d'un document de base conceptuelle, d'un document de synthèse et d'une note d'orientation sur la mise en œuvre du cadre. En Janvier 2016, les partenaires de la TAP a approuvé ce cadre commun

qui est maintenant appliquée dans huit pays en Afrique (4), Asie (2) et en Amérique centrale (2) avec le soutien de l'UE-finance par le projet du Développement des Capacités pour les Systèmes d'Innovation Agricole (CDAIS), mis en œuvre conjointement par AGRINATURA et de la FAO, en collaboration avec des partenaires locaux de 2015 à 2018.

Mots clés: les systèmes d'innovation agricole, AGRINATURA, le développement des capacités, la méta-apprentissage, la plate-forme agricole tropicale

Introduction

Innovation. In the face of a changing climate and degrading natural resources, the challenges in food and agriculture are increasingly complex and agricultural development depends on innovation, widely recognized as a major source of improved productivity, competitiveness and economic growth throughout advanced and emerging economies. Innovation plays a key role in contributing to the CAADP ambitions and achieving the Sustainable Development Goals (SDGs) of ending poverty and hunger, achieving food security, improving nutrition and promoting sustainable agriculture. Innovation is an outcome of interactive learning (Leeuwis and Aarts, 2011), and it is a co-evolutionary process involving a wide range of actors combining not only technological but also social, organizational, economic and institutional changes (Klerkx *et al.*, 2012). Institutions of higher education and research can play an important role in this process, not only in developing new technologies and products, but also in instigating processes of change, promoting joint learning with stakeholders within the AIS, and promoting institutional and policy change.

Innovation processes need to be locally owned, responding to the needs and conditions of AIS stakeholders and to agro-ecosystems. Investments in agricultural innovation systems must be context specific, and respond to the stage of and vision for development in a particular country and agricultural sector. Given resource limitations, investments need to be assessed, prioritized, sequenced and tailored to the needs, challenges and resources that are present (World Bank, 2006). Many countries are not fully exploiting their innovation potential due to, among other limiting factors, the fact that institutions of tertiary education do not invest in the capacities, skills and institutional arrangements necessary to engage in multi-disciplinary and multi-stakeholder collaboration. They frequently lack the resources and a favourable and conducive enabling environment (e.g. policies, incentives, informal and formal institutions, markets, etc.) that would promote such collaboration.

The AIS perspective. The AIS perspective emphasizes that agricultural innovation is not only just about new technologies but also about institutional change resulting from complex, dynamic and multi-stakeholders process of interaction (Leeuwis and Aarts, 2011). For innovation to occur interactions among diverse stakeholders need to be open and to draw upon the most appropriate available knowledge (World Bank, 2006). Conceptually, the AIS, comprises four components: knowledge and education, business and enterprise, including small-holder farmers, bridging institutions, such as stakeholder platforms and advisory services, and the enabling environment, consisting of policies as well as practices, mindsets and attitudes. Innovation, in order to take off, requires the right mix of different actors, social mechanisms

and policies. As an endogenous process, it cannot rely only on spin-off from foreign research, but needs local capacities to generate knowledge and develop new technologies and business processes.

Capacity Development for AIS. ‘Capacity’ can be defined simply as ‘the ability of people, organizations and society as a whole to manage their affairs successfully’ (OECD, 2006). ‘Capacity Development’ can therefore be defined as ‘the process whereby people, organizations and society as a whole unleash, strengthen, create, adapt and maintain capacity over time’ (OECD, 2006). As with agricultural innovation, capacity ‘emerges’ over time, driven by multiple factors. No single element such as incentives, leadership, financial support, trained staff, knowledge or structure can alone lead to the development of capacity. But if capacity is understood as involving collective learning and adaptation to numerous opportunities and challenges, then it cannot be designed and implemented by external actors with a well-defined and standardized set of products and services. Accepting this fact calls for a fundamental change in our perception of capacity development – not just as a vehicle for results but a way of facilitating processes that enable stakeholders to seize opportunities, build trust and take joint action.

The concept of AIS not only calls for a shift in the roles of various actors in agricultural innovation, but also calls for innovative and systemic approaches to capacity development itself. Innovation cannot rely only on spin offs of foreign research, but needs endogenous capacities to generate, systematize, and adapt knowledge and to adopt and up-scale new practices. Academia and Research are therefore challenged to address these capacities, not just of their staff and students, but also as organisations and through the creation of an enabling environment of interactive, multi-disciplinary learning.

Capacity Development for AIS is an endogenous process, therefore ownership by local actors is paramount to its success. The collective energy, motivation and commitment of stakeholders to engage in a process of change are crucial. Capacity Development for AIS interventions thus need to go beyond improving immediate performance, and also develop the capacity to adapt to new and constantly changing environments, to learn and analyse the internal and external context, and to relate and build partnerships and pro-actively plan the future. Interventions must respond to the expressed needs of actors. Capacity Development for AIS is therefore not designed and implemented with a well-defined and standardized set of products and services, but is context specific and involves an iterative process rather than one-off time-bound intervention. The capacity needs of today will change tomorrow, based on experience gained in the face of new challenges or emerging opportunities. Capacity Development for AIS is a multi-dimensional and multi-actor process that goes well beyond the direct transfer of knowledge and skills at the individual level and addresses in an integrated manner organizational and institutional dimensions. Above all CD for AIS must enhance interaction, build trust and the create synergy between research institutions and public and private sector actors, smallholder farmers and development organizations to enable them to address a whole range of activities, investments and policies and avail opportunities to make change happen.

The Tropical Agriculture Platform. In 2012, the Tropical Agriculture Platform¹ (TAP) was created to promote the development of national capacities for agricultural innovation in the tropics with the aim of enhancing the overall performance of Agricultural Innovation Systems. A particular focus was placed on small- and medium-scale producers and enterprises in the agribusiness sector. In 2013, TAP undertook regional assessments of capacities for AIS in sub-Saharan Africa (Ojijo *et al.*, 2013), as well as Southeast Asia and Central America. These assessments identified the following constraints as limiting factors for the effectiveness of AIS: a) interventions to strengthen agricultural innovation systems are seldom designed and implemented in an integrated manner and consequently fails to capture the full complexity of innovation processes, b) capacity development interventions from internal and external actors are not sufficiently targeted to meet the AIS capacity needs of tropical countries, c) CD interventions are frequently implemented independently from each other, and are often too small in scale, narrow in scope, and neglecting institutional and organizational capacity dimensions, and d) there is a lack of high-level political and operational mechanisms to coordinate interventions for capacity development (Aerni *et al.*, 2015). Institutes of Higher Education and R&D are, amongst others, called upon to review how their teaching can create an understanding of AIS and address these capacity gaps.

The common framework for Capacity Development in AIS

Building upon the results of regional assessments, and with the objective to promote the development of national capacities for agricultural innovation in the tropics, TAP developed a “Common Framework on Capacity Development for Agricultural Innovation Systems². The objective of this Framework is to harmonize and coordinate the different approaches to CD in support of agricultural innovation, and promote optimal use of the resources of different donors and technical cooperation agencies.

The Framework promotes a shift of mind-set and attitudes among the main actors, and provides concepts, principles, methodologies and tools to better understand the architecture of AIS, to assess CD needs, and to plan, implement, monitor and evaluate CD interventions. It emphasizes the crucial role of facilitation, learning, documentation and knowledge management issues for enabling agricultural innovation, all of which should lead to more sustainable and efficient AIS (Tropical Agriculture Platform, 2016).

¹ For a full description of the Tropical Agricultural Platform membership, objectives, overall approach and plan of work, see <http://www.fao.org/in-action/tropical-agriculture-platform/>

² The Common Framework publications are available at:

- a. Conceptual background: <http://www.cabi.org/Uploads/CABI/about-us/4.8.5-other-business-policies-and-strategies/tap-conceptual-background.pdf>
- b. Guidance note: <http://www.cabi.org/Uploads/CABI/about-us/4.8.5-other-business-policies-and-strategies/tap-guidance-note.pdf>
- c. Synthesis document: <http://www.cabi.org/Uploads/CABI/about-us/4.8.5-other-business-policies-and-strategies/tap-synthesis-document.pdf>

The TAP Common Framework recognizes three dimensions of CD and their inter-connections: Individuals, Organizations and the Enabling Environment. Within the context of AIS, it is pertinent to stress the crucial importance of partnerships and networks in creating that inter-connected-ness, and in bringing together the three dimensions to create new knowledge. The Framework emphasizes the inter-dependent relationship between these dimensions as a way of strengthening 'system-wide' capacity.

Functional Capacities required

The Common Framework defines four key capacities required for AIS to perform effectively:

- (i) **Capacity to Navigate Complexity.** A shift in mind-sets, attitudes and behaviour to comprehend the larger system and to create an understanding of the whole system, as well as a shift from mainly reductionist understanding of the parts to systemic understanding of the relationships among the parts; viewing change as an emerging property that cannot be predicted or planned for in a linear fashion.
- (ii) **Capacity for Collaboration.** Enabling actors to understand each other's perspectives and managing conflicts, manage diversity in order to combine individual skills and knowledge, and create an awareness of their complementarity; and building synergetic partnerships and networks to enhance collaboration. It also involves communication skills and strategies, both internally and externally.
- (iii) **Capacity for Reflection and Learning.** Bringing stakeholders together, designing and leading processes of critical reflection and following a double-loop learning process leading to action and change. It requires respect for different opinions and an atmosphere of trust for those opinions to be voiced. It also requires a systematic tracking of processes and progress to enable reflection to take place. Interventions need to be sufficiently flexible and adaptable to changing conditions, and analysis undertaken in an iterative fashion so as to promote experimentation and adaptive capacities as new opportunities for learning emerge.
- (iv) **Capacity to Engage in Strategic and Political Processes.** Capacity Development for transformational change is inherently political, and involves questioning the status quo. Power relations need to be understood in a number of dimensions, including: economic interests; the balance of power among elites; and civil society-state relations. Understanding and influencing the politics and power relations between individuals, within organizations and of the wider society, is crucial for bringing about new forms of interaction among stakeholders. It includes the conscious empowerment of vulnerable and often marginalized groups.

These four capacities are the core of an overarching **Capacity to Adapt and Respond in order to Realize the Potential of Innovation**, shifting focus from reactive problem solving to co-creating the future. This requires facilitative leadership to enable all of the above to

happen. The five capacities, are interdependent and are relevant at each of the three dimensions of CD.

An operational approach to CD in AIS. The Framework proposes a cycle of five stages for implementing CD for AIS interventions: “Galvanizing Commitment”, “Visioning”, “Capacity needs assessment”, “CD strategy development” and “Implementation”. The Cycles will be substantially identical for each of the three dimensions (Individuals, Organizations and the Enabling Environment) although the actors involved and the methods used may vary. The cycle is proposed as a guide for contextualized action rather than as a blueprint for achieving effective CD for AIS. Country approaches may differ significantly in content and process according to context, opportunities, commitment and resources.

The practicalities of the proposed approach need to be piloted and the CD cycle further refined in the light of experience. But the key element common to all countries should be a systemic approach through dual pathways ensuring that all actors within the system have the opportunity to participate, to learn together and to formulate joint solutions.

Importance is given to skilled facilitators in the CD process, and it is vital that the process described by the cycle is accompanied by the identification and strengthening of individuals and organizations that can act as effective agents of change. They can be extension services, private consulting firms, university departments, capacity development organizations or NGOs.

Conclusions

There is large consensus within the international community about the fact that agricultural innovation is critically required for increasing agricultural productivity and reducing the environmental pressure on agricultural systems and, consequently, for meeting the internationally agreed goals. Nevertheless, the support provided to the AIS in least developed countries is quantitatively and qualitatively insufficient and erratic. Institutes of higher education need to improve their own capacities if they are to fulfil their own role, both as components within the AIS themselves, as well as providing for the future professionals working within those AIS.

The need for universities to adopt innovation systems thinking, promote “soft skills” (communication, teamwork, personal mastery), promote experiential and meta-learning, and work collaboratively with other players in the innovation system has long been recognised and often advocated for (e.g. Ison, 1990; Muir-Leresche, 2004; Hawkins *et al.*, 2006; Chakeredza *et al.*, 2008). The TAP emphasis on “functional capacities” as being fundamental for AIS, yet again reinforces these arguments. While there are documented constraints to universities adopting such changes (Hawkins, 2010), the alternative is that universities will not be able to play their full role in agricultural development.

Implications of a shift to Agricultural Innovation Systems thinking

From:	To:
Considering knowledge generation as a final objective	Using knowledge as a means to achieve change
Understanding of the component parts of agricultural systems (crops, livestock, markets, policies, etc)	A systemic understanding of the relationships between the different aspects of the Agricultural Innovation System
Focus on mainly 'hard systems analysis' (improving the mechanics and or efficiency of the system)	Balanced focus also o 'soft systems analysis' (negotiating the meaning of the system and desirable transformations with stakeholders involved)
Seeing participation as a question of consulting beneficiaries	Facilitating engagement for interactive learning between stakeholders, resulting in joint analysis, planning, and collective action
Working individually	Working with others, in constantly changing ad-hoc teams and partnerships
Teaching and/or being taught as an individual	Learning, learning through social processes, and learning how to learn
A culture of research and development (R&D) within organizations based on individual merit and competition	Collaboration and teamwork within and between organizations

Acknowledgement

This paper is a contribution to the 2016 Fifth African Higher Education Week and RUFORUM Biennial Conference.

References

- Aerni, P., Nichterlein, K., Rudgard, S. and Sonnino, A. 2015. Making Agricultural Innovation Systems (AIS) work for development in tropical countries. *Sustainability* 7(1): 831–850.
- Chakeredza, S., Temu, A.B., Saka, J.D.K., Munthali, D.C., Muir-Leresche, K., Akinnifesi, F.K., Ajayi, O.C. and Sileshi, G. 2008. Tailoring tertiary agricultural education for sustainable development in Sub-Saharan Africa: Opportunities and challenges. *Scientific Research and Essay* 3 (8):326-332.
- Food and Agricultural Organisation (FAO). 2010. Enhancing FAO's practices for supporting capacity development of member countries. Learning Module 1. FAO, Rome, Italy.
- Food and Agricultural Organisation (FAO). 2014. The State of Food and Agriculture. Innovation in Family Farming. FAO, Rome, Italy.

- Fuglie, K. and Wang, S. L. 2012. Productivity growth in global agriculture shifting to developing countries. *Choices – The Magazine of Food, Farm and Resource Issues* 27 (4).
- Hawkins, R., Booth, R., Chitsike, C., Twinamasiko, E., Tenywa, M., Karanja, G., Ngcobo, T. and Verschoor, A.J. 2009. Strengthening inter-institutional capacity for rural innovation: experience from Uganda, Kenya and South Africa. In: Sanginga, P., Waters-Bayer, A., Kaaria, S., Njuki, J. and Wettasinha, C. (eds). *Innovation Africa: Enriching Farmers' Livelihoods*. Earthscan.
- Hawkins, R. 2010. *Experiential learning, action research and outreach: A gap analysis*. RUFORUM, Kampala, Uganda.
- Ison, R. 1990. *Teaching threatens sustainable agriculture*. Gatekeeper Series 21, IIED, London.
- Klerkx, L., van Mierlo, B. and Leeuwis, C. 2012. Evolution of systems approaches to agricultural innovation: Concepts, analysis and interventions. In: Darnhofer, I., Gibbon, D. and Dedieu, B. (Eds.), *Farming systems research into the 21st Century: The New Dynamic*. Dordrecht, Springer.
- Leeuwis, C. and Aarts, N. 2011. Rethinking communication in innovation processes: Creating space for change in complex systems. *The Journal of Agricultural Education and Extension* 17 (1): 21 - 36.
- Muir-Leresche, K. 2004. Transforming university agricultural education. In: Temu, A., Chakeredza, S., Mogotsi, K., Munthali, D. and Mulinge, R. (Eds.), *Rebuilding Africa's capacity for agricultural development: the role of tertiary education*. ANAFE Symposium on Tertiary Agricultural Education, April 2003, Nairobi, pp. 420-432.
- OECD. 2006. *The challenge of capacity development: working towards good practice*. DAC Network on Governance, OECD, Paris, France.
- Ojjo, N.K.O., Jakinda, D.O. and Annor-Frempong, I. 2013. Assessment of current capacities and needs for institutional and individual capacity development in agricultural innovation systems. FARA, and FAO. Available online at http://www.tapipedia.org/sites/default/files/tap_fara_report_aug13_needs_assessment_africa_0.pdf
- Spielman, D. and Birner, R. 2008. *How innovative is your agriculture? Using innovation indicators and benchmarks to strengthen national agriculture and rural development*. Discussion Paper Vol. 41. Washington.
- Tropical Agriculture Platform. 2016. *Common Framework on Capacity Development for Agricultural Innovation Systems: Conceptual Background*. CAB International, Wallingford, UK.
- World Bank. 2006. *Enhancing agricultural innovation: how to go beyond the strengthening of research systems*. Washington, D.C.: World Bank.