LANSA
Leveraging Agriculture for Nutrition in South Asia

Convergence on Nutrition in Agricultural Systems of Innovation: Concepts and Methods, with Examples from Pakistan

Volume 2014 No 01

Michael Loevinsohn[1] and Rashid Mehmood [2]
October 2014

UKaid
from the British people

COLLECTIVE FOR SOCIAL SCIENCE RESEARCH

IDS Institute of Development Studies

[1] Institute of Development Studies, Brighton, UK
[2] Collective for Social Science Research, Karachi, Pakistan

Contents

About this paper

This paper seeks to introduce the systems of innovation concept, one of LANSA's three cross-cutting themes, but not yet well understood by many of its partners and stakeholders. The origins of the concept and the need it was seen to fill will be described. The paper will illustrate the relevance of a system of innovation perspective and the notion of "convergence on nutrition" to LANSA's objectives using examples from on-going work in Pakistan. It is intended as a living document: revisions will describe insights from the completed Pakistan study and related work elsewhere in LANSA and beyond. Feedback on our approach from partners, stakeholders and colleagues outside LANSA will help us enrich the work.

The authors are grateful for the comments and support of CSSR colleagues, Haris Gazdar Mysbah Balagamwala and Samar Zuberi.

About LANSA

Leveraging Agriculture for Nutrition in South Asia (LANSA) is an international research partnership. LANSA is finding out how agriculture and agri-food systems can be better designed to advance nutrition. LANSA is focused on policies, interventions and strategies that can improve the nutritional status of women and children in South Asia. LANSA is funded by UK aid from the UK government. The views expressed do not necessarily reflect the UK Government's official policies. For more information see www.lansasouthasia.org

List of Abbreviations

AKIS	Agricultural Knowledge and Information System
NARS	National Agricultural Research System
PDS	Public Distribution System
RTI	The Research and Training Institute for Livestock Development
SoI	Systems of Innovation

1 Background

This paper seeks to properly introduce the concept of systems of innovation (SoI) to LANSA partners and stakeholders. Innovation systems is one of the three cross-cutting themes in the project, along with gender and fragility, yet it is evident that many partners do not have a clear sense of what it entails – not surprisingly because it is only in the last 10-15 years that the concept has been taken up, and still not widely, within agriculture. Even less is there appreciation by partners of the relevance of the concept to LANSA's objectives. The paper will seek to show the usefulness of the concept, using examples from on-going work in Pakistan.

The paper first briefly sketches the origins of the system of innovation concept and the need it was seen to fulfil in agriculture. It then illustrates the different ways it has been employed as a framework to explain how change in agricultural practices and outcomes happens and is sustained. At its heart is "innovation", which can be understood both as an outcome – a new or improved product, process or organizational form (Niosi et al., 1993) – and as the process by which innovations are generated. The SoI concept focuses on the systemic nature of that process. A system of innovation can be defined as:

"...a network of organizations, enterprises, and individuals focused on bringing new products, new processes, and new forms of organization into economic use, together with the institutions and policies that affect their behaviour and performance. The innovation systems concept embraces not only the science suppliers but the totality and interaction of actors involved in innovation. It extends beyond the creation of knowledge to encompass the factors affecting demand for and use of knowledge in novel and useful ways" (World Bank, 2007).

Key here, and contrasting with other accounts of the development, movement and application of ideas in agriculture, the SoI concept recognizes that all these actors are capable of innovation, that this is not just the purview of research and that actors relate to one another in more than a passive or hierarchically determined fashion: interactive learning is central to the functioning of SoI. Also important is the notion of a shared direction or coherence to actors' innovations.

This paper is concerned with the extent to which the direction of innovation in agricultural SoI furthers nutrition objectives, what will be referred to as their convergence on nutrition. Convergence, like the degree of coherence in actors' innovations and the interactive nature of their relationships are a matter of degree, amenable to assessment and, we suggest, subject to influence by carefully designed interventions.

2 The landscape of nutrition-relevant innovation in agriculture

The convergence of agricultural innovation systems on nutrition concerns is central to LANSA's aims and its approach. The Consortium's purpose is to answer the question: "How can South Asian agriculture and related food policies and interventions be designed and implemented to increase

their impacts on nutrition, especially the nutrition status of children and adolescent girls". For this, it is crucial to understand where in relation to nutrition concerns agricultural organizations and networks of organizations are currently active. Three facets of convergence can be recognized that are relevant to LANSA's objectives:

- Are there SoI that, without consciously aiming to do so, are possibly having a significant effect on the food-linked drivers of malnutrition? They might be focused on other concerns such as household food security or adaptation to climate change and working to ensure that nutritionally vulnerable groups are able to access these innovations. Yet in a context of generally poorly expressed demand for nutrition in the agricultural sector, the importance of this work may not be appreciated. The priority then is to clarify and assess what these SoI are doing and the impact on nutrition that they are having, raising awareness and charting opportunities to build on their work.

- Are there SoI that, with relatively small changes in direction could have a much greater effect on the drivers of malnutrition than they do currently? It is important in such cases to clarify what technical or institutional innovation would be required to have the desired impact and to assess what is standing in the way – the obstacles related to understanding, incentives, interests and resources. Of course, while "relatively small" changes in direction may be required, this does not mean that they will necessarily be easy to bring about.

- Are there SoI that are active on topics close to those of our Pillar 2 and 3 projects? If partners responsible for these projects are not yet aware of these networks and in touch with their members, building closer relationships can improve the prospects for mutual influence: helping us better align our work with what others are doing and ensuring that our findings are readily accessible to those who can make good use of them. As will become clearer below, the relationship between SoI and value chains, the particular concern of Pillar 2, is close.

This landscape of innovation systems is also key to how LANSA expects to have impact. Our theory of change is centred on our work influencing agricultural and other sector actors: "Policy and practice communities incorporate new knowledge into discourse, attitudes and behaviours". Whether they will or not is at least in part related to convergence, to the opportunities to contribute to alleviating malnutrition that they recognize and that our work can help to bring into focus. It is likely through the SoI that these practice communities are part of and which the policy communities support and influence that LANSA will itself contribute to reducing malnutrition.

3 Why "system of innovation"?

The system of innovation framework builds on and goes beyond earlier understandings of the relationship between science, technology and agricultural change. Table 1 sketches the distinctions with the two most widely known precursors, the National Agricultural Research System (NARS) and the Agricultural Knowledge and Information System (AKIS).

The NARS concept emerged in the 1970's when Green Revolution technologies in rice, wheat and maize, spearheaded by international and national research, were expanding rapidly in many Asian and

Latin American agricultures. However, adoption and impact were very unequal: the more risk-prone, rainfed agricultural zones of these countries and entire countries, especially African, saw few benefits. The NARS concept was invoked to explain these different outcomes and to suggest interventions to address them. It focused attention on the strength of national research organizations and of their links with international research institutes and with national agricultural extension and education providers (Sumberg, 2005, Otsuka and Kalirajan, 2006). The relationship with farmers, the intended users of new technologies, was essentially linear and uni-directional, cast in terms of supply.

By the 1980's, problems with the NARS model were becoming widely evident. Technologies developed by formal research and propagated by extension agencies were often poorly suited to the diverse bio-physical, economic and social environments that farmers worked in. Two-way flows of information that could feed this information back to research and provide the essential demand side to research direction-setting were absent in the theory and too often in practice. As well, the reality of invention and adaptation of technology – both in its institutional and technical aspects – led by farmers and other actors found little place in the NARS model.

Röling (1990) defined the Agricultural Knowledge and Information System as "a set of agricultural organizations and/or persons, and the links and interactions between them, engaged in such processes as the generation, transformation, transmission, storage, retrieval, integration, diffusion and utilization of knowledge and information, with the purpose of working synergistically to support decision making, problem solving and innovation in a given country's agriculture or a domain thereof." In this formulation, the framework has much in common with the SoI concept. However as Spielman and Birner (2008) note, the AKIS was often interpreted in a narrower sense, reduced to a research- farmer-extension triangle. Also little emphasized in the model was the role of consumers and processing and marketing actors as innovators and sources of demand on technological development (Ugbe, 2010).

The systems of innovation concept was first applied to developing country agriculture in the mid-1990s (Hall and Clark, 1995). It responded to several developments, including the increased role of markets as drivers of technological change, the widening range of research providers and funders and the quickening pace of agro-ecological and economic change that was calling forth responses from all actors. The concept emerged in the 1940's and, beginning in the 1980s, was employed to understand variation among countries in the rate and quality of innovation, seen as the foundation of economic growth (Lundvall, 1992). It was applied to a range of sectors – manufacturing transport, energy, health – and one of the attractions of SoI for people working in agriculture was that it linked them organically with other areas of economy and society.

Table 1 Frameworks of science, technology and agricultural change

Defining feature	**NARS: National Agricultural Research System**	**AKIS: Agricultural Knowledge and Information System**	**AIS: Agricultural Innovation System**
Purpose	Strengthening the capacity for agricultural research, technology development, and technology transfer	Strengthening communication and knowledge delivery services to people in the rural sector	Strengthening the capacity to innovate throughout the agricultural production and marketing system
Actors	National agricultural Research organizations, Agricultural universities or faculties of agriculture, extension services, and farmers	National agricultural research organizations, Agricultural universities or faculties, extension services, farmers, NGOs, and entrepreneurs in rural areas	Potentially all actors in the public and private sectors involved in the creation, diffusion, adaptation, and use of all types of knowledge relevant to agricultural production and marketing
Outcome	Technology invention and technology ransfer	Technology adoption and innovation in agricultural Production	Combinations of technical and Institutional innovations throughout the production, marketing, policy research, and enterprise domains
Organizing principle	Using science to create new technologies	Accessing agricultural knowledge	New uses of knowledge for social and economic change
Mechanism for innovation	Technology transfers	Knowledge and information exchanges	Interactive learning
Role of Policy	Resource allocation, priority setting	Enabling framework	Enabling framework; an integrated component
Nature of capacity strengthening	Strengthening infrastructure and human resources for scientific research	Strengthening communication between actors in rural areas	Strengthening interactions between actors; creating an enabling environment

Adapted from Spielman and Birner (2008) and World Bank (2007)

4 The uses of systems of innovation

In what follows we draw primarily on South Asian examples to give a sense of the range of purposes the SoI framework has been applied to, the scales of analysis and the methods[3] that have been used.

Spielman and Birner (2008) propose a set of national level indicators of the state and performance of science and technology deployed for agricultural innovation. These are both quantitative and qualitative and broader in scope than those that have been collected to assess NARS, including, for example, the quality of interactions among actors in a specific value chain related to product and process innovation and the share and quality of extension services that are based on collaborations among innovation system actors. Beyond providing a basis for inter-country comparison, these indicators could be used to suggest where capacity enhancement is most needed to improve performance. However, to our knowledge there has not yet been any concerted attempt to measure these indicators.

The SoI framework has been used most often to analyse case studies of innovation processes in specific areas and farming systems, primarily using qualitative methods. An example is the research, refinement and spread of post-harvest technologies among small-hold vegetable framers in Himachal Pradesh (Clark et al., 2003). The study draws attention to the continuing innovation and interactive learning that involved the Indian Institute of Management, a local NGO, farmer networks and commodity traders locally and in Delhi and the national NGO which played a catalytic role. The authors claim that the project succeeded in strengthening the innovative capacity of actors, an outcome that they say survived the withdrawal of donor support.

A number of researchers have used the SoI framework to compare case studies of institutional change. Hall et al. (1998) examine experiences in India with the development of public-private partnerships in research and in the opening up of new markets for horticultural products (Hall et al., 2001), some more, some less successful. Both sets of case studies highlighted needs for policy reform and, again, for interactive learning. A key lesson the authors draw is that the technological processes that eventually led to economic benefits for farmers were a dynamic process that required institutional flexibility, including the ability to form, dissolve and, in one case, reform partnerships.

Brooks and Loevinsohn (2011) consider the characteristics of SoI that are likely to enable them to sustain food security in situations of rapid climatic and socio-economic change. They propose four key features: (i) support for the multi-functionality of agriculture and for opportunities to achieve multiple benefits; (ii) providing farmers access to diverse technological options, enabling flexibility and resilience; (iii) enhancing the capabilities of decision makers at all levels; and (iv) continuity of effort aimed at securing the well-being of those who depend on agriculture. The authors assess and compare three agricultural SoI in relation to these features: maize in southern Africa, rice in Southeast Asia and watershed development in India.

In a series of publications, Raina and colleagues (Raina et al., 2009, Raina and Vijay Shankar, 2011) employ the SoI framework to examine the origins of what they contend is the longstanding exclusion

[3] Spielman et al (2009) provide a useful review of methods that have been used in agricultural SoI studies.

of millions of rural poor in India from agricultural development gains. This exclusion encompasses the drylands where many of them live, the diverse crops and cropping systems they exploit and the small farms they manage. They trace this exclusion through two key components of the Indian agricultural SoI: (i) the centralization of formal research and development and its focus on technology based on irrigation and intensive use of bio-chemical inputs, and (ii) the very limited access by small farmers to relevant information through extension and training. They note the emergence of parallel and often poorly visible SoI at local and state level that are largely unsupported by national policy and underfinanced. Strategies to reverse exclusion must take account of its deep institutional foundations. They see the best prospects for reform being initiated at state level where achieving a focus on the predominant crops of small farmers and local and regional market opportunities is more feasible and where interactive learning among actors more readily realized (Raina et al., 2009). The implications of this exclusion for the persistence of malnutrition are likely significant but the authors have not drawn them out in these studies.

The Timbaktu Collective (2004) enlisted the SoI framework to trace the expansion and subsequent collapse of groundnut monoculture in Anantapur, a dryland district in Andhra Pradesh, and to explore the potential for diversification with millets. The Collective had been researching the agronomic and ecological advantages of re-introducing millets to local farming systems and used the framework to map SoI actors who could provide the key functions, including marketing and processing. Achieving substantial impact from diversification required addressing the market advantage that rice enjoyed, due notably to its heavily subsidized provision by the Public Distribution System. A pilot PDS in the district in 2009, financed by the World Bank and supported by local government, procured millets from farmers at guaranteed prices. There was a rapid increase in millet production and consumers responded favorably when the grain was sold at a price competitive with that of rice (Sakkhari, 2009).

The Collective's researchers were very much aware of the potential nutrition benefits from diversification with millets and included a nutrition research institute in the actor mapping. In 2004, the institute appeared to be entirely isolated from the agricultural actors. Improving that situation was among the interventions the Collective proposed. Their perspective is well aligned with our concept of convergence on nutrition.

5 Agricultural systems of innovation converging on key nutrition concerns in Pakistan

The work currently underway in Pakistan addresses the following questions:

- Can systems of innovation – clusters of innovative activity within the country's agriculture – be identified that are now having or could have, with relatively small changes in direction, a significant beneficial effect on nutrition?
- What are the constraining and enabling influences on such nutritionally-relevant innovation?
- What support or incentives are required to encourage further convergence in these SoI and to enable them to make a substantial contribution to nutrition and the alleviation of specific nutritional deficits?

6 Methodology

We are following a seven step process:

6.1 Identify priority areas

We began by defining priority areas as topics and/or geographical areas where agricultural innovation appears likely to have the greatest potential for alleviating malnutrition. In this we drew on the Pakistan Evidence Paper (Balagamwala and Gazdar, 2013), the stakeholder interviews and other sources. We expect to refine the identification as we learn more from our respondents.

The Evidence Paper highlights a number of trends and patterns in the relationship between agriculture and nutrition:

- Rates of stunting and underweight among children are high and increasing in some parts of the country. They are inversely related to wealth;
- Prevalence of anemia and vitamin A deficiency is increasing in women and children;
- Calorie consumption is positively related to wealth and access to land;
- Land ownership is highly skewed with substantial rates of rural landlessness and near landlessness;
- Women are an increasing proportion of the agricultural workforce but mostly as unpaid family labour;
- Rural areas with low levels of income from non-agricultural sources often have high rates of malnutrition;
- Rainfed areas are vulnerable to drought and are among the poorest in the country.

The Evidence Paper's assessment of agriculture-nutrition pathways and disconnects notes that the (near) landless are largely deprived of direct access to food through self-provisioning (and only partially recover this access if they are able to rent in land). Dependent mostly on the market for their food, they are vulnerable to seasonal swings in price which those with land are, to some extent, able to buffer through on-farm storage. One of our informants in the stakeholder interviews stated that the expansion of commercial dairy and poultry production had displaced local small-scale production, limiting access by the rural poor to nutrient-rich products such as eggs and yoghurt, an issue which we will follow up with other informants.

Patriarchy and unequal gender relations, the Evidence Paper asserts, impose unequal burdens on women in childcare, food preparation and other household tasks and restrict their access to off-farm and non-agricultural income, which limits their influence on the household's decision making. Women's ability to take account of nutrition in household decisions affecting production, consumption and care is further limited because their access to relevant information is, again, restricted by unequal gender relations.

We identified the following as priority areas:

Innovation (especially by organizations in networks), involving small farmers (especially women and the (near) landless) to improve:

a) Access to seed of diverse crops (especially micronutrient-dense crops and varieties);
b) Access to crop and land management technologies;
c) Access to reliable and affordable irrigation (e.g. canal, groundwater, rainfall capture, rehabilitation of local systems);
d) Access to livestock e.g. poultry, sheep, goats, cattle and their nutrient-dense products;
e) Access to information and ideas on the above topics and others, such as the kitchen garden concept via e.g. radio, group-based extension/field schools, village theatre;
f) Income earning opportunities e.g. in marketing or processing of agricultural products;
g) Access, in all seasons, to food, income and protection from infection through e.g. water and soil management, environmental e.g. watershed management, dry season employment options, improved sanitation;
h) Opportunities in terms of the above in areas where food insecurity is concentrated e.g. rainfed areas, areas prone to soil salinity, waterlogging or flooding.

6.2 Identify candidate SoI

We are currently interviewing informants involved or familiar with the agricultural sector to identify SoI active in or near these priority areas.

6.3 Select SoI

We intend to select 4-6 of these SoI for intensive study, based on 3 criteria:

- Proximity of activities to priority areas;
- Dynamism e.g. evidence of constructive interaction leading to innovation by farmers, and;
- Potential for impact on nutritional concerns e.g. actors' willingness to consider changes that would increase this impact; the feasibility of these changes; potential to scale up.

6.4 Interview major actors

We will identify and interview the major actors in each of the selected SoI to build up a description of how it has developed, its geographic focus, and the nature and extent of actors' innovations. We will map and characterize the relationships between actors. With actors individually and, where possible, collectively, we will explore opportunities for and constraints to furthering nutritionally-relevant innovation.

What might be done, for example, to:

- Improve access to and consumption of food that satisfies the nutritional needs of all, in lean seasons and hard years;
- Support care, and better informed care, and;
- Contribute to a healthier environment?

What factors (e.g. capacities, attitudes, policies, entrenched interests) constrain such innovation? What factors (e.g. better information on nutrition, collaboration with nutrition partners, institutional incentives) might enable it?

6.5 Identify and interview potential nutrition partners

We will seek out already identified or potential nutrition partners to assess their understanding of the issues the SoI are engaged with, perceptions of their importance, and estimation of the opportunities for collaboration.

7 Early results

We have so far (August 2014) interviewed 8 informants from Sindh, 2 from the Agricultural Research Institute, 3 from the Livestock Department, one from the Directorate of Agricultural Extension and Information and 2 farmers (small and medium). Besides testing our interview instruments and methods, our principal concern at this point is to identify SoI that are active in or near the priority areas and are candidates for intensive study (step 2).

Two SoI can tentatively be identified:

7.1 Kitchen gardens

Several organizations in Sindh are working to provide women farmers with information on the kitchen garden concept and key inputs. In the state sector, the Agricultural Training Institute of the Agriculture, Supply and Prices Department is providing such training. The Department is also training its women extension workers to provide women farmers information on the concept and is actively supporting NGOs which are able to deploy much larger numbers of women extension workers. Some NGOs also provide farmers key inputs, for example Save the Children Fund, which is providing kitchen gardening kits and training to women affected by the recent floods. Kitchen gardens may be critical to the large number of flood-affected households in recovering access to nutritious food.

7.2 Small-hold livestock

The Research and Training Institute for Livestock Development (RTI) of the Livestock & Fisheries Department, Government of Sindh, with support from Japan International Cooperation Agency, is providing buffalo and training to women farmers with small holdings. This includes training on the processing of milk into yoghurt and maya (a milk sweet) which are consumed and sold locally. The training includes topics on children's and women's nutrition and the importance of dairy products. RTI also trains NGOs' master trainers as these organizations require. A number of NGOs are active in farmer training on e.g. fodder production and new approaches involving mixed farming. Some are providing microfinance to small farmers for the purchase of livestock. The national and state rural support programmes are providing goats and buffalo to small farmers and to landless who are renting in land. Private companies, such as the Engro Foundation, are working with small farmers and educating them about milk collection, feeding into more distant value chains.

We will be interviewing informants with different perspectives to get a clearer sense of which other organizations are involved and whether there is sufficient and continuing interaction among them for these to be considered as SoI. In Pakistan's decentralized governmental context, it will also be important to understand the extent of cross-provincial linkages.

This working paper is a work in progress. It will be revised as we pursue the research in Pakistan and complement its findings with applications of the convergence concept elsewhere in the LANSA consortium and beyond. Feedback on our approach from partners, stakeholders and colleagues outside LANSA will help us enrich the work.

References

Balagamwala, M. & Gazdar, H. 2013. Agriculture and Nutrition in Pakistan: Pathways and Disconnects. *IDS Bulletin,* **44,** 66-74.

Brooks, S. & Loevinsohn, M. 2011. Shaping agricultural innovation systems responsive to food insecurity and climate change, Natural Resources Forum 35(3):185-200.

Clark, N., Hall, A., Sulaiman, R. & Naik, G. 2003. Research as capacity building: The case of an NGO facilitated post-harvest innovation system for the Himalayan hills. *World Development,* **31,** 1845-1863.

Hall, A., Bockett, G., Taylor, S., Sivamohan, M. V. K. & Clark, N. 2001. Why Research Partnerships Really Matter: Innovation Theory, Institutional Arrangements and Implications for Developing New Technology for the Poor. *World Development,* **29,** 783-797.

Hall, A. & Clark, N. 1995. Coping with change, complexity and diversity in agriculture—the case of rhizobium inoculants in Thailand. *World Development,* **23,** 1601-1614.

Hall, A., Sivamohan, M., Clark, N., Taylor, S. & Beckett, G. 1998. Institutional developments in Indian agricultural R&D systems: Emerging patterns of public and private sector activities. *Science Technology and Development,* **16,** 51-76.

Lundvall, B.-Å. 1992. *National systems of innovation: Toward a theory of innovation and interactive learning,* London and New York, Pinter.

Niosi, J., Saviotti, P., Bellon, B. & Crow, M. 1993. National systems of innovation: in search of a workable concept. *Technology in Society,* **15,** 207-227.

Otsuka, K. & Kalirajan, K. P. 2006. Rice green revolution in Asia and its transferability to Africa: An introduction. *The Developing Economies,* **44,** 107-122.

Raina, R. & Vijay Shankar, P. 2011. Rainfed Agriculture: Enabling New Rules of the Game. *SIID Policy Options- No.1*. Systems of Innovation for Inclusive Development.

Raina, R. S., Joseph, K., Haribabu, E. & Kumar, R. 2009. Agricultural Innovation Systems and the Co-evolution of Exclusion in India. *Working Paper SIID 07/2009*. Delhi: Systems of Innovation for Inclusive Development.

Röling, N. 1990. The agricultural research-technology transfer interface: a knowledge systems perspective. *In:* KAIMOWITZ, D. (ed.) *Making the link: Agricultural research and technology transfer in developing countries.* Boulder, USA: Westview Press.

Sakkhari, K. 2009. Introducing millets into Public Distribution System (PDS): a pilot project by WASSAN in Andhra Pradesh. Hyderabad: Watershed Support Services and Activities Network.

Spielman, D. & Birner, R. 2008. How Innovative Is Your Agriculture? Using Innovation Indicators and Benchmarks to Strengthen National Agricultural Innovation Systems. *Agriculture and Rural Development Discussion Paper 41*. Washington: World Bank.

Spielman, D. J., Ekboir, J. & Davis, K. 2009. The art and science of innovation systems inquiry: Applications to Sub-Saharan African agriculture. *Technology in Society,* **31,** 399-405.

Sumberg, J. 2005. Systems of innovation theory and the changing architecture of agricultural research in Africa. *Food policy,* **30,** 21-41.

Timbaktu Collective 2004. Report on phase I of the action research project to explore the commercialization prospects of millets in Anantapur District. Patancheru, AP: Crop-Post Harvest Program, DFID.

Ugbe, U. P. 2010. What Does Innovation Smell Like? A Conceptual Framework for Analysing and Evaluating DFID-RIU Experiments in Brokering Agricultural Innovation and Development. *RIU Discussion Paper 10*. London: DFID.

World Bank 2007. Enhancing Agricultural Innovation: How to go Beyond the Strengthening of Research Systems. Washington: World Bank.