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# BEYOND KNOWLEDGE BROKERING: AN EXPLORATORY STUDY ON INNOVATION INTERMEDIARIES IN AN EVOLVING SMALLHOLDER AGRICULTURAL SYSTEM IN KENYA

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## ABSTRACT

Enhancing an increasingly market-driven smallholder agricultural sector in developing countries requires broad systemic innovation support. The intermediary landscape of the agricultural sector has changed to include various actors undertaking a wider range of functions beyond knowledge and technology dissemination, thus broadening the understanding of extension service provision. This paper presents findings of an exploratory case-study that aimed to examine how different types of organisations are fulfilling an intermediary role in an evolving Kenyan agricultural sector. Using a snowball sampling approach, the study identified and interviewed key informants in twenty-two intermediary organisations. The results show that these organisations fulfil functions that are not limited to knowledge brokering to individual farmers, but also include fostering integration and interaction among the diverse actors engaged in innovation networks. The intermediaries provide support across technological, organisational and institutional innovation. The study identified varied organisational arrangements distinguishing different intermediary actors. Some of the organisations fulfilled a more specialised innovation-brokering role involving facilitation and co-ordination of innovation processes. The majority of intermediaries undertake brokering as a side activity, while substantively contributing to the innovation process. On the basis of these findings, we distinguish four innovation intermediation arrangements: technology broker, systemic broker, enterprise development support and input access support. The results show that innovation brokering is a pervasive task and will require policy support to embed it in innovation support arrangements, but without prescribing a *one-size-fits-all* approach.

**KEY WORDS:** *EXTENSION, AGRO-ENTERPRISE, INNOVATION NETWORKS, INNOVATION BROKERING, FACILITATION*

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## INTRODUCTION AND OBJECTIVES

The agricultural sector in Kenya, as in many developing countries, is evolving, driven largely by a policy and practice push to transform smallholder producers into entrepreneurs, pursuing market opportunities in agricultural value chains, while continuing to address food insecurity challenges. The opportunities include diversification of crops and products and value addition as a result of changing market demand for both staple and high value crops (Kibaara *et al*., 2008; Republic of Kenya, 2009). The changes in the sector require enhanced innovation capacity, through providing appropriate innovation support arrangements to meet new needs. Supporting smallholder agro-enterprises requires the provision of non-technical support services such as marketing support, financing, collective organising and business management. Further, there is increased recognition that innovation is a process that occurs within networks and requires systemic support, including strengthening of interactions between diverse actors. However, mobilising such networks – central to enabling innovation – remains a challenge in most countries, including Kenya (World Bank, 2006). This has raised questions about the role of the intermediary domain, which in agriculture has traditionally been viewed as extension and advisory services.

In Kenya, the intermediary domain has changed, reflected in the emergence of new actors and the repositioning of existing ones. These include state, private sector and non-governmental agencies that provide innovation support for an evolving number of smallholder agro-enterprises (Muyanga and Jayne, 2008; Nyambo *et al*., 2009; Republic of Kenya, 2009). However, there is little empirical research on this evolving domain, particularly on the expanded role of intermediaries in enhancing innovation capacity of an evolving smallholder dominated agricultural sector. This paper presents findings of research undertaken to explore this intermediary structure and the broad functions these actors fulfil in supporting innovation in smallholder agro-enterprise development in Kenya. Before presenting the research objectives, we briefly review the literature on the evolving role of intermediaries in supporting agricultural innovation, focusing on the sub-Saharan African (SSA) context.

### The changing intermediary domain in supporting agriculture innovation in SSA: A brief review

Renewed attention on revitalising agricultural development in SSA has focused efforts on how to bolster agricultural innovation systems in the smallholder dominated sector (InterAcademy Council, 2004; World Bank, 2006; Juma, 2011). This focus on supporting agricultural innovation has opened the recurrent debate on the role of extension services in supporting intermediary actors in the innovation system. Critics have noted the ineffectiveness of the public sector-dominated extension approach because of its linear understanding of innovation, that assumed agricultural research to be the source of all agricultural innovation, resulting in an emphasis on technology transfer (Leeuwis and van den Ban, 2004; Davis, 2008; Rivera and Sulaiman, 2009). Understanding agriculture innovation as a dynamic process that requires interaction among diverse actors, and resulting from aligning technological, organisational and institutional dimensions, has also resulted in a changing intermediary landscape (Smits, 2002; Leeuwis and van den Ban, 2004).

In many SSA countries, initial changes were reflected in extension reforms that pushed for a 'pluralistic' extension system comprising a mix of public, private and semi-public actors aiming to provide demand-driven services to farmers. It was envisaged that a pluralistic system would stimulate an appropriate 'mix' of public and private funding and delivery mechanisms (Davis, 2008; Heemskerk *et al*., 2008; Muyanga and Jayne, 2008). More recent focus on enhancing agriculture innovation systems has highlighted the broader role of intermediaries in innovation support (Leeuwis and van den Ban, 2004; Gebremedhin *et al*., 2006; Klerkx *et al*., 2009; Rivera and Sulaiman, 2009). A World Bank (2006) study found that even when there were strong market incentives to innovate, it was not sufficient to induce new patterns of

collaboration necessary to support innovation. To resolve innovation system failures, studies point to the important role of intermediary actors in building necessary linkages, thus enhancing innovation capacity (World Bank, 2006; Klerkx *et al*. 2009).

Most of the literature on innovation intermediaries has been generated by experiences in industrial sectors (Howells, 2006; Winch and Courtney, 2007). Howells (2006, p.702) provides a useful definition of an innovation intermediary as 'an organization or body that acts as an agent or broker in any aspect of the innovation process between two or more parties.' The intermediaries undertake a broad range of functions. Increasingly, scholars of agriculture innovation have noted similar broad innovation support functions that include: facilitation of needs identification and agenda-setting processes; organising producers and the rural poor; matching demand and supply of knowledge/ technology; building coalitions of different stakeholders; promoting platforms for experimentation; sourcing funding for projects; and enhancing business skills and management of innovation processes (Klerkx *et al*., 2009; Knickel *et al*., 2009; Sulaiman *et al*., 2010). Underlying this is what Leeuwis and van den Ban (2004) refer to as communication functions which recognise relations that must be negotiated among actors and accompany social learning in innovation processes.

These expanded innovation support functions raise questions about the structure of the intermediary domain. In some cases extension services undertake these expanded functions in addition to their technical support role (Gebremedhin *et al*., 2006; Dormon et al., 2007; Davis, 2008; Rivera and Sulaiman, 2009). In other contexts, intermediaries act more as innovation brokers, who are dedicated agencies that primarily facilitate and build links among many actors without providing substantive technical support (Klerkx *et al*., 2009). It is clear that the intermediary domain in agriculture is changing in both form and function. But very few empirical studies have looked at these changes in SSA, particularly to understand the types of functions that intermediaries are undertaking. It is this gap that informed this research, which aims to contribute to understanding the evolving role of agriculture extension in the context of the need for broader systemic support for agriculture innovation in Kenya.

The objectives of the research were to discover answers to the following questions:

1. Who are the intermediary actors in the evolving Kenyan agricultural innovation system?
2. How are the intermediaries contributing to innovation system support?

## MATERIALS, METHODS AND DATA SOURCES

The study used an exploratory case-study design to identify and characterise innovation intermediaries working in the agricultural sector. Using a snowball sampling approach (Creswell, 2002), 22 organisations who were providing innovation intermediary services were approached to participate in the study. The data were collected between May and December 2010 through in-depth interviews with key informants within the identified organisations. The data were analysed with the help of *Atlas.ti*, a qualitative data software program.

## RESULTS AND DISCUSSIONS

### The innovation intermediaries' landscape in the Kenyan agricultural sector

The study identified various organisational arrangements fulfilling an innovation intermediary role. These included government agencies (extension services, special programmes), consultants, NGOs, private enterprises, producer associations and special programmes/projects. Some of the identified organisations were older and well-established, but the majority of the cases had emerged within the last decade. As the results show, there is a varied mix of public and private funding (e.g. fees for service, private sector) modalities for the intermediaries. The most common source of financing was through public funding (i.e. development programmes and government grants).

### The role of innovation intermediaries in agricultural innovation in Kenya

Below we discuss the role of the identified innovation intermediaries based on six broad

functions identified in literature (van Lente *et al*., 2003; Howells, 2006).

### *Demand articulation or stimulation*

The findings show that intermediaries undertook various activities (e.g. need assessments, strategic planning) to support demands for incremental innovation support (e.g. access to existing technologies/inputs and knowledge). More proactive demands for technologies, knowledge, and accompanying services were necessary to enable innovation. For example AATF and ISAAA played a catalytic role in stimulating demand for new agro-biotechnology while FIPS, Real IPM and AGMARK stimulated demand for existing technologies (fertiliser and improved seeds) whose uptake had been low. This demand stimulation was also carried out through identification of enterprise opportunities for smallholders and follow-up by stimulating demand for technical and business support (i.e. Technoserve, FCI, EADD[3]).

### *Network building*

The results show how intermediaries are instrumental in orchestrating and brokering networks of heterogeneous actors. The networks that the different intermediaries facilitated vary considerably, particularly within subsectors. For example, innovation intermediaries facilitated complex forward (output) and backward (input) linkages due to the nature of the dairy and horticulture value chains.

The intermediaries working in the maize (staples) subsector focused mainly on supporting backward linkages for input access. The agro-biotechnology-focused intermediaries (ISAAA and AATF) built networks around emerging technologies, engaging mainly with public and private R&D actors at both local and international levels and private enterprises who could support the acquisition and dissemination of the technologies.

### *Knowledge and technology brokering*

All the intermediaries were involved in knowledge/technology brokering. This included mainly facilitating access to brokering 'on the shelf' technologies that could be seen as incremental technology innovation, with the exception of the newer agro-biotechnology. For example, AATF brokered access to proprietary technologies and then supported experimentation, adaptation and dissemination in the local context. FCI and Technoserve facilitated various high-value horticultural enterprises (e.g. bananas, onions, vegetables) where they brokered access to new technologies, such as improved seed varieties, through research organisations or private seed companies.

### *Innovation process monitoring*

From the findings, intermediaries are instrumental in building networks and organising spaces for; interactions, stimulating learning and negotiation, among the different actors. For example, KDSCP facilitated monthly meetings through the NDSTF, aimed at aligning the diverse agendas of the different actors. EADD facilitated what they refer to as a hub, i.e. a milk chilling plant (collection centre) as a space where actors, including farmers, business service providers and processors, interact and transact business. NALEP also facilitated district level multi-stakeholder forums where diverse actors supporting smallholder farming households within a specific region aligned their work to ensure complementarity and avoid duplication.

3 Abbreviations: AATF, African Agricultural Technology Foundation; AGMARK, Agricultural Market Development Trust; EADD, East Africa Dairy Development project; FCI, Farm Concern International; FIPS, Farm Input Promotion Services; FPEAK, Fresh Produce Exporters Association of Kenya; ISAAA, International Service for the Acquisition of Agri-biotech Applications; KDSC, Kenya Dairy Sector Competitiveness Program; KHDP, Kenya Horticultural Development Program; MESPT, Micro Enterprises Support Programme Trust; NALEP, National Agriculture and Livestock Extension Programme; NDSTF, National Dairy Sector Task Force; SHOMAP, Smallholder Horticulture Marketing Programme; SITE, Strengthening Informal Sector Training and Enterprise.

**TABLE 1: TYPOLOGY OF INTERMEDIARIES BASED ON FUNCTIONS**

| Intermediary type | Examples | Target areas and innovation levels | Areas of focus | Strengths (+) and weaknesses (–) |
|---|---|---|---|---|
| **Systemic broker** | KDSCP, NALEP, Agriprofocus | Technology<br>Organisational<br>Institutional<br>Macro and meso-level | Strategic demand articulation – sector agendas (including research)<br>Network building and platform for interaction<br>Steering sector-wide innovation process<br>Institutional innovation – policy | Balance all innovation areas and long-term (system) changes (+)<br>Programme-based sustainability (–) |
| **Technology broker** | ISAAA, AATF | Technology<br>Institutional<br>Macro-level | Demand stimulation<br>Network building<br>Knowledge/technology brokering<br>Institutional innovation – policy and regulation | Technology push (–)<br>Linking technology/ knowledge and institutional support(+) |
| **Enterprise development support** | Farm concern Technoserve, SHOMAP, KHDP, EADD, Setpro, Spantrack, Precise management, FPEAK, SITE, World Wide, Sires, MESPT, Today Agriculture | Technology<br>Organisational<br>Micro-level | Demand articulation – market driven opportunities<br>Network building<br>Innovation process management<br>Knowledge brokering<br>Capacity building – human and organisation | Market driven – focus on high value crops (+)<br>Support entrepreneurship (+)<br>Institutional engagement minimal (–) |
| **Pro-poor input access** | FIPS, AGMARK, REAL-IPM | Technology<br>Organisational<br>Micro-level | Demand stimulation for input use<br>Network building<br>Knowledge brokering<br>Capacity-building, organisation and human | Technology push (inputs) and micro-level subsistence focused (–)<br>Reaching the most vulnerable (+)<br>Institutional engagement minimal (–) |

### *Enterprise capacity-building*

Most of the intermediation for capacity-building related to organising the farmers into producer groups, training them on technical (agricultural) and generic business skills and linking farmers to markets. The results indicate that a good number of intermediaries were more substantively involved in capacity-building.

### *Institutional support*

Some intermediaries explicitly engaged in supporting institutional change, particularly with regard to policy or stimulating the interface between scientists and practitioners. In addition, innovation brokering is instrumental in facilitating institutional change in terms of practice and attitudes. For example, intermediaries identified in the dairy sector linked farmers with different services and negotiated terms of engagement with service providers, with the aim of improving quality of service delivery and building trust between these actors. Similarly, the intermediaries brokered interactions between smallholders and financial institutions (banks), stimulating a change in attitude for both parties and resulting in new financial products (e.g. insurance, loans) being developed for smallholder farmers.

### Typology of intermediaries identified

From the results above, we characterised the different intermediaries based on the functions and levels of focus and distinguished four intermediary types (see Table 1) though one can argue the types are not mutually exclusive.

- **Systemic brokers** work at a higher network level (e.g. sector-wide) and are important in facilitating interactions and co-ordinating efforts for long-term sector changes.
- **Specialised technology brokers** work in emerging agrobiotechnologies, are involved in stimulating demand for and application of new technologies, and support institutional change (e.g. development of policy and regulations) linked to technological change.
- **Enterprise development support intermediaries** focus mainly on agribusiness or enterprise development, guided by market demand. Most are substantively involved in the innovation process, including providing extension support (production), research and business skills training.
- **Pro-poor input access intermediaries** work in the context of poor households to facilitate demand for existing technologies (seeds/fertiliser) and provide technical support for enabling experimentation with these technologies accessed in small packs, thus minimising farmers' risk.

## CONCLUSIONS, RECOMMENDATIONS AND IMPLICATIONS

The findings illustrate a diverse intermediary domain in the smallholder dominated agricultural sector in Kenya that is increasingly market-oriented. This indicates a pluralistic innovation support structure that is increasingly undertaking diverse innovation support tasks. This confirms what other scholars have noted: that already many actors are fulfilling innovation intermediary roles in the nascent agricultural innovation systems in developing countries (Klerkx *et al*., 2009; Rivera and Sulaiman, 2009; Sulaiman *et al*., 2010). We note the emergence of new actors, and note that some established organisations that had initially provided traditional extension support to smallholders, have now shifted their mandates and scope and have taken on a broader role.

The findings confirm the arguments that focusing just on knowledge and technology access and use as a starting point for innovation limits the understanding of the innovation process and how to support it. The context of innovation has shifted and increasingly takes place in the context of more complex and multiple relationships and innovation intermediation that must be facilitated. It entails a broad range of tasks beyond knowledge brokering aimed at making these relationships productive and synergistic. The innovation intermediaries consider themselves to be facilitators, although some provide substantive knowledge intensive services in supporting innovation both technically (e.g. extension services) and on non-technical aspects (e.g. business skills training) (Howells, 2006; Klerkx *et al*., 2009; Sulaiman *et al*., 2010). This facilitator and bridging role – though it may seem "invisible" (Klerkx and Leeuwis, 2008) – is clearly important in efforts to align technological, organisational and institutional dimensions of innovation in nascent agriculture innovation systems in SSA (World Bank, 2006).

One important role of intermediaries in relation to knowledge/technology brokering is in influencing the research agenda for new or emerging knowledge demands. Innovation brokers have been shown to play this crucial role of matching prospective demand and supply in a growing knowledge market and also in acting as important links between science and practice (Klerkx and Leeuwis, 2008; Kristjanson *et al*., 2009; Kingiri and Hall, 2012). However the findings show that the intermediaries identified focused more on disseminating technologies rather than on identifying research issues from the users. This shows that the challenge of aligning research to address user-needs persists, thus showing a gap in innovation brokering.

It is clear from this study that there are different intermediaries operating at different levels of system aggregation from micro (farm level) to macro (sectoral level), however all of these levels intersect. The emergence of 'systemic brokers',

identified as an important intermediary type for creating long-term systemic change, is showing promise (van Lente *et al*., 2003; Smits and Kuhlmann, 2004). Systemic brokers play a strategic role in stimulating robust innovation systems change because of their ability to form what Howells (2006) has referred to as an 'ecology of influence' in transforming relations among the heterogeneous actors. Thus public policy should be more explicit about how such a role should be supported as part of efforts to enable innovation.

What are the implications of this changing landscape for Kenya and other SSA countries in general? The current policy approach to supporting innovation capacity in smallholder farming in Kenya has moved towards demand-driven, pluralistic extension services, emphasising various models for service delivery including public–private partnerships (Muyanga and Jayne, 2008; Republic of Kenya, 2009). The emphasis is on innovation as an individual process. However there is need for a bundle of broader support functions in the context of system innovation that entails supporting individual entrepreneurship, stimulating interaction and supporting continuous learning and alignment among heterogeneous actors. Thus policy and financial support should reflect this imperative for broad system support. We noted the vulnerability of most of the organisations studied to changing donor priorities due to their current dependence on external funding sources. Innovation support services provided by the organisations we studied covered a continuum of public–private goods that might require different funding strategies. In order to facilitate and stimulate system dynamism to enhance innovation, an adequate level of investment to support these roles is needed. This will most likely be in the form of more public/government support (Klerkx and Leeuwis, 2008)

In conclusion, the study has provided insights into the innovation intermediary landscape reflected by diverse actors fulfilling broad functions to address innovation system failures or gaps at different levels of system aggregation. Given the exploratory nature of the study, it might be premature at this stage to draw hard conclusions on the adequacy of the identified intermediaries in their efforts to support broad system innovation, but the findings provide us with useful insights for initial reflection. Additional research on the extent to which intermediaries have contributed to innovation processes and resultant impacts is now needed.

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## LITERATURE CITED

**Creswell, J.W. 2002.** *Research Design: Qualitative, Quantitative and Mixed Method Approaches*. Sage, Thousand Oaks, CA.

**Davis, K.E. 2008.** 'Extension in sub-Saharan Africa: Overview and assessment of past and current models and future prospects'. *Journal of International Agricultural and Extension Education* 15 (3): 15–28.

**Dormon, E.N.A., Leeuwis, C., Fiadjoe, F.Y., Sakyi–Dawson, O. and van Huis, A. 2007.** 'Creating space for innovation: the case of cocoa production in the Suhum-Kraboa-Coalter district of Ghana'. *International Journal of Agricultural Sustainability* 5 (2–3): 232–246.

**Gebremedhin, B., Hoekstra, D. and Tegegne, A. 2006.** *Commercialization of Ethiopian*

*agriculture: Extension service from input supplier to knowledge broker and facilitator*. IPMS Working Paper No.1. ILRI, Nairobi, Kenya.

**Heemskerk, W., Nederlof, S. and Wennink, B. 2008.** 'Outsourcing agricultural advisory services: Enhancing rural innovation in sub-Saharan Africa'. Development Policy and Practice, Bulletin 380. KIT, Amsterdam, The Netherlands.

**Howells, J. 2006.** 'Intermediation and the role of intermediaries in innovation'. *Research Policy* 35 (5): 715–728.

**InterAcademy Council. 2004.** *Realizing the Promise and Potential of African Agriculture*. IAC Report. Amsterdam, The Netherlands.

**Juma, C. 2011.** *The New Harvest: Agricultural Innovation in Africa*. Oxford University Press, New York, USA.

**Kibaara, B., Ariga, J., Olwande, J. and Jayne, T.S. 2008.** *Trends in Kenyan Agricultural Productivity: 1997–2007*. Tegemeo Institute, Egerton University, Kenya. Working Paper 31/2008.

**Kingiri, A.N. and Hall, A. 2012.** 'The role of policy brokers: The case of biotechnology in Kenya'. *Review of Policy Research* 29 (4): 492–522.

**Klerkx, L. and Leeuwis, C. 2008.** 'Matching demand and supply in the agricultural knowledge infrastructure: Experiences with innovation intermediaries'. *Food Policy* 33 (3): 260–276.

**Klerkx, L., Hall, A. and Leeuwis, C. 2009.** 'Strengthening agricultural innovation capacity: Are innovation brokers the answer?' *International Journal of Agricultural Resources, Governance and Ecology* 8 (5-6): 409–438.

**Knickel, K., Brunori, G., Rand, S. and Proost, M.D.C. 2009.** 'Towards a better conceptual framework for innovation processes in agriculture and rural development: From linear models to systemic approaches'. *Journal of Agricultural Education and Extension* 15: 131–146.

**Kristjanson, P., Reid, R.S., Dickson, N., Clark, W.C., Romney, D., Puskur, R., MacMillan, S. and Grace, D. 2009.** 'Linking international agricultural research knowledge with action for sustainable development'. *Proceedings of the National Academy of Sciences, USA* 106 (13): 5047–5052.

**Leeuwis, C. and van den Ban, A. 2004.** *Communication for Rural Innovation: Rethinking Agricultural Extension*. Blackwell Science, Oxford, UK.

**Muyanga, M. and Jayne, T.S. 2008.** 'Private agricultural extension system in Kenya: Practice and policy lessons'. *Journal of Agricultural Education and Extension* 14 (2): 111–124.

**Nyambo, B., Sief, A., Varela, A.M., Lohr, B., Cooper, J. and Dobson, H. 2009.** 'Private extension-service provision for smallholder horticultural producers in Kenya: An approach'. *Development in Practice* 19 (1): 94–102.

**Republic of Kenya, 2009.** *Agricultural Sector Development Strategy. 2009–2020*. Ministry of Agriculture, Kenya.

**Rivera, W.M. and Sulaiman, R.V. 2009.** 'Extension: Object of reform, engine for innovation'. *Outlook on Agriculture* 38: 267–273.

**Smits, R. 2002.** 'Innovation studies in the 21st century: Questions from a user's perspective'. *Technological Forecasting and Social Change* 69 (9): 861–883.

**Smits, R. and Kuhlmann, S. 2004.** 'The rise of systemic instruments in innovation policy'. *International Journal of Foresight and Innovation Policy* 1: 4–32.

**Sulaiman, V.R., Hall, A., Vamsidhar, R.T.S. and Dorai, K. 2010.** 'Studying rural innovation management: A framework and early findings from RIU in South Asia'. RIU Discussion Paper.

**van Lente, H., Hekkert, M., Smits, R. and van Waveren, B. 2003.** 'Roles of systemic intermediaries in transition processes'. *International Journal of Innovation Management* 7 (3): 1–33.

**Winch, G.M. and Courtney, R. 2007.** 'The organization of innovation brokers: An international review'. *Technology Analysis and Strategic Management* 19 (6): 747–763.

**World Bank, 2006.** *Enhancing Agricultural Innovation: How to Go Beyond the Strengthening of Research Systems*. World Bank, Washington, DC, USA.