



2011 Discussion Paper 13

**BEYOND KNOWLEDGE BROKERAGE: AN EXPLORATORY STUDY
OF INNOVATION INTERMEDIARIES IN AN EVOLVING
SMALLHOLDER AGRICULTURAL SYSTEM IN KENYA**

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APRIL 2011

ACKNOWLEDGMENT

This document resulted in part from research supported by the Research into Use (RIU) programme, funded by the UK's Department for International Development (DFID) for the benefit of developing countries. The views expressed are not necessarily those of DFID.

The authors wish to thank the International Livestock Research Institute (ILRI) for hosting the first author as a Graduate Fellow, with a special mention to Dr. Seife Ayele and Caroline Bosire for their support during analysis and providing initial comments on earlier drafts. The authors would also like to thank the participants of the study who gave their valuable time and insights during interviews. The usual disclaimers apply.



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BEYOND KNOWLEDGE BROKERAGE: AN EXPLORATORY STUDY OF INNOVATION INTERMEDIARIES IN AN EVOLVING SMALLHOLDER AGRICULTURAL SYSTEM IN KENYA

Catherine W. Kilelu¹, Laurens Klerkx², Cees Leeuwis³ and Andy Hall⁴

Abstract

The recognition that innovation occurs in networks of heterogeneous actors and requires broad systemic support beyond knowledge brokering has resulted in a changing landscape of the intermediary domain in an increasingly market-driven agricultural sector in developing countries. This paper presents findings of an explorative case study that looked at 22 organisations identified as fulfilling an intermediary role in the Kenyan agricultural sector. The results show that these organisations fulfill functions that are not limited to distribution of knowledge and putting it into use. The functions also include fostering integration and interaction among the diverse actors engaged in innovation networks and working on technological, organisational and institutional innovation. Further, the study identified various organisational arrangements of innovation intermediaries with some organisations fulfilling a specialised innovation brokering role, even as other intermediaries take on brokering as a side activity, while still substantively contributing to the innovation process. Based on these findings we identify a typology of 4 innovation intermediation arrangements, including technology brokers, systemic brokers, enterprise development support and input access support. The results indicate that innovation brokering is a pervasive task in supporting innovation and will require policy support to embed it in innovation support arrangements. The paper is not normative about these arrangements.

Key words: Smallholder agriculture, innovation intermediaries, agriculture innovation, knowledge brokers, Kenya

JEL Codes: L26, L32, N5, N57, O13, O19, O31, O32, O55, Q12, Q13, Q16

RIU DISCUSSION PAPER SERIES

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LIST OF ACRONYMS

AATF	-	African Agriculture Technology Foundation
AGMARK	-	Agricultural Market Development Trust
BDS	-	Business Development Services
CHSRF	-	Canadian Health Services Research Foundation
CRT	-	Central Research Team, RIU
DFID	-	Department for International Development, UK
EADD	-	East Africa Dairy Development Project
FCI	-	Farm Concern International
FIPS	-	Farm Input Promotion Services
FPEAK	-	Fresh Produce Exporters Association Kenya
GDP	-	Gross Domestic Product
IFPRI	-	International Food Policy Research Institute
IPM	-	Integrated Pest Management
ISAAA	-	International Services for Acquisition Agriculture
KIBS	-	Knowledge-Intensive Business Service
KDSCP	-	Kenya Dairy Sector Competitiveness Program
KHDP	-	Kenya Horticulture Development Program
LINK	-	Learning INnovation Knowledge
MESPT	-	Micro Enterprise Support Project Trust
NALEP	-	National Agriculture and Livestock Extension Program
NDSTF	-	National Dairy Sector Task force

NGOs	-	Non-Governmental Organisations
R&D	-	Research and Development
RIU	-	Research Into Use
S&T	-	Science and Technology
SDCP	-	Smallholder Dairy Commercialization Program
SHOMAP	-	Smallholder Horticulture Marketing Program
SITE	-	Strengthening Informal Sector Training and Enterprise
SMEs	-	Small and Medium Enterprises
UK	-	United Kingdom
UN	-	United Nations
UNU-MERIT	-	United Nations University-Maastricht Economic and social Research and training centre on Innovation and Technology
USA	-	United States of America

1. INTRODUCTION

The agricultural sector in Kenya, as in many developing countries, is evolving, driven largely by a policy and practice push to transform smallholder farmers into entrepreneurs while continuing to address food insecurity challenges. The tactics being employed by farmers in their pursuit of market opportunities include diversification of crops, products and value addition, driven by new markets for both staple and high-value crops (Kibaara et al., 2008; Republic of Kenya, 2009). This increasing emphasis on market orientation has pointed to the need to evolve agricultural innovation support arrangements in a way that will enable smallholders to develop the required capacities needed to participate in the ever-growing numbers of agri-based value networks or chains. These networks form an agricultural innovation system of heterogeneous actors operating at different levels, and includes the accompanying organisational and institutional structures that are a prerequisite for enabling innovation (Spielman, 2005; World Bank, 2006).

However, scholars have noted that mobilising such networks in order to enable access to knowledge — thus fostering the necessary linkages and aligning different actors with diverging interests in order to enable innovation — remains a challenge in the agricultural sectors of most developing countries. Often, such linkages are absent or dysfunctional, resulting in what has been referred to as “system and market failures”. In Kenya, several scholars have noted these gaps (Keskin et al., 2008; Odame et al., 2009). To address these challenges, scholars have pointed to the role of intermediaries in bridging gaps among the diverse actors and facilitating links with necessary innovation support services (Klerkx and Leeuwis, 2008a). Traditionally, extension services were considered to be the main intermediary actors in supporting agriculture innovation. However, the support they offered was primarily focused on intermediating knowledge and technology transfer from research to farmers. The effectiveness of this approach has been questioned for its linear understanding of innovation. The recognition that innovation requires broad systemic support beyond knowledge generation and use to include forging links and interactions among diverse actors has resulted in a changing landscape in the intermediary domain.

In Kenya, as in other developing countries, this changing intermediary domain is reflected in the recent emergence of new actors and the re-positioning of existing ones, including the state, the private sector and non-governmental actors — in what is considered a demand-driven agricultural support system (Muyanga and Jayne 2008; Nyambo et al. 2009; Odame et al. 2009; Republic of Kenya, 2009). However, the growing literature on agricultural innovation systems in Kenya and other developing countries suggests that there has been little empirical research that has looked systematically at the evolving intermediary domain with the aim of understanding the broad functions and roles and contributions of intermediaries in supporting innovation. It is this dearth of empirical studies that led us to the research questions examined in this paper: What does the innovation intermediary landscape in the evolving Kenya agriculture innovation system look like? How and why do the intermediaries contribute to innovation support, beyond knowledge brokering?

This paper presents findings from an explorative case study on this changing innovation support landscape in the increasingly market-driven agricultural sector in Kenya. It is focused on select sub-sectors, including dairy, horticulture⁵ and maize-staples.

The paper is structured as follows. The next section builds a conceptual framework looking at intermediaries and their contribution to supporting innovation processes in agricultural innovation networks. Section 3 summarises the methods, followed by the results of the study in Section 4. Section 5 involves a discussion and understanding of the diversity of intermediary structures and the broad innovation support functions they fulfill that go beyond knowledge brokering. Section 6 concludes the paper, pointing out the implications of the study's findings for policy and further research.

⁵ The horticulture sub-sector here covers fresh fruit and vegetables but not flowers.

2. THE EMERGENCE OF THE INNOVATION SYSTEMS APPROACH AND THE IMPORTANCE OF LINKAGE BUILDING IN AGRICULTURAL INNOVATION

It is now understood that supporting innovation goes beyond increasing the supply of new scientific knowledge and technologies. Rather, innovation emerges out of the interplay between scientific, technological, socio-economic, institutional and organisational arrangements (Smits, 2002). Further, innovation stems from collaboration and interactions among a diverse network of actors, forming innovation coalitions (Engel, 1995) or, more recently, public-partnerships (Hall et al., 2001; Hartwich and Tola, 2007). This understanding has influenced the agricultural innovation systems perspective that has gained currency in understanding agricultural development (Biggs, 1990; Spielman, 2005; World Bank, 2006).

However, innovation systems in developing countries have been noted to be rather weak, with linkages between various actors characterised as rather sporadic and fragmented (World Bank, 2006; Szogs, 2008). To address such system fragmentation, studies have pointed to the role of intermediary organisations in creating the necessary linkages between the many actors in innovation networks (World Bank, 2006; Klerkx and Leeuwis, 2008a). The shift toward an emphasis on agricultural innovation systems in developing countries has also occurred in the context of restructuring agricultural knowledge and information systems, particularly research and extension services (Leeuwis and cf van Den Ban, 2004; Sumberg, 2005). In current innovation systems thinking, it is understood that the generation and exchange of (technical) knowledge are not the only prerequisites for innovation. Rather, other factors, including organisational capacity, policy, infrastructure, funding, and markets, need to be stimulated and linkages among heterogeneous actors facilitated to enable innovation.

In addition, a focus on smallholder enterprise development has pointed to the need for providing agricultural entrepreneurs with both technical and non-technical support services, such as marketing, financing, collective organising and business management. This understanding has refocused attention on the role of intermediaries in the context of

demand-oriented, ‘pluralistic’ systems of extension and innovation support. This changing intermediary domain is not only reflected in the emergence of new organisational arrangements but also in the nature of the broad functions that intermediaries are undertaking to support innovation (Leeuwis and cf van Den Ban, 2004; Klerkx et al., 2009; Rivera and Sulaiman, 2009)

2.1 Going beyond knowledge brokering to systemic innovation intermediation

Most of the literature on intermediaries in innovation has emerged out of studies in the industrial sector (and, increasingly, in the health field) that have analysed their role in linking users and producers of scientific knowledge and related technologies (Hargadon, 2002; Smedlund, 2006; Stewart and Hyysalo, 2008; Suvinen et al., 2010). This perspective often equate intermediaries with knowledge brokers, in the sense of being translators and disseminators who put research findings into use, much like the classical definition of agriculture extension. However, other scholars distinguish knowledge broker as those who facilitate and negotiate access to knowledge (CHSRF, 2003), rather than being the experts who are substantively involved in the localisation, redistribution and transformation of this knowledge (Laszlo and Laszlo, 2002; Meyer, 2010).

Further, others have argued that knowledge brokerage, in principle, is not a linear “science-push” process, particularly in increasingly demand-driven approaches to innovation. These scholars view knowledge brokering as a more sophisticated task of matching demand and supply of knowledge, entailing demand articulation of needs (including knowledge) — which then influences research agendas. Such knowledge brokering occurs in the context of emerging knowledge markets due to privatisation of research and extension systems. In this context, the demand side denotes agricultural entrepreneurs, while the supply side features R&D and Knowledge-Intensive Business Service (KIBS) actors (Clark, 2002; Leeuwis and cf van Den Ban, 2004; Klerkx and Leeuwis, 2008a). Further, knowledge brokers have also been understood as intermediaries who occupy “boundary positions”, sitting at the periphery of different worlds and creating interstices between various actors in the network. The focus

on most boundary work literature has looked mainly at the interaction between the science, policy and practice worlds (McNie, 2007; Kristjanson et al., 2009; Michaels, 2009).

Clearly, there is a need for knowledge brokers in agriculture innovation, particularly in a context where sources of knowledge are multiple and highly dispersed (Engel, 1995; Röling, 2009). However, an emphasis on brokering scientific knowledge and technology alone is not cognisant of the complexity of drivers of agriculture innovation, particularly in developing countries. As Röling (2009) has pointed out, innovation is the emergent property of interaction. Thus, the promotion and support of innovation becomes a matter of facilitating interaction. This understanding of the collaborative nature of innovation has shifted the focus of innovation support beyond knowledge brokering to innovation intermediation.

Innovation intermediation encompasses a broader innovation support and management role that involves offering longer-term, relational innovation capabilities as well as support that aims at reinforcing relational embeddedness within innovation networks.

Intermediaries, therefore, act as ‘bridging organisations’ that facilitate access to knowledge, skills and services and goods from a wide range of organisations.

In the context of agriculture innovation in developing countries, as in other regions, intermediaries facilitate the setting of the innovation agenda: by organising producers and the rural poor; by building coalitions of different stakeholders; by promoting platforms for information and knowledge sharing; by experimenting with and learning from new approaches: and by facilitating organisational and institutional capacity and enhancing business skills (Klerkx et al., 2009; Knickel et al., 2009; Sulaiman et al., 2010). This broad view of the role of intermediaries is particularly key for building adaptive capacities of smallholder producers who, similar to other SMEs (Small and Medium Enterprises), require support in coping with challenges. The challenges may come in the form of not being able to adequately articulate their innovation support needs due to various market and system failures, such as information asymmetry, capacity and competency gaps, limited interaction among actors, lack of infrastructure, funding etc. (Woolthuis et al., 2005; Klerkx and Leeuwis, 2008a).

2.2 Defining innovation intermediaries: Specialised broker or a complementary role?

The important and catalytic role of innovation intermediaries in addressing system and market failures forms a strong argument for their inclusion in the growing body of research on agriculture innovation systems. However, the literature on innovation intermediaries has been quite fragmented and, as Howells (2006) notes, this has resulted in a dispersed field of study that is not well grounded theoretically. Because of a lack of conceptual groundedness, definitions of intermediaries have not yet been crystallised and the various concepts are used interchangeably, making it hard to distinguish intermediary types. The term innovation intermediary has been described using various terms, including broker, boundary spanner, and third party.

According to Howells (2006, p. 720) the term innovation intermediary is an umbrella term that denotes “an organisation or body that acts as an agent or broker in any aspect of the innovation process between two or more parties”. These organisations undertake a range of activities that include: scouting potential collaborators; brokering a transaction; mediating, helping find advice, funding and supporting collaboration. But as Klerkx and Leeuwis (2008a) point out there is a **distinction between actors who take on intermediary roles but contribute substantive knowledge to the innovation process (i.e., as an expert or translator of research findings) and those who are specialised innovation intermediaries and act as enablers by facilitating multi-stakeholder interactions in innovation.** This mirrors Winch and Courtney’s (2005) views of what they define as innovation brokers. These are specialised organisations founded especially to undertake the broker role as their core business rather than as a by-product of other principal activities. Their distinct attribute is that they are focused not on the implementation of innovations, but on supporting other organisations to innovate. As such they do not contribute substantively to content (i.e., acting as an expert, or a technology source) but merely facilitate it. Van Lente et al. (2003) also distinguish systemic intermediaries as specific types who work mainly at the system or network level to facilitate actor interactions. However, as Howells (2006) points out organisations do not

restrict themselves to just being intermediaries but generally combine this role with directly providing technical service (e.g., as research or technical consultants).

We argue that these distinctions are specific to innovation trajectory contexts. For example, in the Dutch agricultural sector, specialised innovation brokers have emerged and established their positions in the context of a fully privatised knowledge infrastructure (van Lente et al., 2003; Klerkx and Leeuwis, 2008a). In many developing countries the context is such that innovation brokering is done as a side activity by many organisations such as research institutes, consultants, input suppliers and special programmes (Klerkx et al., 2009). There are debates about what the most appropriate innovation brokerage arrangement would be in a developing country context without necessarily proposing a blueprint. Some scholars argue for the need to retool and expand the role of extension services to take on what we have noted as broad intermediary functions, including knowledge brokerage and facilitation of multi-actor interactions. Gebremedhin et al. (2006) and Rivera and Sulaiman (2009) have argued for specialised agencies to take on a systemic intermediary role for catalysing necessary linkages within innovation networks (Klerkx et al., 2009).

For this reason, our starting point is to understand the diversity of actors that form the intermediary domain in a nascent agricultural innovation system in the Kenyan context. For the purpose of this study, we define an innovation intermediary as an organisation formally engaged in coordinating and facilitating innovation processes between two or more parties and which may also engage in a variety of functions related to the many aspects of innovation.

2.3 Functional characterisation of innovation intermediaries

This broad definition of innovation intermediaries is the starting point for mapping the diversity of actors and the myriad functions they undertake in supporting agricultural innovation. These include what Leeuwis and van den Ban (2004) refer to as communicative functions that are cognisant of multiple actors and relations that need to be negotiated in innovation processes. Following a comprehensive review of various authors who have

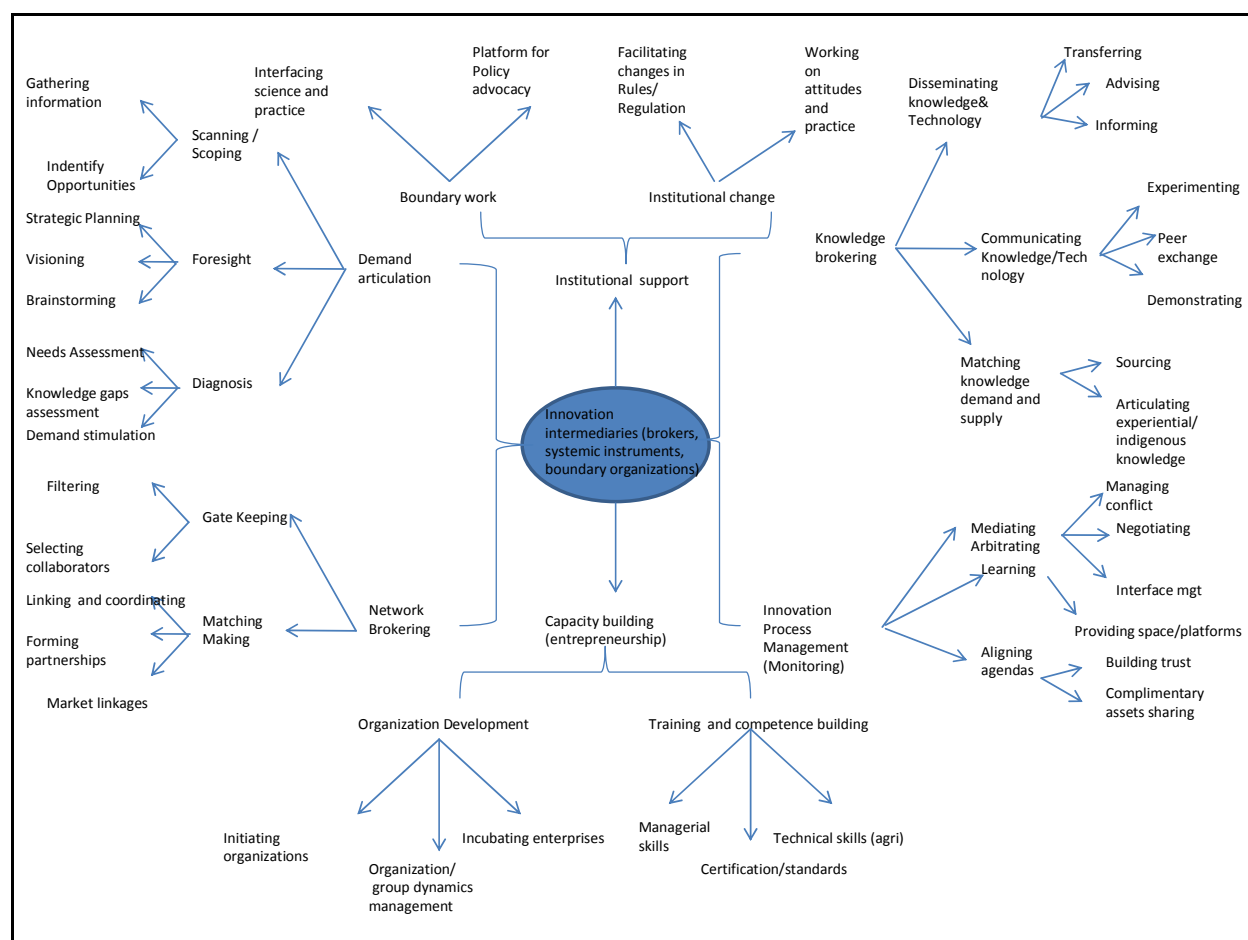
looked at roles and functions of intermediaries and brokers in supporting and managing innovation processes (van Lente et al., 2003; Smits and Kuhlmann, 2004; Howells, 2006; Klerkx and Leeuwis, 2008b; Kristjanson et al., 2009), we noted six broad functions, namely:

- Demand articulation/stimulation
- Network brokering
- Knowledge brokering
- Innovation process management
- Capacity building
- Institutional building

These broad functions are fulfilled through various sub-functions and accompanying tasks.

Figure 1 on the following page is a schematic representation of these functions, which guides our analysis.

Fig. 1: Range of Innovation Intermediary Functions



(Howells 2006; Klerkx and Leeuwis 2008a; Klerkx and Leeuwis 2008b; c; Klerkx et al. 2009; Kristjanson et al. 2009; Smits and Kuhlmann 2004; van Lente et al. 2003)

It is also important to note that innovation intermediaries provide support at different levels in innovation networks, including the macro, meso and micro levels. This is similar to what Howells (2006: 724) noted, that “intermediaries are increasingly involved in more complex relationships, such as ‘many-to-one-to-one’, ‘one-to-one to-many’, ‘many-to-one-to-many’, or even ‘many to-many-to-many’ collaborations, forming both vertical and horizontal relationships in increasingly distributed innovation networks”.

3. EXPLORING INNOVATION INTERMEDIARIES IN THE CHANGING AGRICULTURAL SECTOR IN KENYA: CASE STUDIES FROM SELECTED SUB-SECTORS

This section presents the empirical study that explored innovation intermediaries in the agricultural sector in Kenya with a focus on the dairy and horticulture and maize sub-sectors. The three sub-sectors were selected to provide areas of comparison. The dairy and horticultural sub-sectors are considered dynamic and more integrated into high value market chains that involve a wide range of public and private stakeholders. The maize (staples) sub-sector is shifting from predominantly subsistence agriculture to one in which there are an increasing number of opportunities for smallholder integration into input and output markets. These provide different contexts for understanding the role of innovation intermediaries (Neven and Reardon, 2004; Kibaara et al., 2008; Technoserve, 2008; Odame et al., 2009).

3.1 Research methods

The study used an exploratory case study design to identify and characterise innovation intermediaries in selected sub-sectors. A case study design was selected because of the study's emphasis on detailed contextual analysis in a limited number of events (Yin, 2002). Using a snowball sampling approach (Creswell, 2002), 22 organisations in the different sub-sectors, which provided intermediary services were identified and approached for the study. This sampling approach was utilised due to the lack of an identifiable list of intermediary organisations because of reasons similar to what Howells (2006) noted, including lack of an accepted definition and consensus of what an 'innovation intermediary' was as well as the multiplicity of organisations taking on intermediary roles in innovation processes.

The data was collected between May and December 2010 through interviews with key informants within the identified organisations. A checklist was developed to guide the interviews, focusing on the organisation type, their activities and functions. To ensure reliability of data collection and analysis all the interviews were taped and fully transcribed. These were then coded using the qualitative data software ATLAS ti v.6.1 followed by broad

classifications using the Microsoft Excel software. The interview data was supplemented by information from various organisational documents that were accessed, including progress and annual reports, strategic plans and brochures. The study sought to understand the nature of activities and functions of the innovation intermediaries, but did not evaluate their effectiveness. This can be considered a limitation of the study.

4. RESULTS OF THE STUDY

4.1 The innovation intermediary landscape in Kenyan agriculture

The study identified various organisations and organisational forms characterised as intermediaries (See Table 1 later in this section). These included government agencies, consultants, NGOs, private enterprises and producer associations and special programmes (such as consortiums and networks). Some of the identified organisations were long-established, but a majority of the cases were set up within the last decade. These included consultants, NGOs and special programmes.

The findings (Table 1) indicate a varied mix of funding modalities for the intermediaries. The most common source of funding was through external financing, including bilateral funding agencies, private charitable foundations and government grants. This funding was accessible for intermediaries working across all three sub-sectors. This implies that a majority of innovation support financing continues to be a public good. However, other financing vehicles noted in the horticulture sub-sector included fee-for-service arrangements and some shareholding by private consultants (e.g., Today Agriculture) and membership fees at FPEAK (Fresh Produce Exporters Association Kenya), which works in the horticulture sub-sector. ISAAA (International Services for Acquisition Agriculture), an agri-biotechnology entity, received some funding from private companies, while Real IPM, a for-profit enterprise, was financed through a matching grant through a competitive innovation fund.

The findings show that most of the innovation intermediaries consider their role mainly as facilitators. However, they also undertake substantive activities in supporting innovation both technically (e.g., providing extension services) and non-technical aspects (business skills training).

However, some of the organisations, including KDSCP (Kenya Dairy Sector Competitiveness Program), Agriprofocus, ISAAA and AATF (African Agriculture Technology Foundation), can be categorised as innovation brokers as they are purely focused on catalysing and facilitating interactions in support of different levels of innovation (see Table 1).

Further, results indicate that some of the intermediaries are established organisations that used to be involved in supporting smallholder farmers through more traditional style extension, focused on knowledge and technology transfer, but who now seem to have shifted their mandates and scopes to take on a more facilitative role (e.g., Technoserve and FPEAK). As one respondent noted:

“We started to help the African farmer improve technologically in what they are doing. We were more focused on the production end. In early 2000 we shifted to being more value chain-focused; we focused more on the market driven sales, that just being market facilitators.”

Similarly, NALEP (National Agriculture and Livestock Extension Program), which is a government extension programme, is reflective of this shift from providing extension and advisory services to taking on a more systemic intermediary role. NALEP facilitates district stakeholder forums that provide platforms intended to mobilise relevant actors and foster collaboration among them as they work in specific regions to support rural farming households in exploiting livelihood opportunities.

The results also show that some of the intermediaries are specifically oriented towards a certain agricultural sub-sector (e.g., dairy farming, horticulture, staples-maize), whereas others are cross-sectoral, working in different agricultural areas. In addition, some of the organisations (e.g., Spantrack, Setpro, Precise Management and the NGO, SITE⁶) also work in non-agricultural sectors, such as SME development. As such, they have a strong emphasis in strengthening business and management skills of agricultural entrepreneurs. These intermediaries worked mainly in the dairy sector where there is renewed attention to strengthening the management and governance of cooperatives, farmer-led companies and other small enterprises in the sub-sector. Also, it was noted that the NGOs working in horticulture emphasised a private-sector, market-driven model for supporting innovation.

⁶ Strengthening Informal Sector Training and Enterprise

These findings indicate an increasing emphasis on supporting innovation for smallholder producers as agro-entrepreneurs, particularly in dairy and horticulture sectors.

4.2 The role of innovation intermediaries in agriculture innovation in Kenya

Below we discuss the roles identified within the intermediary landscape in Kenya using the framework of the 6 broad functions identified in Figure 1 in the previous section. These include: i) Demand Articulation and Stimulation Support ii) Networking Brokering iii) Knowledge Brokering iv) Capacity Building v) Innovation Process Management and vi) Institutional Innovation.

(i) Demand Articulation and Stimulation Support

Demand articulation for innovation support takes many different forms, as noted in Figure 1. The findings in Table 1 show that the intermediaries in Kenya undertook various activities to support demand articulation and incremental innovation support (e.g., providing access to existing technologies/inputs and knowledge). Demands were expressed through needs assessment exercises and, in some cases such as in the dairy sector, through strategic planning. In this case demand articulation focused on analysing the problems and challenges that the smallholder producers face in applying existing knowledge or technologies in production or in the form of bottlenecks around access to output markets or finance etc. In explaining their support in demand articulation, one respondent noted:

So the issue first of all is to go through with them, like an assessment, self assessment of a sort and then they'd discover the gaps within. Then for some of those gaps, you automatically know what they are lacking and who has it. When you point it out to them, they say "yes, that is what we need". They really see what is hindering them.

From the findings, we noted that demand articulation also entailed a more pro-active role for the intermediaries in stimulating demand for technologies, knowledge and accompanying services necessary for enabling innovation. For example, AATF and ISAAA

play a catalytic role to stimulate demand for new agri-biotechnology through scoping for information and technology intelligence gathering and raising awareness about these radical technological innovations. Similarly, intermediaries such as FIPS (Farm Input Promotion Services), Real IPM and AGMARK (Agricultural Market Development Trust), whose focus is on enabling access to agricultural inputs, played an important role in stimulating demand for already available technologies (fertilisers and improved seeds) that have a low uptake in particular regions. This was supplemented by stimulating supply and availability of these inputs at the local level through rural stockists.

Also, demand stimulation was also related to the ongoing policy supported discourse of engaging in farming as a business. The role of the intermediaries in this case was to identify enterprise opportunities for smallholders and follow up with stimulating demand for enterprise support, as noted in the quotes below:

“you start showing them how they can do serious business”

“...help them to realise the benefit of having a business plan, a strategic plan and ensure that this business plan and strategic plans are being implemented”

Example of such intermediaries include: FCI (Farm Concern International), Technoserve, EADD (East Africa Dairy Development Project), KDSCP and the various consultants who worked mainly in the horticulture and dairy sub-sectors.

Some of the intermediaries worked at a higher system level (macro) by facilitating more strategic demand articulation. For example, KDSCP worked with heterogeneous actors in the dairy sector to articulate the challenges and opportunities along the dairy value chain and identified areas of interventions — including knowledge, organisational forms and institutional gaps such as policy and regulation — in order to enhance sector competitiveness. Agriprofocus also facilitated needs assessment and demand articulation for agribusiness (mainly in the horticulture and dairy sectors) and provided development

support for members. This included demand articulation for knowledge and technology and identification of institutional gaps (e.g, policy).

Table 1: Characterising innovation intermediary functions in supporting agricultural development in Kenya

Name of Organisation	Type of Organisation and Year established	Sector	Funding	Types of activities	Broad Functions and level of functioning**
1. Kenya Dairy Sector Competitiveness Program (KDSCP) (Managed by Land O Lakes)	International NGO - 2007	Dairy	Donor	<ul style="list-style-type: none"> -Organising the multi-actor National Dairy Taskforce as a platform for articulating issues that impede sector competitiveness -Stimulating and supporting (funding) capacity building of different actors (business development service providers- business development services, training institutes, Kenya Dairy Board), -Facilitating policy and regulatory change - Engaging the private sector actors in exploring product development - Program coordination (lead agency) 	1, 2, 4,5, 6 Sub-sectoral (systemic) level
2. MESPT (Micro Enterprise Support Project Trust)	Trust-2008	Cross-sectoral	Donor and Kenya government	<ul style="list-style-type: none"> - Conducting needs assessment for improving smallholder dairy production and marketing -Facilitating capacity building for business development services (BDS) - Supporting dairy cooperatives as microenterprises 	1, 2, 4, 5 Collective enterprises
3. EADD (East Africa Dairy Development Project)	Consortium (NGOs and Research institutes)- 2007	Dairy	Donor	<ul style="list-style-type: none"> -Conducting needs assessment and identifying challenges affecting smallholder dairy production and marketing -Facilitating formation of Dairy Business Associations and enhancing their management through capacity building - Stimulating and support (funding) capacity building of different actors (business development service providers e.g. artificial insemination, feeds, transporters dairy businesses -Linking with processors -Program coordination (lead agency) 	1,2,3,4,5 Collectives enterprises
4. Setpro consultants	Consultants- 2000	Cross-sectoral	Donor funding (Third party)	<ul style="list-style-type: none"> -Needs assessment and facilitating strategic planning support for dairy milk cooperatives in specific regions - Linking and stimulating demand for BDS (artificial insemination, animal health, training and advisory) by cooperatives -Facilitating training of farmer cooperatives on technical and business skills, -Forging and managing linkages between cooperative and financial institutions, training institutions, inputs suppliers 	1,2,3,4,5 Collectives enterprises
5. Precise management	Consultant- 2005	Cross-sectoral	Donor funding (Third party)	As above	1,2,3,4,5 Collectives enterprises
6. Spantrack Consulting	Consultants- 1996	Cross-sectoral	Donor funding (Third party)	As above	1,2,3,4,5 Collectives enterprise

Name of Organisation	Type of Organisation and Year established	Sector	Funding	Types of activities	Broad Functions and level of functioning**
7. World Wide Sires (East Africa)	Limited company-1990	Dairy	Donor funding (Third party)	As above	1,2,3,4,5 Collective enterprises
8. Smallholder Dairy Commercialization Program (SDCP)	Ministry of Livestock Program-2007	Dairy	Government / Donor Grant	-Facilitating market-oriented dairy enterprise development through private service providers to train on organisation and enterprise skills - Providing technical support to smallholder dairy producers -Supporting market chain development -Supporting policy implementation -Program coordination (lead agency)	1,4,5, 6 Farmer common interest groups
9. SITE	Local NGO-1995	Cross-sectoral	Donor	-Facilitating training of dairy traders and linking them to technical information -Support formation of dairy traders association	1, 2, 3,,5 Dairy Service providers
10. Farm Concern International (FCI)	Local NGO-2003	Agribusiness-Horticulture and Staples	Donor	- Needs assessment and market research for identifying enterprise opportunities - Facilitating access /dissemination of available technology (crop varieties) from research stations and private sector actors and peer exchanges -Organising and supporting smallholder producers into commercial villages. - Facilitating training on technical (production and post-harvest) and non-technical (business skills) -Supporting access to microfinance - Facilitating value networks of different actors with emphasis on public-private partnerships	1,2,3,4,5 Farmer collective enterprise
11. KHDP (Kenya Horticulture Development Program) (Managed by Fintrac)	Consultants-2005	Horticulture	Donor	-Needs assessment and opportunity identification - Provides agronomic marketing, postharvest handling, and processing support for smallholders (both in-house capacity and in partnership with others) - Facilitate support for SPS compliance through training - Building partnerships -Program management	1,2,3,4,5,6 Farmer collective enterprises
12. Technoserve	International NGO-1973	Agribusiness-Horticulture and Dairy	Donor	-Enterprise development through agro-industry analysis and strategic planning -Facilitating smallholder producer enterprise development by linking to business experts for training -Facilitating linkage formation among different actors along the value chain with emphasis on market actors	1,2,3,4,5 Farmer collective enterprises

Name of Organisation	Type of Organisation and Year established	Sector	Funding	Types of activities	Broad Functions and level of functioning**
13. Smallholder Horticulture Marketing Program (SHOMAP)	Ministry of Agriculture Program-2007	Horticulture	Government/ Donor Grant	-Supporting production of select horticulture products with market potential by common interest groups -Facilitating infrastructure development (access roads, collection centers and markets) to enhance market access of selected enterprises - Program coordination (lead agency)	1,2,3,4,5 Farmer collective enterprises
14. NALEP- National Agriculture and Livestock Extension program	Ministry of Agriculture Program-2000	Agribusiness and extension	Government/ Donor Grant	-Facilitating needs assessment and identification of livelihood opportunities - Facilitating stakeholder forums to link many actors at regional (district) levels to set agendas and collaborate in selected initiatives - Provide technical (extension) support in production - Facilitate implementation of policy - Program coordination (lead agency)	1,2,3,4,5, 6 Stakeholder Forums- Network level
15. FPEAK –Fresh Produce Exporters Association Kenya	Producer Association- 1975	Horticulture	Membership fees, Donor	-Facilitate technical training in production (on quality- safety and code of practice) -Auditing - Marketing information and facilitation -Lobbying and advocacy on sector policy and regulation issues	1,2,3,4,5, 6 Individual and Farmer collective enterprises
16. AgriProFocus	NGO Network- 2009	Agribusiness	Donor	-Facilitate a learning platform among agencies and individuals supporting agriculture enterprise development -Policy advocacy -Aim to link agribusinesses and research in order to match demand and supply of knowledge - Stimulating and facilitating decentralised (localised) market of capacity building services through a capacity development fund	1,2,3, Network
17. Today Agriculture	Consultants- 2004	Horticulture (mainly export)	Consulting fees, Shares	-Organising farmers for production -Providing technical advice in production(on quality- safety and code of practice) -Auditing -Technology transfer support	1,2, 3,5
18. ISAAA (International	International	Crop	Donor, Private	- Facilitating access to crop biotechnology by identifying, supporting acquisition, application and	1,2,3,4,6

Name of Organisation	Type of Organisation and Year established	Sector	Funding	Types of activities	Broad Functions and level of functioning**
Services for Acquisition Agriculture)	NGO-1996	Biotechnology	companies	dissemination of crop biotechnology through linking local agriculture, research institutes and sources of the biotechnology (proprietary) -Gathering, processing and sharing biotechnology knowledge - Policy brokering supporting agro- biotechnology	Stakeholder Forums- Network level
19. AATF- (African Agriculture Technology Foundation)	Regional NGO-2002	Crop and Livestock proprietary biotechnology	Donor	- Facilitates the identification, access, development, delivery and utilisation of proprietary agricultural technologies -Negotiating IPR to enable access and adaptation and use of the technology -Capacity building of African institutions on biotechnology research -Policy advocacy	1,2,3,4, 5, 6 Stakeholder Forums- Network level
20. FIPS- Farm Input Promotion Services	Local Not for Profit company-2003	Staples (maize, sorghum, etc.)	Donors	-Stimulate farmer demand for inputs (small pack fertiliser and seeds)- -Promote development of village-based agricultural advisors and input suppliers -Facilitate increased farmers' access to and proper use of agricultural inputs through public-private sector partnerships (e.g. Research centres, Fertiliser and seed companies) -Stimulate market for inputs through increase demand and matching with supply by local stockists	1,2,3,4,5 Individual farmers
21. Real IPM	Private company-2003	Floriculture and Maize	Matching grant from donors	- Stimulate farmer demand for inputs (small pack fertiliser and seeds) - Product development –combined seed and fertilisers (for priming) and biopesticides -Training on Integrated Pest Management -Policy advocacy on biopesticides	1,2,3,4,5 Individuals farmers
22. AGMARK (Agricultural Market Development Trust)	Local NGO-2004	Agro-input supply	Donor	-Facilitating access to agricultural inputs through support for rural agrodealer network development -Stimulating commercialisation of new varieties of seeds (inputs) by creating demand for the same -Facilitating training of agrodealers on business management and technical and agronomic matters - Output market identification and facilitation (limited) -Policy advocacy on input subsidies	1,2,3,4,5 Agro-dealers (microlevel)

1=Demand articulation; 2= Network Building; 3=Knowledge brokering; 4= Innovation process management; 5=Capacity building 6= Institutional innovation

* **Most prominent functions of the organisation noted in bold

Network brokering

The results in Table 1 indicate that intermediaries were instrumental in orchestrating and brokering networks of different actors. However, notably, the network constellations that the different intermediaries facilitated vary considerably, particularly within sub-sectors.

Due to the nature of the business, intermediaries working in the dairy sector (as noted in Table 1) built both forward (input) and backward (output) linkages with various actors. These included a range of what is referred to as business development services (BDS), such as Artificial Insemination and Animal Health service providers, feed manufacturers, cattle genetics companies, transporters, financial services, processors and various government agencies and researchers. In the horticulture sub-sector intermediaries (e.g., Farm Concern, Technoserve, Today Agriculture and KHDP-Kenya Horticulture Development Program) supported farmer producer groups to forge links with input suppliers, microfinance, extension services (public and private), public research institutes, quality assurance services (e.g., certification) and various output markets, including local traders, institutions, supermarkets and exporters. A commonality between the intermediaries in these two sub-sectors is their emphasis on private-sector models focused on stimulating commercially-oriented BDS.

The intermediaries focused on supporting input access in the maize sub-sector (i.e., FIPS, Real IPM and AGMARK) mobilised less diverse networks, comprising mainly fertiliser and seed companies, research institutes, local agrodealers/input stockists and extension agents. Because marketing was not the principal goal for the majority of small-scale producers in the maize sector, marketing actors were peripheral in the network and were located mostly at the local market. The agri-biotechnology sector-focused intermediaries (ISAAA and AATF) built networks around emerging technologies, and mainly with public and private R&D actors at both local and international levels as well as private enterprises that were used to support the acquisition and dissemination of the technologies.

KDSCP, which worked at a higher systemic level in the dairy sector, was instrumental in facilitating the National Dairy Sector Task force (NDSTF) that strategically brought

heterogeneous public-private partners to work strategically in driving innovation of the sub-sector at large.

Knowledge and technology brokering

Knowledge and technology brokering is an important element in supporting agricultural innovation. Almost all the intermediaries identified in this study were involved in knowledge/technology brokering to various degrees. Intermediaries dealing with more sophisticated agri-biotechnologies (AATF and ISAAA) were primarily technology brokers who facilitated sourcing of the technologies and then supported experimentation, adaptation and dissemination of the same. These agricultural technologies were primarily proprietary.

Intermediaries focused on enterprise support used market analysis to identify enterprise opportunities (commodities), which determined the knowledge and technology they brokered (on production and post-harvest issues). For example, Farmconcern and Technoserve facilitated the identification of high-value horticultural crops that had a market demand, and then provided support to smallholder farmers to participate in these enterprises. The intermediaries brokered access to technologies such as improved seed varieties through research organisations or private enterprises and provided support for their application. In the dairy sector the intermediaries also brokered access to knowledge and available technologies (such as artificial insemination, feeds, etc.). These results indicate that the intermediaries' role in knowledge/technology brokering was related more to facilitating access rather than facilitating in the articulation of knowledge gaps and in influencing research agendas.

Innovation process monitoring

From the findings, it is clear that the intermediaries are instrumental in organising the spaces for interactions and for stimulating learning and for negotiation among different actors with diverse interests. For example, KDSCP facilitated meetings through the National Dairy Sector Task Force, which met monthly with the aim of aligning diverse agendas of different actors interested in addressing the challenges faced by the sector. NALEP also facilitated district-level multi-stakeholder forums such as platforms, where diverse actors

supporting smallholder farming households within a specific region align their work to ensure complementarity and avoid duplication.

EADD facilitated what they refer to as a hub (such as a milk cooling plant or collection centre), which provides the physical space where actors convene to provide different services. The hub aimed to align different actors, including producers, business service providers, processors and financial services, by systematising their interactions and transactions through a check-off system where services can be offered on credit linked to milk deliveries. Also, many of the intermediaries working at the level of the farmer or farmer collectives (e.g., Setpro, Farmconcern, SHOMAP – Smallholder Horticulture Marketing Program, SDCP, and KHDP) supported local level learning efforts (e.g., peer-exchanges, farmer field schools and field days). AATF and ISAAA's facilitation of access to biotechnology entailed negotiating and securing intellectual property rights for proprietary technologies and then managing the public-private partnerships involved in the process of locally adapting the technology and dissemination.

Enterprise Capacity building

Capacity building is particularly critical in supporting innovation for smallholder producers in a developing country such as Kenya. Some of the intermediaries took on a more facilitative role in linking smallholder producers to services that could strengthen their capacity — particularly around collective action. Most of the intermediation for capacity building was related to organising the farmers into producer groups, training them on both technical (agriculture) and generic business skills. The results indicate that a good number of intermediaries were more substantively involved in capacity building using their own in-house capacity.

In the dairy sector, capacity building related to strengthening farmer cooperatives and business was central. For example, EADD was centrally involved in facilitating formation of what they called dairy business associations, whereas KDSCP focused primarily on strengthening cooperatives, many of which had collapsed due to management challenges.

SDCP (Smallholder Dairy Commercialization Program) facilitated the formation of farmer common interest groups.

Institutional support

As indicated in Figure 1, intermediaries play a role in institutional innovation as boundary actors, particularly in the interface between science and practice and also in the policy and regulatory arena in innovation processes. From the results, only a few intermediaries explicitly engaged in supporting institutional change, particularly with regard to policy or stimulating the interface between scientists and practitioners. As indicated in the last column of Table 1, the actors engaged in facilitating institutional support were those working at a systemic level — e.g., KDSCP, Agriprofocus, NALEP and those involved in radical innovation with (emerging) agri-biotechnology innovation such as ISAAA and AATF.

4.3 Typologies of intermediaries

From the results above we characterised the different intermediaries based on their performance of functions and area of focus and came up with a typology of four intermediary types: systemic Brokers, Technology Brokers, Enterprise Development Support and Input Access Support (see Table 2 below).

Table 2. Typology of intermediaries based on functions

Intermediary type	Examples	Targets areas of Innovation	Area of focus in their functions	Strengths (+) and Weakness (-)
Systemic broker	KDSCP, NALEP, AgriProfocus	Technology, Organisational and Institutional	-Demand articulation- Strategic-research and sector agendas - Networks brokering - Innovation process management- sector wide - Institutional innovation- policy	-Balance all innovation areas and long term (system) changes(+) - Program-based-sustainability (-)
Technology broker	ISAAA, AATF	Technology and institutional	-Demand articulation/stimulation- Technology -Network brokering -Knowledge brokering -Institutional innovation- policy and regulation	-Technology push (-) -Linking technology and institutional context (+)
Enterprise development support	Farmconcern, Technoserve, SHOMAP, KHDP,	Technology and Organisational	-Demand articulation- Market driven -Network brokering- -Innovation process management	-Market driven- focus on high value crops (+) -Support entrepreneurship (+)

	SHDCP, EADD, SetPro, SpanTrack, Precise management		-Knowledge brokering- -Capacity building- organisation and human	- Institutional dimension not addressed (-)
Inputs access focused	FIPS, AGMARK, Real IPM	Technology and Organisational	-Demand stimulation -Network brokering -Knowledge brokering - Capacity building- organisation and human	-Technology push and micro-level (-) - Reaching the most vulnerable (+)

Systemic Brokers

Those intermediaries who work at a higher network level (sector-wide) are important in facilitating interactions and coordinating efforts for long-term changes. They facilitate demand articulation of needs and options of the desired changes at the system level, broker networks of diverse actors (including industry actors, policy-makers, researchers and others) and manage the various processes of aligning different actors and supporting learning processes. These intermediaries also play an important role in boundary spanning in order to influence policy and regulations necessary to provide the enabling environment to support necessary innovation within the system they are working in.

Technology Brokers

These intermediaries work in the realm of emerging agri-biotechnologies and are involved in stimulating demand for the new technology and facilitating intricate networks through which knowledge is shared, exchanged and put into use. They also focus on supporting institutional innovation related to policy and regulatory change as these provide an enabling environment and conditions needed to make productive use of the knowledge they broker.

Enterprise Development Support

These intermediaries are mainly focused on agri-business or enterprise development, guided by market demands. While some of these intermediaries work only in the agricultural sector, a good number also have a cross-sectoral focus in supporting small and medium enterprises, including those in agriculture. The value added of these intermediaries is, therefore, in bringing together the two worlds of agricultural entrepreneurs and agricultural and non-agricultural business service providers. The intermediaries were

involved in facilitating demand articulation for business development services and supporting network brokering and capacity building of farmers. The networks are built around public-private partnerships and benchmarked to private sector market development approaches. Most of these intermediaries are substantively involved in the innovation process, including providing extension support (production), research, business skills, training, etc.

Input Access Support

Input access-focused intermediaries work in the context of what can be considered a system lock-in of limited use of inputs in smallholder maize (staple) production systems in Kenya. The limited adoption of technologies such as fertilisers and improved seed has been blamed on lack of both demand for the technologies (due to various socio-economic reasons) and an efficient, commercially viable input supply infrastructure in rural areas. These intermediaries, therefore, focus on stimulating demand for the technology through capacity building to enhance knowledge. While this appears to be more of a transfer of technology role, the intermediaries' added value is in networks they broker involving local input stockists, public research institutes and input manufacturers in supporting what is incremental technology innovation. Similar to the enterprise support category, these intermediaries also provided substantive support to farmers.

5. DISCUSSION: THEORETICAL AND POLICY IMPLICATIONS

The findings from this study illustrate a diverse intermediary domain in an increasingly demand-driven, market-oriented and smallholder-dominated agricultural sector in Kenya. A range of organisations were identified as taking on an intermediary role in facilitating and coordinating interactions among heterogeneous actors in various agri-business networks. This indicates a pluralistic innovation support structure and corresponds to what other scholars have noted; namely, that there are already many actors fulfilling innovation intermediary roles in nascent agricultural innovation systems in developing countries (Klerkx et al., 2009).

The contribution of the innovation intermediaries is illustrated in the diverse functions and activities they undertake, including demand articulation, network brokering, innovation process management, capacity building and institutional support. Clearly, the support provided by the innovation intermediaries goes beyond simply facilitating access to knowledge and technologies. These findings, therefore, point to the need to shift attention to knowledge access and use as a starting point for innovation, thus limiting the understanding of innovation support to simply that of knowledge brokering. But, as we note, innovation is a process involving a range of tasks. This is because the context of innovation is also shifting and increasingly taking place in the context of more complex and multiple relationships. Thus, innovation intermediation that entails broader innovation support is becoming increasingly important.

In contrast to what Klerkx et al. (2009) found in the Dutch context — where new specialised organisations emerged as innovation brokers — the findings in this study of the Kenyan context revealed four broad categories of innovation intermediaries: Systemic Brokers, Technology Brokers, Enterprise Development Support and Input Access-Focused Intermediaries. Each of the different categories emerged from different starting points and objectives, which have determined the tasks and functions they perform. Some can be categorised as specialised brokers, whereas others are innovation intermediaries who mixed

substantive involvement in the innovation process with brokering as a side activity (Klerkx et al., 2009).

The technology brokers (e.g., ISAAA) can be categorised as innovation brokers. Their focus is on facilitating access to proprietary technology internationally, but, given that such technology regimes are new, the policy vacuums observed pointed to the need for support in the policy and regulatory domains, particularly around bio-safety concerns in order to enable technology access and use. These brokers, however, remain technology-focused. Systemic brokers include organisations that started out with strategic objectives such as sector support and development and have developed their brokering role from this starting point. These two broker types were explicit in addressing the institutional gaps, particularly between the policy level and the operational level, and forming what Howells (2006) has referred to as an 'ecology' of influences on other actors within the system.

The input support category, typified by FIPS, has taken farmer access to technology as a starting point and has structured its activities around linking with local supply systems. Those in the enterprise development support category have defined their role much more broadly right from the start and have bundled together a wider set of innovation support activities than the other categories of brokers defined.

While we noted that all the intermediaries identified are involved in facilitating innovation networks or configurations and supporting learning processes within these networks, they are not addressing the underlying institutional issues, such as organisational incentives and cognitive differences between the diverse actors that are likely to hamper demand-driven approaches to ways of working.

What this suggests is that the starting point of an organisation determines whether it becomes a specialised brokers or enabler of innovation or whether it takes on a brokering role as add-on to its main role (e.g., research, technical expertise, etc.). So, for example, organisations that started working on farm-level issues tended to restrict the purview of their activities to end-of-the-pipe sources of technology and associated support services.

Enterprise development organisations tend to engage in a wider set of brokerage roles. And organisations that start with strategic objectives tend to focus on systemic intermediation. However, we note that the innovation brokering function is increasingly pervasive and critical for supporting growing smallholder enterprises in Kenya and other similar developing countries. Increasing, this orientation toward supporting entrepreneurship development and business management in agriculture has been noted elsewhere (Phillipson et al., 2004; Eenhoorn, 2007; Knickel et al., 2009).

What are the implications of this in terms of public policy support to the innovation brokering function? First, the role of innovation brokering shows promise for systematically supporting demand-driven orientation of agricultural development, including steering research and extension support. Further, as Sulaiman et al. (2010) have argued, we also need to understand innovation more broadly in the context of the adaptation of agriculture systems as it increasingly is influenced by global scale phenomena. The strategic orientation of systemic brokers is well positioned to support such broad agendas.

Secondly, the implication of this is that it may not be necessary to think in terms of public support for specialist brokering services. That is to say that the organisational format of innovation support may not be analogous to the largely homogeneous public agricultural extension services. Instead, brokering could be performed by an eclectic collection of different sorts of organisations, projects and initiatives. Clearly this is a challenge for policy in supporting such a diversity of initiatives. Competitive funding may be one way forward, but this presupposes that there is a large enough number of alternative suppliers in each category identified. This is probably the case for farm-level organisations assisting with input supply, but may not be the case in systemic and technology-focused categories. Indeed, given the vulnerability of some of the organisations studied to external funding and dependence on donor support, national governments need to recognise that brokerage is a critical component of national innovation capacity and fund it, confirming what Klerkx et al. (2009) have noted — namely, that brokering as a public good will require public or collective funding.

Finally, while brokering would appear to be a pervasive activity there are both strengths and limitations apparent in each category observed (Table 2). There is, therefore, a need to weigh in and make choices about which functions need to be emphasised at different levels of brokering. For example, are the main bottlenecks to do with connecting farmers to technology and markets or are they about system changes at the national level? Of course, the reality is that brokerage is required at all levels and it is not a case of either/or. However, it may well be the case that certain forms of brokerage may be performed already by and supported by other others — for example, as part of business models (see Hall et al., 2010) and that the role of policy is to fill gaps and link together various forms of brokering at different levels. Therefore, rather than present a blueprint of how the intermediary domain needs to be organised, what is important is to ensure support for this important role, which, as noted, will require public or collective funding.

6. CONCLUSIONS

The objective of this paper was to shed light through an exploratory study of the diverse innovation intermediary landscape in the changing Kenyan agricultural sector and to highlight the broad and holistic contributions of intermediaries in supporting agricultural innovation processes. We have empirically shown that innovation support goes beyond brokering knowledge and technology access and includes broader innovation management tasks.

We have also identified an innovation intermediary landscape that combines varied organisational arrangements that include specialised innovation brokers and organisations that have a more hybrid identity, taking on brokering as a complementary function. This indicates that while innovation brokering is becoming pervasive in the support for innovation, the role and the concomitant innovation intermediary landscape and structures are shaped by context. And while the various intermediaries undertake a broad set of functions, which are all necessary in enabling innovation, we note that the institutional support function — in the sense of facilitating new practices, routines and norms — is still weakly addressed. Since innovation requires a careful balancing of technological, organisational and institutional dimensions, we note the need for innovation intermediaries to give due attention to institutional issues if they are to enhance the innovation capacity in smallholder agriculture.

In conclusion we note that given that this was an initial explorative study, it would be useful to conduct additional studies to confirm these initial insights and to further the understanding of the contribution of innovation intermediaries to smallholder agricultural innovation. An area for further inquiry would be on how intermediaries position themselves in dynamic innovation networks and explore the extent to which they experience tensions, as noted by other scholars. Also, a systematic inquiry into the effectiveness of this innovation intermediary model in supporting agriculture innovation is another area for systematic inquiry. These points indicate research gaps on more process-oriented studies on the functioning of intermediaries.

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