Advances in Knowledge Brokering in the Agricultural Sector: Towards Innovation System Facilitation

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Abstract The process of knowledge brokering in the agricultural sector, where it is generally called agricultural extension, has been studied since the 1950s. While agricultural extension initially employed research push models, it gradually moved towards research pull and collaborative research models. The current agricultural innovation systems perspective goes beyond seeing research as the main input to change and innovation, and recognises that innovation emerges from the complex interactions among multiple actors and is about fostering combined technical, social and institutional change. As a result of adopting this innovation systems perspective, extension is refocusing to go beyond enhancing research uptake, and engaging in systemic facilitation or what has been called ‘innovation brokering’. Innovation brokering is about performing several linkage building and facilitation activities in innovation systems, creating an enabling context for effective policy formulation and implementation, development and innovation. Conclusions are that an innovation systems perspective also has relevance for sectors other than agriculture, which implies that in these sectors knowledge brokering as enhancing research uptake and use should be complemented with broader innovation brokering activities.

1 Introduction
Recently, interest in enhancing the uptake, use and impact of research in policy and practice has increased considerably. This interest has emerged in various fields such as medical and health science, environmental science, and development (Lavis et al. 2006; Michaels 2009; Fisher and Vogel 2008). An increasingly popular approach to enhance research uptake and use, moving beyond mere diffusion of research results through reviews, leaflets, and summaries, is ‘knowledge brokering’ (Bielak et al. 2008). Although several definitions and modalities of knowledge brokering exist (see Michaels 2009; Meyer 2010; Fisher 2011), knowledge brokering is broadly about filtering relevant research, advocating the use of research in policy and practice, translating research into plain language and helping people to make sense of and apply information, and establishing a connection between research producers and users during research processes (Lomas 2007; Neef and Neubert 2011). This implies that knowledge brokering is not only about enhancing ‘research push’, but also about enhancing ‘research pull’ and facilitating collaboration between researchers and stakeholders to foster a process of joint knowledge construction, which often enhances research impact. While researchers can engage in knowledge brokering activities (Ward et al. 2010), these activities are often executed by specialised actors or organisations who are then called ‘knowledge brokers’ (Bielak et al. 2006; Lomas 2007; Meyer 2010).

While the knowledge brokering literature from the medical and health science field as well as the environmental science field has increasingly recognised research pull and participatory or collaborative research models, there remains a strong focus on ‘research’ and ‘knowledge’ (often explained as research evidence), which obscures the fact that to effectuate change and innovation there are several other influential factors...
Given these shortcomings, participatory research approaches emerged (based on research pull and collaboration), such as Farmer First (see Scoones and Thompson 2009 for an overview) and participatory technology development (see Neef and Neubert 2011 for an overview). The key objective of these participatory approaches was to enhance research uptake and impact, by adapting research to specific contexts and creating ownership of the research. This participatory research perspective considered the broader knowledge systems in which farmers were embedded, and evolved into the so-called Agricultural Knowledge and Information Systems (AKIS) perspective. However, AKIS mainly considered farmers, researchers and extensionists, but did not explicitly focus on the broader network of actors and institutional factors that impact agricultural innovation.

The importance of addressing the multiplicity of actors and institutional factors has become recognised in the Agricultural Innovation Systems (AIS) perspective. The AIS perspective moves beyond research and technology development as main ingredients for innovation and recognises that agricultural innovation is not just about adopting new technologies invented by research and transferred to farmers; it also requires a balance amongst new technical practices and alternative ways of organising, for example markets, labour, land tenure and distribution of benefits (Brooks and Loevinsohn 2011; Dormon et al. 2004). Innovation does not only involve adaptation to prevailing contextual conditions, but also the active influencing, redesign, or destruction of pre-existing conditions and institutional frameworks (Hounkonnou et al. 2012; Klerkx et al. 2010; Woodhill 2010). Such change is affected by complex interdependencies between actors, organisations and artefacts, unintended and unforeseen developments, and coincidence and dynamics of conflicts that challenge linear approaches and reductionist understanding (Woodhill 2010). This perspective implies that innovation depends on coordinated action in a network of actors, and that it is not very useful to merely look at the degree to which research outcomes are adopted or used as an indicator of successful innovation processes. Research is no longer considered as external and static, but rather as an integral and dynamic part of innovation.
2.2 From knowledge brokering towards systemic facilitation

The above signalled changes in thinking about the role of extension and research in agricultural innovation have certain implications for how the contribution of knowledge brokering is seen. The innovation systems perspective acknowledges that research does not equal innovation, but that innovation happens in society, and involves the re-ordering of relations and institutions in multiple social networks. Communication obviously plays a role in such re-ordering, but can no longer be thought of only in terms of merely brokering research knowledge to policy and practice in a research push or research pull mode. Also, it is not just about enhancing dialogue and direct collaboration between research producers and research users, considering the many factors that influence change and innovation. Rather, innovation needs
Table 2 Roles of systemic facilitators/innovation brokers*

<table>
<thead>
<tr>
<th>Articulation of problems and possibilities</th>
<th>Network building</th>
<th>Supporting negotiation and learning in networks – dealing with dynamics of power and conflict</th>
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<tr>
<td>Demonstrate and visualise interdependencies among stakeholder practices</td>
<td>Make an inventory of existing initiatives, complemented with stakeholder analysis</td>
<td>Identify and propose process facilitators who are credible and trusted by the stakeholders involved</td>
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<td>Explore and exchange stakeholder perspectives (values, problems, aspirations, context, etc.) through discussion, role playing, dramatisation, visits, filmed interviews, informality, humour, fun, etc.</td>
<td>Build on existing initiatives for change and the networks around these</td>
<td>Work towards process agreements, including dealing with media, mandates, etc.</td>
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<tr>
<td>Visualise invisible biophysical processes with the help of discovery learning tools or simulation</td>
<td>UWork towards ‘coalitions of the willing’ and exclude actors who do not feel interdependent</td>
<td>Steer collaborative research activities to questions relevant to less resourceful stakeholders</td>
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<td>Explore past and current trends and likely futures if nothing changes</td>
<td>Mobilise pressures from outside (carrots and sticks) to enhance feelings of interdependence</td>
<td>Make stakeholders talk in terms of proposals and counter-proposals</td>
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<td>Use visioning tools and scenario analysis to imagine (and find common ground on) possible futures</td>
<td>Forge/broker contact between existing networks and outsiders and/or outside expertise</td>
<td>Ensure regular communication with constituents to take them along in the process</td>
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<td>Discuss institutional and other influences that reinforce existing patterns/problems</td>
<td></td>
<td>Translate agreed-upon problems and solutions into storylines and symbols that are likely to resonate in society</td>
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<tr>
<td>Organise contact with others who have encountered and managed similar problems</td>
<td></td>
<td>Use media and lobby tactics to influence societal agendas and advocate solutions (with the help of storylines/symbols)</td>
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<tr>
<td>Elicit uncertainties that hinder change, and design collaborative investigation and experimentation to develop common starting points</td>
<td></td>
<td>Use practical actions and experiments as source of reflection and learning, rather than organising discussion and reflection only</td>
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<td>Articulate knowledge and resource needs (e.g. funding, lobbying support) as well as where to get knowledge and resources</td>
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<td>Organise regular reflection on process dynamics and satisfaction with outcomes</td>
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* The table shows a repertoire of innovation brokering roles which can be applied depending on the situation at hand, but not necessarily in a chronological order.

Source: Adapted from Leeuwis and Aarts (2011).
to be thought of in terms of a process that takes place in the context of the building, designing, and/or evolution of relations among multiple actors and institutions.

With regard to the role of extensionists, there is a shift towards – or rather the emergence of – an additional and complementary role as systemic facilitator (Clark 2002; Millstone et al. 2010; Rivera and Sulaiman 2009). Terms such as ‘innovation intermediary’ or ‘innovation broker’ have been coined to indicate this role (Klerkx and Leeuwis 2009; Kilelu et al. 2011). While these innovation brokers also aim to resolve communication problems between groups, instead of merely aiming at bridging a knowledge gap between science and practice/policy, they aim to bridge several other divides among groups involved in innovation and development. Such divides may be caused, for example, by different incentive and value systems for public and private actors hindering smooth collaboration, differences between local indigenous knowledge systems and formal scientific knowledge systems and ideological differences amongst different non-governmental organisations (NGOs) (Pant and Hambly-Odame 2006). Furthermore, innovation brokers help to get access to several other resources essential for innovation, such as capital, political support, business development services and material resources.

Leeuwis and Aarts have summarised the implications for extensionists or researchers of moving beyond a linear transfer of technology role and a mere focus on research, to becoming an innovation broker or systemic facilitator (see Table 2).

The role of innovation brokers may take shape in different ways, and may be executed by individual researchers (Schut et al. 2011), by research or extension organisations, NGOs, government agencies (Kilelu et al. 2011;
Performing innovation brokering roles in addition to ‘classical’ research and extension roles is challenging. It has been found hard to sustainably embed the innovation brokering role in a person or an organisation for which it is not (yet) the core-business. For example, as Rivera and Sulaiman (2009) argue, although extension organisations are pressure to develop into facilitating organisations that connect farmers with different sets of service providers, many still adhere to a linear transfer-of-technology paradigm. Hoedé et al. (2008) found that action researchers in the role of innovation broker constantly had to defend this role and negotiate their status in their organisations as their colleagues saw this work as lacking scientific legitimacy (see also Schut et al. 2011). This calls for alternative reward and incentive structures that pay more attention and attribute more value to fulfilling an innovation broker role within the research process and building bridges between research, policy and practice (cf. Schut 2012).

However, also when being an independent intermediary (i.e. not linked to a ‘classical’ organisation), fulfilling the innovation broker role is challenging. Even more than knowledge brokers who actively ‘pass on’ research knowledge (see e.g. Fisher and Vogel 2008; Shaxson and Gwyn 2010), the intangibility of the activities of innovation brokers make it hard to show to stakeholders what is the value of innovation brokering. Furthermore, the need to maintain a neutral position as an ‘honest broker’ (Pielke 2007) who connects different actors but does not have a strong normative orientation, requires careful manoeuvring in terms of positioning between multiple actors. It requires balancing between taking too much credit, and not having one’s contribution recognised; between steering processes too much and being too laissez-faire; between having sufficient expert knowledge to obtain a legitimate position in a network and acting too much as an expert and overruling contributions of the network partners; between empowering non-powerful actors in the network and starting to act as a spokesperson for these.

3 Conclusion: implications for thinking on knowledge brokering

As stated in the introduction, the goal of this article was not to present developments in the field of agricultural extension as an universal best-practice. However, it does offer a starting point for reflection on knowledge brokering. What the experience from agriculture shows, is that there is a need to move beyond narrow and simplistic ideas and strategies for enhancing the contribution of research to policy processes and development practice, and linking research producers to research users. Although a legitimate goal, and not denying that research makes important contributions to innovation and change processes, experience from the agricultural sector show that research is just one of many elements that influence the course and outcome of innovation and change processes. Following the innovation systems perspective, innovation requires work on changing relationships and institutions at different levels and the goes far beyond the focus on interfaces between research producers and research users.

The literature on knowledge brokering in a wide range of fields acknowledges that ‘producer’ and ‘user’ of knowledge are not rigid categories and that interactivity is required; moving from transfer, dissemination and consulting to engagement and collaboration (Bielak et al. 2008; Lavis et al. 2006; Lomas 2007; Meyer 2010; Michaels 2009). Nonetheless, the main focus appears to remain at the level of better inserting research into policy and practice. In that sense—and to use the examples presented in Table 1—it seems to have arrived at knowledge systems thinking as embodied in the AKIS perspective. However, given the similar complexity in which change and innovation in other sectors (e.g. health, development assistance, etc.) takes place, an innovation systems perspective could be useful as framework for analysis and action. From an innovation systems perspective, a broader range of brokering tasks to support coordinated action in networks that are connected to innovation, policy and development processes are needed. Research uptake is important, and knowledge brokering is an essential function, but should be accompanied by or integrated within the function of innovation brokering (see also Fisher 2011: 6), which more broadly focuses on rearranging all technical, social and institutional relationships needed for
innovation and change. Such a broad focus can contribute to creating an enabling environment for effective policy formulation and implementation, development and innovation. This appears not yet to be explicitly recognised and considered in many studies on knowledge brokering. Moving towards such an innovation broker role would require that ideas from innovation systems thinking are considered in and adapted to different fields. Additionally, awareness should be created as to what such an innovation broker role implies in terms of identity, capacities and mandate of those who intend to fulfil this role, and how it differs from a knowledge broker role. Also in the field of agriculture, this remains a great challenge.

Notes
1 Section 2 of this article draws heavily on a number of earlier publications by the authors (Leeuwis and Aarts 2011; Klerkx et al. 2012; Kilelu et al. 2011; Schut et al. 2011).

References