Agricultural Extension, Collective Action and Innovation Systems: Lessons on Network Brokering from Peru and Mexico

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ABSTRACT Purpose: New approaches to extension service delivery are needed that stimulate increased agricultural production, contribute to collective action and which also foster the emergence of agricultural innovation systems. Research in Peru and Mexico explores some of these new approaches.
Design/methodology/approach: In both countries, a qualitative value chain mapping methodology was used to explore the challenges of providing extension provision to resource-poor farmers in ways that stimulate collective action and agricultural innovation systems.
Findings: In Peru, collective action and the development of an agriculture innovation system required the network broker activities of initially a non-governmental organization (NGO) and then increasingly trusted local farmers known as Kamayoq. In Mexico, collective action took place in the context of a linear transfer-of-technology approach focused on access to improved maize seed and there was no evidence of the emergence of innovation networks.
Practical implications: Different extension modalities can foster collective action but this in itself is not enough to encourage innovation. Extension needs to focus on combining collective action with networking amongst sets of heterogeneous value chain actors.
Originality/value: The Peruvian and Mexican case studies demonstrate that the debate about the modalities of pluralistic and diversified extension systems has obscured the reality that the development community still has some way to go to achieve comprehensively the paradigm shift from a linear transfer-of-technology approach to one that supports the emergence of agricultural innovation systems.

KEY WORDS: Agricultural extension, Agricultural innovation systems, Empowerment, Smallholder farmers, Mexico, Peru
Introduction

By 2020, the world will have around 7.7 billion people and by 2050 the figure will be approximately 9.3 billion. These people will need to be fed, and significantly increasing food production and sustaining this production without compromising environmental integrity and public health are major challenges (Tilman et al., 2002). Enhancing agricultural productivity in those areas of the world bypassed by the Green Revolution will require new approaches that provide incentives and funding mechanisms that promote the translation of new innovations in plant science into concrete benefits for poor farmers (Navarro, 2006; Delmer, 2005). The need to increase agricultural production and productivity is taking place at the same time as changes in the global agricultural economy are providing farmers with new challenges and opportunities particularly related to access to markets (Markelova et al., 2009).

Strengthening developing country capacities for research and the development of more responsive extension services is, hence, necessary to support farmers to make better decisions relating to overall household livelihood strategies (Chapman et al., 2003; Bebbington, 1997). Agricultural extension, education and training can help many farmers maximize the potential of their productive assets particularly in light of the fact that most of the new technologies that farmers need will be 'information intensive', that is, they will require increased levels of knowledge for appropriate management (Tripp, 2001). However, the need for more responsive extension provision has coincided with deep cuts to publicly-funded extension services in the developing world.

Traditional publicly funded extension provision was criticized for being top-down, paternalistic, inflexible, subject to bureaucratic inefficiencies and, therefore, unable to cope with the dynamic demands of modern agriculture (e.g. Ajieh et al. 2008; Ogunlade et al., 2009). In contrast, private extension provision was seen as the way forward in terms of it becoming more demand-driven (Keynan et al. 1997; Klerkx and Leeuwis, 2009). Research has confirmed that farmers are, in principle, willing to pay for technologies and information. Picciotto and Anderson (1997) reported that in Brazil, performance contracts between farmers and extension agents have increased the commitment of extension workers, improved service delivery and increased agricultural productivity. Meanwhile, Horna et al. (2007) found that farmers in Nigeria and Benin are willing to pay for information about seed, suggesting possibilities for private delivery of seed. In Nigeria, Ajayi (2006) and Ozor et al. (2007) also documented farmers’ willingness to pay for extension provision, especially if it were provided to groups of farmers. In terms of payment for services, a key issue is that farmers are not necessarily expected to pay the market price for the services but are expected to pay a proportion of the costs of service delivery.

Where services are only offered where demand already exists, however, there is a risk that private sector providers will serve only the better-off farmers and ignore those living in marginal areas (Miehlbradt and McVay, 2003; Chapman and Tripp, 2003; Rivera and Cary, 1997; Muyanga and Jayne, 2008). In the majority of cases the private sector has proven incapable of replacing previous state services due to high transaction costs, dispersed clientele and low (or non-existent) profits. New approaches to
extension provision are needed along with a new consensus on the role of the public and private sectors whereby extension can be provided to resource-poor farmers on a more sustainable basis. This calls for pluralistic and diversified extension systems, a need that has largely been recognized by the research and development community along with policy-makers.

It is possible to separate the provision of funding from the provision of service (Chapman and Tripp, 2003). Debates, therefore, have tended to focus on the differing roles of the private and public sectors in terms of who funds and who delivers extension provision (Anderson and Van Crowder, 2000; Umali-Deininger, 2007; Ortiz, 2006). There is a danger, however, that by focusing on the modalities of extension provision, less attention is directed at the extent to which extension provision is contributing (or not) to the increase in social and human capital, which is imperative if farmers are to maximize the potential of their productive assets. There should be more focus on ‘strengthening the capacity of different actors in agricultural development to create, diffuse and use knowledge’ (Rivera and Sulaiman, 2009: 268).

There is, hence, a need to look beyond the funding and execution mechanisms of extension per se and to focus more on the extent to which extension is contributing to farmer empowerment and change. In light of the importance of enhancing farmers’ social and human capital and faced with what is often suboptimal public or private extension delivery, more attention is being directed at extension modalities that more effectively facilitate collective action amongst farmers. These approaches include Farmer Field Schools (FFS) (Anandajayasekeram et al., 2007), Local Agricultural Research Committees (CIALs) (Bentley et al., 2006) and farmer organizations (Markelova et al., 2009).

Collective action can be defined as ‘voluntary action taken by a group to achieve common interests’ (Meinzen-Dick and Di Gregorio, 2004: 1). Collective action can exist in the absence of farmer organization, the latter being a formal expression of collective action. Collective action and farmer organization may well play an important role in facilitating farmers’ links with public and private sector extension providers and, ultimately, leading to increased agricultural production, enhanced rural innovation and greater access to markets. There are, however, a number of key research questions including: what has been the experience with group/collective based learning? What has been the role of extension agents as facilitators in these initiatives? How should the fostering of collective action best be funded?

These issues are explored from an innovation systems perspective and in the context of agricultural service provision in Peru and Mexico. The rest of this article is structured as follows: the next section introduces the concepts of innovation systems and collective action, pointing out that the role of collective action in innovation processes has received little attention especially in the context of pluralistic and diversified extension provision. The methodology section is followed by two case studies: first the Kamayoq in Peru and then the maize seed sector in southern Mexico. The discussion focuses on the importance of network brokers in fostering collective action and innovation systems. The conclusion highlights the fact that while the funding and extension delivery mechanisms are important, more attention needs to be directed at supporting the role of network brokers and the emergence of collective action and agricultural innovation systems.
Collective Action and Innovation Systems in the Context of Pluralistic and Diversified Extension Provision

Innovation Systems

Traditionally extension provision was largely a linear process with knowledge, information and technology generated from a central source (such as a publicly funded research entity) and then with information flowing from researchers to farmers via extension agents (Biggs, 1990). The danger is that mono-disciplinary theoretical recommendations may be made for what are, in fact, multi-faceted problems embedded in complex local agro-ecosystems and socio-cultural systems. Agricultural development is an immensely complex process characterized by a high degree of non-linearity. Agriculture can be viewed as an integrated social-technical system in which farmers and service providers create solutions to production and livelihood problems, often taking advantage of new opportunities through the modification of new technologies and existing production systems (Hall et al., 2005).

In the agricultural sector, innovation is a central strategy to achieve economic, social and environmental goals (Klerkx et al., 2009). In the linear vision, innovation results from the creation of knowledge through basic scientific research, followed by strategic, applied and adaptive research, and ultimately to technology development, dissemination and adoption (Spielman et al., 2008). However, farmers participate in social change not as passive subjects, but rather as social actors whose strategies and interactions shape the outcome of development within the limits of the information and resources available (Sumberg et al., 2003). A linear transfer-of-technology extension approach is, hence, likely to stymie local innovation networks (Kibwika et al., 2009; Waters-Bayer et al., 2004). Hence, in place of a linear approach, what is needed is a systems approach in which innovation is the result of a process of networking, interactive learning and negotiation among a heterogeneous set of actors (Klerkx et al., 2009).

The use of participatory approaches can enhance rural innovation capacity, whether through increased accessibility of externally developed technology, the joint development of relevant and appropriate technology by farmers and scientists, or through enhanced local capacity to address problems and devise solutions for them. The importance of farmer participation in agriculture became widely accepted in the 1980s and 1990s (e.g., Bunch, 1982; Chambers et al., 1989; Scoones and Thompson, 1994) but is often characterized by passive as opposed to active participation (Biggs, 1988). While participatory approaches still take research as an important driver in innovation processes, this has been broadened by an innovation systems perspective.

An innovation system can be defined as a network of organizations and individuals that are focused on bringing new products, new processes and new forms of organization into social and economic use. The institutions and policies that affect their behavior and performance are also part of the innovation system. Innovation systems depend on learning processes, feedback loops and iterative interactions that are decidedly non-linear (Spielman et al., 2008; Davis et al., 2008). An innovation system consists of a web of dynamic interactions among researchers, extension...
agents, equipment manufacturers, input suppliers, farmers, traders and processors (Hall et al., 2005).

In a vibrant innovation system, agricultural development results from efforts to combine technological improvements in production, processing and distribution with organizational improvements in how information and knowledge are exchanged between various actors in these systems, along with policy changes that create favorable incentives and institutions to promote change (Davis et al., 2008). An innovation system can, hence, be described in terms of three elements (Watts et al. 2003): (i) the organizations and individuals involved in generating, diffusing, adapting and using new knowledge; (ii) the interactive learning that occurs when organizations are involved in the generation, diffusion, adaptation and use of new knowledge (and how this leads to innovation); and (iii) the institutions that govern how these interactions and processes occur.

Agricultural innovation systems, therefore, include both users and producers of information, and must link them in a dynamic process that needs to be supported by appropriate framework conditions—not just policies but also financial, business and educational systems (Spielman et al., 2008). Innovations systems have emerged around conservation agricultural practices across the developing world (Erenstein et al., 2008; Dixon et al., 2008) and well as in market access (Devaux et al., 2009).

Collective Action

The role of collective action in innovation processes has received little attention to date even though the idea of farmer organization and collective marketing is not new. As Devaux et al. (2009) comment, the literature on collective action emphasizes its role among individuals with common interests, in managing common pool resources, reducing transaction costs, gaining economies of scale and improving the bargaining power of small farmers. The innovation literature, meanwhile, highlights the importance of interactive, social learning among individuals with different perspectives and interests. Neither discusses the use of collective action in fostering innovation, an area that is becoming more topical in the context of pluralistic and diversified extension systems.

Provided farmers can overcome the difficulties of organizing into a group, farmers’ associations can allow small farmers to pool their resources to purchase extension information that individual farmers may not be able to afford on their own (Umali-Deininger, 2007). Earlier experiences with collective action, for example cooperatives, were decidedly mixed (Markelova et al., 2009) and numerous attempts to foster farmer organizations have failed. In Zimbabwe, many local farming groups established to access inputs and/or market outputs disintegrated because there was considerable mistrust between farmers (Masakure and Henson, 2005). Berdegue (2002) describes farmer organizations in Chile, where close social relations prevented members from enforcing rules for fear of alienating friends and neighbors. In Mexico, rural organizations have a history of being used for political ends, are manipulated by corrupt leaders, or have failed because of interpersonal mistrust (Key and Runsten, 1999).
It is often a challenge to establish collectively agreed rules, to secure members’ commitments to abide by the rules and to monitor and enforce compliance. Furthermore, development practitioners face the dilemma that the poor often lack essential assets for successful cooperation such as basic education, management and entrepreneurial skills, and financial capacity (Stringfellow et al., 1997; Kibwika et al., 2009; Quintana, 2004). Finally, organizational and contextual challenges limit the scale, scope and spread of producer organizations, their activities, and, hence, their development impact (Chirwa et al., 2005).

However, collective action is often an ingredient in the success of extension provision and farmer learning, for example, in Uganda (Ramírez, 2005), Kenya (Davis et al., 2004; Muyanga and Jayne, 2008) and Costa Rica (Faure, 2004). Successful methodologies include CIALs, community-level organizations for helping agricultural scientists and farmers to collaborate on adaptive research (Bentley et al., 2006; Braun et al., 2000) and farmer field schools. The aim of farmer field schools is to educate farmers in an informal setting within their own environment, address production systems from a broad perspective and not just isolated components and encourage farmer experimentation and group action in which the trainer is more a facilitator than instructor (Anandajayasekeram et al., 2007).

The growing interest in collective action has also coincided with increased market opportunities for farmers. Recent studies of agricultural innovation highlight the utility of the value chain concept as a unit of analysis and focus of interventions aimed at stimulating innovations and developing innovation capacity (Devaux et al., 2009).

Value chain actors (including farmers) require certain conditions and services from other enterprises and support organizations to effectively participate in the market (Best et al., 2006). These may include financial (particularly micro-credit) and non-financial services, the latter commonly known as business development services (BDS).

Collective action in the form of producer groups can help farmers more readily access these services (Markelova et al. 2009; Shepherd, 2007). Collective action can also open up new marketing opportunities for smallholders by introducing innovations to existing value chains or creating entry ways into new markets. For example, creating new demand for traditional products through processing and value-adding activities has proved to be an innovative route to higher prices, such as through design of a branding strategy and an awareness campaign for minor millets (Gruère et al., 2009) and the use of native Andean potatoes in the production of potato chips (Devaux et al., 2009). Experience to date suggests that what is often needed is a network broker, an internal or external ‘facilitator’ who catalyzes collective action (Best et al., 2006).

Cabero and van Immerzeel (2007) describe the Pachamama Raymi capacity building system in Peru whereby local farmer-trainers facilitated and encouraged the emergence of agricultural innovation systems through a strong focus on collective action and joint learning. The emphasis is less on whether the facilitators are external or internal agents and/or whether they are supported by the private or public sector, the key is that they need to be catalysts or knowledge brokers rather than instructors, working with communities to achieve the same communities’ defined and perceived goals (Anandajayasekeram et al., 2007). Devaux et al. (2009) describe how collective
action was triggered amongst potato producers in the Andes initially by an external research organization and then once local groups had been established they took on lives of their own.

Despite the documented success stories in terms of the role of facilitators or network brokers in fostering collective action and innovation systems, Klerkx and Leeuwis (2009) and Klerkx et al. (2009) highlight challenges, not least: maintaining a neutral position (e.g., ensuring that they are genuinely seen as facilitators and not competitors); building legitimacy amongst different actors; and securing funding for their network brokering activities. The key questions are how best can collective action be fostered and how it can be used to stimulate agricultural innovation systems especially in the context of diversified and pluralistic extension provision.

Methodology

The research reported here relied on a combination of qualitative fieldwork in Peru and Mexico and a literature review. The author used a qualitative value chain mapping methodology that has proved effective and efficient in identifying different value chain actors and the relationships between them (Hellin et al., 2009; 2010). The first step to any mapping exercise is to identify the important actors and build up a list of the people and institutions that play a part in the value chain. By its nature this is a dynamic and iterative process—such a list should not stay constant, but change and grow as our understanding of the market map evolves.

Fieldwork consisted of semi-structured interviews and focus group meetings, complemented with participant observation. The key value chain actors interviewed included farmers, extension agents, NGOs, seed companies, agro-processors and government researchers. The qualitative research process involved conversations in which topics were predetermined but in which questions and insights arose during the discussion. One-to-one conversations and group meetings were considered a useful tool because they shed light on the relationship of individual farmers’ decisions to broader social pressures and beliefs (Rhoades, 1991). Interviews with groups of farmers may be more instructive than those with individual farmers because group members have an overlapping spread of knowledge, covering a wider field than any single person. Furthermore, these methods can be a rapid and resource-efficient way of gathering information about complex relationships.

In Peru, interviews were held with staff belonging to the local development NGO (see below) in both its Lima and Sicuani offices. This was followed by interviews with 18 individual farmers in nine local villages and mixed-gender focus group meetings in three local villages. In Mexico, semi-structured interviews were conducted with eight seed distributors and five private extension agents in the region of La Frailesca in the state of Chiapas (see below). Focus group meetings were conducted in four villages that are representative of the poverty levels found in the region. In each village, a focus group of mixed genders was initially carried out with approximately 15 farmers attending each meeting. This was followed by a focus group meeting that was undertaken separately with men in each of the four villages, and a focus group with women only in three of the four villages. In Mexico, interviews were also conducted
with eight local government and research officials and a representative of MASECA, the main maize grain purchaser in the region.

The Kamayoq in the Highlands of Peru

Agriculture in much of the Andes is problematic because seasonal variations in climate can bring drought, floods, frost or hail within one growing season. In the highlands, livelihood security is further undermined by discrimination, since the arrival of the Spanish Conquistadors, against the indigenous Aymara and Quechua communities. Furthermore, much of the Andes are characterized by low endowments of ‘geographic capital’ (natural, social, human and physical capital) and poverty is widespread. Despite these disadvantages, indigenous groups in the Andes have survived for thousands of years with their livelihood security based on a range of tubers, a mix of different grains and livestock (Hellin and Higman, 2005).

Peruvian highland farmers, however, need access to new productivity-enhancing technologies and also access to markets. This need coincides with a substantial reduction in the provision of publicly-funded extension services. For example, the government agricultural extension program run by what is now the National Institute of Agrarian Research (Instituto Nacional de Investigación Agraria (INIA)), employed 1,400 extension officers in 1986, but fewer than 100 officers in 1992. The role of the state was reduced to providing only basic services such as certain types of agricultural information (e.g., prices) to support farmers’ decision making (Ortiz, 2006).

Since the 1990s, Practical Action, a development NGO, has been working in Quechua-speaking farming communities in the Peruvian Andes to try to fill this void in extension provision and to encourage farmer innovation. Initially the focus was on communities living in the valleys above 3,500 meters, where common crops are maize, potatoes and beans, and where families also have one or two head of cattle each, some sheep and a number of guinea-pigs (a food staple in the Andes). Since 2003, the focus has broadened to include communities living above 4,000 meters, where farmers raise alpacas and cultivate potatoes.

Influenced by the pedagogic approach of the Brazilian educator Paulo Freire, Practical Action recognized that one of the most effective ways to address farmers’ needs was through a farmer-to-farmer extension approach that also encouraged farmer organization, farmer experimentation and learning by doing. In the early 1990s, Practical Action began training a number of farmer extension agents, known locally as Kamayoq. The objective was to train local farmers who would then be responsible for training other villagers and encouraging farmer experimentation and innovation. The training initially focused on irrigation techniques but broadened in the mid-1990s to include themes identified by the farmers, including: Andean crops, horticulture, livestock, forestry, agro-industry and marketing.

At the end of 2007, approximately 200 Kamayoq had been trained, of whom 20% were women. Training courses took place at a Kamayoq school in Sicuani, 140 km north of Cusco, and also in different field locations, so that the Kamayoq can ‘learn by doing’ (de la Torre, 2004). Instructors include staff from Practical Action, long-serving Kamayoq, and experts from regional universities in the cities of Puno and Cusco. During the training, the Kamayoq also visit INIA’s experimental stations,
other NGOs working in the region and large-scale farmers. Throughout their training, the Kamayoq establish contact with technical experts from the private and public sectors and with other farmers—an agricultural innovation system which they can tap into when they need information and technical advice once they finish their training.

The increase in social and human capital is recognized by many as one of the greatest benefits of the whole Kamayoq approach. Although they provide technical advice, the Kamayoq are not promoters of off-the-shelf technologies. On the contrary, they work with groups of local farmers to generate innovations in response to local agricultural and veterinary problems. This is important not just for empowering farmers, but also because farming conditions in the Andes are so complex and diverse that it is difficult to find a ready-to-use technology that can be adopted by a large number of farmers without some degree of adaptation. The Kamayoq are key players in a two-way flow of information: from the individuals and institutions promoting development, and from the local farmers to these same individuals and organizations. The Kamayoq can be considered as facilitators of local innovations systems (Hellin and Dixon, 2008).

The Kamayoq have encouraged farmer participatory research. Successful initiatives include the treatment of a maize fungus disease; the control of mildew on onions; and particularly the treatment of animal diseases. One of the biggest problems in sheep and cattle (and increasingly alpaca) in the Andes is the parasitic disease Fasciola hepatica, commonly known as ‘sheep liver fluke’. Infected bulls sell for up to 65% of the price of healthy bulls. In the case of cows, infection causes a reduction of more than 50% in milk production. Weakened animals are also susceptible to a number of secondary diseases. Few farm families could afford conventional medicines. The discovery of a natural medicine to treat and control F. hepatica depended on a process of participatory research and development, and innovation guided by the Kamayoq and involving local farmers, Practical Action and national researchers. More than 3,000 families now use the natural medicine for controlling F. hepatica in the highland provinces near to Sicuani, and villagers have treated approximately 30,000 cattle and 7,000 sheep (Hellin and Dixon, 2008). The medicine’s widespread use has led to fewer sick animals, higher milk yields and diversification into a range of milk products including yoghurt and cheese, as well as the cultivation of ‘new’ crops such as onion and carrots. Farmers are now involved in experiments to find a cure for F. hepatica in alpacas.

There is growing demand for the Kamayoq’s technical advice along with their skills in facilitating group experimentation and learning. The Kamayoq are increasingly being contracted by public and private organizations to extend the model beyond the communities and regions where they have operated to date. Even though the emphasis is on collective action and local innovation, the Kamayoq, like most conventional agricultural extension provision, have worked predominantly on improving and increasing production at the farm level. The next step is, therefore, to determine how the Kamayoq model could be developed to provide farmers with the business services that they need in order to benefit from emerging market opportunities (for example, market linkages and processing skills). What this entails is the further development of the agricultural innovation systems in order to encourage and facilitate farmers’ access to markets in a similar way, perhaps, to the
success of the Papa Andina initiative in the Andes (Devaux et al., 2009) which brings researchers together with other agricultural service providers and value chain actors, including small farmers, to promote pro-poor innovations in Andean potato-based food systems.

**Mexican Maize Farmers and Access to Agricultural Inputs**

Maize in Mexico is a widely consumed and multi-purpose crop. White maize is primarily for direct human consumption and yellow maize is predominantly a component of livestock feed. Approximately 12 million tonnes of white maize grain are consumed annually. Combine this amount with grain dedicated to livestock, industrial uses and national reserves, and the total yearly requirement for maize in Mexico is around 26 million tonnes. Approximately 20 million tonnes are produced nationally and another six million to seven million tonnes are imported. Meanwhile, other maize products are used in both rural and urban areas: maize stalks are used for fencing; husks are used for wrapping hot food; and leaves are used as animal fodder.

Maize cultivation in Mexico is characterized by persistent disparities between small-scale and large-scale maize farmers in terms of their access to land, credit and their use of higher-yielding improved maize varieties. Mexican maize cultivation—including access to improved maize seed—has been heavily influenced by government support programmes over the last 30–40 years. Whereas the Mexican government provided significant support to farmers through the majority of the 20th century, this relationship was profoundly changed by the implementation of the North American Free Trade Agreement (NAFTA) in 1994. NAFTA opened the Mexican agricultural sector to ‘free-market’ imports from and exports to the US and Canada.

The policy changes outlined in NAFTA were accompanied by far-reaching reforms. One such change was the withdrawal of much government support for the development and transfer of agricultural technology, which had previously been provided through parastatal businesses. For example, during the early 1990s, the national seed-producing program Programa Nacional de Semillas (PRONASE), which had produced and sold seed to farmers at a subsidized price, was privatized. Meanwhile, restrictions on seed imports were lifted; federal investment in agricultural research decreased (see King, 2006); and the extension activities that had previously fallen under the responsibility of the Secretaría de Agricultura, Ganadería, Desarrollo Rural, Pesca y Alimentación (SAGARPA) were eliminated.

The Mexican maize seed sector has, therefore, undergone significant changes during the past three decades, with government actions opening the way for private seed companies. The International Maize and Wheat Improvement Center (CIMMYT) conducted research in the south of Mexico on the role of collective action in facilitating farmers’ access to improved maize seed. In this case, collective action serves two purposes: first, to facilitate farmers’ access to extension provision (including improved maize seed) provided by extension agents known as despachos, and second, to access subsidized improved maize seed provided by a government program (Keleman et al., 2009). In neither case was attention directed at encouraging
the development of agricultural innovation systems, that is, the focus was on a linear
transfer of technology, largely, improved maize seed.

CIMMYT carried out research in La Frailesca in the southern state of Chiapas
(Hellin et al., 2010). La Frailesca is situated in a valley at an altitude of 600m; but,
surrounding mountains have an elevation up to 2,000 m. Maize is the dominant crop
in both municipalities. Cattle-ranching is a complementary activity and maize crop
residues are an important source of forage in the dry season. While the region
produces large maize surpluses that are exported to other parts of Mexico, it is still
dominated by small-scale farmers, that is, farming activities in La Frailesca are
both subsistence and market oriented. Many farmers date their first use of improved
maize seed to the 1980s, when government programs distributed open-pollinated
variety (OPV) seed as part of technical assistance packages. These OPVs were
reproduced through traditional seed-saving practices. Hybrid varieties, in contrast,
have been available to small-scale farmers in La Frailesca for a little more than a
decade.

Since the mid-1990s, private extension agents, known as despachos, have provided
technical assistance to groups of farmers in preference to individual producers. The
despachos assist farmer groups to access credit provided at low interest rates by
Fideicomisos Instituidos con Relación a la Agricultura (FIRA), a government body
responsible to the Bank of Mexico. The credit is tied to a government-subsidized
technical package that includes a set of inputs: fertilizers, pesticides, herbicides and
seed. The despachos sell this technical package to groups of farmers (there were also
attempts to encourage groups of farmers to take out crop insurance). FIRA in turn
subsidizes the farmer organizations to enable them to pay for the technical package.
The subsidy declines from 70% of the cost in the first year to 20% in the fourth year
(Hellin et al., 2009).

The subsidized system worked well for a number of years, but with declining maize
profitability farmers have defaulted on their loans, banks are less interested in lending
to farmer groups and the number of despachos has fallen. According to different
value chain actors, including the despachos themselves, approximately 10–15% of
the original despachos remain active in the agricultural sector. Interviews with the
despachos and locals revealed that often farmers did not fully understand the ‘value’
of some of the products promoted by the despachos. A good example is crop
insurance. During the focus group meetings farmers said that while they under-
stand the principle behind crop insurance, they had had three consecutive years with
reasonable maize harvests and were now in doubt as to whether taking out the
insurance was in their best interests. Some farmers said that their doubts about
the crop insurance led them to trust less some of the other despachos’ extension
messages.

The government also provided a seed subsidy. In 2006, the subsidy amounted to
300 Mexican pesos (US$28) per bag of seed—enough to plant one hectare—with a
limit of two bags per farmer. Depending on the type of seed, the subsidy covered
between 30% and 100% of the cost. Farmers had to apply to the Secretaría de
Desarrollo Rural (SDR, Ministry of Rural Development) for the subsidy. They
received a voucher that could then be used to purchase subsidized seed from
the distributors. Seed distributors much preferred working with groups of farmers
as it reduced their transaction costs. While in theory individual farmers could apply
for subsidized seed, the SDR explained that there was a preference to work with farmer groups.

In contrast to the existence of farmer groups in La Frailesca working to access subsidised seed, there are very few examples of maize farmers in La Frailesca organizing to access maize grain markets. The Mexican Government fixes the grain price that farmers receive at the buying centers established outside villages throughout La Frailesca. Assuming that the grain meets certain minimal quality standards, farmers receive the government-fixed price per tonne of grain, regardless of the volume or type of grain sold. Farmers’ transaction costs associated with market access are, thus, relatively low. Farmers did not identify any advantages to establishing a farmer organization to sell grain. Furthermore, with an emphasis on collective action to acquire a technology (improved seed) via a linear transfer-of-technology approach, the lack of an agricultural innovation system meant that when the seed subsidy was suspended in 2007 there was little incentive to maintain the farmer group.

Discussion

Public and Private Extension Provision

Debates about extension modalities are important and it is an illusion to think that in the long term private funding and private delivery are the ‘the highest natural condition of extension’ (Anderson and Van Crowder, 2000: 382) and can handle all the situations that extension must legitimately address. If privatized extension is to make a contribution, it will not embody the replacement of a monolithic public extension system by a similarly undifferentiated private system; instead, it will allow the development of a range of extension modalities and funding strategies.

The examples of the Kamayoq in Peru and the despachos in Mexico demonstrate that some sort of private extension delivery is often possible, that is, that information and knowledge can be seen as agricultural inputs that by their nature have a market value, with incentives for private participation. The Kamayoq in Peru and despachos in Mexico are examples of attempts to establish and deliver a demand-driven, accountable and possibly sustainable extension system. The fundamental difference between the two case studies is that in the case of the Kamayoq the emphasis was on collective action and innovation systems, while in Mexico there was no emphasis on the nurturing of an agricultural innovation system; collective action was seen as a way to enhance the effectiveness of a science-based strategy to boost yields through smallholder adoption of technology packages, predominantly, improved maize seed.

There is nothing fundamentally wrong with the approach followed in Mexico. In the face of emasculated public extension provision it was a sound attempt to work with the private sector to foster some sort collective action and enhance farmers’ access to agricultural inputs. It would, however, have been better from a development perspective had the extension message and delivery mechanism led to the emergence of an agricultural innovation system. As Navarro (2006) notes, extension agents are particularly well positioned to maintain an open and multi-directional process that, amongst other things, ensures an interaction with farmers at all levels, that is,
learning from them, educating them and engaging with them at the needs assessment, planning, implementation and evaluation levels.

More importantly, however, the Peru and Mexico case studies also illustrate the danger of narrowly focusing the development debate on the modalities of extension provision rather than looking beyond the funding and execution mechanisms and analyzing the extent to which extension is contributing to collective action and the evolution of agricultural innovation systems.

Collective Action and the Role of Network Brokers

Farmers seldom self-organize and work collectively on a formal basis. Often external input is needed. Most cases of successful agricultural innovation systems highlight the importance of collective action and the crucial role of a facilitator or network broker who catalyzes this collective action, enhances farmers’ access to information and technical assistance and builds the capacity of a group to engage effectively in production and marketing activities.

Those chosen to be trained to be Kamayoq were initially selected by their respective villages. As ‘leaders’ they were already respected and, as has been exemplified in other parts of the world, local leaders can readily serve as ‘an entrance gate for external intervention into the rural community’ (Moumouni et al., 2009: 311). Initially the NGO Practical Action acted as the facilitator working through the Kamayoq and then sufficiently empowering the Kamayoq to take on the facilitator role. In this sense Practical Action and the Kamayoq are similar to the network brokers described by Klerkx et al. (2009), in terms of being systemic intermediaries that connect different actors involved in the innovation system facilitating the establishment of appropriate linkages and multi-stakeholder interaction in the innovation system.

While the literature is clear about the importance of facilitators, the consensus breaks down when it comes to who is best positioned to take on this role. As Klerkx et al. (2009) point out different actors can act take on the role of network or innovation brokers including NGOs and even research organizations, for example, the role of International Potato Center (CIP) in the context of value chain innovations as part of the Papa Andina network (Devaux et al., 2009). The key issue is trust. Devaux et al. (2009) note that in most types of collective action, appropriate leadership is important, but the particular traits of leaders may vary. Leaders should be trusted, able to motivate the members and have necessary skills for the collective enterprise; this is what the Kamayoq have.

The example of the Kamayoq contrasts with the collective action generated amongst small-scale farmers in Mexico. In the case of the latter there was no clearly identified network broker largely because extension provision was not embedded in an innovation systems framework. Collective action was undertaken in order to access agricultural inputs as part of a more conventional linear transfer-of-technology extension approach. The despachos worked with groups of farmers to facilitate uptake of technology packages. Unlike the Kamayoq, the despachos were never ‘innovation brokers’ in the sense of brokers who build appropriate links within an agricultural innovation system and facilitating multi-stakeholder interaction in innovation (Klerlx et al., 2009).
Agricultural Innovation Systems and Pluralistic Extension Provision

While many sources debate whether the private or public sector is best suited for the facilitation or broker role, many agree that NGOs with an appropriate skill set may initially be the best facilitators or network brokers (Thorp et al., 2005). However, both development agencies and the private sector have pivotal roles in facilitating the emergence of innovation systems. Development agencies are especially important in the early stages, but it is critical to engage the private sector in order to reduce the risk that farmers are ‘abandoned’ when a project ends.

The Kamayoq are private sector actors in terms of their being entrepreneurs who are paid for their services. It is farmers’ willingness to pay the Kamayoq that makes the model so interesting. Farmers pay the Kamayoq in cash, in kind or in the promise of future help through an indigenous system known as ‘ayni’. In general, where technical services are provided in response to demand, providers tend to serve only the better-off farmers and to ignore those living in marginal areas, believing that only meager profits can be made from working in these often remote areas.

The Kamayoq model demonstrates that the payment-for-services approach is possible in more marginal areas. The Kamayoq, therefore, face the same challenges as other network brokers as described by Klerkx and Leeuwis (2009) in terms of the challenge of obtaining sustainable funding for their brokerage activities despite their apparently beneficial functions. It is not unrealistic to work towards a system whereby the Kamayoq will eventually be able to pay for all of their training. For the time being, however, the continued success of this development initiative requires external public funding.

Papa Andina’s work illustrates how collective action involving small farmers, market agents, researchers and other agricultural service providers can generate pro-poor market chain innovations (Devaux et al., 2009). The example of the Kamayoq in Peru is of agricultural development that is taking place in an innovation system. The innovation system, in which the Kamayoq play such a key role, has not yet reached the level of maturity of the Papa Andina example but it has the potential to do so.

Adjusting the Focus

National and international policy on extension should promote pluralistic approaches, avoiding universal and idealized models. Contracting in and public-private coalition approaches, in contrast to purely public sector extension (characterized by ineffectiveness and inefficiencies) and purely private for-profit extension (which may ignore public goods and concerns), may help achieve extension services which are both demand led and which internalize public concerns such as environmental protection, food security and socio-economic equity. The ultimate source and modalities of extension are secondary, however, to the more essential question of whether the extension provision is leading to greater collective action and the emergence of innovation systems.

Collective action and farmer organization have a key role to play in rural development. Heemskerk and Wennink (2004: 14) go as far as stating that ‘public agricultural service delivery has in fact in many cases already been reduced to just one of the sources of information for farmers. Public investment in agricultural
innovation will only continue to finance (directly or indirectly) public agricultural service providers if they become effective partners of farmer organizations'. Hence, both the public and private sectors have a role to play in fostering collective action, even though finding a balance between what is publicly funded and what is privately funded is a continuous quest in extension delivery systems (Klerkx and Leeuwis, 2009).

The economic viability of a farmer organization can be ensured as part of a linear technology transfer model but this, perhaps, demonstrates that researchers, development practitioners and policy-makers have not been asking the right question, namely how to ensure that collective action leads to institutions and organizations, for example, farmer organizations that are: (a) effective in terms of linking smallholders to other value chain actors; (b) profitable both for farmers and other chain actors; (c) can be out-scaled to effect change for a large number of farm families; and (d) foster the generation, diffusion, adaptation and use of new knowledge amongst different actors. This represents a potential area for further research, but the agricultural innovations systems perspective, with its emphasis on fostering inclusive networking amongst sets of heterogeneous actors, is a strong candidate for future research.

Conclusions

The case studies from Mexico and Peru demonstrate some of the opportunities and challenges surrounding the emergence of agricultural innovation systems and the key role played by extension. Within pluralistic extension systems, extension agents need to act as both technical advisers and also facilitators/network brokers. The latter role is in many ways the key one as it can contribute to the fostering of collective action and agricultural innovation systems.

The Kamayoq and NGO Practical Action acted as network brokers helping establish links between different chain actors in the Peruvian highlands. The success of the Kamayoq model also partly depended on the creation of a market for technical advisory services. This, in turn, ensured a supply of competent advisers (the Kamayoq) and the stimulation of a demand for advisory services as farmers become aware of new opportunities and the incentives for their own experimentation and innovation. Farmers' willingness to pay the Kamayoq means that their role as both technical advisers and network brokers has become institutionalized in many of the Peruvian farming communities where they evolved.

In the Mexican case study, attention focused more on how best to fund extension provision in the face of dwindling public funding. The despachos extension model was designed to find a judicious balance between private and public sector extension provision. The extension paradigm promoted by the despachos, however, was largely a linear transfer-of-technology one. There was practically no focus on collective action and in the absence of effective network brokers no agricultural innovation systems emerged.

There is a danger that by focusing debate on the modalities of extension provision in terms of the role of the public and private sectors, too much attention is given to the funding and execution mechanisms of extension and too little to appropriate extension modalities that contribute to collective action and the evolution of
agricultural innovation systems. In 1997, Robert Chambers called for a paradigm shift in terms of putting farmers first and avoiding the imposition of top-down realities by professionals (Chambers, 1997). Ten years later researchers were still echoing this call: what is needed is a ‘paradigm-shift, from teaching to learning: from a focus on teaching, towards a focus on learning among people, from their own experience and from that of others, to generate new knowledge’ (Cabero and van Immerzeel, 2007: 58). The reality is that the development community still has some way to go to achieve comprehensively the paradigm shift from a linear transfer-of-technology approach to one that fosters the emergence of agricultural innovation systems.

Acknowledgements

The author is very grateful to two anonymous reviewers for invaluable comments on earlier versions of this article.

References


