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Knowledge management for pro-poor innovation: the Papa Andina case

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Papa Andina began as a regional research program focusing on the Andean potato sectors of Bolivia, Ecuador and Peru, but later shifted its focus to facilitating pro-poor innovation. To accomplish this shift, a number of approaches were developed to foster innovation, by facilitating mutual learning and collective action among individuals and groups with differing, often conflicting, interests. This paper explains why and how Papa Andina shifted its focus from conducting research to facilitating innovation, and describes two approaches that Papa Andina developed to facilitate mutual learning and innovation: the 'participatory market chain approach' and 'horizontal evaluation'. Differing local circumstances and beliefs shaped the work of local teams, and rivalry among the teams stimulated creativity and innovation. Participatory evaluations helped individuals recognize and appreciate differences and build shared knowledge across the teams. After describing the case, the paper discusses the implications for knowledge management and innovation theory, and for the potential use of Papa Andina's approaches in other settings.

Introduction

There is little systematic understanding of the ways in which agricultural research and development (R&D) organisations manage knowledge in order to foster innovation in developing regions. By innovation we do not mean the *production* of new knowledge but 'the *use* of new ideas, new technologies, or new ways of doing things in a place or by people where they have not been used before' (Barnett 2004, p. 1, emphasis added). This paper analyses how Papa Andina, a partnership program hosted by the International Potato Center (CIP), has managed knowledge in order to foster innovation.

CIP is one of 15 international agricultural research centers affiliated with the Consultative Group on International Agricultural Research (CGIAR). The initial goal of the CGIAR, established in the 1970s, was to increase food production in developing countries by carrying out and mobilising research on major food crops and livestock. The institutional design of the CGIAR reflected a 'research-and-technology-transfer' model of innovation that was popular at that time. In this model, the role of CGIAR centers was to carry out strategic and applied agricultural research, the results of which were used by national agricultural research organisations to generate production technologies that were subsequently transferred to farmers. CGIAR centers were expected to produce globally applicable and relevant knowledge that would be freely available for use by all national

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research programs. Such knowledge has been referred to as an 'international public good' (Sagasti and Timmer 2008).

Over time, knowledge of innovation processes has improved, the goals of agricultural research organisations have broadened, and more actors have become involved in research and innovation processes. There has been considerable experimentation with participatory approaches for democratising knowledge management (KM) and improving linkages between research programs and innovation processes. However, few of these experiences have been systematically documented or analysed.

This paper seeks to contribute to our understanding of KM and innovation in developing regions, by analysing the case of Papa Andina. The paper was prepared by six individuals who have been directly involved with Papa Andina, and were based at CIP or at Papa Andina's 'strategic partners' in Bolivia, Ecuador, and Peru.[1] In this sense it presents the reflections of key actors in the Papa Andina case.

In the next section, we introduce theoretical perspectives on KM and innovation. In the third section, we explain why and how Papa Andina shifted its focus from agricultural research to facilitating learning and innovation in value chains, and we outline two approaches developed and used by Papa Andina to promote situated mutual learning (Ferguson *et al*. 2010) and pro-poor innovation. In the final section, we reflect on the implications of this case for KM and innovation theory and on the potential utility of our approaches in other settings.

Changing perspectives on knowledge management and innovation

In this section, we introduce perspectives on KM and innovation that have informed discussions and decisions on the organisation and conduct of R&D efforts, including those associated with the CGIAR.

Changing perspectives on knowledge management

There are two main perspectives on KM – one concerned primarily with codifying, storing, and transferring existing knowledge and the other concerned primarily with producing useful new knowledge. McElroy (2003) refers to these two perspectives as generations of KM. *First-generation KM* focuses on capturing, codifying, and transferring existing knowledge and getting the right information to the right people at the right time. It values what is considered to be universally valid, context-free, objective information. It strives to formulate broadly applicable lessons and best practices. It emphasizes the use of information and communication technology (ICT) for storing, managing, and transmitting knowledge. In contrast, *second-generation KM* goes beyond knowledge warehousing and transfer and also seeks to enhance the capacity of individuals and groups to produce new knowledge that they need to achieve their goals. Second-generation knowledge managers think of KM in a cyclical, holistic way, and are concerned with both knowledge production (learning) and knowledge transfer. As a result, they are concerned with social interactions and social dynamics as well as engineering.

In a recent review of KM practices in international development, Ferguson, Huysman and Soekijad (2010) note that these two perspectives on KM often exist – and are in conflict with one another – within the same organisation. International organisations frequently promote networking among development stakeholders to enhance their participation in development debates and expand the use of context-relevant knowledge in decision-making processes. However, the internal KM systems of these same organisations usually focus

on codifying, storing, and transferring the organisation's knowledge through ICTs. By stressing the use of presumably context-free and universally applicable codified knowledge in their planning and reporting, the internal KM systems of international organisations ignore or downgrade the value of local knowledge, 'marginalizing intended beneficiaries rather than incorporating their knowledge more closely into development interventions' (Ferguson *et al*. 2010, p. 1798). As a result, the internal KM systems of development organisations frequently impact negatively on the achievement of their broader development goals.

The authors suggest an alternative perspective on KM – a third generation – in which *'situated mutual learning'* helps reconcile the external KM goals and programs of international organisations and their internal KM systems and practices (Ferguson *et al*. 2010, p. 1806). In situated mutual learning, different groups and organisations with different interests and social positions interact with one another to generate commonly shared knowledge. Situated mutual learning involves negotiation and mediation of conflicts and reflects the unequal social positions of diverse actors. It does not involve a one-way process of knowledge transfer, but emerges where different parties interact while seeking to advance their own interests. When an international organisation and its local partners engage in situated mutual learning, they co-produce new knowledge that is considered valid and useful on both sides of the organisational boundary.

Changing perspectives on innovation

Studies of industrial innovation have identified perspectives on innovation that are similar to those just described for KM. The 'research-and-technology-transfer' or 'pipeline' model of innovation remains the dominant perspective in many settings. Nevertheless, there is a trend toward what von Hippel (2005) terms 'democratizing innovation'. User-centred innovation processes are seen as offering 'great advantage over the manufacturer-centric innovation development systems that have been the mainstay of commerce for hundreds of years' (Von Hippel 2005, p. 1). Chesbrough (2006) observes a 'paradigm shift' in how companies produce and commercialise industrial knowledge – a shift from 'closed innovation' (an internally focused approach with companies generating their own ideas and then developing and marketing them) to 'open innovation' (with firms using external as well as internal ideas and paths to market). These and other authors provide examples of the growing importance of non-traditional, open and democratic innovation processes in many sectors, including agriculture (Cash *et al*. 2003; Kerkhoff and Lebel 2006; Douthwaite *et al*. 2009).

When the CGIAR was established in the 1970s, its strategy was 'to use the best science in advanced countries to develop technologies for the benefit of food-deficit countries and populations' (Lele 2004, p. 3). It sought to mobilise cutting-edge agricultural sciences, particularly breeding and genetics, to increase the yields of major food crops and livestock in developing countries. The 'Green Revolution' of the 1970s ushered in the use of high-yielding varieties of staple food crops along with chemical fertilizers and pesticides. Early successes with these technologies helped consolidate the research-and-technology-transfer model, which subsequently guided researchers' decisions on what problems to address, what types of solution to pursue, and what organisations to partner with (Vanloqueren and Baret 2009).

Over time, in agriculture as in industry, the limits of the research-and-technology-transfer model have become apparent, as our understanding of innovation processes has improved, more actors have become involved in research and innovation processes, and

stakeholders have come to expect agricultural research to help solve complex problems of rural poverty, food security, nutrition, and natural resource management. As a result, since the 1970s, attention has shifted from improving technology transfer to strengthening national agricultural research systems, to strengthening innovation systems (Pant and Hambly 2009).

An innovation system can be defined as 'a network of organisations, enterprises, and individuals focused on bringing new products, new processes, and new forms of organisation into economic use, together with the institutions and policies that affect their behavior and performance' (World Bank 2006, pp. vi–vii). An innovation system 'extends beyond the creation of knowledge to encompass the factors affecting demand for and use of knowledge in novel and useful ways' (World Bank 2006, p. vii). In addition to researchers, extension agents, and farmers, an agricultural innovation system includes policy-makers, agricultural service providers (such as financial entities, seed certification agencies and non-governmental organisations (NGOs) that support agricultural and rural development), and such market chain actors as input suppliers, commodity traders, processors, retailers, and consumers.

There are subtle, but important differences between perspectives on knowledge systems and innovation systems. Knowledge systems are concerned fundamentally with the production, exchange, and use of knowledge. As Klerkx *et al*. (2009, p. 411) point out, although these functions are essential for innovation processes, innovation systems need to fulfill several other functions, such as fostering entrepreneurship, developing a vision for change, mobilising resources, building legitimacy for change, and overcoming resistance to change. Additionally, 'the agricultural innovation systems approach recognizes the influential role of institutions (i.e., laws, regulations, attitudes, habits, practices, incentives) in shaping how actors interact' in innovation processes.

One approach that has been proposed for promoting innovation is 'innovation brokering', which can be defined as acting as a 'systemic facilitator' within an innovation system, which focuses on enabling other actors to innovate (Klerkx *et al*. 2009, p. 413). As we will see in the next section, over time, over time, Papa Andina's role evolved from one of conducting research to one of brokering innovation processes (Klerkx *et al.* 2009, p. 411).

Despite the evolution of thinking on innovation processes and systems, the institutional arrangements and practices of agricultural R&D have lagged behind. As Hall (2009, p. 30) notes, 'the central challenge remains with us: the need to accelerate policy and institutional change in public (and increasingly, private philanthropic) investments in agricultural science, technology and innovation for development'.

There has been considerable experimentation in recent years in both national and international agricultural research organisations with new ways of linking research with innovation processes. This has mainly been on the periphery of research organisations, in externally funded projects designed to achieve practical outcomes in short time periods. The following section presents the case of one such initiative – the Papa Andina Partnership Program. Examples of other similar initiatives that engage in innovation brokering and the related concept of 'boundary work' are provided by McNie *et al*. (2008) and Kristjanson *et al*. (2009).

The Papa Andina case

Grown mainly by poor smallholders, the potato is the most important food crop in the Andean highlands (Meinzen-Dick *et al*. 2009). For many years, in order to contribute to reducing rural poverty in the Andes, the Swiss Agency for Development and Cooperation

(SDC) supported potato R&D in Bolivia, Ecuador, and Peru. In 1989, Papa Andina was established as a regional project supported by SDC and hosted by CIP. In line with the CGIAR strategy at the time, Papa Andina was designed to implement a regional approach to research planning, priority setting, and implementation that would involve the traditional partners of CIP and SDC – the national potato research programs of Bolivia, Ecuador, and Peru. The goal was to establish a decentralised regional research program with country partners responsible for implementing specific research projects and sharing the results with researchers in the other countries.

Shifting the focus from doing agricultural research to brokering and supporting innovation processes

When the project began, it soon became clear that national policy-makers and researchers were less interested in developing a regional potato research program than in learning to cope with external forces that were buffeting their organisations. These forces included declining funding for agricultural research, accelerating change in the agricultural sector, and expanding demands for short-term impact. Both local stakeholders and international donors were complaining that research was not addressing the most pressing problems, and new value-chain approaches were being promoted as part of a new 'research-for-development' agenda. In this context, researchers and policy-makers wished to improve their understanding of, and ability to respond to, changing demands for research.

To address these issues, we linked up with the *New Paradigm Project* of the International Service for National Agricultural Research (ISNAR), which was also supported by SDC (Souza Silva 2001). The New Paradigm Project offered a theoretical framework for understanding and managing organisational change processes. The framework emphasised the growing role of urban and global markets in driving agricultural change and the need for research organisations to understand the changing global context and to respond appropriately to changing demands for agricultural research and related services.

These ideas fell onto fertile ground. CIP had a long tradition of participatory technology development (Thiele *et al*. 2001). Papa Andina's two coordinators (Devaux and Thiele) had complementary training and skills (plant physiology and social science, respectively) and were experienced in on-farm research. For many years, SDC had supported the use of participatory research methods, and had organised participatory planning workshops for many of the projects it supported. Several of Papa Andina's members had learned participatory project planning methods in these workshops. In line with thinking in the New Paradigm Project, SDC also believed that agricultural research organisations needed to become more open and responsive, working with development partners (including NGOs) and private enterprises to innovate in market chains in ways that would benefit small farmers.

Encouraged by these ideas, Papa Andina's coordinators and national partners conducted strategic planning exercises and explored different approaches for understanding and developing market chains. In Bolivia, this led to experimentation with an approach for market chain analysis developed by the Brazilian Agricultural Research Corporation (EMBRAPA). In Ecuador, strategic planning and market-chain analysis led to establishment of multi-stakeholder platforms that involved the potato researchers, other service providers and small farmers (Thiele *et al*. 2011). This led to further work on farmer organisation and empowerment. In Peru, experimentation began with a market chain approach that engaged not only small farmers and agricultural service providers, but enterprises

involved in potato processing and marketing. The market-chain work in Bolivia and Peru led to development of an approach known as the 'Participatory Market Chain Approach' (Bernet *et al*. 2006; 2008).

In order to promote knowledge sharing among the different national groups, to strengthen the work of local teams, and to learn lessons of a more general nature, Papa Andina's coordinators took the lead in developing a participatory evaluation approach that fosters learning, knowledge sharing, and improvement in the context of a network. This became known as 'Horizontal Evaluation' (Thiele *et al*. 2006; 2007).

As the micro-level work with farmers, service providers, and market chain actors advanced, national groups realised the importance of engaging with policy makers and influencing policy dialogue and decisions. This led to national initiatives, each of which reflected the particular policy context of the country (Devaux, Ordinola *et al*. 2010). In Peru, when a multi-national corporation showed interest in processing and marketing native potato products, the Peruvian team began work on issues of corporate social responsibility.

Through these efforts, there was a gradual shift in the focus of Papa Andina from developing a **regional research agenda** – a set of technically oriented projects, the results of which would be shared across national boundaries – to developing a **regional innovation agenda** focused on strengthening the capacity of national agricultural research organisations to contribute to pro-poor innovation.

Making the shift was not a well-planned process that followed an elaborate strategy or a detailed script, but one that evolved in unexpected ways and that frequently involved disagreements, tensions, and conflict. When work on market chains and multi-stakeholder platforms was undertaken, each local team developed its own perspectives and approaches linked to underlying core beliefs about the nature of the development process, and there was a degree of rivalry among the teams. The diversity of initiatives and experiences and rivalry between the teams promoted methodological innovation. Horizontal Evaluation then served as a useful tool for understanding and learning from the local diversity of perspectives and experiences. Out of the different interests, perspectives, and experiences, shared new concepts and knowledge emerged. In this sense, horizontal evaluation was crucial for situated mutual learning.

It has taken time for the shift from doing research to facilitating situated mutual learning and brokering innovation to be incorporated into the way Papa Andina and its partners work, and the process is still incomplete. Changing the central focus of a partnership program and the ways in which it works is a complex process that involves controversy, interpersonal and inter-organisational conflict, and periodic setbacks. We return to this point in the concluding section of this paper.

In this rest of this section, we describe two of Papa Andina's approaches for promoting situated mutual learning and brokering innovation, which are also the most thoroughly systematised and documented: the PMCA and Horizontal Evaluation.

The participatory market chain approach

In 2003, CIP's Social Sciences Department and Papa Andina members in Peru began experimenting with a participatory approach known as *Rapid Appraisal of Agricultural Knowledge Systems* (RAAKS) that brings diverse stakeholders together to stimulate mutual learning, build trust, and foster innovation (Engel and Salomon 2003). RAAKS was useful to bring those who make their living from a market chain – the so-called 'market chain actors' – together to identify market opportunities. However, it did not include the development of innovations – new products or processes – to exploit the identified

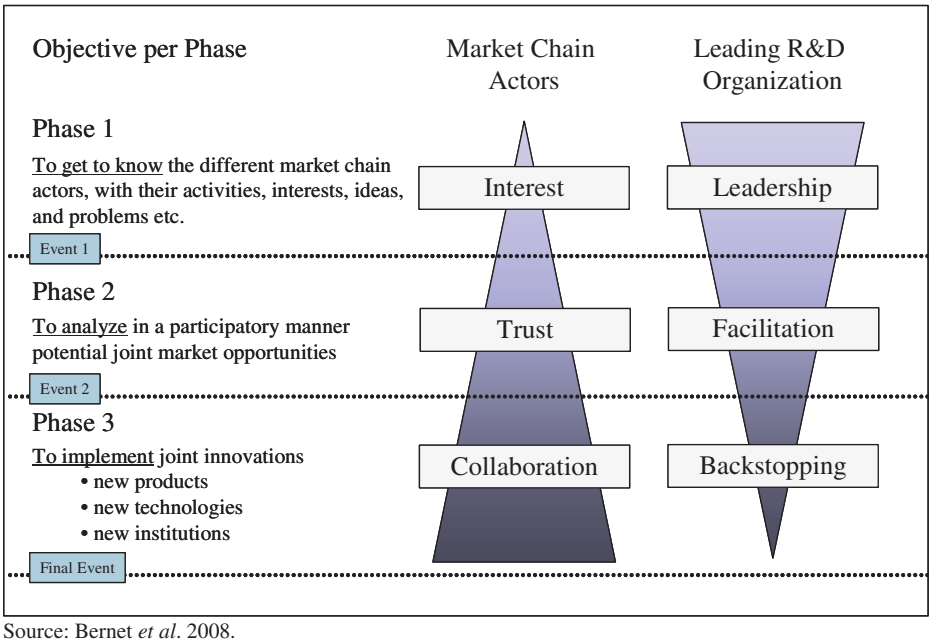
opportunities. As steps and tools were added to foster commercial, technological, and institutional innovations, a new approach emerged, which was named the Participatory Market Chain Approach (PMCA). User guides and training materials for the approach were published in English and Spanish (Bernet *et al*. 2006; 2008; 2011; Antezanna *et al*. 2008).

Description of the approach

The PMCA applies principles of action research to foster market chain innovation. It engages market chain actors and agricultural service providers (including, for example, agronomists, post-harvest technicians, marketing specialists, extension agents, and enterprise development professionals) in facilitated group processes in which market opportunities are identified and assessed, and innovations are developed. The PMCA is implemented in three phases, which comprise the broad innovation brokering functions of demand articulation, network composition and innovation process management:

Phase 1. Familiarisation with the market chain and the key actors
Phase 2. Joint analysis of potential business opportunities
Phase 3. Development of market-driven innovations

As illustrated in Figure 1, a research or development organisation typically initiates work with the PMCA. Early steps include selecting the market chains on which to work, identifying potential R&D partners and carrying out exploratory, diagnostic market research. Key goals of Phase 1 are to become familiar with market chains and market chain actors, and to motivate market chain actors to participate in the PMCA process.



Source: Bernet *et al*. 2008.

Figure 1. The three-phase structure of the PMCA methodology Source: Bernet *et al*. 2008.

In Phase 2, representatives of the R&D organisation facilitate meetings that aim to build up mutual trust and knowledge sharing among participants. In Phase 3, the market chain actors work together to develop new market processes or products, with support from R&D organisations.

During Phase 1, diagnostic research is carried out to become familiar with key market chain actors and understand their interests, problems and ideas. This phase is expected to take two to four months and may involve 20 to 40 interviews with diverse market chain actors. This phase ends with a public event that brings together individuals who have been involved in the PMCA process so far, including market chain actors and representatives of research organisations and other service providers, to discuss results of the market survey and to exchange ideas. Individuals who have not been involved so far are also invited, to share results with them, to stimulate their interest in the PMCA process, and motivate them to participate in future activities.

In Phase 2, thematic groups are established to explore potential market opportunities. The lead R&D organisation facilitates group meetings where market opportunities are identified and discussed. The main challenges during this phase are to engage a wide range of relevant stakeholders – including market entrepreneurs – and to keep participants focused on identifying and exploiting market opportunities, rather than, for example, addressing production problems of unknown importance for marketing. Six to ten meetings may be needed to analyse potential market opportunities. In some cases, specialised market studies may be needed to complement the group work. At the end of this phase, the market opportunities are discussed in a pubic event with a wider audience and new members with complementary knowledge and experience are encouraged to join Phase 3.

Phase 3 focuses on the activities needed to put in place joint innovations, with leadership from market chain agents. A challenge during this phase is to cultivate leadership within the market chain to lead the innovation process. The time required may vary depending upon the complexity of the innovation, the capacity of the group, and biophysical, socio-economic, and institutional conditions. A rough estimate of the time needed, based on experience in Bolivia and Peru, is three to six months. Phase 3 closes with a large public event to which a much wider group is invited to present the commercial innovations or new market products. Invitees include, for example, political officials, donor representatives, commercial leaders, and members of the press.

Applications and results

The PMCA was developed to stimulate pro-poor innovation in potato market chains in Bolivia, Ecuador, and Peru. Subsequently, other organisations expressed interest in applying the approach in other regions and market chains. The Department for International Development (DFID) of the United Kingdom funded a project to introduce the PMCA into Uganda and apply it in market chains for potatoes, sweet potatoes, and vegetables (Horton *et al*. 2010). DFID later provided funding for experimentation with the PMCA and other participatory methods in a program known as the Andean Change Alliance (www.cambioandino.org). In this program, the PMCA was applied in value chains for potatoes in Bolivia and Ecuador, for coffee in Peru, for yams in Colombia, for dairy products in Bolivia and Peru, and for fruits and vegetables in Bolivia (Horton *et al*. 2011). The World Agroforestry Center has employed the PMCA with tropical fruits in Peru. The Australian Aid Agency has supported use of the PMCA in combination with farmer field schools in Indonesia.

Studies in South America and Africa (Devaux *et al*. 2009; Horton *et al*. 2010; 2011) indicate that use of the PMCA has stimulated varying degrees of learning, interaction, innovative thinking, and changes in practices, which in some cases have resulted in commercial, technological, or institutional innovations. Many participants – including both poor farmers and small-scale market agents – have gained valuable new knowledge and experiences that have empowered them in their dealings with other market actors and service providers. Individuals learn a new way of approaching problems – with a more comprehensive market perspective – which they apply in their future work. Exposure to the PMCA also helps professionals appreciate the importance of focusing on practical results and contextualising their work within larger systems such as value chains.

Experience shows that the main benefits don't come *during* application of the PMCA, but *later on* as a series of ideas are tried, adapted, fail, and succeed. This highlights the value of follow-up support to innovating groups after formal completion of a PMCA exercise.

Several organisations that have participated in PMCA exercises have incorporated elements of the approach into their work. A few have adopted use of the PMCA *in toto*. Since agricultural R&D organisations depend on external donors for a large part of their operating funds, they need to include the PMCA in their donor proposals. Recently, many donors are favoring projects that promise tangible results in very short periods of time (sometimes in months, rather than years), limiting the possibility of applying a complete PMCA exercise.

A few universities have incorporated the PMCA into their academic curriculum for development professionals, providing an unexpected avenue for dissemination of the approach.

A country's economic policies set the stage for local development efforts and can support or discourage use of value-chain approaches such as the PMCA. For this reason, international organisations need to work with local groups to determine which approaches are most appropriate for promoting innovation and development in their context.

Successful innovation is more likely in some market chains than in others, highlighting the importance of doing a thorough market analysis before investing heavily in market-chain innovation. Personal factors also influence results. Two types of 'innovation champion' are important:

- The facilitator in the R&D organisation that initiates and supports the PMCA exercise
- One or more respected individuals in the market chain who are committed to, and eventually lead, the innovation process

Without both these types of champion, results of the PMCA may be limited. An especially critical factor is the engagement and commitment of market chain actors, who are expected to play a lead role in driving development of new business opportunities and generating demands for innovation. As *proactive leadership from within the market chain is essential*, engagement of the business community is an area that merits very careful attention in applications of the PMCA.

Horizontal evaluation

Horizontal evaluation is a flexible evaluation method that combines self-assessment and external review by peers (Thiele *et al*. 2006; 2007; Bernet *et al*. 2010). This evaluation

approach was initially developed as a type of 'product evaluation' to assess and improve the new R&D approaches that were being developing in Papa Andina (for example, the PMCA and multi-stakeholder platforms). More recently, horizontal evaluation has been used also to assess R&D processes and experiences as well as products.

In its early years, Papa Andina, like many other regional programs, organised study visits for local professionals to exchange knowledge and experiences. Expert-led evaluations were used to evaluate Papa Andina's work and make recommendations for improvement. The study visits were enjoyable and instructive for participants, but there were few clear outcomes and little follow-up. External evaluations provided interesting results, but Papa Andina's members often doubted the relevance or feasibility of the recommendations, and their implementation was patchy.

In view of the limitations of traditional study visits and expert evaluations, horizontal evaluation was developed as a participatory alternative that combines the positive aspects of both. Evaluation by peers is what makes the process 'horizontal', compared with the 'vertical' evaluation typically provided by outsiders of perceived higher professional status. This method differs from the anonymous peer reviews used by professional journals and research funders, in that horizontal evaluation is open and transparent, with all the participants encouraged to learn and benefit from the evaluation process.

Horizontal evaluation neutralises the power dimension implicit in traditional evaluation, in which the 'expert' judge the 'inexpert' and the 'powerful' assess the 'powerless.' Because of this neutralisation, a more favorable learning environment is created. The involvement of 'peers,' rather than 'experts' creates a more favorable atmosphere for learning and improvement.

Description of the approach

The heart of a horizontal evaluation is a three-day participatory workshop involving a local group (referred to as 'local participants') of 10–15 people and a similarly sized group of outsiders or visitors (referred to as 'visitors'). Visitors are peers from other organisations or projects who are working on similar themes in other contexts or other countries and have a potential interest in applying in their own context the R&D approaches being developed or the knowledge acquired.

The role of local participants is to present, and with help from the visitors, critically assess the work undertaken and make recommendations for improving it. The role of the visitors is to critically assess the work, identifying its strengths and weaknesses and making suggestions that will aid the wider application of its results, if appropriate. The visitors may contribute to the formulation of recommendations, but the local participants must take the lead and actually propose and agree to them, since their ownership of the recommendations will be the key to implementation.

Planning the horizontal evaluation workshop. An organising committee is established that includes decision makers from among both local participants and visitors. Workshop organisers are responsible for:

- Identifying an appropriate object for evaluation (in the cases we have supported, an R&D approach or specific experience of regional interest)
- Ensuring the participation of an appropriate group of local participants and visitors (the latter should have an interest in learning about the approach or experience)
- Designing the three-day workshop and arranging for professional facilitation
- Developing preliminary evaluation criteria

- Arranging field visits that will demonstrate application of the methodology
- Sending both sets of participants background information prior to the workshop
- Making provision for writing up and using the workshop's findings

Day 1 – Introducing the object of the evaluation. At the start of the event, the facilitator introduces the objectives of the workshop and the procedures to be followed, stressing that the workshop is not intended to evaluate everything the organisation or project is doing but just the R&D approach or experience that has been selected for the evaluation. S/he encourages visitors to be critical but constructive, identifying the strengths and positive aspects of the work being reviewed as well as its weaknesses. S/he also encourages local participants to be open and receptive to comments and suggestions.

On Day 1, local participants present the context and background of the R&D approach or experience to be evaluated and describe the activities carried out and the results to date. Our experience has shown that interactive ways of presenting activities, such as knowledge fairs with poster exhibitions, are more effective than PowerPoint presentations. Visitors are encouraged to limit themselves to asking questions and are discouraged from voicing judgments about the value or merits of the work until they have acquired additional information and insights during the field visits on Day 2.

Near the end of the day, the evaluation criteria are discussed and finalised. Then the participants divide into small groups to prepare a short interview guide and make a simple plan for interviews and other forms of information gathering on Day 2.

Day 2 – Field visits. The field visit provides an opportunity for visitors to see at first hand the work carried out and its results, and to talk with those whose livelihoods are directly affected by it. Visitors conduct semi-structured interviews, make direct observations, and as far as possible try to triangulate different sources of information. After the field visit, groups synthesise their findings using the evaluation criteria and present them in a plenary session. It is an opportunity to illustrate observations made during the field visit with photos or videos.

Day 3 – Comparative analysis. Visitors and local participants work separately at the start of Day 3. For each evaluation criterion, the two groups identify strengths, weaknesses and suggestions for improvement. After this group work, visitors and local participants present their findings in plenary session. All participants, helped by the facilitator, then identify convergent and divergent ideas. Where the groups' assessments of strengths or weaknesses diverge, the reasons for the divergence need to be explored in order to reach a shared understanding of the issue (but not necessarily agreement on it). After this plenary session, local participants synthesise recommendations and identify lessons learned as a basis for improving the methodology in the future. Visitors analyse the potential and requirements for applying the approach in their own organisations and settings. Both groups then come together to present, discuss and modify their conclusions in a final plenary session. The workshop ends with the participants identifying specific and time- bound steps to improve their work and facilitate the wider application of its results, if that is judged appropriate.

Applications and results

Participants in the seven horizontal evaluations organised by Papa Andina in Bolivia, Ecuador, Peru, and Uganda have identified the following types of result and benefit (Thiele *et al*. 2007):

- Horizontal evaluation demystifies the evaluation process for participants who have previously only been exposed to external evaluations by 'experts'.
- It provides useful information, insights, and suggestions for improvement of the work or the R&D approach being evaluated.
- It motivates and builds commitment for change on the part of the local project team.
- It strengthens the local project team.
- It encourages experimentation by visitors with new ideas and approaches back home.

Mirroring Papa Andina's experience with knowledge management and innovation system theories: conclusions and implications

Our reflection on the Papa Andina experience leads us to the following conclusions related to perspectives on KM and innovation and to the potential application of the approaches we have developed in other settings.

Papa Andina's approaches, centered on situated mutual learning, have produced new knowledge that has been valuable for both the international and the national organisations involved

Our experience supports the position of Ferguson *et al*. (2010) that situated mutual learning can help bridge the gap between the internal, or active, KM programs of international organisations – which focus on the capture, storage, and transmission of universally valid codified knowledge – and their external or latent KM programs – which focus on learning and the use of locally relevant knowledge in decision making. Approaches such as the PMCA and horizontal evaluation have produced new knowledge that has been useful for both the international and the local organisations involved. Local organisations gained knowledge that could be put to immediate use in addressing development problems; CIP gained knowledge that it could use in its global research programs and disseminate in the form of international public goods (the present publication, for example).

This is not to say that the KM process has been free from tensions and conflicts. On the contrary, local researchers and development professionals have frequently been challenged by managers and colleagues to demonstrate the local relevance and payoff of their work with Papa Andina. Similarly, CIP professionals have been challenged by their managers and peers to explain why scientists in an international organisation should be involved in local market development efforts.

As tangible results have been produced and reported in international peer-reviewed journals – considered the 'acid test' for international public goods in the CGIAR – and as Papa Andina has received public recognition and awards for its work,[2] these challenges have diminished somewhat. However, situated mutual learning that involves work across organisational boundaries is inevitably accompanied by tensions within and between the organisations involved.

Development and application of Papa Andina's approaches has helped members of the partnership understand the needs, interests, and limitations of other members as well as those of the intended beneficiaries

Regional research programs can be set up and their results transferred among researchers, in the form of research reports, publications, or seeds, without the individual members gaining knowledge of the circumstances, needs, interests, or limitations of other members. This is one reason why so many new technologies remain 'on the shelf' and are not used by other researchers, development professionals, or the intended farmer beneficiaries. In contrast, developing and using such new R&D approaches as the PMCA and horizontal evaluation have brought individuals from different disciplines, organisations, and countries together in co-development processes that have allowed them to learn a great deal about other members of the partnership and also about the circumstances and interests of the small farmers and market chain actors who are the intended beneficiaries of these R&D efforts.

Combining decentralised experimentation with centralised analysis and documentation has led to healthy constructive conflict and competition, which stimulated learning and innovation

Over a relatively short period of time, Papa Andina developed several approaches for fostering learning, communication, collective action, and pro-poor innovation involving diverse market chain actors, agricultural service providers, and policy-makers. Combining decentralisation of work on these approaches with horizontal evaluations and participatory planning has contributed to creativity and the productivity of the partnership. Decentralised experimentation has allowed national groups to develop approaches that met their local needs. Horizontal evaluations have allowed the national teams to share their ideas and expose them to constructively critical evaluation. They have also stimulated a degree of, usually friendly, rivalry among the national teams and between the national teams and Papa Andina's coordinators. Feeding the results of the local work and the horizontal evaluations into Papa Andina's planning cycle has contributed to continuous program improvement. At times, disagreements and tensions have flared in public, requiring mediation of conflicts and some 'cooling-off' periods. But on balance the results of open communication and constructive conflict have been quite positive.

The approaches developed have led to many changes in individuals' perspectives and behaviors and to some organisational changes

Those involved in developing and using Papa Andina's approaches report a number of personal and professional benefits. They have gained useful new knowledge, learned new skills, and changed their attitudes and approaches to their work. For example, individuals who have employed the PMCA or participated in horizontal evaluations report having broadened their professional networks and improved their communication, negotiation, facilitation, and evaluation skills. Through involvement in PMCA exercises, they have learned the importance of commercial innovation and its power to drive subsequent technological and institutional change. This has led to changes in the way researchers and development professionals, and in some cases their organisations, plan, implement, and evaluate their own work. In this way, Papa Andina's approaches have gone beyond improving knowledge management to strengthen the capacity of innovation systems.

There have been programmatic changes in some organisations. In Peru, for example, the National Institute for Agricultural Research (INIA) now includes native potatoes in its seed production program. The PROINPA Foundation in Bolivia is now analysing potential market opportunities when testing technologies with farmers. At the international level, recent conferences and symposia of the Latin American Potato Association and the International Society for Tropical Root Crops have included sessions on market-chain development and related issues, which have featured presentations on Papa Andina work.

Notwithstanding these changes, there have been relatively few structural changes in participating organisations. An organisation's operating procedures for program and project planning, KM, and performance assessment are built up over time and resist rapid change. Additionally, R&D organisations are usually part of larger administrative systems, such as national governments or international bureaucracies, which have their own inflexible, procedures. This is why many promising approaches for KM and innovation developed in externally funded projects or partnership programs may take a long time to, or never, become mainstreamed in the host organisations.

Knowledge management tools have contributed to change in the context of innovation brokering

One of Papa Andina's main vehicles for promoting innovation has been the PMCA. Here, knowledge management techniques that foster the production, exchange, and use of relevant new knowledge have been invaluable. However, our experience indicates the importance of focusing not on the KM tools themselves but on their use to achieve broader innovation goals. One of the most important factors in the success of a PMCA application is the extent to which an appropriate innovation network is established, with adequate representation of, and ultimately leadership from, entrepreneurs within the market chain. Another important success factor is the extent to which the exercise is focused on innovation that is market driven, by which we mean innovation that is linked to a market opportunity and emerges from the interaction of actors along the value chain.

In most cases, PMCA exercises have been initiated and facilitated by R&D organisations, which have traditionally partnered with farmers and have limited experience working with market agents. Unless the innovation broker goes beyond his or her comfort zone and enlists the active engagement and eventual leadership of market entrepreneurs, a PMCA exercise is unlikely to result in successful market chain innovation.

Papa Andina's approaches were developed in response to specific needs and circumstances; they are likely to be useful in some other contexts, but not in all

Economic policies, local customs and institutions, and personal and other factors influence the utility and performance of R&D approaches. In Peru, the PMCA is compatible with current national economic policies, which promote market-based development, and here the PMCA has been embraced by public institutions and NGOs. Prior to 2006, this was also true in Bolivia. In contrast, when the PMCA was being developed in Peru and Bolivia, Ecuadorians were sceptical of an approach that would bring small farmers together directly with profit seeking market agents as partners, and preferred to strengthen farmer organisations so they could negotiate more effectively with these market agents as clients. This led to useful work on stakeholder platforms in Ecuador (Cavatassi *et al*. 2011) that later

stimulated similar work in Peru and Bolivia. The PMCA has now been employed in several market chains in the Andes, Uganda, and Indonesia. However, neither this nor any other approach should be expected to be universally applicable.

Introducing complex, knowledge-intensive approaches for facilitating situated mutual learning and pro-poor innovation requires a systematic process with sharing of both codified and tacit knowledge

In order to facilitate the use of the approaches described above, we have prepared user guides, training materials, and publications. But our experience indicates that introducing these approaches into new settings requires more than sending a publication or user guide. A new group can learn to apply the horizontal evaluation approach in a relatively short period of time, if accompanied by a skilled evaluator-facilitator. In comparison, introducing the PMCA is much more demanding, as the approach requires local facilitators/innovation brokers to lead multi-stakeholder groups through unfamiliar types of discussions, negotiations, and product-development processes over a period of months. Innovation brokers need to help groups focus on market-driven innovations. Market chain actors need to be actively engaged and take on a leadership role as the process goes forward. This is definitely not 'business as usual' for most R&D organisations, including NGOs.

Given the needed transformations of perspectives, attitudes, skills, and behaviors, efforts to introduce the PMCA into new settings should be guided by a capacity-development strategy with the following elements (Horton *et al*. 2010):

- Participatory planning and decision-making involving local actors
- Negotiation with senior managers in lead R&D organisations to foster institutional commitment to the PMCA and to support fundraising for its use
- South-South learning exchanges, via study tours to sites where the PMCA has been successfully used
- A training strategy that includes action-oriented PMCA training workshops, use of the *PMCA User Guide* and complementary training materials, practical hands-on work with the PMCA in commodity groups, and backstopping and coaching by experienced PMCA facilitators, involving both face-to-face and virtual communications
- Knowledge sharing among the PMCA practitioners working in commodity teams
- Periodic learning-oriented evaluations to improve the process and document results
- Continuing support after the completion of the exercise

Implementing a thorough capacity development process with these components takes time and resources. It should be seen as an investment in innovation capacity that will generate returns over years. Our experience is that the capacities developed – at the level of individuals and the innovation system – continue to be utilised long after the PMCA exercise formally ends. In most cases, the creative imitations that occur years after the initial efforts are the most important ones (Devaux, Andrade-Piedra *et al*. 2010).

When introducing a new knowledge-intensive approach to a new setting, it needs to be kept in mind that each situation presents a unique combination of socio-economic, political, institutional, and technological conditions. For this reason, the approach will need to be customised for use in each new situation.

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Notes

1. The Strategic Partners are: the PROINPA Foundation in Bolivia; the National Potato Program, INIAP in Ecuador; and the INCOPA Project in Peru. The partners' names in Spanish are: Fundación PROINPA (Promoción e Investigación de Productos Andinos) (www.proinpa.org/); Programa Nacional de Raíces y Tubérculos rubro Papa (PNRT-Papa), INIAP (www.iniap-ecuador.gov.ec/); and Proyecto INCOPA, a coalition of private and public organisations that aims to improve small-scale potato farmers' access to markets (www.cipotato.org/papandina/incopa/incopa.htm).
2. In 2005, CIP, INCOPA, and a private firm, A&L Exportaciones y Servicios SAC, won the Peruvian Award for Entrepreneurial Creativity, given by the Peruvian University for Applied Sciences (http://creatividadempresarial.upc.edu.pe) for developing T'ikapapa (bagged native potatoes) through an initiative that 'values the enormous diversity of Andean potatoes, brings them to urban consumers, and generates sustainable businesses for small farmers'. In 2008, INCOPA and Papa Andina won the award again, this time 'for exploiting the diversity of native potatoes in expanding the competitiveness of products from the Andean region'. In 2007, INCOPA and Papa Andina won the international SEED Award for Entrepreneurship in Sustainable Development, an annual competition designed to support local, innovative partnerships in developing countries working to achieve poverty eradication and environmental sustainability (www.seedinit.org/about-the- seed-awards/index.html). In 2007 INCOPA, A&L Exportaciones y Servicios SAC, Cadenas Productivas Agricolas de Calidad (CAPAC) Perú, Supermarket Wong, producer organisations, and Papa Andina won the World Challenge Award, a competition sponsored by BBC World News and Newsweek, in association with Shell, that rewards projects or small businesses that have shown enterprise and innovation at a grass-roots level (www.theworldchallenge.co.uk/previous-winners.php). In 2008 INCOPA and Potato Andean won Peru's Ardilla de Oro, awarded annually by Peru's Catholic University for a marketing campaign that contributes to social development in Peru (www.infoandina.org/node/26072).

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References

Antezanna, I., Bernet, T., Lopez, G., and Oros, R. 2008. *Enfoque participativo en cadenas productivas (EPCP): Guia para capacitadores*. Lima, Peru: Centro Internacional de la Papa.

Barnett A. 2004. From 'research' to poverty reducing 'innovation'. Policy brief. Brighton, UK: Sussex Research Associates.

Bernet, T., Thiele, G. and Zschocke, T. 2006. *Participatory Market Chain Approach (PMCA) User Guide*. Lima, Peru. International Potato Center (CIP).

Bernet, T., Devaux, A., Thiele, G., López, G., Velasco, C., Manrique, K., and Ordinola, M. 2008. The participatory market chain approach: stimulating pro-poor market-chain innovation. ILAC Brief 21, ILAC-CGIAR.

Bernet T., Velasco C., Thomann, A., and Andrade-Piedra, J., eds. 2010. *Evaluación horizontal: Aprender colectivamente – Guía de usuario*. Centro Internacional de la Papa, Proyecto Innovandes e Iniciativa Papa Andina. Lima, Perú.

Bernet, T., Thiele, G., Zschocke, T., Lopez, G., Velasco, C., and Devaux, A. 2011. *Enfoque participativo en cadenas productivas (EPCP): Manual del usuario*. Lima, Peru: Centro Internacional de la Papa.

Cash, D., Clark, W., Alcock, F., Dickson, N., Eckley, N., Guston, D., Jager, J., and Mitchell, R. 2003. Knowledge systems for sustainable development. *PNAS* 100 (14), 8086–8091.

Cavatassi, R., Gonzalez, M., Winters, P., Andrade-Piedra, J., Espinosa, P. and Thiele, G. 2011. Linking smallholders to the new agricultural economy: the case of the *Plataformas de concertación* in Ecuador. *Journal of Agricultural Economics*, forthcoming.

Chesbrough, H. 2006. *Open innovation*. Boston, MA: Harvard Business School Press.

Devaux, A., Horton D., Velasco C., Thiele G., López G., Bernet T., Reinoso I., and Ordinola M. 2009. *Collective Action for Market Chain Innovation in the Andes*. *Food Policy*, 34, 31–38.

Devaux, A., Andrade-Piedra, J., Horton, D., Ordinola, M., Thiele, G., Thomann, A., and Velasco, C. 2010. Brokering innovation for sustainable development: the Papa Andina case. Rome: Institutional Learning and Change Initiative, ILAC Working Paper 12.

Devaux, A., Ordinola, M., Hibon, A., and Flores, R. 2010. *El sector papa en la region andina: Diagnostico y elementos para una vision estrategica (Bolivia, Ecuador y Peru)*. Lima, Peru: Centro Internacional de la Papa.

Douthwaite, B., Beaulieu, N., Lundy, M., and Peters, D. 2009. Understanding how participatory approaches foster innovation. *International Journal of Agricultural Sustainability*, 7 (1), 42–60.

Engel, P. and Salomon, M. 2003. *Facilitating innovation for development: a RAAKS resource box*. Amsterdam, The Netherlands: KIT Press.

Ferguson, J., Huysman, M., and Soekijad, M. 2010. Knowledge management in practice: pitfalls and potentials for development. *World Development*, 38 (12), 1797–1810.

Hall, A. 2009. Challenges to strengthening agricultural innovation systems: where do we go from here? *In*: I. Scoones and J. Thompson, eds. *Farmer first revisited: innovation for agricultural research and development*. Warwickshire, UK: Practical Action.

Horton, D., Akello, B., Aliguma, L. Bernet, T., Devaux, A., Lemaga, B., Magala, D., Mayanja, S., Sekitto, I., Thiele, G., and Velasco, C. 2010. Developing capacity for agricultural market chain innovation: experience with the 'PMCA' in Uganda. *Journal of International Development*, 22, 367–389.

Horton, D., Oros, R., Paz Ybarnegaray, R., Lopez, G., Velasco, C., Rodriguez, F., Escobar, E., Rotondo, E., Hareau, G., and Thiele, G. 2011. The participatory market chain approach in the Andean Change Alliance: implementation and results in four cases. Lima, Peru: International Potato Center (CIP), Social Sciences Working Paper No. 2011–1.

Kerkhoff, L. van and Lebel, L. 2006. Linking knowledge and action for sustainable development. *Annual Review of Environmental Resource*, 31, 445–477.

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

Kristjanson, P., Reid, R., Dickson, N., Clark, W., Romney, D., Puskur, R., MacMillan, S., and Grace, D. 2009. Linking international agricultural research knowledge with action for sustainable development. *PNAS*, 106 (13), 5047–5052.

Lele, U. 2004. *The CGIAR at 31: an independent meta-evaluation of the Consultative Group on International Agricultural Research*. Washington, DC: World Bank.

McElroy, M. 2003. *The new knowledge management: complexity, learning, and sustainable innovation*. Amsterdam: Butterworth Heinemann. An imprint of Elsevier Science.

McNie, E., van Noordwijk, M., Clark, W., Dickson, N., Sakuntaladewi, N., Suyanto, Joshi, L., Leimona, B., Hairiah, K., and Khususiyah, N. 2008. Boundary organisations, objects, and agents: linking knowledge with action in agroforestry watersheds. Report of a workshop held in Batu, Malang, East Java, Indonesia, 26–29 July 2007. Working Paper, Center for International Development at Harvard University. Cambridge, MA: Harvard University Press.

Meinzen-Dick, R., Devaux, A., and Antezana, I. 2009. Underground assets: potato biodiversity to improve the livelihoods of the poor. *International Journal of Agricultural Sustainability*, 7 (4), 245–248.

Pant, L. and Hambly, H. 2009. Innovation systems in renewable natural resource management and sustainable agriculture: a literature review. *African Journal of Science, Technology, Innovation and Development*, 1 (1), 103–135.

Sagasti, F. and Timmer, V. 2008. An approach to the CGIAR as a provider of international public goods [online]. Document prepared for the system-wide review of the CGIAR system. Washington, DC: CGIAR Secretariat. Available from: http://www.cgiar.org/pdf/ir_sagasti_timmer.pdf [Accessed 18 July 2011].

Souza Silva, J. de. 2001. Roles of planners and planning. *In*: G. Gijsbers, W. Janssen, H. Hambly Odame, and G. Meijerink, eds. *Planning agricultural research: a sourcebook*. Wallingford, UK: CABI Publishing/ISNAR, 159–169.

Thiele, G., Van de Fliert, E., and Campilan, D. 2001. What happened to participatory research at the International Potato Center? *Agriculture and Human Values*, 18 (4), 429–446.

Thiele, G., Devaux, A., Velasco, C., and Manrique, K. 2006. Horizontal evaluation: stimulating social learning among peers. Rome, Italy: Institutional Learning and Change Initiative, ILAC Brief No. 13.

Thiele, G., Devaux, A., Velasco, C., and Horton, D. 2007. Horizontal evaluation: fostering knowledge sharing and program improvement within a network. *American Journal of Evaluation*, 28 (4), 493–508.

Thiele, G., Devaux, A., Reinoso, I., Pico, H., Montesdeoca, F., Pumisacho, M., Andrade-Piedrs, J., Velasco, C., Flores, P., Esprella, R., Thomann, A., Manrique, K., and Horton, D. 2011. Multi-stakeholder platforms for linking small farmers to value chains: evidence from the Andes. *International Journal of Agricultural Sustainability*, 9 (3), in press.

Vanloqueren, G. and Baret, P. 2009. How agricultural research systems shape a technological regime that develops genetic engineering but locks out agroecological innovations. *Research Policy*, 38, 971–983.

Von Hippel, E. 2005. *Democratizing innovation*. Cambridge, MA: MIT Press.

World Bank, 2006. *Enhancing agricultural innovation: how to go beyond the strengthening of research systems*. Washington, DC: World Bank.