

Inclusive innovation for the development of competitive advantages in the value chain of potato in the Andean zone

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Abstract

Despite of the increasing use of innovation systems and the development approaches based on value chains to stimulate the growth of rural incomes, poverty reduction and greater gender equality, there is little systematic knowledge about how to operationalise the value chain approaches in different contexts, and how to extend their benefits. This article considers the development of the value chain in competitive terms, as a type of intervention that promotes the development of competitive advantages and contributes to the reduction of poverty, by improving the links between small farmers, merchants, processors and consumers in a value chain. Participatory Market Chain Approach (PMCA) is described as a flexible approach involving value chain actors, researchers and other service providers in a collective process that explores the potential business opportunities for the benefit of small farmers and other actors in the chain. This approach was initially developed and applied in Peru, and then through knowledge exchange, validated by the International Potato Center (CIP) and local organizations in Bolivia and Ecuador in the Andean region. Experiences about the implementation and adjustment of the approach in these contexts are described here as well as the conditions that have allowed the promotion of innovations as a basis to develop competitive advantages. The document concludes with lessons on the implementation that contributes to improve the design of the interventions and the promotion of value chain approaches in different contexts.

Keywords: Value chain development, innovation, scaling, smallholders, biodiversity, rural livelihoods.

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Introduction

Agriculture is changing rapidly in developing countries in response to a variety of factors, including institutional and policy reforms, improvements in farmers' education and health, new income opportunities and investments in rural infrastructure. There are clear signs that agribusinesses are having a significant global impact on economic development and poverty reduction, both in urban and rural communities (FAO, 2013). Sustainable access to markets makes it possible for poor farmers to increase their work income as one of the strategies to reduce poverty (Wiggins et al. 2013,). But they are often at a disadvantage to produce and carry out transactions in high-quality food chains (that is, generate competitive advantages) due to their still limited access to services, financial and non-financial, and their low organizational capacity for collective marketing. In addition, if one considers that the traditional markets to which they connect normally, are often characterized by distrust, uncertainty and high transaction costs, thus their connections with the market are still informal. This is particularly true for perishable crops, such as potatoes, which are grown on small farms in mountainous areas. For agricultural research to generate competitive advantages that benefit producers in rural areas, it must be complemented with other efforts that improve the regulatory environment, alleviate resource constraints and build local capacity to respond to changing technological and economic challenges and opportunities. Despite the risks associated with high value markets, changes in the agricultural sector can contribute to the development of better support services for farmers, such as technology, extension, insurance and financial support. Small producers with access to technical support services have been willing to adopt new technologies and invest

to take advantage of market opportunities (Royer et al. 2016).

A compilation of research cases presents the results of recent work by the CGIAR² consortium and its partners in Africa, Asia and Latin America in which the opportunities arising from new and expanding markets for agricultural products are analyzed, and identified the challenges for the participation of small producers in these markets and the benefits derived from their participation (Devaux et al. 2016). In the Andean area, the Andean Papa Initiative in the Andes used collective action in two approaches to foster innovation in the market chain: the Participatory Approach to Productive Chains (PAPC) (Devaux et al. 2009) and the Innovation Platforms (Thiele et al. 2011b). Both approaches seek to promote the interaction of small potato producers with market players and agricultural service providers to favor alliances and contractual agreements in response to new market opportunities.

This article raises some perspectives on the development of the value chain (DVC), and highlights the experiences of the International Potato Center (CIP) with the PAPC. This approach, originally developed to increase competitiveness and improve the livelihoods of small potato producers in Peru, has also proven useful in other market chains and in other parts of the Andes and the world. The article presents the experiences of implementation and the adjustments of the approach in the Andes analyzing the factors that have influenced its implementation and considers some lessons arising from the experiences in different contexts to improve the design of the interventions using the PAPC approach as a research tool for development and to analyze the conditions of replication and adaptation.

² CGIAR is a global research association for a future with food security, <http://www.cgiar.org/>

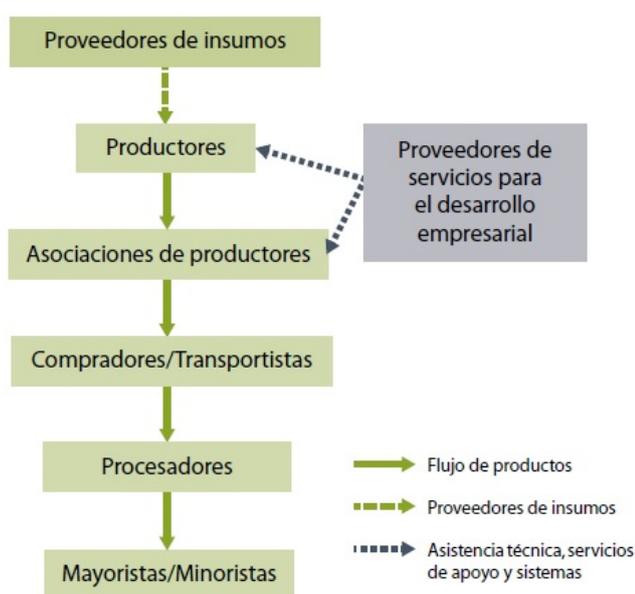
Perspectives on the development concepts of the value chains

The value chain concept represents an important change in the thinking about development and the relationships between agricultural producers, traders, processors and consumers. The term "value chain" is used in different ways in professional literature. In this article, a value chain refers to the set of related actors and markets that transform inputs and services into products with attributes that consumers are willing to buy. Millions of low-income people, a large part of them women, participate in agricultural value chains such as producers, traders, processors and retailers. Many millions more, including the majority of the poor in the developing world, participate in agricultural value chains as workers or consumers. Therefore, improving the performance of agricultural value chains will benefit to a large number of people (Reardon and Timmer 2012, Reardon et al., 2012).

The term "value chain development" (which we will abbreviate as VCD in the article) describes a type of intervention that aims to

address poverty through improved links between businesses and rural producers. It has been defined as a "positive or desirable change in a value chain to extend or improve productive operations and generate social benefits: income and employment generation, economic growth, environmental performance, gender equity and other sustainable development goals" (UNITED 2011). From this perspective, many development agencies, donors and governments have adopted the value chain approach to development as a key element of their rural poverty reduction strategies (Humphrey and Navas-Alemán, 2010).

In contrast to traditional agricultural research and development (R&D) approaches, which focus on improving the capacities of small producers to increase their productivity or better manage natural resources, the VCD approach challenges R&D organizations to work with various actors to understand the performance of the value chain and identify mutually beneficial options to improve the performance and efficiency of the chain, based on the development of innovations.



Source: Devaux et al. 2016, figure 14.1

Figure 1. Stylized value chain.

While the globalization of markets offers

opportunities to market products of greater

value that simply did not exist before, these markets generally demand much more in terms of business acumen, efficiency and attention to quality standards and food safety than traditional product markets (Reardon et al. 2009). Participation in value chains for more demanding markets requires that small producers deliver regular supplies of products of consistent quality and in sufficient quantity. Compliance with these conditions requires access to land, inputs, technology, knowledge, organization, capacity, skill and infrastructure, which may not exist in some communities or may be required in some groups of poor producers. Public policies are also required to adapt government strategies to different situations to support the participation of small producers in more dynamic value chains. Small producers, compared to medium and large farmers, are at a disadvantage in these transformations, since they are often located in areas with less private and public infrastructure, are further away from markets, and have less favorable conditions for agriculture high yields and high quality.

In this context, the CIP, in the framework of its activities in the Andean area, has developed a more integrated participatory approach, which combines agricultural, institutional and value innovation, seeking a synergistic effect. This approach, called the Participatory Approach in Productive Chains (PAPC), seeks to be flexible and involves small farmers, market agents (merchants, companies, processors, among others), researchers and other service providers in a collective process that identifies and explores potential business opportunities that can equally benefit the various actors in a selected chain (Bernet et al. 2006). It was developed

and applied for the first time in the Andes, to increase the competitiveness of the potato market chain, which is an important component of the local agri-food system, and to help improve the livelihoods of small farmers. The CIP has spearheaded the development of the PAPC and has supported the development of the local capacities necessary to facilitate successful innovation processes (Devaux et al. 2013).

PAPC development and its main characteristics

Since the late 1990s, the regional *Andean Papa*³ initiative has worked to strengthen the capacity of research and development organizations in Bolivia, Ecuador and Peru with the general objective of increasing competitiveness and improving the livelihoods of small potato producers (Devaux et al., 2011). In 2002, CIP social scientists, the *Andean Papa* program and the Potato Innovation and Competitiveness Project in Peru (INCOPA Project)⁴ began experimenting with a participatory approach known as Rapid Assessment of Agricultural Knowledge Systems (RAAKS) (Engel & Salomon, 1997), in order to stimulate agricultural innovation. This approach brings together diverse stakeholders in a participatory process that stimulates collective learning, builds trust and promotes innovation. *Papa Andina* used RAAKS to explore market opportunities involving small farmers, along with chain actors, researchers and other service providers.

The participation of merchants, supermarkets, food processors and chefs in a development research process was a radical break with previous participatory R&D efforts, which were limited to researchers and farmers.

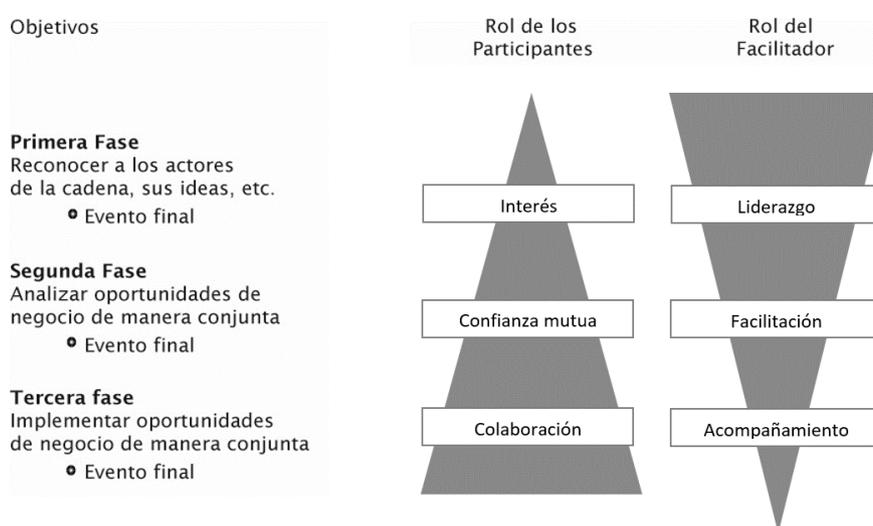
³ The regional Andean Papa or Papa Andina Regional Program, implemented by the CIP with the support of the Swiss Agency for Development and Cooperation (SDC), has worked from 1999 to 2010 to strengthen the capacity of Research and Development (R&D) organizations from Bolivia, Ecuador and Peru, with the aim of increasing competitiveness and improving the livelihoods of small potato producers.

⁴ The INCOPA Project, sponsored by the International Potato Center (CIP) and with the support of the Swiss Agency for Development and Cooperation (SDC) was formulated to improve the competitiveness of the potato value chain in Peru with emphasis in native potatoes grown by small farmers in the high-Andean areas.

When the experiences were implemented, additional steps were added to RAAKS for the development of new products, and in that context a new approach emerged: the PAPC, which was implemented in Peru and then validated in Bolivia in 2003. In the following years the approach was applied in different contexts and widely documented (Ordinola et al., 2009; Devaux et al., 2011).

The PAPC involves the actors that participate in a market chain, as well as the providers of financial and non-financial services, public and private, supporting the chain (such as

researchers, credit providers and development professionals) in a facilitated process in which innovations are identified and developed to take advantage of market opportunities. These innovations can be technological, commercial and institutional. The application of the PAPC is structured in three phases that can last around 12 to 18 months depending on the public, private context and the actors involved, as presented below (Bernet et al., 2006; Antezana et al., 2008).



Source: Taken from Bernet, et al, 2006

Figure 2. The structure of the 3-phase methodology of the PAPC

PHASE 1. Know the actors in the market chain and their activities through a diagnosis. The PAPC is initiated by an R&D organization that leads the selection of the market chain in which it will work, identifying possible R&D partners and conducting exploratory and participatory diagnostic research in the chain. This phase, which can last from two to four months, concludes with a public event to discuss the results of the diagnosis, generate ideas for possible innovations and motivate market chain actors and service providers to participate in Phase 2.

PHASE 2. Joint analysis of potential market opportunities and innovation needs

to take advantage of opportunities. Representatives of the participating R&D organizations facilitate the exploration and analysis of potential market opportunities. The actors in the chain and the service providers, organized in thematic interest groups, hold work meetings to analyze the opportunities using technical or market studies. A second public event is held at the end of Phase 2, to discuss prioritized business opportunities and to encourage new actors with the right knowledge and complementary experience to join Phase 3.

PHASE 3. Joint development of innovations. During this final phase, the groups focus on product development and

market testing and the launch of specific innovations. In this phase, companies play a more leading role. This may require specialized work such as processing, packaging, labeling or brand testing. The PAPC exercise closes with a third public event in which the developed market innovations are presented to a wide network of stakeholders such as public officials,

potential donors, policy makers, private sector decision makers (supermarkets, processors, chefs), public and representatives of the media.

The experiences described in this article illustrate concrete examples of the application of the chain approach and its results in different contexts.

Experiences in the development of revised chains in the Andean Zone.

Cases	Country	Main Sources
(1) The revolution of the native potato in Peru	Peru	Ordinola <i>et al.</i> 2009, 2013 y 2014, Horton and Samanamud, 2013
(2) Accessing high differentiation markets in Huancavelica, Peru	Peru	Ordinola and Bellido, 2016
(3) Conservation and Marketing of native potatoes in Potosí, Bolivia	Bolivia	Horton <i>et al.</i> 2013c
(4) The revaluation of native potatoes in Ecuador	Ecuador	Montesdeoca <i>et al.</i> 2013 and Montesdeoca, 2016

The revolution of the native potato in Peru

From 2001 to 2010, more than 20 public organizations, NGOs and companies worked on the Potato Innovation and Competitiveness Project in Peru (INCOPA) within the framework of the Regional Andean Papa Initiative, with the aim of promoting innovations in the production and commercialization of the native potato and improve the competitiveness of this chain for the benefit of the small farmers who produced it. To this end, the applied research and development approach, called PAPC, was developed and used. INCOPA worked to link small producers of native potatoes with researchers, development professionals and a range of actors in the potato market chain (supermarkets, processors, chefs) to capitalize on the biodiversity of native potatoes and their culinary attributes, nutritional and cultural. The implementation of the PAPC was complemented with efforts to promote alliances between chain actors through

innovation platforms, to increase public awareness of the virtues of native potatoes and to support the formulation of policies in support of these chains. The PAPC acted as a detonator of innovations that, in combination with different interventions in the technical, institutional and political field, triggered commercial, productive and institutional innovation processes that continue until today and contributed to what can be called “the revolution of the native potato in Peru” (Horton and Samanamud, 2013).

In Peru, two cycles of the PAPC were implemented. The first application focused on the commercialization of improved potato varieties; the second cycle focused on the marketing of native potatoes. The participants in the exercises were not only researchers, officials of the Ministry of Agriculture and typical actors of the market chain, but also chefs and supermarket managers. This was the first time that such a diverse group met to collaborate on options to improve and

promote potatoes in Peru. The "new actors" brought renewed energy and new ideas to discussions that had previously been dominated by R&D professionals.

The applications of the PAPC gave rise to two new products made with potatoes native to Peru. *T'ikapapa* was launched as the first brand of gourmet fresh native potato sold in a supermarket in the Peruvian capital. Shortly after, *Jalca Chips*, an innovative product of potato chips of different natural colors (blue, red, yellow) was also produced from native potatoes. Both products were available in grocery stores and were gradually replaced by improved commercial innovations, in a creative imitation process. Today, more than 20 similar products have appeared on the market, some of which are exported, as illustrated in Figure 3 (Ordinola et al., 2009).

In addition to the new products, important ideas emerged for political initiatives and campaigns to raise and promote potatoes and their consumption during the second cycle of the PAPC. Perhaps most notable was the *National Day of the Potato in Peru*. It was established in 2005 and has been held annually since then both in Lima and in the different regions. The Minister of Agriculture established a special commission to organize this event, including participants in the PAPC exercise. Today, this commission continues to function as an institutionalized network and MINAGRI assigns an annual budget to this celebration that is promoted every year by the potato sector in Peruvian society. This commission supported the efforts of Peruvian government officials in their request for the United Nations to declare 2008 as the *International Year of the Potato*. When this proposal was accepted, the commission led numerous outreach activities in Peru for this

celebration that extended throughout the year. The combination of innovations in the market chain, changes in policies to promote the modernization of the commercial sector and public awareness have contributed to changing the image and perception of native potatoes in Peru.

The INCOPA project and its network of public-private partners supported the initiatives of the most innovative small entrepreneurs. These efforts were supported by NGOs that worked in the territories where these potatoes were produced, to help producers organize themselves and be able to supply quality products according to market requirements. The QAPCA Peru platform (Quality Agricultural Productive Chains in Peru), which emerged as an institutional innovation and from the PAPC, has supported the value chain of the native potato by promoting interaction between producers and market agents (Ordinola et al., 2009). The participation of different market players, prompted by the promising results they observed with small businesses, led to the creation of a series of new potato-based products and different brands of superior quality native potato chips, which brought to the market a range of products promoted by multinationals such as Frito Lay and Gloria and also by small businesses of provinces, to respond to diverse market demands. The PAPC provoked a "spark" (trigger) process, where the second and third generation of innovations were, often, more important than the first ones that were developed during their initial application (Ordinola et al., 2013; Proexpansión, 2011). Figure 3 illustrates this process.



Source: Updated based on Ordinola, et al, 2009

Figure 3. PACP as a trigger for innovation for the development of new potato products in Peru

In the province of Andahuaylas, Apurímac Region, Peru, an impact study was implemented to evaluate the initial scope and impacts of the INCOPA Project intervention through the QAPCA Peru⁵ institutional platform, using the methodological framework of “impact path” evaluation (Maldonado et al., 2011). In that region, the INCOPA project promoted the use of biodiversity and the development of market opportunities for native potatoes to improve the competitiveness of the potato chain using PACP. For this study, a list of 80 producers in the intervention area was prepared using the stratification criterion by geographic location (the sampling units are grouped according to their geographical location). Likewise, 66 farmers from the same areas were defined as a counterfactual group.

Among the main conclusions of this case study, it was noted that:

1. potato producers in the studied area have expanded and diversified their commercial relations, mainly due to the greater demand for native potatoes both locally and from supermarkets and agribusiness in Lima;
2. the small producers in the studied area have managed to develop business management skills and have improved their post-harvest techniques according to the greater demand of the new markets to which they have accessed;
3. potato producers (target group) belong to organizations that maintain relationships and links with other service providers,

⁵ Quality Agricultural Production Chains in Peru, (QAPCA Peru) was a second-level social, economic and technological promotion organization, aimed at providing specialized services in the development of potato production chains and other tubers grown in Peru.

which allows them to access technical assistance and the development of more efficient business management;

4. the producers involved in the project obtain higher average incomes through better prices (26 percent above the control group) and higher sales volumes of potatoes, especially native potatoes.

Subsequently, in a case study on the participation in native potato value chains of the producers of these potatoes in the central highlands of Peru, Dan Tobin (2016) investigated social differentiation within communities between participants and non-participants, as well as the reasons for the inclusion or exclusion of households in the chain link. These findings indicate that participation in value chains is not necessarily beneficial for all small producers. For such programs to have broad social benefits, policies and other institutional arrangements are needed to analyze and minimize the risks of participation in such value chains and to provide support for participation in other less demanding types of markets. Since high-value markets often require more investment and assets, there is probably no adequate combination between lower-income households and high-value markets. Horton and Samanamud (2013) also indicate that families with less land, less education, poor access to credit and less developed social networks have benefited less from new market opportunities. But despite these considerations, these same authors mention that the innovation process generated by the PAPC helped improve the image of native potatoes and link small producers with more capacities to dynamic urban markets for potato-based products.

Analyzing the case of the development of native potato chains in Peru, the economic

and political context of the country has been favorable, including government support with favorable policies, the participation of the private sector involved, the development of the gastronomic sector that promotes native products, and the integration in international cooperation projects, in this case of SDC, which strengthened the innovation process through training and support for the implementation of the PAPC and the development of innovations. This process has made it possible to change the previous situation, which considered native potatoes as subsistence staple food for poor farmers of the heights, with little future in market-oriented agriculture, and which are now recognized as a special and nutritious Peruvian product that deserves a prize (via price) in urban markets and gourmet restaurants.

Accessing high differentiation⁶ markets in Huancavelica Peru

The case of the native potatoes of Huancavelica (Peru) is interesting to mention. The experience has focused on the productive and commercial promotion of native potatoes for high segmentation markets (fair trade and organic products) both nationally and internationally. As in the case of experiences with the PAPC in Bolivia, market innovations with native potatoes that were previously developed with the PAPC in Peru, served as initial inputs to develop this experience. It has been possible to develop an innovative model for the management and sustainable management of actions, promoting the articulation of public and private sectors around the chain of native potatoes and based on three components.

This initiative combines (1) **a component related to the market (which is the engine**

⁶ Based on "Developing the production of the mountains based on high segmentation markets: The case of Huancavelica's native potatoes". Consulting report prepared by Miguel Ordinola and Francisco Bellido. September 2016. This project was implemented by the CEDINCO institution with the financial support of the Peruvian Italo Fund (PIF), with families from various communities of Castrovirreyna, Huancavelica and Tayacaja and in partnership with the ENIEX Agronomists and Veterinarians Without Borders - AVWB.

of the model), where the alternatives of national and international markets are complemented, associated with products of high commercial differentiation. Interventions at this level have to do with: i) commercial identification and relationship with mainly international high-segmentation markets (organic and fair trade); ii) access to certifications of recognized commercial value (fair trade and organic production); iii) commercial promotion of diversified products; iv) access to markets and commercial promotion strategy. (2) **A component related to the supply of quality** and continuous supply for the consolidation of the business in the different markets. According to the markets identified, the offer was developed according to the standards required by the demand. For this, the following interventions were implemented: i) promotion of organic production with a demand approach; ii) articulation with research at the local level (thesis); iii) biodiversity conservation (work with conservationist farmers; iv) enable the continuous supply of the product (two campaigns per year with small irrigation systems; v) management, production and use of quality seed; (3) **A component related to organizational aspects**, in the sense that associativity is key to generate scales in production and develop added value. The logic is oriented to the articulation of organizations (from three provinces) with an organizational strengthening work to improve management efficiency. Interventions have to do with the following: i) promote a business model; ii) organizational strengthening actions; iii) capacity building.

These interventions have been initially worked with 230 families and have allowed: i) price improvements since they access markets that recognize (via prices, in some cases the price increases have reached 100%) the quality of the differentiated products ; ii) greater production (quantity) and a substantial improvement in quality, since access to the different certifications required by the final

markets is promoted (they are already in their sixth year of supply); iii) develop greater negotiation skills in the different markets and express themselves in accessing better sales conditions (forms of payment) and differentiated prices (especially in the fair trade segment).

You can rescue lessons from this case:

Organic native potatoes access a market of specific high-quality niches, based on the efficiency of their production

In this experience, the market for products to work (international and national) has been directly identified and an adequate and effective response has been developed. The model is born from the existence of a demand that is not satisfied by organic products and access to European markets, which have been complemented by the demand niches of the local market.

Co-financing is a part of the strategy to engage producers in the execution of projects

A tangible counterpart (monetary or non-monetary) makes it possible for beneficiaries to play an active role at work. Organized producers (now in the framework of the Agricultural Cooperative) have committed themselves to the co-financing of the various interventions (for example, small irrigation systems).

The provision of specialized services is key to the operation of business

In this experience the issues related to organic production management, quality seed management, crop management, water management, marketing, organization and business management, have been reinforced based on obtaining quality production to respond adequately to the market.

Generation of public-private partnerships as a necessary element to avoid isolated interventions

Several institutions have participated in this experience, companies (national and

international), local governments, public institutions (for example, MINAGRI), among other institutions that have enhanced the experience. The alliances provide strength and stability to the different services. The generation of trust is key to optimize the work between the different business actors.

The promotion of demand by private companies as a medium-term supporter.

This has been the case of external markets that have been accessed by small producers participating in this experience (France, Belgium, Germany), local supermarkets (Wong-CENCOSUD) and specialized stores of agroecological and organic products.

Conservation and Marketing of native potatoes in Potosí, Bolivia

From 2007 to 2010, the Andean Change⁷ Alliance project analyzed the processes and products of PAPC implementation in case studies in different chains in the Andes. In this article, we present the case of native potatoes in northern Potosí, Bolivia. PROINPA and the Center for Agricultural Development (CAD) have worked for several years to conserve the biodiversity of potatoes and other Andean crops and to reduce rural poverty in northern Potosí. The region as a whole produces a small surplus of potatoes in the market, which varies widely from year to year depending on weather conditions. Agriculture generates little cash income, and young people leave the countryside in search of employment in mines and cities. This PAPC application sought to take advantage of the growing demand for native potatoes in urban markets.

The CAAD organization and the PRONAPA farmer organization developed a new native potato product called "Miskipapa", which consisted of selected and washed native

potatoes that were sold in meshes. It has been marketed with CAD support for 3 years in supermarkets in La Paz and Cochabamba, in the shop of a mining union, in two tourist hotels and in farmers markets. Due to the limitations in both the supply and demand of native potatoes, the economic benefits for farmers were reduced. Once the support under the EPCP ended, the organization ceased operations in the region and the farmers association dissolved. Miskipapa disappeared from the market. Many of the producing leaders who played an important role in the process have migrated. On the other hand, the conditions of the economic model of the government, the agroclimatic conditions of the place and the situation of poverty of the products did not favor the success of the PAPC implementation.

Currently, there are some private initiatives (NGOs, foundations, companies) linked to the production and marketing of native potatoes, which could be taken as indirect effects or creative imitations of the results of the first efforts with the PAPC to promote native potatoes in the Bolivian market. These were promoted by the PROINPA Foundation after having participated in the initial PAPC initiative with native potatoes. The Andean potato processing company (Pa & Pa) located in Cochabamba provides a native potato sandwich in the form of Pinta Boca color flakes to the Bolivian aviation company - BoA, the state-owned Bolivian flag airline. The initial project (2012) considered the industrialization of four varieties of native potatoes promoted by the PROINPA Foundation, Pa & Pa and producers of the municipality of Colomi (Cochabamba). Another experience that can be considered as a creative imitation in Cochabamba, is the initiative promoted by the native potato "Pinta Boca" in urban markets under the RICA PAPA brand. It was marketed as a fresh

⁷ The Andean Exchange Alliance is a regional cooperation program between social and business organizations in Bolivia, Colombia, Ecuador and Peru, with the aim of including participatory methods for the inclusion of small rural producers in agricultural innovation.

gourmet potato product in supermarkets. It is a family business that began collecting native potato varieties to supply supermarkets in La Paz, Cochabamba, Oruro and Santa Cruz, in addition to providing the Public Prenatal Subsidy Program. Currently, the volume of monthly sales of native potatoes is approximately five tons per month.

Policies in favor of the Peruvian market provided a more favorable environment for the use of P APC than the policies of the Bolivian government, which emphasized the role of the state. Agroecological environments also have an effect on implementation processes and results. In the Bolivian highlands, where the first experiences with the P APC were made and where poverty is very high, limiting access to services, production conditions are adverse due to the reduced use of inputs and climatic risks. They are severe constraints for the implementation of the development approaches of the agricultural market chain for rural poverty reduction. The following most successful experiences were carried out in production areas in Cochabamba under more favorable production and socioeconomic conditions.

The revaluation of native potatoes in Ecuador

In November 2008, through the collaboration between the CIP, through the Andean Exchange Alliance project, the Potatoes Program of the Institute of Agricultural and Livestock Research (INIAP), the local NGO Fundación Marco, and the producers association of the Producers Consortium of Potato (CONPAPA, for its acronym in Spanish), the application of the P APC in the chain of native potatoes of Ecuador began, to capitalize on the great wealth of native potato varieties of the country.

The qualitative diagnosis of the first phase of the P APC involved 29 chefs and restaurant and hotel managers from various provinces of

the country to determine the knowledge and attitudes towards native potatoes and identify niche markets. The results showed that these varieties were unknown in restaurants and hotels in the cities and could not be found in the markets. However, the participants agreed that they represented an interesting business potential. One year after having applied the 3 phases of the P APC, the “native potato” brand was launched in a Grand Final Event of the P APC process with the slogan “discovering the Andean flavour”. The product consisted of a mesh of selected and washed native potatoes (Montesdeoca et al., 2013). The launch was supported with press conferences and gastronomic fairs in the framework of the celebration of National Potato Day. Developing the product as a commercial innovation triggered technological innovations at the production level (fertilization, seed management, pest management) and in the commercial presentation of the potato as a selected product and with a brand name. For the association of CONPAPA producers, it meant raising their associative capacities for gathering and marketing, which for the first time sold native potatoes in various presentations and through commercial articulation with urban intermediate consumers.

Although the “Native Potatoes - Discovering Andean Taste” brand did not prosper in the market due to supply problems, high transaction costs and limited demand volume, the results of the P APC were important to “showcase” the value of the native potato in markets other than those of traditional and local family consumption. These results were positively captured by the INALPROCES company, which for several years opted for high quality products with social responsibility criteria. INALPROCES, inspired by the experience of the CIP Papa Andean Initiative on the marketing of native potatoes in Peru, saw in the Ecuadorian market and abroad, interesting business opportunities through the production and sale

of fried color flakes obtained from of native varieties.

INALPROCES, in alliance with INIAP, the Minga Foundation for Rural Action and Cooperation, and the CIP in Ecuador, worked to identify suitable native potatoes to be produced by CONPAPA farmers and supply the processing demand (Montesdeoca et al., 2013). Two varieties of colored potatoes were selected to produce quality flakes: *Puca Shungo* (Red Heart) and *Yana Shungo* (Black Heart). Its main characteristic is the intense coloration in reddish and purple tones that make them rich in antioxidants, vitamins and proteins and differentiate them from traditional potatoes. In 2011, the color flake brand, KIWA, was launched on the market, promoted with the support of international cooperation as a business model of corporate social responsibility. This business model included working in collaboration with a number of other local actors to maintain consistent production levels and to ensure the supply of quality seeds.

The model also included training services for farmers, based on the methodology of Farmer Field Schools. The business model promoted by INALPROCES was so successful in its beginnings that, in 2011, its work with the Andean potato farmers was awarded as the best Corporate Social Responsibility project in Ecuador by the Ecuadorian-German Chamber of Industry and Commerce.

Since its launch to the market, the product has increased its sales in the national market and in the export market in different places in the United States, Europe and the Middle East. This growth has promoted collaboration between CIP, INIAP and CONPAPA producers, to carry out actions aimed at promoting the production of quality seed of the *Puca Shungo* and *Yana Shungo* varieties, selecting new varieties, increasing production volumes and plan the purchase and sale between CONPAPA and INALPROCES.

The development of Kiwa native potato chips is one of the examples of the evolution of the

innovation process that, as we observe, continues and evolves long after the P APC has formally ended. This commercial innovation has also required technological innovations to respond to market demands. For example, to meet the demand for seed of the varieties used in the production of Kiwa flakes, these varieties were included in the seed multiplication program of the INIAP high quality seed production greenhouse. The case of the KIWA product is an example of how market opportunities and business development with social responsibility function as a driving force for the formation and operation of public-private partnerships for rural development. There are also other challenges at the productive level, mainly with changes in climate and frost in the Ecuadorian Andes that affected production up to 80% in 2014. It is necessary to follow the selection of varieties that allow quality processing. In the field of processing it is necessary to find more options to use these potatoes, such as mashed potatoes and frozen potato chips of Andean native potatoes for export (Martin Acosta, CEO KIWA personal communication).

We observe that in the Ecuadorian macro context the policies in favor of the market were not as favorable as in the Peruvian case. One of the great challenges has been the incentive to entrepreneurship. Although Ecuador is one of the countries with the largest registrations of trademarks and inventions in the Andean area, the development of these proposals rarely becomes business, few companies are created and job opportunities are generated to a much lesser extent (Wong and Padilla, 2017). On the producers side, a general investment support system was required to expand their production. None of the farmers had access to credit, rather when necessary they invested their family savings or requested personal loans.

With the participation of INALPROCES, the product based on color potato flakes has

been developed and expanded with a presence in national and international markets. In 2018, the processed potato product represented 20% of the company's sales. The company plans to expand mainly in the USA, Middle East and Eastern Europe and enter the market with organic certification (Martin Acosta, CEO of KIWA, personal communication)

Lessons for the development of value chains in different contexts

The experiences with the PAPC and interventions in value chains in different contexts allow us to identify some lessons that contribute to improving the design of interventions for the development of value chains by promoting research and collective innovation.

An important element in the promotion of the PAPC is the ever increasing integration of the agricultural sector into the markets that increases market opportunities for small farmers. From the traditional situation of selling directly to rural consumers or to the local market, modern value chains have opened the doors to other buyers: merchants from rural and urban markets, processing companies, fair trade and supermarkets. The implementation of the PAPC, through the interaction of producers with actors in the chain and the analysis of markets, allows to identify market niches and new commercial opportunities where small producers can develop a competitive advantage from having a comparative advantage, in this case biodiversity. In the PAPC user guide (Bernet et al., 2006), there is a tool called “impact filter” that provides a rapid qualitative assessment of the expected impact of different market opportunities in favor of small producers also considering the social and environmental objectives. This tool allows R&D organizations to plan and guide interventions more effectively.

A holistic approach such as PAPC represents a new way of doing agricultural R&D. Instead of undertaking research and then

trying to transfer the results to farmers, the approach brings together a range of relevant actors -including farmers, market agents, processors, researchers and service providers- to prioritize and jointly develop innovations that respond better to the demands of the value chain. The approach to the development of value chains leads us to highlight the importance that must be given in the debates on food security to postharvest and value chain components in contrast to the support aimed only at the productive sector. Therefore, to promote food security, chain efficiency and post-harvest management deserve almost the same weight as farm production support approaches.

The facilitation of the PAPC process. In the cases analyzed, three different types of "champions" are identified, which contribute to the facilitation of the process, which can be crucial for the successful implementation of the PAPC and for the integration of the focus in the R&D organizations. The first type of champion is the one that coordinates the work groups and intervenes in articulating the innovation processes; the second type is a manager/decision maker that facilitates the mobilization of resources for the PAPC, in addition to coordinating in a general way the implementation of the approach; the third type of champion is a recognized leader within the market chain and has good connections for public and policy advocacy. In many cases, the R&D institutions were responsible for introducing and facilitating the process of implementing the methodology within the framework of a project. PAPC facilitators must have communication skills and management of dissimilar groups (for example, dealing with private companies is essential) and be willing to learn and transmit new skills on agricultural marketing and innovation processes.

Innovations arise over time and are not always programmed. The PAPC triggers innovation processes, which often continue and evolve long after the PAPC has formally

ended. Second and third generation innovations or what we call creative imitations are usually even more important than the first innovations developed during the PAPC exercise. But this process requires an investment in services and institutional mechanisms that allow monitoring and supporting innovations that arise beyond the life of a specific project. The lack of accompaniment of chain innovations can become a limitation that reduces the scope of the innovation process.

The context of policies. It seems that the policies in favor of the market in Peru provided a more favorable environment for the use of PAPC. Likewise, in environments where poverty is very high and production conditions are adverse due to climate risks and reduced input use, there are severe limitations for the implementation of development approaches in agricultural market chains. Favorable conditions for these approaches to thrive, they understand that policies should facilitate the participation and development of private actors (producers and companies) and reduce transaction costs for businesses to function. The PAPC seeks, among other things, that three key actors (producers, companies and government) can articulate objectives and put them into practice. When these conditions can be met, with a component of local capacity development, successful innovation processes are facilitated.

Holistic and participatory approaches, such as PAPC, cannot easily be "scaled up" or "transferred". How can you better scale or replicate the observed initiatives? To achieve the replication of successful approaches, dissemination of experiences. To date, investment in learning and dissemination of experiences has not reached a level of support similar to the promotion of practical initiatives in the field.

There is no "single solution" for the challenges faced by basic value chains. There is no single success factor, but in each

case a combination of interventions at different levels is needed to address the processes of value chain development. Rather, a set of policy measures, development programs and strengthening of technical capacities in the chain's actors is needed to facilitate innovation processes and strengthen effective links to promote the participation of small producers in expanding markets. Advocacy in policies is an important variable to ensure that states are articulated in this process. The policy framework influences the development of business and visibility mechanisms must be available to decision makers. In Peru, the public sector was directly involved and there were support mechanisms that complemented private action (of producers and companies) and this generated a positive environment that continues to date as a basis for competitive development.

In the future, a comparative investigation of the variables that influence and determine the adaptation of participatory methodologies such as the PAPC in different contexts would allow us to better define the conditions of replication, adaptation and scaling of these methodologies.

Conflicts of interest

This document does not present conflicts of interest.

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