AGRICULTURE HUMAN INVESTMENT STRATEGIES: TOWARDS STRENGTHENING THE FARMERS INNOVATION CAPACITY (FIC)
STUDY CASE: BOLIVIA
Final Version

Arnoud Hameleers
Sergio Antezana
Bernardo Paz
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Chapter 1: Introduction

The agricultural sector in Bolivia plays an important role in the economy. It represented 15% of the gross national product during the last decades (figure 1). Its growth is mainly due to the increase of agro industrial crops like soya, sunflower and cotton and to a lesser extent sugar cane, rice and maize. It is estimated that 2.5 million hectares are currently being cultivated of which 1.4 million hectares are cultivated by small farmers in the highlands and valleys providing food for the country and 1.1 million hectares are industrial type operations mainly in the tropical lowlands of the country and orientated towards export (CEP, 2010b, Peres & Medeiros, 2011).

Figure 1

During the last decades the country has seen an important shift in its production pattern. Since 1953, after the implementation of the land reform law (Urioste, 2005), the possession and use of land has shifted from 85% owned by small producers in a near subsistence system, to a pattern in which 50% of the agricultural area is used for agro industrial crops. This change was mainly caused by an increase of agricultural area in the tropical lowlands of Bolivia. The agricultural area in 1980 was estimated at 1.1 million hectares and increased to 2.7 million in 2007, which represents a 3% increase of the cultivated area per year (figure 2). The difference in growth rate between industrial crops and traditional crops is impressive: 335% for industrial crops and 20% for traditional crops (Peres & Medeiros, 2011). In real terms, agricultural activity in the highlands and valleys - the traditional production area- has not changed but new areas were incorporated in the tropical lowland area. As a consequence deforestation rates increased dramatically from 1.506 km2/year in the nineties, to 2.247 km2/year for the period 2001 to 2004.
In 2001 (last Bolivian Census), 32% of the population lived in rural areas. It is estimated that the rural population decreases around 2% per year; yet this population still represents 42% of the Economically Active Population and is therefore the largest group within this category, followed by the service sector and industry. Therefore, from a social point of view, the rural population is still very important, and it is where the highest levels of poverty can be found (Exeni, 2010). In 2005, 60% of the Bolivian population lived in poverty of which 37% in extreme poverty. As confirmed by Hartwich and Jansen (2007) who concluded that compared with other South American countries, Bolivia has the highest percentage of rural population and the highest percentage of rural people living below the poverty line.

It is estimated that 700,000 agricultural units exist in Bolivia (CEP, 2010a), of which, 400,000 are small family units in the highlands and valleys and 300,000 medium to large units in the tropical lowlands and dry savannas. Small farmers in Bolivia do not rely solely on agriculture for monetary income, most of them migrate either to cities to work in the construction sector or migrate during the harvesting season to Argentina or Santa Cruz. Agriculture provides 30% to 50% of the total monetary income for small farmers (Antezana, 2005).

As shown in table 1, agricultural productivity in general is low compared to the average of the region and has not increased during the last decades. It is suggested that this is due to the lack of research and extension services but also due to “minifundio” (small unit size and highly divided plots) and land degradation, especially in the highlands and valleys of Bolivia. Additionally Public Investment is, and has been low (Perez and Medeiros, 2011). As a consequence of these factors certain technologies are not being, or cannot be applied.

**Table 1. Average Yields in Tones/year of different crops in Bolivia and South America**
Bolivian public sector investment has grown from 272 million US in 1987 to 629 millions in 2005; which implies a 4.7% annual growth rate. However after 2005 public sector investment has tripled to 1.439 million US in 2009, implying a 22.9% annual growth rate. Between 1990 to date, public investment has prioritized: Roads and transportation sector (30% - 50%), Health (8% - 18%), Exploration of oil and gas (32% - 8%), Education (10% – 18%) and finally, agriculture (9%).

The origin for public investment has shifted from mainly foreign resources (donations and credits) to national resources. This is very important in terms of being able to finance long term projects. Figure 3 shows the shift of financing source of public investment:

**Figure 3 financing source of Public Investment**

Source: Peres & Medeiros (2011)
Total Public Expenditure (including public sector investment) has also increased notably in the past years: from 2.809 million US in 1996 to 9.771 million US in 2008 (11% annual growth). Specific public expenditure in agriculture has followed a similar trend, but it’s participation in the total public expenditure is still modest: 9% as an average and is still financed mostly through foreign resources: up to 60% of the total expenditure in agriculture is financed through foreign credit (49%) or external donations (11%), while only 40% is financed through national resources. Total expenditure in agriculture from 1996 – 2008 can be detailed in figure 4.

**Figure 4. Public expenditure in Agriculture**

![Figure 4. Public expenditure in Agriculture](image)

As shown in Figure 4, Rural Road infrastructure and Disaster Prevention are the focus in terms of public investment. Agricultural incentives schemes are mostly oriented towards animal health campaigns and the provision of seeds and fertilizers to the poorest rural population. Specific Agricultural Infrastructure investments imply mainly the construction of irrigation systems; “Others” include expenditures such as the development of rural and food security strategies and more general rural development schemes. As shown, public investment in Research and Extension represent only 3% of public agricultural investment, which shows the low level of public priority and possibly explaining the low level of technological progress in agriculture.
Chapter 2: Research and Extension apparatus state of development

Research efforts in Bolivia date back to 1937 when the first experimental stations were implemented. Since then, Bolivia has seen the development and death of various research and extension systems with swings between public and private sector leadership and periods without any formal research and extension system (Montaño, 2007). The biggest problem Bolivia has experienced is the lack of continuity of its agricultural services; this has lead to large losses in terms of knowledge (Paz, 1999 y 2000, Coca-Morante, 2008), which probably reflect the low levels of production and productivity when comparing to other countries in South America.

A collaboration agreement between the United States of America and Bolivia resulted in the first research and extension service (Servicio Agricola Interamericano, SAI). During this period (1937 to 1975) public universities started to show interest in agriculture, initially more from an academic perspective, but thereafter by establishing the first model farms and research farms.

Most public universities in Bolivia teach agricultural sciences; and there are a vast number of students in these faculties. For example, between 1980 to 2010 more than 10,000 thesis were produced in the sector, of which 4,258 were specialized in agronomy, 3,502 in animal production, 842 in forestry, and 851 in other subjects, showing the enormous amount of research generated by public Universities.

However the impact of this work in the sector is limited due to the serious internal and external problems universities have in relating to its context as extensively discussed by Hameleers (2005). One of the basic problems is the funding of its research and extension activities. Of the total budget of public universities, 96% is spent on salaries (Santa Cruz, 2006), leaving very little scope for research and extension activities. More specifically, of the 10.5 million US$ annually spent by the Bolivian state on agricultural related faculties, only 3.5% was spent on research and extension. As shown in figure 5, this value is very variable, ranging from 70% in the University of Pando, to 0% in others. The majority of the faculties spend between 0 to 8% of their budget on research and extension activities. This reflects the general focus of public universities which is: to educate and not assume research and extension functions.

An important opportunity for Universities to increase investment in research and extension services was generated by the designation of a percentage of the revenues coming from gas export. These are resources which cannot be spent on salaries and it was expected that this assignation would give an important impetus to research and extension activities in public universities. In 2010 this budget amounted to 100 million US$, but public universities only executed 32% of these resources; again ranging from 70% in Pando and only 1% in La Paz, the biggest public university of Bolivia. This would again, confirm the previously mentioned focus of public universities on education only.

But not only public universities are involved in the Bolivian research and extension systems. In 1975, the Bolivian Agricultural Technology Institute (IBTA) was created as a public institution with the specific task of providing
agricultural research and extension services. The institution comprised of 15 rural research stations and a staff of about 250 professionals. Its functionality was based on an eco regional division of the country; it had three regions and 7 national programs. During its existence it suffered various processes of restructuration mainly caused by the changes in its financing structure (source). Initially IBTA focused on research and extension but research efforts were not demand driven (some argue they were driven by the personal interests of individual researchers. Montaño, et al. 2007) mainly because of the lack of an institutional structure that permitted demand capture. Extension efforts were limited to 50 people covering the whole country and as a consequence with a limited impact (Paz, 1998).

The link between research and extension was difficult, although examples of participatory research in farmer’s fields could be found. In 1989, IBTA took the decision to prioritize research and some pre extension activities for two reasons, i) because its institutional capacity was too limited to have a real impact and the Bolivian state did not have the economic means to increase it, and ii) The proliferation of a great number of public and private organizations (internationally funded projects and NGO’s) that provided extension services as part of their rural development activities.

One of the failures of the IBTA system was its lack of institutional stability (several reorganizations) and the instability of its human resources. This impeded the institution to develop research programs with long term impact but more importantly did not allow the institution to build up long term institutional relationships. Its relation with the regional governments, universities, farmer organizations and the private sector, etc. was very limited and as a consequence its institutional base was very fragile and totally dependent on the national government. As a consequence, when the governmental decentralization process initiated in 1997, it was very easy for the national government to dissolve IBTA and transfer the research and extension functions to the regional governments. However, this meant the end of the agricultural research and extension functions of the Bolivian state at that point in time, because the regional governments were not able or willing to assume these responsibilities. Any research functions in this intermediate period were carried out by NGO’s and foundations (E.g. PROIMPA). The only exception is CIAT in Santa Cruz, which maintained itself as a public institution financed by that regional government and some farmers associations.

Currently, the backbone of human resources working in research services in Bolivia originates from the IBTA system. During the IBTA period, a large number of people (approximately 55) were given the opportunity to study a Master or PhD degree in foreign universities. Additionally a large number of students from national public universities were given the opportunity to execute their degree research project within the organization.

As a response to the total lack of an official national agricultural research and extension system, in 2000, a new organization was set up: The “Bolivian Agricultural Technology System” (SIBTA). It’s objectives were: i) to reduce rural poverty by increasing farmers’ income as well as their food security; and ii) to increase the sector’s competitiveness with more efficient technology. SIBTA was the result of a coordinated effort of the Bolivian government and
international donor agencies of the Netherlands, United States, Switzerland, Great Britain, Denmark, Germany, and the Interamerican Development Bank.

It was very much a donor driven project in which the influence of the Bolivian State was very limited and in which the leadership was expected to be assumed by the private sector (producers and private research and extension providers). The total budget for the new system was US 40 million for a 7 year period, of which 50% was financed by the national government (mainly through debt). The system included the provision of competitive funding, mainly for extension services and to a limited extent, research. Farmers were required to pay a part of the costs of the services provided to assure their commitment and involvement. The institutional base of the system was the creation of 4 private foundations in the 4 different eco regions of the country (Altiplano, Valles, Tropico, Chaco). The Foundations did not provide the services themselves but contracted private companies and other private institutions (foundations and NGO’s) to provide the services. Public Universities were excluded from providing the services.

The system relied on market studies in order to define research and extension priorities to support, and relied on a productive chain analysis in order to assess its actors and internal dynamics. Potential export sectors were prioritized with the argument that the internal markets were too small or lacked sufficient profit margins. SIBTA was criticized as some important local non exporting sectors were left aside (potatoes was one of the best examples) and the productive chain approach became an objective itself instead of a means to understand reality (SIBTA, 2008). The result of this approach was the exclusion of a large population of farmers (the smallest and least developed) of the SIBTA system, but more importantly it created a scheme in which farmer demand in reality was induced by the foundations and the private service providers. Close to 79% of the beneficiaries of the system expressed that they were satisfied with the services provided but interestingly 60% indicated also that they sensed demands were induced (Lema et al, 2006).

The research and extension services were provided by private companies, NGO’s and Foundations. It was assumed that a competitive market of these services existed in Bolivia (Salinas-Castro, 1998). Very little effort was put into developing, strengthening and keeping it competitive. Public institutions were excluded from this market. As a result services provided were not of the highest quality, but more importantly it was difficult to generate an institutional learning process in the service providers, or construct on previous experiences. At the end of the day they were competing in markets in which knowledge and experience were the competitive elements, preventing the interchange of these products and experiences.

According to Lema et al. (2006), who studied the farmers’ perception of SIBTA’s results, SIBTA increased farmers’ income (monetary income for specific crops of the participating farmers was increased by 88% on average) and developed technological capacities in a limited group of them, but was not perceived as good in developing market skills for farmers or in articulating them into the design of the innovation demand itself. SIBTA financed 264
projects for 84,117 families. The resources spent were 23.35 million US, plus a 1.3 million spent by local families.

SIBTA’s research system was heavily criticized. Some applied specific research was carried out by service providers as part of the extension package; it was often of poor quality because of the lack of experience and lack of research capacity within the service providers. Knowledge was not widely disseminated as it was a key competitive advantage for a service provider. Five strategic research programs were set up; i) Quinoa, ii) irrigation in valleys, iii) soil management, iv) Maize, and v) irrigation in mountains. In reality SIBTA provided Innovation on the basis of existing knowledge and/or best practices copied from other countries.

In terms of its institutional base, there was little involvement of the public sector as a whole (ministry of agriculture, public universities and local governments) and no connection to the education process or human capital development (aside from direct beneficiaries) while a high level of private partnerships were developed with little sustainability.

As a result, a system was developed that benefited few, did not respond to farmers at the subsistence level, contributed little to the local agricultural innovation process and was almost totally separated from the public sector. For these reasons, the Bolivian Government in 2006 decided not to support the SIBTA system anymore and decided to develop a more public led system.

In 2007, a new system was initiated called the National Institute of Agricultural and Forestry research (INIAF). Its organizational structure was initially based on the national seed certification service. This new organization had a difficult time establishing itself (INIAF, 2010). Initially, financial support from the Bolivian state was very limited and relied on donor agencies, especially DANIDA. More than 73% of the cost of the system was financed by international cooperation. More recently, in 2011, the Bolivian state has decided to support the new organization with a substantial amount of state support, comparable to the budget of a ministry, giving the new organization a chance of long term survival. The organization actually employs 200 persons and only 23% of the cost is paid for by international cooperation.

The services provided are very limited. Seed certification services have been able to maintain its functionality, but research and extension activities have been very reduced. The organization in reality is still in development and construction. As from 2012 the organization is expected to launch a number of new activities on the basis of a World Bank loan and support from two donor agencies (DANIDA y COSUDE) on the basis of an annual budget of 10 million $ /year for a five year period (World Bank, 2010).

Research funding is based on two strategies: a competitive research fund (CEP, 2010a) in order to solve specific regional problems; and a strategic research line, in five specific agricultural crops. In terms of extension services, the role of INIAF is proposed to be a facilitator, identifying needs and the provision of these services using regional or municipal financial resources.
It is very difficult to evaluate the INIAF system at this point in time. It is clear that it is a public sector driven system responding to public policy but with a clear risk of not using capacities developed available in other institutions (Universities, ONG’s etc.). It is not clear how demands from the productive sector will be captured and responded to. Farmer participation, at the decision level, is actually very low and priorities are defined on the basis of national policies and political priorities. Bolivia is actually in a process of decentralization and until roles at the different levels are clarified it is difficult to see how this new system will respond to more regional demands.

In Figure 5, the annual average amounts (in millions of US$) programmed for each of the three public research and extension institutions that worked in Bolivia since 1992 are shown.

**Figure 5. Total Budget of the Public Research and Extension Institutions (R&E)**

As can be concluded from the above, the expenditure in research and extension from the public sector has increased in absolute terms between organizations. While IBTA spent an average of 4 million US $ between 1992 – 1998; SIBTA spent nearly 50% more (5,7 million). INIAF is expected to spend nearly 10 million US$ in the next years, as this was the total final fund the government has defined (most of it is coming from debt again).

Figure 6 shows these same budgets in relation to the average agricultural GDP (in tens of millions of US$) for the same period of time in each case.

**Figure 6: R&E / Agricultural GDP**
Research and extension expenditures have not only increased, but have also grown in relation to the size of the agricultural activity in Bolivia during the past 20 years. Figure 6 shows that for every 1000 US dollars produced by the sector, IBTA spent 3.8 US dollars, SIBTA 4.3 and INIAF will spend 4.8 US dollars. It is important to mention that the creation and institutionalization of these institutions has also been expensive and is included in these figures as part of the total budget.

It is also important to state that in Bolivia various types of agricultural innovation systems have been implemented but the main problem has been the lack of continuity. At some point in time, a public research station based innovation system existed and then a totally private sector based system was developed. Actually a new public sector system is being implemented with serious risks of again not responding to the needs of the sector. In the new INIAF design there exists a clear risk of repeating IBTA’s and SIBTA’s deficiencies like public definition of priorities, little participation of beneficiaries in the design and the lack of clear and proven mechanisms for the capture of demand.

The only permanent providers of research and extension services are NGO’s and the public universities (with the mentioned limitations). Integrated rural development projects probably have/had a bigger role in terms of innovation than the “official innovation systems”.

Chapter 3: Specific public policies towards promoting the formulation of human capital in the rural sector with particular reference to the small landowners
There are no specific public policies in Bolivia towards the formation of human capital with reference to small landholders/farmers in the agricultural sector. The primary, secondary and university systems are well developed and respond to the needs of urban and academic oriented professionals; but in terms of intermediate technical education, very little exists. There is no system that specifically supports the agricultural sector intending to develop capacities at farmer level. The agricultural research and extension systems - as described before- did not incorporate a specific schooling component as part of their structure. Neither did or do specific public institutions exist at the national or decentralized-level that provide producers with specific technical skills.

There is, however, a public alternative education system with 300 centers mainly based in rural areas. They were set up to provide adult education (alphabetization, basic education), but more recently are also offering specific technical education ranging from rural construction to computing. The selection of the skills to be developed is based on local priorities demanded by the population and local governments (municipalities who finance a percentage of the cost). As shown in figure 7, 24% of the skills taught are related to agriculture. Some of these centers also offer specific agricultural skills for fruit or milk production. At this point in time the Vice Ministry of Alternative Education is developing a new strategy to formalize this type of technical education in terms of an official certification system. This would permit the public system to provide a platform oriented towards the agricultural sector.

Another challenge is to articulate this system with the new innovation system (INIAF) and generate quality and minimum standards. Paz (2002) evaluated a sample (60) of these centers and showed that the quality of the training
programs was variable and not based on common educational standards. Quality was correlated to external support from NGO’s (e.g. FAUTAPO) or the Catholic Church (FERIA’s). The alternative education system can be used to develop skills in the agricultural sector, but this will need further development.

Box 1. DANIDA’s CETAS
An interesting example is provided by DANIDA. It comprises four agricultural schools in two departments that initially taught young people general agricultural skills; very soon it became clear that only 33% of these students went back to their home farm (DELACH, 2008). A new educational model was introduced based on short specialized courses for specific crops or agricultural activity. The courses had high technical but very practical contents and its short time period permitted producers to participate. As centers gained local acceptance and endorsement by local producers, some - but not sufficient-local funding became available. A one year certified course, carried out in the communities and in the centre has a cost of about US$ 500 (CENETEP, 2010) per participant. Participants have reported improvement in production levels of 30 to 50%. The problem with these centers is that they have never been institutionalized in the public sector and depend heavily on donor funding.

The public programs for agricultural development were/are donor or central government driven with limited participation of the final user and often not on track with national or regional policies. Recent examples of this kind of program are PASA, a food security program financed by the European Community, or PAR, a productivity development program financed by the national government (via credit with the World Bank). Both programs have no relation with INIAF although they also depend on the Ministry of Agriculture; and have no relations with the previously mentioned “centers system”.

Both programs have extension activities but no research component. Both are limited to specific regions and do not build on local, regional or national institutionalism and have a limited time frame (3 to 5 years). Older examples are the PAC program, a EU financed rural development program or the community forestry development program (GCP/BOL/030/NET) executed by FAO and financed by the Dutch Government, with large numbers of extensionists but again with a regional scope and very limited research activity. These programs use local technicians with serious technical limitations, almost no specialization and no research background. In general, these programs do not contain training or research activities.

These programs have been the biggest providers of innovation to the producers in the agricultural sector in Bolivia, especially in terms of extension services. The in depth comparative advantage of these programs is also a disadvantage: they are very specific: one crop, a specific region o a few communities within a region. Research in particular was/is a very limited component of these programs.
It can be concluded that through these programs knowledge and skills were/are transferred to the producer but this innovation process was/is more guided by the specific objectives of the program than by demands of the producer. Additionally these programs have a specific beginning and end; they are not part of the formation of a national institutionalized service based on a specific national policy.

Chapter 4: Training programs provided by additional sectors for improving farmers’ abilities and skills

Due to the low capacity and lack of institutional continuity of the public sector, the private sector and NGO’s have developed these capacities and skills and are often seen as the natural providers of innovation for the agricultural sector with the disadvantage that the services provided do not necessarily respond to the needs of the farmer but are driven by commercial or donor objectives.

There are two processes that lead to the provision of training in the private sector. One as part of the commercialization process: training is part of the induction to buy a specific product (e.g. genetics, fertilizers, machinery, veterinary products, fungicides, insecticides etc.). This method only reaches the medium and large producers and is focused on commercial crops and not on small producers or traditional food security related crops.

Box 2. GRAVETAL

GRAVETAL is an agro-industrial company working in the tropical lowlands of Bolivia, mostly with soybeans and sunflower. It provides seeds to medium and large sized farmers, with no less than 100 hectares and access to mechanization. The company signs production contracts and on this basis provides them with seeds and agrochemicals via credit and provides technical assistance. The collateral for the credit is always land. GRAVETAL works this scheme annually with roughly 25,000 farmers.

Nearly all of the Bolivian oilseed crops are exported; 95% of these products are sold to the Andean Community. GRAVETAL represents 47% of the total soybean crude oil exported by Bolivia, and 31% of the soybean meal exports.

Small producers depend on their access to information and products (the famous bottle of coca cola with insecticide) from the local provider - who often has not received training -; also there is no effective regulatory mechanism to secure the quality of the products these providers sell. Small producers are still the largest group of farmers in Bolivia and in general do not receive training or skills via this channel. Their economic capacity is too limited to be of interest for the commercial companies.
The second process of provision of training by the private sector is when a private business is trying to achieve certain quality standard from the producer (E.g. Organic Quinoa, Beans and Peanuts etc.). In these cases, often also the small producer is involved and their economic capacity is not a limiting factor. Interesting alliances can be found in Bolivia in which commercial companies really invest in terms of training and skill development of their providers. There is involvement of small producers especially in labor intensive products. Good examples of these are Andean Valley in quinoa and GRACEBOL in beans. The companies provide on field technical assistance and do some applied research. Most of these companies are involved in exports and require a specific quality in order to satisfy their buyer’s demands. As Bolivian markets do not have a highly specialized demand, most of these products are suited for exports to Europe or United States, and in some very specific cases, in South America.

**Box 3. GRACEBOL**

The study case was based on a co-financing agreement with a regional rural development project (DELACH, financing some of the inputs) and the company. The farmer organization (representing 110 producers) signed a production contract with the company with a pre-established price for the product. The company provided technical assistance and did some research on cultivation techniques and the evaluation of varieties. The interesting aspect of this experience is that after the first induced and subsidized experience, the company still finances the local technician and the farmers have increased the production areas of this crop, which they did not even know of 5 years before. A long term relation has been generated by the farmers and the company.

Within the private sector, there are a large number of NGO’s and foundations involved in the provision of innovation for the agricultural sector. These organizations provide extension services and - in some cases - get involved in research. Their funding is often international but some NGO’s also access public funds, providing services for municipalities and regional governments. The big advantage of NGO’s is that they are less prone to institutional change and/or change of their human resources. They are able to construct their actions based on previous experiences and are able to build long term relationships with farmers.

Currently there are a number of large foundations active in the agricultural sector providing technical assistance and research. The PROIMPA foundation has a potato research program and provides extension services to a large part of the country. During the time when the SIBTA system was functioning, PROIMPA was a large provider of research and extension services in maize, fruit and chili pepper. Their extension system is based on the farmer field school principle. Nowadays PROIMPA is more oriented towards research, based
on a range of international collaborations. Another important provider of innovation is the seed centre of Pairumani financed by the Patiño foundation. The center was created to improve the social and economic situation of the rural communities on the basis of genetic improvement of the crops and the use of certified seeds. The centre operates based on a network of quality seed production from small producers; it also manages a seed bank for maize and cereals based on international standards. The centre provides extension services and is involved in genetic improvement of local genetic material. On basis of these activities the centre has developed a regional/national prestige as an important provider of innovation for small producers especially in terms of genetic improvement of crops and crop management.

A more recent player in providing extension services is the AUTAPO foundation. It is working on two agricultural production chains: quinoa, and grapes and wines. It provides technical assistance and technical education at different levels of the production chain as part of an integral support strategy. An interesting aspect is that AUTAPO is specialized in education, and is currently mixing this capacity with its extension services, providing, therefore, competency based education for adults with very positive results. The final outcome (technical assistance in an integral technical education package) is proving to be an efficient way of installing skills in the productive sector.

But not all NGOs work on a national level, a large group of smaller, regional or locally based NGO’s provide research and extension services. They depend on local resources (competitive funds from local governments), international funding and sometimes religious organizations (national or international). They provide - in a very punctual way - extension and demonstration services to small farmers. As mentioned before, the big advantage is that they are local, semi permanent and often have a high level of confidence from farmers. Their disadvantage is often that the technical level of the services provided is low. It is based on national or local knowledge but not based on internationally available knowledge and the development of new knowledge.

An interesting example is the IPTK foundation, founded in 1976, during the military governments in an effort to solve poverty and corruption in a region where there was no real presence of the Bolivian government (the North of the department of Potosi). The foundation provides agricultural training and extension services but has a high dependence on external aid. Another example is the ACLO foundation created by the Catholic Church covering the southern and poorest region of Bolivia. On the basis of radio programs and on site extension services, the foundation has had an important impact in the innovation process but again from a food security principle. Their most important outcome has been the formation of leaders and leadership skills in farmers, providing farmer organizations with an important voice.

There also are a number of large international NGO’s like ADRA (Adventist Development and Relief Agency), Save the Children, Care and FHI (Food for the Hungry International) that - from a humanitarian perspective - provide mainly extension services to small farmers. These organizations where mainly financed by USAID and it is estimated that in 2004, they had up to 1.000 extensionists working in the field. Their technology levels are not high and focused on food security, but what is interesting about them is that they
reached the poorest and most disadvantaged regions of Bolivia, even regions where the public system has not operated before. Due to the complicated political relation of Bolivia and USA, activities of these NGO’s have diminished lately.

Civil Society has played an important role in developing the agricultural sector in Bolivia but oriented to the representation and organization of small farmers, and not to the provision of technical assistance. Organizations like CSUTCB (Bolivian Farmers National Federation), the Bartolina Sisa (rural woman organization), CIOEC (Integrated Committee of Economically Oriented Farmers) and AOPEB (Association of Environmental Friendly Farmers) provide some training in leadership and organization skills. Their role should not be underestimated in generating the platforms that permit providers of extension and research services to have efficient access to the small farmer. However in terms of providing training, their role is limited and depends on external financing sources.

In Bolivia there are very few farmers’ organizations that have organized innovation services for the small farmer. It is not customary to pay for these services, mainly because the free available services provided by NGO’s. There are some exceptions, but these come from farming organizations representing exportable crops like ANAPO (Producer Association of Oleaginous crops and wheat), which represents 14,000 producers and 25% of the gross national product of the department of Santa Cruz. ANAPO provides independent research and management practices, technical information and specific courses of interest for its members.

Smalls farmers’ organizations that provide some training in agricultural activities can be found in exportable crops such as coffee, cocoa and quinoa. These are the few examples of stronger second tier small farmers’ organizations, that are capable of organizing training facilities for their associates with mixed funding (external and from farmers). Most of these training courses will be oriented to both agricultural activities and some organization skills such as: accounting and legal tasks.

Box 4. CEIBO

CEIBO, a small farmers’ second-tier organization that represents more than 1,200 members spread throughout smaller cooperatives in the northern tropical region of Bolivia. This organization is owned and run by farmers. It is an interesting example of how farmers can prioritize education and training as a competitive strategy. CEIBO was founded in 1977 by Andean migrants who settled down in the Amazon and harvested cocoa as a means to generate income. Though the cooperative has been supported by several international donors and NGOs, the strategic objective has been developed by farmers’ since its origins. CEIBO is currently exporting cocoa beans and chocolate.

One of CEIBO’s principles is that farmers have to share technical knowledge, but their strategy does not stop there, they have a training program for the associates’ children. The program (supported by donors and local funds) trains youngsters in specific tasks related to the cooperative: production, transformation, ecological production, accounting and legal issues. For these
In conclusion there are two main types of technical assistance from the private sector to small farmers, i) technical assistance from food security/rural development programs with a more humanitarian approach and focused on the population with higher levels of vulnerability (mostly carried out by NGOs), and ii) technical assistance to highly profitable agricultural products in the high lands and valleys such as quinoa, potatoes, coffee and others (farmers’ organizations, NGOs). According to CEP (2010), the number professionals providing technical assistance within these schemes is at least 2,000, and can be as much as 5,000; in either case, this “system” has more staff than any of the “official systems” mentioned. This implies that for every 140 to 350 farming units in Bolivia there is one technician working in this manner.

The main problem with this non official system of technical assistance is the lack of structure and fragmentation of efforts resulting in duplication, contradictions and lack of continuity preventing the building upon existing knowledge. Examples are known of a beneficiary being attended by two or three institutions, while others have little or no attention at all. Farmers’ organizations providing training or technical assistance are the fewest. They have been established in the few profitable sectors for small farmers like Quinoa, coffee, milk and cocoa.

**Chapter 5: Rural/farmer organizations aimed at strengthening the innovation systems dimensions**

There are three main forms of organization in rural areas. The oldest one dates back to pre republican times when communities were organized according to local customs and cultural authorities such as Jilacatas, Tata Mallkus, Mama Jilliris, etc. By the middle of the twentieth century, the Bolivian revolution supported the organization of farmers’ unions in opposition to traditional authorities. This was done in order to replace traditional authorities with local political leaders allied to the revolution. In some cases unions (federaciones de campesinos) have totally replaced traditional authorities, in others not. Where
they coexist, they have established that religious and moral issues are part of the roles traditional authorities play, and political roles are assumed by unions. As political, religious and moral topics are part of these institutions’ interests, there is little interest in productive activities.

Organizations with a focus on production were set up more recently and vary from cooperatives, associations, CORACA’s (Farmers’ associations) and OECA’s (farmers’ economic organizations). Farmers are organized at local, regional or national level. Most of them respond to specific commodities, for example: quinoa, maize, cattle, wheat or milk which causes a problem in terms of resolving systematic problems of the production system (rotation systems).

There are some local organizations that have a more integral approach and are community or regionally based and represent the complete production system of the farmer. These types of organizations are usually very weak in terms of management and general organization. Their support to the innovation systems as individuals is limited. Second- and third-tier organizations (regional and national) exist in profitable products and they have potentially a bigger impact on the innovation system.

In terms of specific advocacy organizations, the national farmers union (CSUTCB) and the Indigenous rural women organization (Confederación Nacional de Mujeres Campesinas Indígenas Originarias de Bolivia “Bartolina Sisa”) are the most important. These organizations - with more than 30 years of history – are the main political actors representing rural farmers. However their focus on productive aspects is limited, their main aim is social revindication. These organizations have achieved important results in terms of land rights, social rights etc. but have developed few skills in terms of agricultural policy reforms or influencing the innovation system.

Most of the farmers’ organizations involved in producing, transforming or exporting are integrated in CIOEC (since 1991): Integrated Committee of Economically Oriented Farmers’ Organizations. This national level organization has boards in most of the nine departments of Bolivia and represents nearly 360 farmers’ organizations. CIOEC’s goal is to strengthen farmers’ organizations by developing marketing and leadership skills, providing technical and legal assistance and developing gender politics amongst the organizations. These is done through several programs, most of them supported by international donor agencies, but ran by CIOEC. However, due to political changes in the country and their high dependence on international donors, their level of influence is limited.

Farmers working in ecological products are integrated in AOPEB: Association of Environmental Friendly Farmers. This organization is also open to private sector enterprises involved in ecological production, and not only farmers’ organizations, despite their name. This organization provides technical assistance for the production and ecological transformation of products, as well as assistance in legal, financial and marketing issues related to the set up of an ecological organization. It also lobbies for the recognition of alternative norms on certification, for example a farmer internal control system. Recently, the Bolivian government has taken a more pro active role in this area and established CNAPE (Consejo Nacional de Agricultura Organica). This national
public institution is responsible for the development of norms and legislation for organic certification and its implementation.

Multipurpose organizations such as the chambers of commerce exist in most departments of Bolivia. In many cases they also represent the agricultural sector. An interesting example is CAINCO (Chamber of industry commerce, and tourism in Santa Cruz) that represent commercial - industrial agriculture in Bolivia. This chamber provides training in terms of competivity, export and taxes etc. and is an important political voice for the private sector.

Articulation between CAINCO and CSUTCB or any of the other organizations (Bartolina Sisa, CIOEC and AOPEB) are very limited. Also their articulation to the innovation system is reduced as the actors involved in the innovation system are not clearly indentified; the system is currently based on limited efforts from the public sector and a large input from NGOs that is poorly coordinated.

Chapter 6: New forms of entrepreneurial organizations for efficient increased agricultural production

In a systematization of new forms of entrepreneurial organizations for efficient increased agricultural production, the forms of organization can be been resumed in (Peres and Tacuri, 2004, Soriano, 2008 and Soriano y Martinez,2010):

i) Farmers’ organizations involved in the complete production chain: production, transformation, and marketing (even to final customer or export). This is the case for organizations working in exportable products, though there are some cases of organizations working with local school breakfast provision. The main examples of these forms of organization in the case of exports are: coffee, cocoa, quinoa, and Brazilian nuts. At the national level, the main examples are: rice (mostly run by Japanese migrants) and milk cooperatives.

ii) Farmers’ organization not involved in direct sales to the final costumer. This is the case of a lot of organizations that gather production from their associates, but sell raw production or semi transformed goods to private enterprises who transform these products for the final costumer (either by simple processes such as quality selection, or by transformation itself). Examples of these can be found in almost all exportable products and fruit, rice, maize, milk and others for the national market.

iii) Private enterprises that gather production from individual farmers and process it for the final customer (national and international markets). Most of the agricultural production chains were functioning like this in Bolivia. Because of the lack of organization, information and communication, farmers were often paid with low prices; this explains the rapid development of the large range of producer organizations, and also their lack of trust to private enterprises.

In certain specialized production chains, these private companies have proved to be very important, especially if the products are perishable or
markets are very specialized. Farmers´ organizations have shown not to be capable to assume the commercialization task and more specialized private companies are needed.

iv) More recently as part of the political changes in Bolivia, public production enterprises have been set up, mainly in transformation and marketing of some products. Examples are milk processing plants, Citrus juice plants and Brazilian nuts. In general these experiences are not very positive. The public administration system is a limiting factor, but experiences are very recent and it’s difficult to estimate impact and success of these enterprises.

International capital in private enterprises. This is the case of very few productive sectors and few small farmers are involved. International investors or companies work with local enterprises or landowners who provide land (either for rent or as a capital contribution) whether for livestock or the extensive (thousands of hectares) production of grains, mainly soybeans.

In the cases of farmer organizations involved in the complete production chain, few examples can be found in Bolivia, they are often products destined for export. These organizations have often a history of long term external support in terms of technical assistance and capital support and their sustainability is yet to be proven. But these organizations are ran and owned by the small farmer.

The second category of organizations, supporting the production process and mainly created to generate an associated selling process are the most common form to be found in Bolivia. During the last decade hundreds of these organizations have been formed. The main goal for these organizations was to “skip the middle man”. The final goal of these associations (of any legal form or name) is to improve the price for farmers. The biggest challenge of these organizations is that entrepreneurial skills are not always available, not allowing these organizations to achieve their goal due to the lack of internal efficiency or lack of negotiation skills.

The third form, a private enterprise, is probably the most common form of relating small farmers to their markets. It is probably the most efficient form of getting production to the market but does not always result in a fair price for the farmer. There is an urgent need to formalize/transparentize these types of relationships but the state of the legal system in Bolivia does not permit this at this point in time. Most of the relations between farmers and private companies are informal.

The public companies set up by the Bolivian government mainly aimed at breaking monopolies; up to now, they have not been very successful, mainly due to their lack of capacity and inefficiencies caused by the application of a public administration. But these enterprises are still at a very early phase of development and one has to wait to see if this form will be a viable option.

The international enterprises operating in Bolivia do not work with small farmers, but certainly have brought innovation to agricultural production but mainly in a few exportable crops like soybean, and sunflower.
Chapter 7: Conclusions

1) Bolivia has seen an important shift in its agricultural tendencies since the mid nineties. Industrial crops have increased their participation, while small farmers - especially in the highlands - have been forced to migrate because of the lack of competitiveness of their production system. In general production levels are low in Bolivia compared to bordering countries like Brazil, Argentina and Chile and this is probably related to the lack of appropriate public investment.

2) Support to rural population via public research and extension facilities has been inadequate in Bolivia throughout its history, even though there have been important political changes in the past 25 years. Universities are not focusing on research or extension. The public research and extension apparatus has followed Bolivian’s political path: state oriented (80’s) – market oriented (90’s) – state oriented (2005); nevertheless, small farmers have had little participation in key decisions about this public service and no strategic vision has oriented this service for more than 10 years in a row; this has caused a major impediment in agricultural research as priorities have shifted from a food security vision to an export oriented one. As Montaño, et al (2007) resumes, even thought there have been different innovation systems in Bolivia, at least IBTA and SIBTA share a common ground of deficiencies: little or no articulation with national and regional organizations, no incentive scheme for innovation (either for public universities researchers or private foundations), no strategic vision on the value of information and communication processes, no pro poor strategy, and little participation of farmers in the design of the system.

3) Even though research has had a curved road, technical assistance has been available for a long time for both types of farmers. Big entrepreneurs have been able to pay for it, while small farmers have received technical assistance mainly from NGOs and international cooperation agencies. The main problem with these services is that they are usually provided to a small group of farmers (usually the most audacious), for short periods of time with no strategic vision, and little farmer participation in the design of the program itself. Results from these providers are limited and often temporary.

4) In order to foster farmers’ participation, different types of organizations have been set up either by small farmers themselves, or the national government or international donor programs. Political and religious organizations have organized rural residents for several decades, but recently (nineties), new forms of organization have emerged and they are orienting their efforts towards strengthening the productive development. These forms of organization (cooperatives, associations, and others) have grown especially in specific sectors where market conditions are favorable (because of the existence of high value commodities or solidarity markets), mostly: quinoa, coffee, Brazilian nut and cocoa beans.
5) The lack of formalization of (small) farmers is a main issue for reaching them, together with the lack of consistency in national policy. Recent efforts of formalization are limited to landownership, but can offer a platform for further (entrepreneurial and fiscal/financial) formalization of agricultural productive units.

6) The basic problem in Bolivia is the lack of a clear technically developed vision in terms of priorities, resulting in short term, often political objectives in terms of research and extension. The lack of continuous public institutions does not permit coordination and complementarities with the private sector and NGO sector and as a result often institutional priorities are more important than priorities of the sector to be developed.
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