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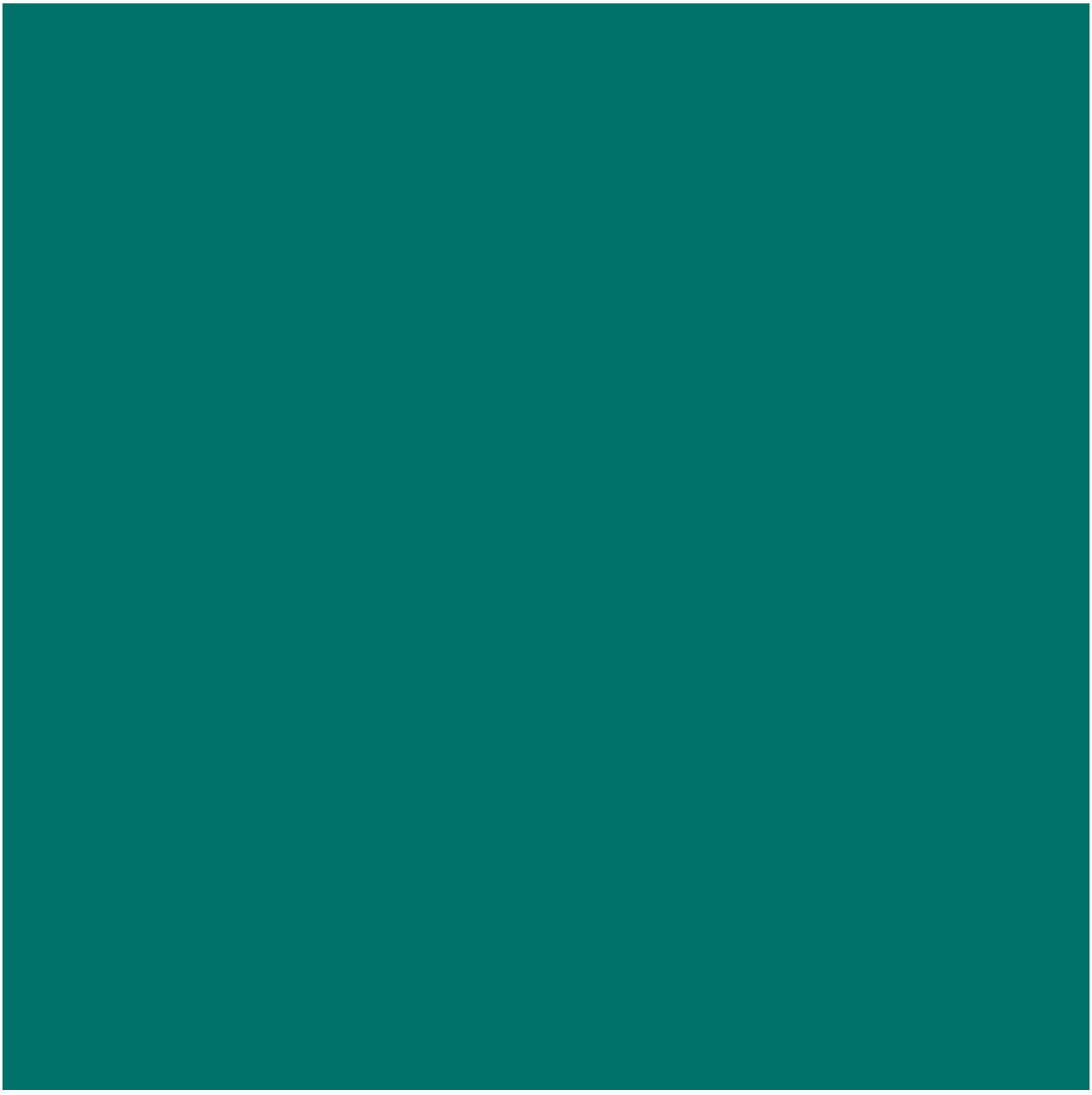
Examples from Honduras, Nicaragua and Bolivia

Innovation Systems in Latin America



Foreword

It was a real privilege for us to design and conduct this initial study on Innovation systems in Latin America. We are very grateful to all of our partners and collaborators in supporting our ambitious search for understanding the current conditions that support and hinder innovation. The excellence of this work and of the results that we were able to achieve after such a short but intense 6 week period, during the summer of 2004, was only due to the fact that we had extremely dedicated and professional contributions from many experts and professionals from each country that we visited.

The main source of information that this report is based on, are the perceptions, opinions and experience of the many knowledgeable and experienced persons we interviewed from Bolivia, Honduras and Nicaragua, who willingly offered their time to help us understand both the broader picture and the intricacies of innovation processes in their respective countries. Most of our interviewees also attended a 'feedback workshop' to continue the examination and discussion of our findings and tentative conclusions. In addition, 13 persons from the three countries even travelled together with us to a conference in Ottawa, Canada, where they provided further input to advance our understanding.

A big thanks – to all of you.

Another key secret behind our ability to accomplish so much during such a short period of time was our team and our teamwork. We had the fortune to lead this work with the support of a very creative, dynamic and continuously learning team. We would never have been able to accomplish half of what we did without the wonderful support from our students and associates Rolando Jimenez, a mechanical engineer from Costa Rica and Carol Arribasplata, an industrial engineer from Peru. Rolando and Carol understood from the start the ambition level of this project, learned our approach and models quickly, and were able to overcome all of the problems and odds – and succeed to set up and conduct the interviews that we needed – without a complaint. And in parallel to this study, they have been able to use the data from this study as well as supplemented data for their Master Thesis at Chalmers University of Technology entitled "Innovations Systems in Honduras, Nicaragua and Bolivia – Exploring the Role of Financing and Intellectual Property".

And finally, none of this work would have been possible without the support from Sida/Sarec. We are very grateful for your willingness to initiate and finance this study and for all of your help to establish the initial contacts and your openness with your past projects and results, so we could build upon your experience.

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1. Background and Introduction

The concepts of innovation systems and innovation clusters have in several Western industrialized countries become important both for researchers and policy makers aiming at understanding and influencing the development of innovation and economic activities. Sweden has in a pioneering way even developed a specific governmental organization focused on supporting the development of innovation systems, VINNOVA. Worldwide there has been an increasing interest in sharing of experiences from the development of innovation clusters/systems. One experience sharing network is The Competitiveness Institute – a non for profit organization, headquartered in Barcelona, Spain. VINNOVA, supporting experience sharing activities, took an active role in organizing the 6th Global Conference of The Competitiveness Institute, on the theme "Innovative Clusters a New Challenge", in Göteborg, Sweden in September 2003.

At this 6h Global Conference, delegates from Africa participated for the first time; from Mozambique, Tanzania and Uganda. Sida/SAREC had taken the initiative to the African participation, offering support in order to identify interested and capable individuals in Africa, funding their participation in the conference and assisting in arranging a special stream within the conference. The purpose was to place the issue of innovation systems or cluster on the agenda in these three African countries. Viewing development in terms of innovation systems and clusters was something new for most of the African delegates, but among the conference participants a common understanding evolved that these concepts could be of interest and important to consider for the future. Hence, direct outcomes of this Sida/SAREC initiative was the arrangement of a regional cluster conference in Bagamoyo, Tanzania in February 2004 (Mwamila et al. 2004) and plans for continued cooperation between the three countries where the universities involved will play a major role.

Encouraged by the African experiences, Sida/SAREC decided to widen the participation with delegates from Bolivia, Honduras and Nicaragua at the 7th Global Conference of the Competitiveness Institute, entitled "Building Innovative Clusters for Competitive Advantage" in Ottawa, Canada in September 2004. Therefore, Sida/SAREC offered a corresponding support to these Latin American countries. The design and strategies for the initiative in Latin America was based both on the goals SAREC had defined, as well as on the experiences learned from

the work conducted for the African program. The present report is based on the authors' visits to Bolivia, Honduras and Nicaragua during June-August 2004 in order to develop an initial understanding of innovation processes and identifying stakeholders working with national innovation processes. It also reviews the experiences of the invited Latin American participants in the 7th Global Conference in September 2004 and finally, presents suggestions for further activities.

2. Purpose

The main purpose of the Latin American project in Bolivia, Honduras and Nicaragua was to introduce and develop *a process* that will *increase awareness*, cooperation and debate on the role and opportunity that *'innovation clusters'* may have in the development of innovations. The main purpose can be subdivided into the following subpurposes:

- To identify and analyze the current status of *local innovation* and *cluster activities*
  - To *identify key stakeholders* active in innovation and to analyze the *relationships* between the various stakeholder and cluster groups
  - To analyze the *university's role* in innovation activities
  - To *identify supports and hinders to innovation activities and the emergence of innovation clusters*
- To *increase the connectivity* between the key stakeholders active in innovation activities both locally in within the wider region.
  - To invite various stakeholders to meet and discuss the preliminary findings in a *workshop* at the end of our visit to each of the Latin American countries.
  - To invite a group of stakeholders from each country to participate in the 7th Global Innovation *Cluster Conference in Ottawa, Canada in the end of September 2004.*

3. Project Goals and Outputs according to the LA project plan

1. To identify the key stakeholders working, studying or setting policy on innovation activities in Bolivia, Honduras and Nicaragua. See Table 1, for a list of the stakeholders to be included.
    a. Interview them individually
    b. Invite them to join local workshop to meet with one another in a supportive forum
2. To develop a picture of the local innovation system or cluster activities in Bolivia, Honduras and Nicaragua – from the perception and activities of the various stakeholders in the innovation process.
    a. To document the current status and future needs
    b. To determine what supports and what hinders innovation
    c. To understand what type and quality of relationships exist and what relations are missing in the cluster
3. To develop the local universities awareness and readiness to improve their position in the innovation process in their society
    a. To educate the university leadership group on innovation systems and clusters
    b. To examine what and how the university currently supports and hinders innovation within their own organisation
    c. To explore the opportunities for improving the universities positioning in the society to support the innovation activities
    d. To develop a local university team that will act as co-researchers with Swedish team
        i. Introduce methodology
        ii. Participate actively in the process
            1. Data collection and analysis
            2. Planning for workshop and conference

4. To invite (3 to 10) key stakeholders from each country to present their work at the TCI Conference in Ottawa in October 2004
    a. To support the individuals to prepare a presentation for the conference
    b. To create a workshop and seminar process that will enhance the participants possibility of meeting with the audience
    c. To create a process that will support group reflection and analysis
    d. To document the results of the conference
5. To develop a final report on the current status and future opportunities for innovation activities and clusters
    a. Country by country
    b. From a regional perspective

4. Innovation Systems and Innovation Clusters

A characteristic of developed industrial nations is the capacity to innovate and create new products, new production processes, and new ways of organizing operations and distribution. The importance of innovation for economic development and job creation has long been recognized and in this context, the specific role of the entrepreneurs and the start-up of new companies have been emphasized (Schumpeter 1911 and 1934). The first half of the 20th century saw the gradual development of in-house research capabilities in the large corporations and the R&D laboratories of large firms assumed an important complementary role in the creation of knowledge needed for innovations (Schumpeter 1942).[1] However, firms typically develop in relationships with other firms and organizations, including universities and research centers: this has been expressed in terms of concepts such as "development blocs" (Dahmén 1950), clusters, networks or systems. Specifically, the concept of "innovation system" has been used when studying the participants and their environment, including the regulatory mechanisms (institutions such as laws and culture), involved in creating and diffusing new technology and innovations. Innovation systems have mainly been studied on a national level (Freeman 1987, Alänge & Jacobsson 1992, Lundvall 1992, Nelson 1993, Carlsson 1997, Edquist 1997, Alänge & Lundgren 2000, Lundgren & Alänge 2000), but they can also be of a more local level, as well as transcend national borders (Alänge et al. 1992, Lundgren 1996, Rickne 2000, Holmén 2001, Lindmark 2002). The industrial network approach shows considerable similarities to the innovation systems approach in its focus on the role of interaction among industrial actors in technological development (Håkansson 1987, 1995, Bångens 2001) or in a slightly different form as regional network-based industrial systems (Saxenian, 1994). A further parallel research flow has developed around the 'Triple Helix' concept, emphasizing the dynamic cooperation between industry, academy and government (Etzkowitz & Leydesdorff 1995, 2000, Casas & Luna 1997) and the increasingly entrepreneurial role of universities in technological innovation (Etzkowitz et al. 2000, Etzkowitz 2003). Yet another stream of research has focused on innovation clusters (Porter 1990) which essentially is defined in a very similar way "cluster consists

[1] Mansfield (1968) suggested that there is a considerable advantage in a diversity of firm sizes in an economy and later he also emphasized the synergetic cooperation between small start-up companies creating new technology and large firms with superior marketing and distribution capabilities.

of co-located and linked industries, government, academia, finance and institutions for collaboration" (Sölvell et al. 2003).

Technological change can be seen as a learning process which is mainly gradual and cumulative in nature. Firms build upon their existing knowledge base when they search for new opportunities, which means that innovation processes often are rooted in the present economic structure, i.e. they are path dependent (David 1988) and largely local in nature (Alänge et al. 1998). This means that there is a risk that firms and other actors in the innovation system risk to become 'locked-in' to the 'old technologies' (Cohen & Levinthal 1990). There is also a risk that the soft institutional factors, such as values and norms, may block innovation processes, both in individual firms and in networks of firms and other stakeholders. Hence, there has been a growing interest in researching the effect of values and culture on innovation and diffusion processes (Scheinberg 1989, Miconnet 2001). The importance of culture and institutions has also been emphasized by researchers within the area of innovation systems (Pérez 1990, Lundvall 1992, Lundgren & Alänge 2000)

Innovation processes consist both of the development of new products, services, processes or ways of organizing activities and their further diffusion among the stakeholders of the innovation system. However, the gradual and cumulative nature of technical and organizational change makes it misleading to make a clear-cut distinction between innovation and diffusion, instead a characteristic is that the innovation typically alters in the course of the diffusion process (Alänge et al. 1998).

While the national system is a natural unit of analysis, providing an identical context in terms of rules for economic activity, innovations are often created through interplay of participants from different nations. Hence, innovations are developed in open systems, and there is a need of considering the inputs to and outputs from the system when analyzing an innovation system, as the system borders have always been set through an arbitrary process, based on what makes sense for the aim of the analysis. Correspondingly, a regional open innovation system often has considerable contacts outside the region, but typically the focus of analysis is on the vitality of the cooperation among the participants inside the system.

Put into a regional context, there are many examples of local growth areas, often built around a specific technology area, including local knowledge production and innovation. The dynamic interplay between university research, entrepreneurship and company formation has been emphasized (Lundqvist 2001), e.g. in Silicon Valley (Rogers & Larsen 1984, Saxenian 1994) or in a new "emergent" form of cooperation in Mexico (Casas and Luna eds. 1999), or in the close cooperation between different small companies, e.g. in industrial districts in Italy (Pyke et al. 1990) or in the Swedish "Småland" small scale industry intensive area (Johannisson 1985). This kind of dynamic cooperation contributes to the creation of employment and to an increased attractiveness of the local region, both for the location of new companies and for established units to remain and expand. Among measures on local level can be mentioned: the development of excellent educational institutions and research institutions, the establishment of incubators for new company creation, the development of communications, the provision of land and facilities. Of specific importance is the creation of meeting places for communication and interchange between industry, academia and government, contributing to the establishment of a culture of innovations. It has to be emphasized that these local growth areas are never totally self-sustained – the contacts outside the local system (including less frequent "weak-

ties", Granovetter 1973) can be of immense importance for its continued development – i.e. it is an open system. Rather, the connectivity locally is the base, i.e. a good information and knowledge flow between local actors, but it is as important that some actors have connections outside the system with excellent research units, suppliers of technology, or market competence. These links outside, which typically can be international, can in a well functioning local innovation system be essential for the development of many companies and local economic activity, provided that there are local arenas or meeting places (Alänge 1987). However, developing countries do not typically show these characteristics of well integrated local innovation systems. Instead, both essential actors may be missing and in addition essential links between the existing actors could be missing, a condition where the local innovation system can be seen as an "infant local network" (Alänge 1987, pp. 238–239).

The scientific field of innovation systems has recently grown in importance but the research has primarily been focused on western industrialized countries, and only a few on developing countries (Intarakamnerd et al. 2001). The relationships between globalization and national/local systems seem to be relatively under-researched (Johnson & Segura-Bonilla 2001). Also, the role and implications of large multinational corporations' activities on regional innovation systems needs to be further explored, as these MNCs in one sense function as semi-autonomous innovations systems, only loosely connected to local innovations systems in host countries. In an even more limited sense research has considered the interplay between different innovation systems in industrializing and industrialized countries. There is however an increasing interest in applying the national system of innovation concept on developing countries and transitional economies (DCTE), and Aguirre (2003) argues that national innovation systems exist and that the approaches are useful in DCTE, but they have to be adapted to the conditions and their systemic weaknesses. Major weaknesses identified in DCTE innovation systems are the absence of a culture of innovation as well as systemic weaknesses. Aguirre argues that to build up national innovation systems, the state must define policies and strategies for Science & Technology. Lall and Pietrobelli (2003) has even taken the stance that the word 'innovation' should be replaced by 'technology' leading to a systemic concept of 'national technology systems' in developing countries, because of the importance of import, adaptation and improvement rather than the creation of new technologies. Aguirre argues instead for the introduction of the concept of 'traditional knowledge' to allow for the focus on minor and incremental innovations, which responds to the need for a mentality change in developing countries, "that perceive themselves as mere technology receptors and not as creators or even adaptors" (p.14). In this culture change there are two actors of big importance in DCTEs, the State and donors. Aguirre argues that "the state must define policies.." and that "a strong policy approach is necessary to create favorable conditions" and that "Under present global conditions, the development and use of knowledge as a key resource of the economic base cannot simply be left to the operation of market forces." (p.3). Furthermore, donor organizations have a critical role in DCTEs, influencing governments, providing resources for the build up of scientific institutions and commercialization of research results and strengthening the conceptual approaches to innovation and sustainable industrialization leading to an improved specialization of DCTEs. However, donors must also follow an agreed set of norms and practices coordinating with the direction of other donors

and local policy makers. In the past, donors having their own agenda, contributed to "an unbalanced system with many unconnected parts …. a system capable of absorbing large sums of money with little noticeable impact on the lives of poor people in these countries" (p.17).

Mytelka & Farinelli (2000) point out that innovation is not solely the preserve of science-based industrial sectors, but can also occur in traditional sectors. They claim that the traditional sectors thus remain potential platforms for catching up by developing countries, but policy makers need to adopt a broader perspective on the opportunities for learning and innovation in these sectors. Based on a two industry comparison from Italy and Denmark, they point at three cluster-related factors of importance: first the extent to which clusters enable a deepening and broadening of the local knowledge base to include design, quality control and marketing; second, the extent which clusters facilitate the establishment of linkages to a wider set of knowledge inputs including materials and machinery suppliers; third, the ability to collectively transform 'low tech' industries into tacit knowledge intensive clusters. In this context, Alänge (1987) emphasized the importance of tool-making capability or close links to tool makers for local clusters to innovate and thrive within metal component manufacturing, and not necessarily direct links to the manufacturers of machinery. Mytelka & Farinelli (2000) also indicated that there are multiple paths to develop innovation systems, which calls for a careful analysis by policy makers on which structures and policies to use in order to stimulate learning, linkages and investments. In this respect, they added that financing innovation does not always require venture capitalists or stock markets; in the case of the furniture cluster they studied, instead cluster-oriented banking was a critical component.

Recent Latin American studies of innovation processes and networks include Arocena & Sutz (2000), Casas & Luna (1999), Casas et al. (2000), Corona Treviño (2001, 2002), Santos Corral (2000), Muñoz et al. (1999, 2001) and Alänge et al. (2001). Corona Treviño (2001) has made a thorough empirical and mainly descriptive study of innovative firms in a regional perspective. The focus is on the "Polo de innovación" (innovation pole) consisting of technology based companies, incubators and science parks, universities and research centers, units for information and technology transfer, and risk capital sources. The empirical data is from the El Bajío region, consisting of parts of the Querétaro and the Guanajuato states in Mexico. Corona Treviño points out that the appearance of technology based company start ups is a recent phenomena in Mexico and that it shows a cyclic behavior (pp.99–100). Corona Treviño (2002) provides an overview of theories on technological innovation and presents one chapter on Latin American contributions. This book briefly presents the concept of innovation systems, but does not build upon recent contributions in the field (pp.281–282). Casas & Luna (1997) is an edited volume focusing on how Mexican companies evolve over time in relationships with government and academy, and several contributions are based on the Triple Helix approach. They claim that these spatial relations are new and emerging in Mexico. Casas et al. (2000) present an empirical study of the material sciences, biotechnology and telecommunications sectors and introduce the concept of "emergent knowledge spaces". They emphasize the importance of regional research institutes for the development of knowledge spaces that possibly can lead to the development of a complete Triple Helix model. Bortagaray & Tiffin (2000) in their overview of innovation clusters in Latin America made a brief presentation of the 'maquiladora' dominated border city Monterrey, which "has a great potential for creating innovation clusters" and has "one of the biggest and

best technical universities in Mexico – and Latin America – the Instituto Technologico de Monterrey" but they conclude by "only time will tell if the technological and business structures come together in a deeper partnership to form an innovation cluster" (p.26). Muñoz et al. (1999) studied how micro and small suppliers to the automotive industry evolved over time. They concluded that the small suppliers showed a clear development during the time span 1991–1999 in all technology related dimensions investigated: machinery and equipment, process technology and product technology, from a weak or medium stage into a medium-high stage. However, they pointed out that the product and process development primarily concerned improvement and not real innovations. Muñoz et al. (2001) studied the problems of establishing relationships between academia and industry in the Querétaro region. They found that larger and medium sized companies were more willing to establish relationships with academia than micro and small firms. They also made a test of actively approaching companies with a portfolio of project proposals and found that this type of active intervention was a door opener leading to the establishment of joint projects between firms and academia. Finally, Alänge et al.'s (2001, 2004) study of the innovation system of Querétaro explored the barriers and facilitators to innovation in this regional innovation system. One major problem identified was the lack of connectivity between the stakeholders. Hence, this regional innovation system on one hand manufactures quality products but on the other hand it is fragile and built on weak links and misperceptions. These weak links stands as a threat for its future ability to develop product and process innovations (Alänge et al. 2004).

While the research community of innovation systems (or techno-economic systems) primarily focused on studying existing systems after they had been developed, the policy implications influenced politicians and national and regional authorities to a considerable degree. This was reinforced by international organizations such as OECD who created seminars and programs around the concept and its use as a methodology for intervention. The same kind of influence could be seen from the more normative Triple Helix approach, always putting a focus on the role of universities. The large research program initiated by the Harvard Business School professor Michael Porter in the late 1980s resulted in a new book in 1990 and a stream of articles but also in a considerable amount of consultancy, to various countries, not the least in Latin America. Hence, Porter's innovation cluster concept (and also his value chain concept) had a strong influence on the top government level resulting in policy formulation in several Latin American countries. The early policy initiatives, e.g. starting in Finland in 1990 (Miettinen 2002), and government interventions were based on a belief of being able to influence the development of the innovation processes and system evolution (Carlsson & Jacobsson 2004). The structural build-up of organizations and intervention processes in some Western countries, such as Canada, Finland, Sweden and the U.K., is now influencing a similar development in developing countries. However, both in industrialized and in developing countries there is an increasing feeling that it is not always so easy to make governmental interventions in something as unpredictable as innovation and business processes. Hence, major efforts to evaluate on-going programs has been put in place, such as in Canada, where 28 innovation systems have been evaluated, and in Norway and Sweden, where a groups of researcher have been formed to follow the on-going innovation cluster/system programs, to be able both to evaluate and provide in-time input to the managers of the innovation system activities as well as to the funding agencies.

5. Design and Methodology

A. Research Question

As it was reviewed above, the objective of our work in Latin America was to examine four questions:

First, to explore how *entrepreneurial universities* are. In other words, to what extent universities had a leadership, culture, processes, or strategies to support innovation activities within their university.

The second key question was to examine how researchers, situated both within the universities as well as in research institutes both perceive as well as succeed to commercialize their research. In other words, to explore the extent to which *researchers are linked to industry, what are the factors that support and hinder the commercialization* process of their research.

The third key question was to examine how the *stakeholders in the local innovation system are working together or not*. In other words, to what extent do they cooperate and to what extent is there competition. And what factors are supporting or hindering their cooperation.

The fourth key question was to examine what other *factors could be supporting or hindering innovation activities and processes in these 3 countries. In other words, to what extent and how are the laws, values, customs, mentality, history, resources, relationships, competence, etc. or lack of them influencing local innovation.*

B. Overall design

Given the nature of the questions (described above) and the nature of this assignment by Sida (described in the introduction), it was important to design this research project in a way that would both respect the need to 'understand' the current situation in each country and to respect the fact that with such an inquiry a sort of 'intervention' is made. Hence, it was necessary to build a research process that would be sensitive to both how we defined the current status of innovation and research as well as sensitive to how our own positioning i.e.: our role and responsibility could effect the innovation process.

As a result a number of principles were explored and thereafter defined to serve as the basic cornerstones of our research design and methodology.

C. Conceptual model and philosophical base

7 principle cornerstones were identified as being important to shaping our research design process in Latin America. They are as follows:

a. *Phenomenological* – There are many ways to design a research project that would be empirically based. Given that our task was to describe the current status of the innovation systems from the stakeholders' perspective in Bolivia, Honduras and Nicaragua, it was important for us to design a method that would try to be true to the experience, conditions and to the explanations that we gathered from each of the stakeholders. Our aim was to be able to capture as much of the facts, experience, feelings, perception that was currently being experienced and to avoid (as much as possible) our own interpretation of their experiences. Hence, the principles we selected for our design, are based in the phenomenological approach to research.

   When working phenomenologically with data, it is not only in the data collection process that you need to be preserving or staying true to the phenomenon. It is also necessary to take care of this phenomenon in the data analysis process, as well as in the feedback process. As a result, the strategy we used to analyse the data, tried to keep the exact citations of the respondents intact, and we tried to keep the steps in the process of analysis transparent and easy to follow. In addition, one key step in the analytical process is to present back to the 'interviewees' the data that we have analyzed in order to get their feedback on whether or not we remained true to what they have said. Hence, we instituted a workshop process, in the end of each country visit, whereby all interviewees were invited to participate. In each workshop, we presented our initial analysis of the data that we collected, and asked the participants for either the confirmation of our analysis or a suggestion for how we can improve on what we wrote – in order to be more true to what they said (i.e. ensuring that we did not over emphasize or under emphasize their points). These workshops also served the purpose of adding new data to our study, partly through the interviewees and partly by additional persons attending who had not been available for separate interviews.

b. *Quality of the Relationships* – Research, is in itself an intervention. Whether we like it or not, and whether we try our best to be non-intrusive and as objective as possible, it is nearly impossible not to recognize that the research process is in itself an intervention into an ongoing process. It is hard to take the 'I' out of the science when we do research. (Brown 1996). Our research process faced the same dilemma. We as researchers struggled with the questions – How to maintain enough distance from our interviewees in order to limit the effect on their responses, while at the same time to be able to develop a relationship in the research process that can establish trust in the moment, and can be built upon for future cooperation.

   The design we created followed the principle of relationship building (Scheinberg & Frischer 2004) that tried to develop a level and quality of relationship in the research process that went beyond the specific task of data collection. We attempted not only to be clear about the goals and purpose of our work, but to determine how such an inquiry could benefit the interviewee as well. We attempted to take care of our interviewees, to ensure that they understood what we meant, and could to the best of their ability express what they wanted to say. We attempted to see if we could find a common base of interest, focus and passion during the research process. In addition, we invited all of the persons interviewed to attend a workshop at the end of the week. While one of the main purposes of this workshop was to get feedback on our data analysis, the second key purpose was to create

an opportunity for this diverse group of persons working in this field of innovation to come together and meet one another. This supports our notion that it is through relationship that knowledge can transfer.

c. *Mutuality and Co-creation process* – Being researchers and consultants from Sweden was certainly a factor to consider when designing this research approach. There are many cross cultural and psycho-sociological issues that can be noted here that can influence and confound the research and further development work process. For example, one question that had to be considered was – how does the fact that Sida/SAREC is financing this project, affect the research process? Second, what could the underlying effect be, given that the leading researchers are coming from Sweden, a country in the West, which has been offering advice and money to these countries for many years? The issue of 'being the foreign expert' while they are 'not knowing' or being the 'top dog' while they are the 'under dog' – was an important issue to consider in designing and conducting our work. As a result, we tried to integrate the notion of mutuality into our research and analysis work and to ensure that the strategies that will follow are done through a co-creative process.

The Relationship Based Model for Learning (Scheinberg & Frischer 2004, Frischer, Alänge & Scheinberg 2000) states that for learning to take place it requires both the teacher and the learner to have and take mutual responsibility for learning process. In this respect, competence development and learning needs a relationship between the parties involved, and this relationship needs to be based on a notion that both parties are responsible and willing to enhance the learning process and outcome.

The design of our research work and analysis process therefore incorporated this notion of co-learning and mutual responsibility for the process and results. In the original proposal to Sida/SAREC, it was recommended that the Swedish team include academic representatives from the local countries. This idea was based upon the wish that the research methods as well as the outcomes of this work could be transferred to our local partners. However, due to various logistical reasons, no local representative joined the data collection team. However, in order to ensure that the data itself was not 'perceived' as 'our data', it was important to have a workshop at the end of each week (per country). By sharing the data directly with all of the interviewees, strengthens the likelihood that the data is owned by the local participants and any process that continues is co-created between the Swedish and the local teams.

d. *Action Research* – The research team started this research project with a number of key research questions that were generated both by Sida/SAREC and the team. However, it was important that the research process and questions would feel relevant and meaningful for our local partners. As a result, it was necessary to have an open and flexible research design. We followed an action research process, whereby we continuously adjusted both the models we used as well as the questions we asked during our work in each country. We followed the action research notion that states that AR "is a participatory, democratic process concerned with developing practical knowing in the pursuit of worthwhile human processes, grounded in a participatory worldview that we believe is emerging at this historical moment. It seeks to bring together action and reflection, theory and practice,

in participation with others, in the pursuit of practical solutions to issues of pressing concern to people, and more generally the flourishing of individual persons and their communities" (Reason & Bradbury 2001). As a result of this perspective, it was possible for us to adjust the cluster framework that we started using to become more locally relevant.

e. Learning and learning cycles – As in most research based projects both the research work as well as the data collected can often be seen as very complex and chaotic. In our case, we were 4 researchers from Sweden, most often splitting up into 2 research teams. Each team was going to conduct at least 3 to 5 interviews per day. Each interview was expected to take between 1 to 4 hours (depending on the situation and number of persons per organisation to interview). In order manage and enjoy this sort of complexity and data load, it was necessary for the team to integrate a learning philosophy into the research and feedback design. The learning principles and process followed by each member of the research team are those defined by the Cycle of Experience (Scheinberg and Alänge, 1998). This process emphasizes the need to follow a very conscious and systematic approach – which all team members would follow. Each individual and team would apply this systematic way of working during the data collection process as well as include a deep reflection process at the end of each day. This reflection process also supported the researchers to be able to learn, share our learnings and to continuously improve the process as we went along.

f. Stakeholders perspective – Ever since Erik Dahmén coined the term 'development blocs' in 1950, researchers have gradually started to recognize the importance of groups, networks or clusters in the generation and development of innovation activities, systems and processes. As reviewed above, there are many concepts and models for analysing innovation processes. As this was a very first step in the exploration of innovation activities, players, and processes in Bolivia, Honduras and Nicaragua, it was determined to use a stakeholder model as an underlying model for observing both the players in the innovation processes and the dynamics between them. In the Table 1 below, we present the key stakeholders and institutions that we aimed to include in the research sample.

Stakeholders model

1. Universities and Research Institutes
    a. Universities
        i. State
        ii. Private
        iii. Central American
    b. Research Institutes
2. Industry
    a. Local
        i. Large
        ii. Medium
        iii. Micro and Small
    b. International
        i. Large
        ii. Medium
        iii. Small
3. Unions
4. Government
    a. Ministry of Economy
    b. Ministry of Industry and commerce
    c. Ministry of Science and technology
    d. Ministry of Education
    e. Intellectual Property
5. Politics and Community
    a. Political leaders
    b. Community leaders
6. Banks and Financial organisations
    a. Development banks
    b. Commercial banks
    c. Micro Financing
7. Linking Organisations
    a. Chamber of Commerce and Industry
    b. Associations
8. Aid and other Funding agencies
    a. Local
    b. International (Sida, Cida, USAid, UNDP)
9. Institutions
    a. Culture
        i. Media
        ii. Values studies
    b. Laws
10. Consulate or Embassy
    a. Swedish

Table 1: Model of Stakeholders Used to Identify Research Participants

g. Cluster model – In each country, the research team attempted to introduce *cluster thinking* as one method or model that is possible to use, when evaluating their local innovation systems and competitiveness strategies. A cluster model was therefore selected to support the introduction of our research work, as well as to support a visualization of the stakeholders we interviewed during our research work. It is interesting to note that the cluster model selected – based on Sölvell et al. 2003 (originally inspired by Porter 1990) – was revised during our research process. We received feedback from our local partners in

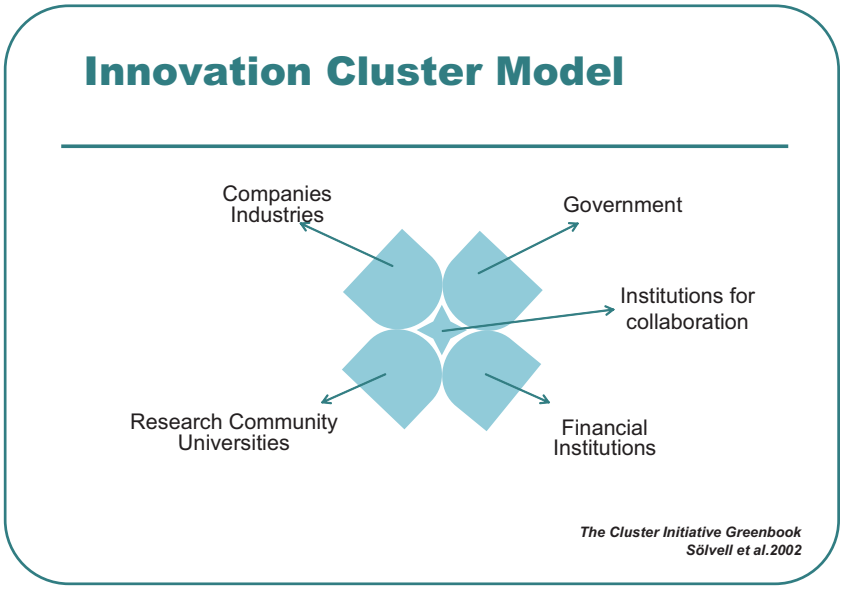

Figure 1: The original innovation cluster model

each country that the model did not properly reflect the stakeholder groups that they believed were critical to the local innovation process. As a result, the original cluster model presented in our work, presented in Figure 1 below was continuously revised.

It was important to revise the above model (even if it was used strictly for teaching purposes) in each country. Each country specified specific stakeholders that were clearly missing from the above picture. For example, the revisions included the addition of *unions* in Honduras, the inclusion of the *donor community* in Nicaragua and the addition of the *indigenous communities in Bolivia*.

D. Overview of the Design of the Research project

In order to have enough time to set up our meetings to collect the data that we planned, as well as to present the preliminary results collected at a workshop held at the end the week, the team planned to spend at least one week in each country. As a result, one week was booked for Honduras, and one week was booked for Nicaragua. Due to the fact that Bolivia had 3 key geographic locations from which the research would be conducted, 3 weeks were planned for the research work in Bolivia. Table 2 presents the trip plan:

Honduras	1 week	June 26-July 3, 2004
Nicaragua	1 week	July 3 – 10, 2004
Bolivia	3 weeks	July 10 – 31, 2004

Table 2. Country visits for data collection and workshops

a. Design per country

A common design was created for our research work in each country. The work was divided into 3 parts: the data collection, the data analysis, and the workshop. More specifically, an ideal design was developed for each country, and is presented in table 3 below:

Day	Activity
Day 1	Common meeting with key Universities in the country or region – Morning session – presentation and discussion – Afternoon session – interviews and exercises
Day 2 to 4	Interviews in 2 teams – approx. 3 to 5 interviews per day
Day 4 pm	Analysis – team analysed the data collected
Day 5	Workshop – presentation of preliminary results and feedback

Table 3: Planned design for each country

We followed the above 'ideal' design to a great extent, but unfortunately, it was not possible to follow the exact process in every country. When we arrived in Honduras, our primary contact university in Honduras (UNAH) had been on vacation for the previous two weeks. Hence, it was impossible for them to arrange this common meeting of the key universities in the region. By the end of the week a workshop was arranged at UNAH with the participation of interviewees from the two private universities visited.

Our experience in Nicaragua was exemplary. We were able to follow this design exactly. When we arrived to our primary contact university (UNA) on Monday, representatives from 11 Universities in the region participated in our opening seminar and activities. The Rector of the UNA was the Chair of this meeting. He had a good rapport with all of the participants, and was a committed and active leader throughout the entire day. After a week of interviews the concluding workshop was arranged at the Ministry of Industry, in order to hold this final workshop in a more neutral and central location (than the University).

In Bolivia, we had defined university partners in each of the three regions of the country.

In La Paz, the Associate Rector of UMSA greeted us on Monday morning, and had invited approximately 20 researchers and teachers from within UMSA. After we presented our ideas in the opening seminar, a number of the local researchers presented their current work.

In Cochabamba, we were able to follow an improved version of the ideal design. The UPB arranged a meeting with over 50 persons representing all of the key stakeholders working with innovation in the region. And the visit to this region ended with a visit to UMSS, where they arranged a tour and a meeting with a number of the leading researchers at the university. The week that followed, these first days, was full of interviews.

In Santa Cruz, a meeting was arranged at UPSA with the vice rector and key professors followed by a tour of the university facilities. The concluding workshop in Bolivia, was set up at the National Academy of Science in La Paz at the end of the 3rd week. The interviewees from each of the 3 regions were all invited.

b. Sample

Three steps were taken in order to identify the persons to interview:

Sample criteria

In order to answer the research questions posed above, the team identified a set of criteria that would help select those persons who were most able to address these issues.

The criteria presented in Table 4 below, were used for selecting those persons to be invited to participate in this research project.

Criteria Category	Criteria Description for each country
1. Stakeholder group	Persons interviewed need to represent a distribution of persons from the various stakeholder groups (see table 1 for the stakeholder model)
2. Region	To have a representation of respondents across the various key regions in each country
3. Gender	To have an equal distribution of representation of respondents of both genders
4. Sector	To have a representation of interviewees from various sectors of economy, and a core representation from the agriculture and agribusiness sector
5. Various levels of power	To have a representation of persons interviewed who represent various levels in the power system

Table 4: Criteria for selecting the sample

Sample selection process

The process to select the sample followed a similar process in each country. This process was broken down into 9 steps. They are as follows:

Step 1 The stakeholder model was reviewed in order to review the categories defined

Step 2 Sida presented a list of those persons and contacts they had in each country

Step 3 An internet search was conducted for each country – trying to identify names and organisations within each stakeholder group

Step 4 Sida and the research team wrote and sent a letter to the key contact persons in each country requesting their support in helping us identify key persons

Step 5 Research team prioritized list of persons and companies found – and asked our local contact for their recommendations

Step 6 Research team contacted the possible organisations or persons by either email or by telephone to present the project and to set up appointments

Step 7 A representative of the Swedish team travelled to Honduras and Nicaragua a week in advance, to confirm meetings and to find and set up additional meetings

Step 8 A representative of the Swedish team, continued to call and identify persons for Bolivia, during the 2 weeks prior to our arrival there.

Step 9 The selection process continued even during our visit to each country. Additional names were sought and found during our visit, in order to complete the representation of the stakeholder groups needed.

Final sample of Stakeholder groups participating in the interviews – By Country

The persons included in the final group of persons interviewed and/ met with during our visit are presented in the Tables 5–8 below, that are organized by country:

Honduras

Category	Univ. or research institutes	Govt	Comp	Financial	Linking org.	Unions	Total
Number of organisations	3	4	2	2	3	1	**15**
No. persons interviewed						7	**26**

Table 5: Number of organisations and individuals interviewed in Honduras

A total of 15 organisations were selected and included in the interviews in Honduras. All stakeholder groups were included. It is interesting to note that the cluster model (Sölvell et al. 2003) used as a organizing method to present our interviews did not correspond with the stakeholder groups we interviewed. One of the stakeholder groups we considered to be important and thus included in our stakeholder criteria, were unions. Unions have a strong and powerful role in industry and in shaping the attitudes and direction of business practices in Latin America and unions also play a central role at the public university. However, it is clear from the model as presented below in figure 2, that a petal representing unions is missing from this cluster construct. (Appendix 1, which specifies the names of the organisations more clearly)

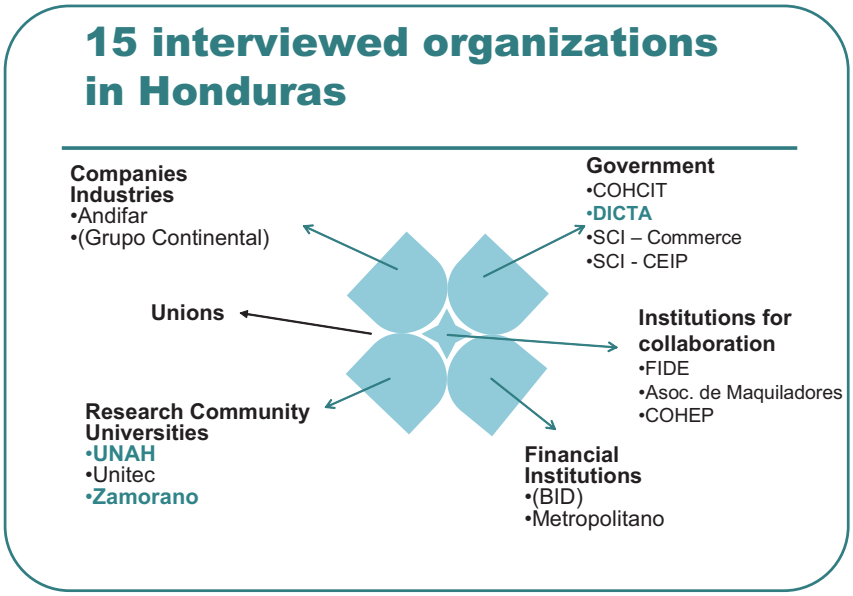

Figure 2: Interviewed organizations in Honduras according to cluster model

Category	Universities or research institutes	Government	Companies	Financial	Linking org.	**Total**
Number of organisa-tions	11	9	3	3	3	**29**
Number of persons interviewed						**35**
Number of participants in university workshop						**20**

Table 6: Number of organisations and individuals interviewed in Nicaragua

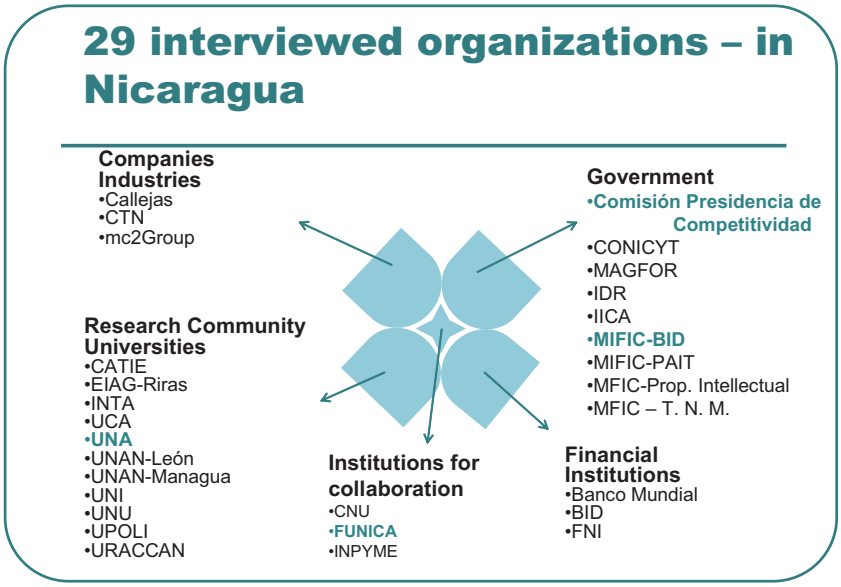

Figure 3: Interviewed organizations in Nicaragua according to cluster model

Nicaragua is strongly dependent on the international donor community which does not necessarily have the same goals between themselves or with the Nicaraguan government. Hence, we put a specific focus on the donor community, which could be seen as an extension of the financial institutions (see Figure 3 above). See Appendix 1 for a list, which specifies the names of the organisations more clearly.

Bolivia

Category	Universities or research institutes	Government	Companies	Financial	Linking org.	**Total**
Number of organisations in Bolivia	7	9	5	3	7	30
Number of persons interviewed						72

Table 7: Number of organisations and individuals interviewed in Bolivia

A total of 30 organisations were selected and participated in the interviews in Bolivia (see table 7). All stakeholder groups were represented. It is interesting to note that as in Honduras, the cluster model (Sölvell et al. 2003) used as a organizing method to present our interviews did not correspond with the stakeholder groups we interviewed. One of the stakeholder groups we considered to be important and thus included in our stakeholder criteria, were indigenous communities. Indigenous communities have a strong and powerful role in Bolivian society and in shaping the attitudes and direction of university research focus and business practices in Bolivia. However, it is clear from the model as presented below in figure 4, that a petal representing this stakeholder group is missing from this cluster construct.

Figure 4: Interviewed organizations in Bolivia according to cluster model

For a list detailing the names of the organizations interviewed, see Appendix 1.

Furthermore, the distribution of interviewees across the three visited regions, was as follows (see Table 8).

Category	University or research institute	Government	Companies	Financial	Linking org.	Total
Number of organisations – La Paz	2	7	3	1	3	**16**
Number of organisations Cochabamba	4	2	1	-	1	**8**
Number of organisations Santa Cruz	1	-	-	2	2	**5**
No. of persons at university meeting in Cochabamba						**35**

Table 8: Organisation Respondents according to Region in Bolivia:

C. Methodology

Data collection

Three different methods were used to collect the data needed to answer the research questions posed above.

The main method used was the interview. A semi-structured interview was selected, because it allowed us to prepare the concrete questions that we needed to have answered, as well as allowed us the flexibility to follow the interviewee into areas that we had not considered, but that were relevant for the interviewee.

Existing materials were also collected from each interviewee, in order to supplement each interview with good examples and relevant information.

In addition, data collected from ongoing systematic observation was also used.

The Interview guide

The questions used in the interview were developed based upon 3 processes. First, we examined the questionnaire guide that we developed to assess innovation processes and stakeholder relations in Querétaro, Mexico in 2003. Then, we reviewed our current research questions, and developed a series of sub-questions to each key question.

In addition, we selected the key theories we intended to check and study, which also helped us identify questions.

Based upon the input from the above 3 sources, a draft of the questionnaire was developed and distributed to the team. The team gave feedback and improvement ideas. A final model for a questionnaire guide was created in English. This interview model was then adapted for each of the stakeholder groups. Five interview guides were developed: one for universities and research institutes, one for industry, one for government agencies, one for linking organisations, and one for financial institutions. And as the last step, each of the guides were translated into Spanish.

The final interview guide was organized into 2 main sections. The structure of the interview guide that we used for Universities and Research institutes will be presented below as an example to illustrate the sections included:

a. Current working situation

i. Main idea or purpose for their business
ii. Description of innovations made (product, process, organisation) and processes that exist to support it
iii. Current role and relation to industry
iv. Current role and relation to other universities and research institutes
v. Current role and relation to government organisations
vi. Reflection on what factors influence the need for local innovation – positive and negative factors
vii. Perception of cooperating with other Central American countries

b. Future cooperation supports or barriers

i. Plans, goals and priorities for the next 5 years in your university
ii. Plans and goals for cooperating with industry
iii. Plans and goals for cooperating with other universities and research institutes
iv. Plans and goals for cooperating with government agencies
v. Perception of what barriers or hinders can slow down or stop the cooperation needed
vi. Perception of what supports are needed to strengthen the coop eration between the stakeholders
vii. What recommendation and suggestions do you have for the various stakeholder groups

Each interview was estimated to take approximately 1 ½ to 2 hours. As mentioned above, this questionnaire guided the interview process, and allowed each researcher to add additional questions during their interview.

Experience however, showed that the interviews conducted would take between one hour and 5 hours. In the case of the short interviews, the interviewees were not able to 'give us more time'. And in the case of the long interviews, the key interviewee brought in a number of other persons to be interviewed as well. This latter case occurred in approximately 30 % of the interviews we conducted. However, on average, each interview lasted approximately 2 hours.

Materials collected

During the interviews, the researchers asked for concrete examples and evidence of what the interviewee was describing. As a result, a lot of additional material was collected during the interviews. Examples of such supplementary material includes: Documents describing the prioritized value chains, list of the indices used to assess competitiveness of various sectors, Science and Technology Policy and other policy documents, etc.

Please see Appendix 2 for a list of all the materials received.

Observation and Reflection

As was mentioned above in the principles influencing the research design, one major factor that influenced our research was our commitment to a phenomenological approach. The data set that can be collected can therefore range from the spoken and written data that are made obvious during the interview. However, other data can also be included, for example, feelings stated and felt during the interview, the experience and quality of the contact during the interview, the reflection made and insights collected during and after the interviews were conducted, etc.

Due to the importance the research team gave to this type of 'intuitive data' – the team therefore instituted a systematic way to observe and reflect during and after the interview sessions. And thereafter document this information as well.

Analysis strategy – by country

On Thursday late afternoon or evening, the teams would reunite and begin the process of data analysis. Due to the constraint of time (and energy – the teams were often tired from a very intensive week), a very clear process was established for analysing the data collected. This process is outlined in Table 9 below:

Step 1	each research team sat on their own to read through the data they collected and to collect any intuitive observations
Step 2	each stakeholder group was evaluated for specific characteristics, links with other stakeholders, quality and dynamics of the relationships between the stakeholders
Step 3	themes, patterns and issues were identified for each stakeholder group – within each research team
Step 4	the research teams shared their analysis for each stakeholder group and developed a joint finding
Step 5	the total research team identified trends, issues and questions that need to be considered that went between and beyond stakeholder groups
Step 6	and finally, the researchers tried to formulate their conclusions and responses for research questions were posed

Table 9: Strategy for Data Analysis

Workshops

A workshop was arranged as a gathering point for all persons who were interviewed and who participated in this stage of the research project. In addition, while not all interviewees could attend, each concluding workshop was also visited by a number of additional persons who were introduced to us as they had shown an interest to work on the issue. The workshop followed a full or half day presentation and discussion program, and was held on the Friday following the data collection week(s).

There were five main purposes of the workshop, which were:

1. to present the initial findings, trends, ideas from our interviews
2. to get feedback from the invited persons, in order to improve the reliability and credibility of the findings we identified and to ensure that the ownership of the findings are not the Swedish researchers – but rather the ownership can be shared by the interviewee and the interviewer alike.
3. to create the opportunity and process whereby both the local partners, researchers and persons involved in innovation activities are co-creating the vision, focus and meaning of the process of exploring innovation along with the Swedish team.
4. to create an opportunity for the network of gathered stakeholders to have a chance to meet one another and to get an insight into what type of competence, experience and motivation there exists in their country to work with this issue.
5. to identify a few key persons who demonstrated their competence, commitment and interest to work further with this issue and therefore be a good candidate to be invited to Canada for The Competitiveness Conference in September 2004.

The workshop day was divided into 3 main sections. The first section of the workshop was dedicated to reviewing the findings from the research and getting feedback directly from the audience, after each key finding was presented. The second section of the workshop was dedicated to having a break, whereby all of the participants could meet with one another and exchange experiences. The third section of the workshop was dedicated to discussing the next steps and future activities. During this section, the Swedish team presented a number of questions for the participants to consider in small groups:

a. What is my organisation's role and my own role in the innovation system we belong to?
b. Where are the gaps?
c. Where are the opportunities?
d. Is there a need for new linking mechanisms?

i. Arenas – meeting places, physical and virtual?
ii. Are there parallel systems without connection?
iii. Who plays the role of broker?
iv. Is there a need of upgrading – connecting existing brokers or in establishing new brokers?

A final workshop was conducted in each of the 3 countries. The experience and results differed country by country.

In *Honduras*, the final workshop was held at UNAH, and had 11 persons attending, 5 persons from three universities, the university chancellor, one government official and a journalist. We had anticipated a larger crowd, however there were 2 factors that could have influenced the size. First, there was a national strike on this Friday, which was considered to be violent and worrisome, since it was in the streets and stopped traffic all day. And second, the number of persons interviewed in Honduras was not that large, which of course in turn, limited the number of invited guests. The dialogue and interaction during this workshop was open and useful. The research team received a number of good tips and feedback

to improve the findings. However, the synergy in the group was not so strong, and no apparent network appeared to form.

In *Nicaragua*, the final workshop was held in the Ministry of Industry (MIFIC), and had nearly 40 persons participating. The participants represented all the various stakeholder groups. The original plan was to hold the workshop in UNA, however, it was moved to the Ministry based upon the consideration that: 1) a number of interviewees had attitudes about the university as a meeting place, and we thought that the ministry would be a more neutral place, and 2) UNA was not geographically central, while the Ministry was.

The turnout was fantastic. More people attended than we expected. Persons we interviewed invited their colleagues as well to join us for the workshop. There was a lot response and dialogue and many good interventions and points were made to improve the research findings. In contrast to the low synergy in Honduras, the Nicaragua final workshop was extremely dynamic. There was a feeling in the room that gave the impression that all that were there were completely committed improving the competitiveness and innovativeness of Nicaragua and that they had both the position power as well as the competence and motivation to do something about it. All objectives were met in the Nicaraguan workshop. In addition to getting great feedback on our research and ideas, the participants accepted a motion (from one of the participants) to establish themselves as a support network for the Presidential Committee on Competitiveness and cluster practices and started by developing a list of future activities and concern on improving innovation processes. Three journalists were present at the Nicaragua workshop and conducted interviews.

In *Bolivia*, the final workshop was held in the Academy of Sciences in central La Paz, and had over 60 persons attending. Here too, all stakeholders were represented. And while the original plan was to hold the final workshop in the public university UMSA (our local partner) we moved it – with great foresight – to the Academy of Sciences. As in Nicaragua, the university in Bolivia is also a very political organisation, evoking a wide range of feelings. We believed that the Academy would serve as a more neutral setting. (Our move was fortunate, as on the Friday of our workshop, the university was engaged in a large and messy strike, which would have completely disrupted our possibility of having our workshop.) However, the day was not without faults. An airport strike was also planned for this Friday, and we worried whether our colleagues from Cochabamba or Santa Cruz would be able to make it to the conference. 'Where there is a will there is a way' – certainly characterized the large turnout. It was clear, that those interviewees who believed it was critical to attend, took night buses, or flew in a day early, in order to attend.

As in Nicaragua, the dynamics and exchange in the final workshop in Bolivia was fantastic. We truly had an extremely competent and motivated group of experts, all of whom were happy and open to meet and share their experiences and opinions with one another. It was the first time that such a gathering of these persons took place. So all participants were appreciating the opportunity to meet with one another during workshop. One other exciting thing took place in this workshop. It was used by one of the participants to officially present the 'hot off the press' Science and Technology Policy and Plan for Bolivia'. This policy particularly focused on the role and issues of science and technology for innovation and development. So, it was very exciting to have our forum used as a platform for this type of sharing and cooperation. The press was invited and also had a chance to interview a number of the participants on our work.

6. Findings

The findings presented and summarized in this report are taken from those findings that were analysed and presented in the final workshops in each country. First, the findings from Honduras are presented, then from Nicaragua and finally findings from Bolivia.

Honduras – Main findings

In Honduras, the research teams had an opportunity to interview 26 persons, working in 12 organisations representing 6 stakeholder groups. While the research questions and direction did not prioritize any particular industry or sector to focus on from the start, the majority of the interviews conducted in Honduras were in the Agro-business cluster or area.

The findings from these interviews will be presented in 3 sections: In the first section, we will present an overview of how the agro-business cluster looks today. In the next section we will present a number of the key variables that are supporting and hindering innovation and cooperation in Honduras. In the final section of this report we will present the suggestions and ideas on how to continue.

An Example of an Agro- Industrial Cluster

In order to understand the current state of innovation and cooperation, we tried to illustrate how one cluster could look from one university's perspective, see figure 5.

The picture (figure 5) provides a broad outline of the linkages existing between the Zamorano University and other organizations both in Honduras and outside of Honduras. There are links both to growers and producers of agricultural product, to the Science & Technology organization DICTA and the investment strategy and linkage organization FIDE, but there are also international contacts both to funding organizations and universities. In addition, the Zamorano students come from all over Latin America and the university has an excellent alumni network covering several Latin American countries. What is also visible in this picture are the links that are non-existing or weak. The linkages to the financing organizations for company start-ups are less developed, and the same 'non-link' situation exists in relation to related industries, such as food processing, forestry and pharmaceuticals. The non-existing links doesn't necessarily mean that links must be developed, but the picture can help analyzing the present situation and different opportunities in terms of future strategies.

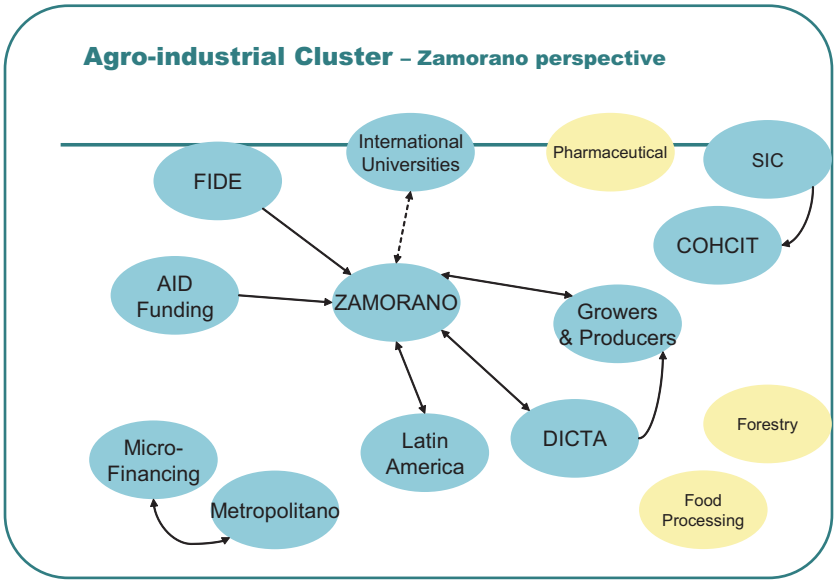

Figure 5: A sketch of an agro-industrial cluster from a university perspective

In summary, this university-centered cluster diagram reveals an example of how connected or not the university is currently in Honduras. As seen in the diagram above, this university has established cooperation activities with a number of stakeholders, i.e.: with the markets (both suppliers and producers (growers) (due to their training and education programs), with policy makers (by virtue of its political status and budget) and funding sources from an international donor organisation (for its research activities). But, the university has not yet established ties with local industry or private funding organisations.

Supports and Hinders for Innovation in Honduras

There were many factors that were identified that pose both hinders and opportunities for innovation in Honduras. The following is a review of 12 issues that emerged as key hinders to overcome or opportunities to pursue for the further development of research, innovation and entrepreneurship in Honduras:

1. *Good examples exist but are invisible* – During our interviews we were surprised, and found many good examples of research and of innovative activities. However, we also found and wondered why such good examples were virtually invisible. We found that in nearly all of the cases, research results and experiences were not shared with others and they were not documented in a way that made the work visible to others. In fact, research activities were so invisible, that industry and other stakeholders did not even consider looking for possible information. *The question is, what can be done to start the process of making visible that which is invisible.*
2. *Parallel Efforts* – We know from experiences from other developed and not as developed countries, that a certain degree of competition and parallel efforts can be essential to stimulate innovation. Also in Honduras, we found several examples of parallel activities, e.g. newly started entrepreneurship education at different universities – which has the potential of stimulating the development of innovative practices within the educational sector, especially so if the experiences in some way could be shared across the universities. There were also

other efforts that were duplicating themselves. For example, we found two universities that were engaged in creating virtual libraries. Of course it was necessary and useful for them to create such libraries for their own internal student body. However, it was strange to find out that they were also both involved in two parallel efforts of creating two virtual libraries for the government. When we asked them, they told us that there was absolutely no cooperation between them on these new technologies. *The question therefore is, with the lack of resources in Honduras, what is the benefit of independent efforts. Is there a thought about healthy competition to drive development and innovation or is it merely a matter of laziness or lack of cooperation insights that prevent the various organisations from seeking cooperation?*

3. *Research and Science not on the agenda* – in all of the interviews that we conducted we did not find one organisation that had prioritized research in either their current activities or in their strategies for the future. Even in the universities, where research was being conducted, there were no strategies or even a plan for how to develop their current research. And there was no indication or evidence of any resources being allocated for creating research as a platform for their future work. *The question remains – why is science and technology not on the agenda in the government or research community.*
4. *Focus on Infrastructure* – it was also interesting to observe how there was a predominant focus on the creation of the infrastructure needed for communication but no visible focus on the content of the communication. Both the universities and COHCIT (the Science and technology center) were proud to tell about projects they were working on and the huge budgets they had. But they offered no perspective on the content or practical use of what they are constructing. *The question is, how is it possible to link the innovations going on within the infrastructure to the innovation that could be made in the software, content and process side.*
5. *External orientation* – A pattern that emerged in nearly every stakeholder group was the perspective that those things coming from outside of Honduras had more value and prestige than those products, ideas and organisations coming from within Honduras. This attitude shaped every stakeholders' world that we met. For example, a pharmaceutical company understood that medicine that looked like it came from the West (i.e. with English writing, nice packaging, etc.) was much more likely to sell in Honduras, than products that would appear to be more local. They said: the consumers have more trust and confidence in products that are imported. As a result, they invested a lot of money to improve their packaging and appear as if they are imported.

   We also found this attitude in banks and government agencies. These stakeholders indicated that it was best for investment to come from outside Honduras. Neither of these types of organisations had confidence themselves to invest in their own country. And they indicated that they had little confidence in their customers, and had interest rates that were extremely high (over 30%).

   In addition, this attitude was found in universities, whereby, they only would look for knowledge and research information from foreign sources, never from the other local universities or research institutes. The question is, besides making the invisible more visible, what else can help support a shift in mentality of believing in and trusting the local resources and competences.

6. *'No tax' incentives* – One feature that dominated the Honduran economy was the 'no tax' incentive policies. Of course tax incentives are a common strategy for enticing investment into a country. And Honduras is no exception in using this incentive, particularly in inviting textile and garment companies. One measure of the effects on investments is that 250 companies are members of the Association of companies in the tax free zone of San Pedro da Sula, out of which 186 are producing firms. However, it was also apparent that this policy favours foreign investment but discourages and hinders local investment. In fact, we learned from our interviews that the local companies and entrepreneurs suffered from this imbalanced distribution of benefits (to foreigners and franchisers) and that they were in fact discriminated against. One example that was given was how a foreign pharmaceutical company was wooed to move its operations to Honduras, being offered free buildings and facilities and additional tax incentives. While the local pharmaceutical companies received no benefits, no support and faced a very hostile financial market. A second example comes from the machiladora world. We learned from our meetings in San Pedro da Sula, that the tax incentive offered an opportunity for companies to invest in Honduran labor intensive production. Typically, the companies that take this opportunity are not investing for a long term, they do not invest in any training and development of their staff, they do not invest in any infrastructure or community development work in their neighbourhoods, and they do not feel committed to Honduras. And, if the costs are lower in China, they will pick up and move (e.g. the impending change in the quota rules for export to the USA in January 2005 will certainly have an effect). However, we also heard of one example where the companies in the Free Trade Zone through the Association of Firms had contributed to the establishment of a training unit specialized in textile production in San Pedro da Sula. *So when a government decides to forfeit taxes from large companies by inviting them to locate into free trade zones – then these companies are not required to be considerate of or to make a contribution to the local society. The question is, how is it possible to create a forum to reflect on the full picture of the current tax policy, with an emphasis on the exploration of what incentives are needed for entrepreneurs and local innovation investment.*
7. *The Human Factor and Mentality* – A number of interesting findings emerged regarding those factors that support and hinder the innovation process that have to do with human factors and the mentality of the local stakeholders. With each meeting, we asked each interviewee what they believed was one of the key factors hindering innovation and competitiveness, and they uniformly answered – the local mentality. So what is the local mentality they are referring to? Included here are: a resistance to new ideas, a focus on short term versus long term thinking, a lack of a systematic approach to introducing new technology, risk aversion, and very limited confidence in Honduran products or competence. Many of the respondents talked about a type of jealousy that exists between Hondurans, "people are just not that happy if someone else does well". As a result, most people are not oriented to help each other out. Cooperation is not in the Honduran fabric of relationship now. Although we heard a continuous wish to do something for the country, there was a lack of initiative and ideas that used cooperation as means. *The question is, what can be done to initiate cooperation as a means of development. How can the cluster model be useful in this respect?*

8. *Perceptions of UNAH are controversial* – As presented in the methodology section above, one of the key issues we were examining was the quality and dynamics of the relationships between the key stakeholders. This included everything, from assessing the current relationship, if there was one, as well as to analyse the perception of a stakeholder if there was no relationship. One of the stakeholders commented upon by nearly all interviewees in this study was UNAH, the largest public university in Honduras. These comments were typically very strong, but we should also bear in mind another finding from our interviews. We found that there seems to be limited knowledge about what is really being done at UNAH, both by persons external and internal to UNAH. Although it was pointed out that for example, the engineering and medical school are of high quality, most of the other comments were unfortunately not as positive. For example, all of the stakeholders perceived UNAH to be extremely political. They pointed out that the politics infects all aspects of UNAH's activities. For example, without exception, all stakeholders believed that it was not possible to trust the quality of the students graduating from UNAH. The politics, they said, affect the grading system, as the students are often voting for the teachers, which thereby infect the teacher's ability to grade the students. As a result, it was never clear which students were in fact the most competent or clever. In addition, the quality of the teachers and the leadership (i.e. deans) was questioned and hard to trust, given that it is not always the best teachers or the best deans that remain, but only those voted in by the students. It was also noted that the politics also affects the quality of the scientific work. Another point brought up by everyone was the problem of the strikes within the university. These strikes were used continuously and with out a doubt made the environment for working less efficient and effective. *The question is, what can UNAH do to try to create activities that make what is being done visible and are not dependent on political actions.*
9. *Perceptions of the private organisations* – There was an overriding perception in among the Honduran stakeholders that private organisations are more trustworthy and independent than public organisations. Two interesting examples emerged from this discussion. First, it was stated by the majority of those interviewed that private universities are better than public universities. Given the example presented above regarding the politics in UNAH, this comment comes as no surprise. The other interesting example comes from the view of the government. There is a perception that the government is very bureaucratic, people working there are not educated, and they have no understanding of the private sector. In fact, there is a common view that there is no industrial policy for Honduras and that it is good for the country. Instead, COHEP and Fide, both private organisations were highly respected and trusted. What is interesting to note here, is that Fide, the privately run investment organisation, is largely financed by the World Bank and BID, and that their focus as been to create policy and strategy for developing the investment opportunities into Honduras. Their policies have been or are becoming the base of Honduran industrial policy and it is not clear or transparent who or what is really driving such policies. *So, the question is, what benefit or harm is there in pretending there is no industrial policy, and what is there to lose in exposing the strategies and whose interests they are serving in making the current soft policies more 'official'?*

10. *Power positions* – While COHEP in general is not well organised and is not efficient, one of the associations within COHEP – ANDI – has a lot of power and prestige. ANDI is the Association of largest industries in Honduras. Amongst other things, they are responsible for defining the policies for the free trade zones. *What is needed to support the improvement of these large official organisations?*
11. *Lack of quality and standards* – As was reviewed above, one feature of the Honduran innovation system is that it is very external oriented. One factor driving this outward orientation is the fact that Honduras lacks a sense and demand for quality and standards. There is a perception of a lack of quality in the local competence and labor force, which resulted in a practice of importing so many professionals from other countries. There was also a lack of quality packaging materials (which also must be imported from neighbouring countries in Central America). And there was a lack of standards and quality infrastructure which impacted on the ongoing problem of poor and unsafe quality and poor or no procedures for regulation. *The question is, how can bring in quality thinking and practices into the projects that we will do.*
12. *Emerging innovation cluster perspective* – We found however, that there was an awareness among our interviewees of cluster thinking. We also found a few examples of cluster activity, including the cluster emerging among the Maquiladores (apparel and textile sector) in San Pedro de Sula. There was also mention of cluster thinking in Fide. *So the question is, what can be learned from the cluster activities started in the past.*
13. *Central American perspective* – Another question posed to all interviewees was regarding their perspective on whether having a Central American orientation was an opportunity or not. In the majority of respondents we found that they thought that CAFTA was very important for them in their ability to compete with North America and Europe, and that through collaboration, it was possible for local regions to specialize. *So the question is, what forum can be created or joined to support the continued development and exploration of this perspective.*

Nicaragua – Main findings

In Nicaragua, the research teams had an opportunity to interview 35 persons, working in 23 organisations and to obtain additional data from 20 workshop participants from 10 different universities in Nicaragua. While the research questions and direction did not prioritise any particular industry or sector to focus on from the start, a large percent of the interviews conducted in Nicaragua were also in the Agro-industry and agro-business cluster or area.

The findings from these interviews will be presented in 3 sections: In the first section, we will present an overview of how the agro-business cluster looks today in Nicaragua. In the next section we will present a number of the key variables that are supporting and hindering innovation and cooperation in Nicaragua from the various stakeholder perspectives. In the final section we will present the suggestions and ideas on how to continue.

An example of an Agro-industry cluster

The agro-industrial cluster in Nicaragua was drawn from the perspective of the public agricultural university UNA, see figure 6.

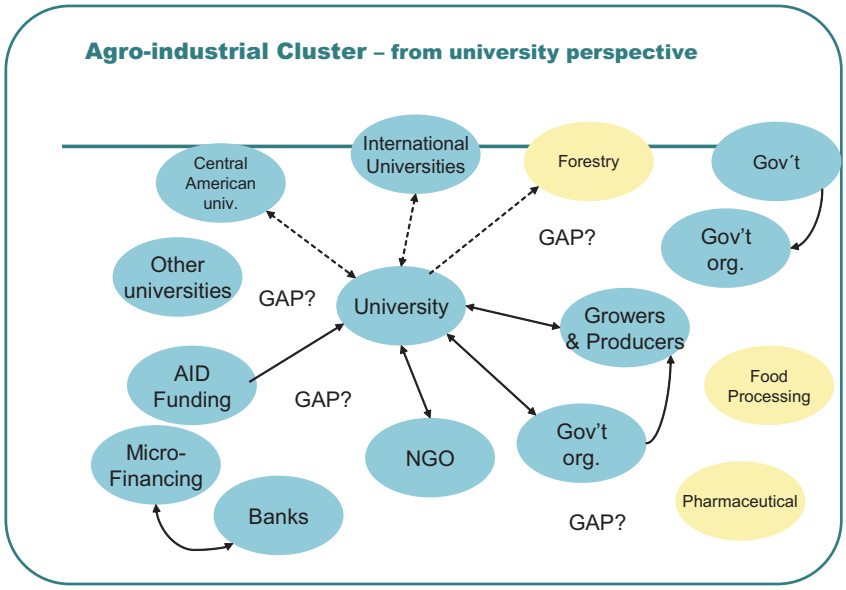

Figure 6: A sketch of an agro-industrial cluster from a university perspective

This picture illustrates that UNA has relationships to a number of stakeholders or organisations in its cluster or sector. It has established cooperation with growers and producers by providing various services, to government organizations by virtue of the fact that it is a public university, to NGOs offering expertise on joint projects, and with aid donor organizations, as they are the source of funding for their research activities. In addition, there are some links both to other Central American and to international universities. Weak links have also been established to the forestry sector through UNA's participation in networking activities. However, if we focus on the 'perceived' gaps, we see that links are missing to the financial sector, including micro-financing. We also see gaps to related industries, such as food processing and pharmaceuticals, as well as to other governmental organizations, which are not directly focused on agriculture, but on activities promoting entrepreneurship and business development. Once again, the identification of gaps does not automatically prescribe that relationships have to be established; rather it means that the possible closing of these gaps could be taken into strategic consideration.

Supports and Hinders for Innovation and Research

In the following section, we will present a number of the key factors that were found that support or hinder innovation and development as perceived by the various stakeholders, interviewed.

Private Sector Focus and Perspective

1. *Local innovation is weak* – We found several good examples of innovation in the organisations we interviewed. And we also found that there was an Innovation Award that was being promoted by the government.

   However, the majority of the respondents had the belief that entrepreneurial spirit is not common, neither internally in large or small companies nor leading to the formation of new companies. They said that even if there is innovation the technology is lagging far behind, and that there are no relationships with universities. When examin-

ing the budgets in the organisations interviewed, we found that there were virtually no R&D budgets. Another characteristic of the organisations today is that they are too supply oriented. Most organisations lack market research, information and know-how. As a result, there is a tendency to produce many of the same products, due to the lack of information on both the local and international markets. As was found in Honduras, the quality of the supplies and inputs in Nicaragua is poor. There are few raw materials and of those, there is very little variation. And there are no local packaging producers that offer quality or modern design.

2. *SME's are weak* – There are many problems plaguing small and medium industry in Nicaragua, however, one issue that is very disturbing is the fact that many of the entrepreneurs and employed in this sector are malnourished and not feeling well. Many of the farmers and suppliers to the agro-industry live under very tough conditions, which contribute to their bad health. In addition to health issues, the SME are to large extent very small companies and have no economy of scale to operate in. They are not operating their businesses in a strategic way, are unaware of their costs, and the quality of their products is not stable and consistent. The majority of businesses in the agro-sector are micro or small sized, and there is no culture for cooperation. We heard from many of the interviewees that this lack of cooperation stems from the 1980's, during the Sandinista period. We were told that in the 1980's, ironically, "cooperatives meant control and not cooperation". Hence, there is an underlying mentality or attitude in Nicaragua that it is better to do it yourself, and avoid cooperation.
3. *External Orientation* – As was seen in Honduras, there was a lack of confidence in the local Nicaraguan knowledge. We found that Nicaraguan industry searches for knowledge and information external to Nicaragua. One example is the position of intellectual property. The market for creating local trademarks and patents has not yet been developed, as most trademarks and patents in Nicaragua are still imported.

University and Research Institute Focus and Perspective

1. *Not market oriented* – Although the demand is not that great, we did find a number of cases where industry has asked for services from the universities. Most of the services requested were to create customized courses for their employees, to conduct lab tests, to do projects, etc. However, to the companies' dismay as well as our own, the universities did not or were not able to respond. As a result, very few services have been or are currently being delivered by universities to industry. In addition, many of the industries informed us that they would be more inclined to look to cooperate with the university however, they had no idea, for example, what type of laboratory facilities universities had to offer, (i.e. no lists of laboratories have been either developed or distributed to SME's) or what research focus or competence the universities have been developing (e.g. they had never seen any list of research projects or specific researchers).
2. *Student competence does not match market needs* – All stakeholders had strong opinions and most often strong criticism of the university education system – regardless of which interest group they represented. For example, the majority claimed that: most of the courses are not up to date, important courses are missing from the curriculum (i.e.

ISO, best practices, etc.) most of the courses are too theoretical and lack any practical components, and there is a lack of classes and support for entrepreneurship and starting your own company. As a result, the job market for the students is quite tough and critical to their abilities and training when they graduate.

3. *Research tradition is non-existent* – At the time we conducted this research, we found that research activity and research itself are not on the agenda in Nicaragua and as a result, are not very developed. On a basic level, students are not taught research in school. As a result, students do not have any competence or experience in doing studies or any type of research during their education. In addition, teachers only prioritise teaching in their work in the universities, and are not taking any time to conduct their own research. This is due to a number of factors. First, the university has had no custom and gives no incentive to teachers to take time for their own research. For example, they are not allowed to allocate part of their working time to research activities. Instead, teachers are supported only to focus only on their teaching.

   Second, there are no systems or research centers that provide funds and grants to support research activities. And even for those projects that are available, very few teachers submit proposals for them. And even if the teachers get money for their projects, they only get money for their costs, i.e. equipment, materials, etc. and do not get any money for their time. This creates a negative vicious cycle, since without outside money for their time, it is impossible for the teachers to take time from their teaching assignment. And if they do not take extra time from their teaching work, there is no possibility to conduct research.

   Third, there are very few PhD graduates in Nicaragua. As a result, there is no understanding of what their value is for society – both in the university world and in industry. The market does not know what to do with or how to take advantage of their specialized competence yet. And there is confusion on how to compensate them for their work.

   Fourth, for the research that does exist, it is not systematically documented, it is not systematically presented in public forums within the university, it is not systematically integrated into the teaching curriculum, nor is it systematically diffused through publication, or conference presentations.

   Fifth, for those lucky PhD graduates who do get employment in the university, they are most often given administrative assignments as a sign of respect, which of course takes them away from their core competence and research field.

   And finally, many of the key perceptions of the university and research world indicated that many of the above issues are based in a mentality that is not about cooperation and development but about secrecy and mistrust. The key perceptions we collected about this mentality included: that people working there are highly political – politics drive everything, there is a lot of jealousy among colleagues, researchers are not sharing their ideas and work, and that there are no clear processes and decision made – there is no transparency on what is going on.

4. *The University is driven by Politics* – As in Honduras, the public universities in Nicaragua are also driven by politics and not by quality.

Teachers, deans and other university personnel retain their positions based upon popularity, which has been found is not determined by their competence. And student grades are inflated. Ambition and high standards hold second place.

Bank and Financial Sector Focus and Perspective

Two key issues emerged in the financial sector that is contributing to the current hinders to innovation in the economy and society:

1. *Financing for SME is complicated* – Nearly everyone interviewed had the opinion that it is too expensive to take a loan from a bank in Nicaragua. The interest rate for a loan for a SME today, is approximately 18% and for micro businesses, the financing of loans is generally over 30%. In addition, banks are demanding collateral that is nearly impossible for SME owners to deliver. Banks have also found (according to the bankers interviewed) that the administrative costs for working with SME to be too high for them. And finally, banks had very bad experiences in the 1980's, when the culture in Nicaragua was not to pay back loans. As a result, based upon these experiences and attitudes developed over the years, banks have not and are still not positioning themselves as the financial sources for SME and micro companies in Nicaragua today. So, where then is the source of the money for the entrepreneurial activities? We were told that there was a total of 70 million US dollars available for SME development, however, where this money is, and who is really getting this money is something to be evaluated in the future.
2. *Financing innovation is very limited* – Financing is also difficult to find for other types of business development activities. We learned that 'it is easier to get a loan for a car than to get a loan for innovation'. It was difficult to classify or define a project as an innovation, and even if you could, there was no money around for the investment. Companies themselves did not set money aside for innovative activities. They claimed that it was partially due to the weak legal system.

   We did however find a number of strong sources of financing for innovation projects driven by: BID-BAIT, FUNICA, IDR and INPYME.

Government Focus and Perspective

1. *The Presidential Commission on Productivity* – In Nicaragua a unit was created, reporting directly to the President, which focuses on national productivity and emphasizes clusters as a means for innovation and productivity development. A number of policies are being formulated in policy documents, however, much remains to be done in order to bring this policy into practice.
2. *National Development Plan* – The interviewees expressed a very strong need for the development of a common national vision for innovation. In the present national plan science and technology is not even mentioned and an innovation policy is lacking. But there is some reference to innovation clusters in the National Development Plan (as mentioned above).
3. *CONICYT* – Nearly all of the interviewees expressed high expectations for this organisation, however, they were all disappointed. CONICYT was perceived as a nearly invisible organization, although it has been established with the purpose of creating links between industry and universities. They claimed that CONICYT lacked a vision, has few ideas and directions and has not implemented many

practical activities to support this development. The key contribution of CONICYT in the recent year has been to arrange science fairs for high schools in Managua.

4. *Shift of Perspective in Agribusiness* – Our research found a number of very good examples of innovation in the agribusiness sector. The Ministry of Agriculture, MAGFOR, has developed policies and strategies for shifting from the supply to the demand perspective and approach. For example, there are programs developed now to develop a better understanding the needs of the market, and to help the producers learn about and try to meet these needs. However, we also found that this shift in policy is not deployed so widely, e.g.: very few people know about it yet. In addition, there is a conflict inside the government agency, between the older supply side advocates and the new movement to shift to demand orientation. Whereby the supply-siders, want to continue to support the small producers, regardless of the market need and conditions. However, we found that Nicaragua has been traditionally open to the world market and has trade agreements with CAFTA and has developed a number of patents and brands.
5. *Funding of innovative SME projects* – We found some interesting examples of how the Nicaraguan government, funds innovative projects in small firms. One example is the program currently led by MIFIC where they have organized grants and loans for innovation. While MIFIC's primary intention was not to support cluster activities, a number of the firms being supported are located in common sector groupings.
6. *Free Trade Zones* – Nicaragua has a number of Free Trade Zones, which have been operating with some success. We found however, that the majority of the firms operating inside these zones have very little to no business connections to the local business community. For example, very few of the foreign companies are using the local suppliers of either products or services for their business operation inside the Free Trade Zone. And within a couple of months (in 2005), the quotas will be eliminated, whereby making it possible for China to start competing. It was apparent from our interviews that no one was prepared for this change of quotas. However, we did find that the unions were currently satisfied with the current agreements and conditions for workers inside the Free trade zones.

Linking Organisation Focus and Perspective

1. *Some Good examples* – A number of organisations stood out in Nicaragua as functioning linking organisations which pursue and experiment with activities that resemble cluster work. FUNICA is one such organisation that was developed and operates as an agriculture business cluster developer. Their mission is to learn and define the market demand, to help link the producers around this demand and to subsequently link the suppliers, universities and research institutes to this process of development. We learned that the FUNICA organisation was founded and is represented by all the various stakeholder groups within the agribusiness sector or cluster. It is interesting to note that FUNICA had never heard of or was aware of cluster thinking as a conceptual or methodological framework. We learned from them as well as from the other interviewees, that there are a growing number of supplier organisations offering extension services and technical support. Due to this growth, there are efforts underway to try to

organize and certify these services and competence, in order to define and ensure the quality standards of the services being delivered.

2. *Catch 22* – Even with the little progress being made in creating some cooperation, we found that there were a number of issues that confound the progress. For example, currently, there is a press to develop cooperatives and associations to work in this area as NGOs in Nicaragua. However, by definition, the majority of the cooperatives and associations are not-for-profit organisations. As a result, it is difficult for these organisations to survive and to accumulate enough money to be available for investment, innovation and entrepreneurial activities as well as for their own development. This has created a real 'Catch 22' situation. In addition, while many of these linking organisations are positioning themselves as a deliverer of much needed services, there are still certain skills missing in this market niche. We learned from responses as well as from our own experience that many in this group lack the skills in asking questions and in how to listen and analyse what the various stakeholders are saying, including to understand the limitations of a 'demand orientation', i.e. that the customers do not always know best what they need.

Innovation and Cluster Focus and Perspective

1. Definition of innovation cluster is still so new – we learned both from our interviews as well from our opening and closing workshops that working according a cluster perspective was either an unknown or a very new concept. We found little evidence of developed networks and relationships across the stakeholder groups. However, we did find some very good examples of clusters activity, even if they were not called 'clusters'.
2. Innovation cluster Policy – The Central government in Nicaragua has in the past few years, been pursuing a cluster- based policy. As a result, they have now accumulated some insight and experience from this interest. We also found a few examples of cooperation between government, industry, research and financial organisations. The clusters found to be emerging include: the coffee cluster and the wood product cluster.
3. The Coffee cluster – the following is a summary of some of the characteristics of this cluster:
    a. Proble m defined jointly by producers and the university – 'to develop an organic coffee'.
    b. 10,000 dollars a year has been invested
        i. 75% by FUNICA
        ii. 25% by university and producers
    c. It took 8 months to go from problem definition to market
    d. There were 5 local and 1 international research institutions involved
4. The Wood Product and furniture cluster – the following is a summary of some of the characteristics of this cluster:
    a. Two leading actors have organized small workshops which includes the development of:

i. the design,
ii. the market – local and export
iii. the quality and supervision of the quality
iv. relationships that are clear, defined and transparent

b. There are currently 2 leading actors involved in this process – (healthy competition – cf. Porter 1990). For example, one of the leading actors is now differentiating towards using certified wood for the furniture (from replanted forests).

5. *Mixed results* – Cluster based approaches may seem simple and natural but experience shows that it is not be as easy to implement in practice. Even in the very early stages of development, cluster activity in Nicaragua has shown mixed results. We found that there are big 'gaps' in the cluster groups, i.e. missing key organisations or competences. We also found that there is confusion on how to design a cluster – from a regional versus a sector frame of reference. In addition we observed that whatever results have been achieved, there is virtually no diffusion of the experiences of the approaches and hence limited learning. And finally, we found that while some universities and research institutes were linked into this work few of the universities involved were public universities.
6. *Emerging innovation clusters* – based upon our research, it was clear that in the future it is possible to continue the development of cluster thinking and approaches in Nicaragua, working through the following organisations:
   a. National Development Plan
   b. Comisión Presidencial de Competitividad
   c. FUNICA
   d. MAGFOR
   e. IDR
   f. Donors involved – ASDI, World Bank, BID

Bolivia – Main Findings

In Bolivia, the research teams had an opportunity to travel to 3 different regions, La Paz, Cochabamba and Santa Cruz, in order to get an overview of the research, innovation and cluster activity today. The research team interviewed 30 organisations in total, over 70 interviewees, and attended a meeting at one university where over 35 persons attended, representing the main stakeholder groups. While the research questions and direction did not prioritize any particular industry or sector to focus on from the start, a large percent of the interviews conducted in Bolivia were related to the Agriculture/agro-industry area.

The findings from these interviews will be presented in 3 sections: In the first section, we will present an overview of how an example of an agro-business cluster looks today in Bolivia. In the next section we will present a number of the key variables that are supporting and hindering innovation and cooperation in Bolivia from the various stakeholder perspectives. In the final section of this report, we will present the suggestions and ideas on how to continue in the future.

An example of an Agro-industry cluster

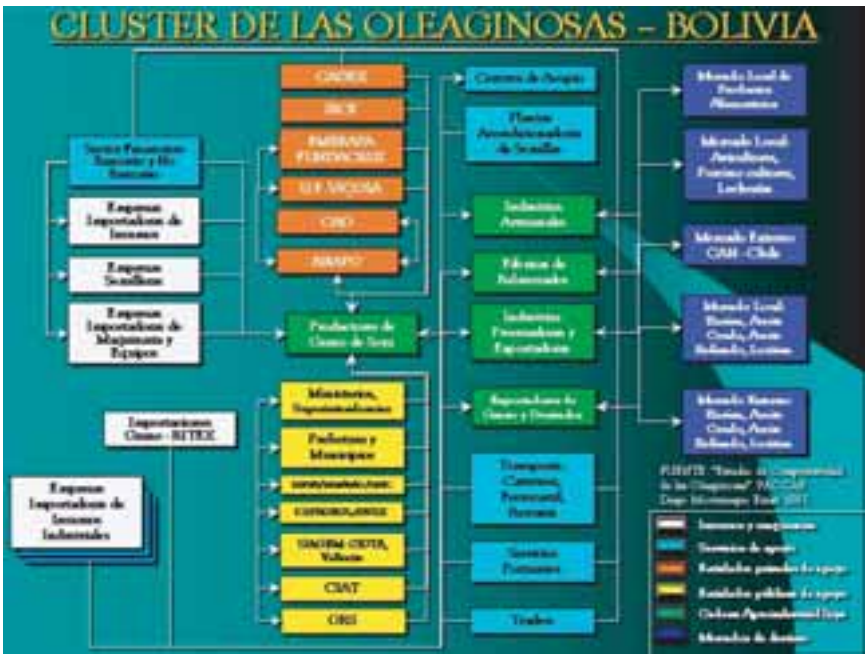

Figure 7: The cluster of oleaginosas in Bolivia *Source: ANAPO (2004)*

The above cluster of soya bean growers (oleaginosas) is an example of a cluster project driven by the association of soya bean growers (ANAPO) in order to create linkages inside this growing agricultural field in Bolivia. As there are around 80.000 growers of soya beans, it makes it hard to reach every individual grower and involve them in cluster activities. Hence, the enormity of this sector has to be taken into account when intervening and working on developing the cluster.

Those involved in developing this cluster pointed to the importance of top leadership commitment in this cluster's development process. (e.g. the initiative was taken by the leader of the Association). They also pointed out that most of the problems that occurred in their work were not of a pure technical or economical nature, but were mostly human resource related. For example, it took a lot of effort to convince individuals who had never cooperated for a common purpose before, to feel the need and motivation to share a common purpose and to start to cooperate.

Supports and Hinders for Innovation and Research

Industry – Private Sector Focus and Perspective

1. *Local innovation is emergent* – Recently Bolivia created a National Innovation Award, which shows that the issue of innovation is getting more attention. And although there was not so much evidence of local innovation in large companies, we did find a number of good examples of local activities and processes that were innovative in other fields or contexts. For example, we identified one excellent innovative program investing in eco-tourism that was initiated by an indigenous community "San Jose de Uchupia" in the Amazon. And we also found a few interesting examples of product, process and organisation innovations in smaller and medium size companies. In the SME organisations we also found good examples of producers having developed deeper relationships with suppliers. For example, inviting the suppliers to help design a new product, inviting students into the organisation to help survey the employee values and needs.

2. *Too many obstacles in large organisations* – Evidence from our interviews found that there was a lack of entrepreneurial spirit in most companies across Bolivia. There was no 'culture' for innovation, no budgets set aside for innovative activities, nor any investment planned for R&D (Research and Development). This lack of culture was able to freeze into place by virtue of the fact, that so little new inspiration and ideas were able to flow into the large organisations in Bolivia. One example of this was their lack of any form of relationship with the Universities or research institutes.
3. *Problems for the SME as well* – While the SME complained that they have access to only old and imported technology, it is not clear for us, whether that is a good or bad situation. It is more what you do with the technology and whether you can find a market for what you do, that would seem to matter most. The SME organisations as well as the perception of the other stakeholders interviewed, perceived that there was a lack of competence in small and medium companies. They specified the lack of: technical knowledge, the lack of understanding of markets and the lack of understanding of competitive strategies and pricing. It is strongly possible that these competence shortages are a strong contributor to the limited growth and development of most SME.
4. *The informal sector* – The informal sector and the activities in micro-businesses both drive a large part of the economy and are responsible for a considerable share of the existing job opportunities in Bolivia. Most of these companies have their strategy for 'surviving' and as a result are not often directed towards creating new innovations for a market. Some of these companies cluster around similar kind of production, e.g. a specific type of textile product. Innovation in such a group of companies is not a continuous process, but if one of the cluster members comes across a new pattern (maybe seeing a new textile product while visiting a trade fair or when travelling to another city) and starts making a new design, which can diffuse rapidly among the other small micro-businesses. Although there are a certain amount of credits available through the micro-financing providers, this funding is not generally oriented towards the financing of new products and services which require investment in development (or research), but rather in existing production processes – see further the section on financing.
5. *Negative effects of black economy* – Unfortunately, Bolivia is plagued by a very large black economy. According to our interviewees, the black economy has both resulted in formal local companies closing and in several international companies deciding to leave Bolivia, as the competition and unlawful factors were impossible to contend with. According to one interviewee, 'many of the entrepreneurs working in the informal sector, are making a lot of money, but they do not have a consumer orientation. This means, that they are a section of the society that is grossing a large income, but are not supporting the economy by buying things'.
6. *Domestic market limited* – Linked to the issue reviewed just above, we have learned that Bolivia has approximately 8 million inhabitants, but only 500,000 consumers. As a result, it is very difficult for any company to survive or continue growing by staying domestically oriented. Another complication found was that in very many cases, the market mechanisms did not work. For example, the producers could not define their problems and the suppliers could not respond.

7. *Tax system hampers local industry* – There are many rules and regulations regarding taxes in Bolivia. Currently there is a rule that says, if you earn over 4.000 US dollars a month, you need to pay a certain (i.e. high) level of taxes. So, most companies do not report their true sales figures, in order to avoid paying the higher tax fee.

University and Research Institute Focus and Perspective

1. *University research* – As was also found in Honduras and Nicaragua, there was a lack of interest and motivation in Bolivian universities to conduct research. However, we did find excellent examples of research being conducted at certain universities in Bolivia. The key to success in research at a public university was, according to some interviewees, that the researchers isolated themselves from the rest of the university. As a result, a number of research islands exist within the public universities, which remain virtually unknown and unseen – on purpose. We were told that this is the only way to survive doing research. International donors finance most of the research being conducted, which is also kept quiet or secret. Therefore, no research is systematically presented or diffused, within the university or to the outside society. It makes you wonder what the demands the international donors have on the research-funded recipients. This becomes even more complicated when we examined the missing links between the research being conducted and its commercialization process. We found very weak connections between laboratory research and commercial application. However, in contrast to Honduras and Nicaragua, there was more money available for applied research in Bolivia. But we did find that most universities lacked systems, motivation and methods (and a culture) for applying for such funds, e.g. they lacked the know-how and know–who to develop proposals.
2. *Vicious Cycle in Research* – As mentioned above, one of the key problems plaguing research today is the lack of visibility, which creates a vicious cycle. Because most people keep their research hidden, they are not documenting their research for local diffusion. Because no one is documenting the research, the universities themselves have no clue as to what kind of research exists in their university. As a result of this void, and lack of concrete lists and publications, no one in industry is aware of the knowledge and methods that are being developed inside the university. And due to this unawareness, industry does not even ask for or assume that there could be something of value in the university. And based upon this 'misinformation or misperception', the industry has developed attitudes and a prejudice against the university. This vicious cycle or negative spiral has been around for quite some time, and has unfortunately, etched its way into the Bolivian stakeholders' collective mind.
3. *Lack of communication on current R&D* – We found two other factors that compound the issue of communication in universities even further. There is a current movement in many of the universities to create IT systems, to be able to make the information more available in intranet, etc. This of course is a good development. However, what we found was, that the universities were not offering – through low tech or high tech methods the content that they have. A second issue found regarding communication, was the lack of common meeting places for teachers, researchers and students. However, it needs to be noted that we found some evidence of an emerging openness to start in-

forming about on-going research. For example, a seminar series and a public competition for research ideas were just recently implemented in one university and a publication presenting existing research was issued in another public university.

4. *The entrepreneurial University is largely non-existent* – One of the areas that our research team explored in great depth was how entrepreneurial the universities were in Bolivia. We aimed to examine what products and services the university was offering, who besides students were perceived as customers, the relationship the university had with industry, how research was managed, as well as to what extent the university offered support for business start ups. Unfortunately, none of the Public Universities and only a handful of private universities operated in an entrepreneurial way. At the present time, students were being educated to become employees and not business developers. Courses in entrepreneurship were scarce, and if found, they were just starting up. There were no incentives given to researchers or to industry to support the commercialization of the research being conducted. There were few examples of developed and active relationships between the university and industry. Lastly, we did not find any evidence of any university having their own or being linked to an external incubator.
5. *Students' competence does not match market need* –Nearly all stakeholders had the same opinion regarding the quality of the graduating students. There is a common perception that the courses being offered in the universities are out of date, certain courses are missing, e.g. ISO9000, most courses are only theoretical (offering no practical work), and most universities do not offer entrepreneurship training or start-up incubators.
6. *Public versus Private Universities* – We found large differences between the public and private universities in Bolivia. It was evident from all of the interviews conducted, that the private universities were much more entrepreneurial. They were very market oriented, having closer relationships to local industry, offering a variety of product and services to them and having an ongoing placement for students during their training. Common services being offered at this time were customized courses for local industry, arranging student projects and offering their laboratories for conducting tests. One interesting example was found at UPSA, the private university in Santa Cruz. This university was founded by the business community which influences the way they define their markets and networks. They also work closely with the local communities as well as with the local SME organisations. At UPSA, the entrepreneurs have participated in developing the curricula, by scrutinizing an initial proposal and providing suggestions for improvement, which lead to modifications.

   The Public universities on the other hand, were not well organized to respond to requests from the market and did not have any strategy for developing this business direction. And unfortunately, the perception of the public universities by all stakeholder groups was very poor. The following is a list of the issues named by our interviewees that characterised the public university today: politicised, always on strike, competition, unfair distribution of government means, politics and not driven for academic excellence.
7. *Lack of a Research Culture* – Research can be seen as a long-term investment, in the sense that it has a purpose to develop new knowledge

and new researchers needed for knowledge development. Neither the private nor the public universities had a 'culture' or practice that supported research. The universities only hire – teachers – and not researchers and if they make an exception to hire a researcher the conditions for hiring are completely different, than for teachers. For example, when a teacher is hired, they are hired for long periods of time, however researchers are hired from a year to year basis – which then prohibits long term planning, and the contract is destined to a political process (i.e.: as it must be renewed every year). In addition, we did not find even one example where a researcher could have a career inside a university. The selection of the researcher is very political, as no departments plan for researchers in their strategic plans. And there are no incentives for conducting research. We even heard that the researchers feel 'guilty' when they need to ask to take time off from teaching or to ask for research money. Lastly, we learned that many researchers are limited themselves in their thinking – as they design studies with short-term perspectives and they feel incapable to write proposals for public tenders.

We did however find one good example of how research was being supported in UMSS in Cochabamba. During the last year, UMSS initiated a program (with the support of Sida) to introduce a competition among the students for research projects. The first year was a success, as nearly double the number of applications than grants available were received.

8. *Research Institutes in their own class* – We also found excellent examples of Research labs across Bolivia. Although we are not experts to be able to discriminate good from great, we were very impressed with the standards presented in the Gene banks being managed to oversee Andean diversity, as well as the way they were able to commercialize the results of their research, even if it was for a limited production series. Examples of such research institutes were found in: PROINPA, Simon I Patino and UMSS (2 independent research institutes and one public university in Cochabamba, respectively) as well as in UMSA (the public university in La Paz).

Bank and Financial Sector Focus and Perspective

1. *Local innovation in Bolivia* – Bolivia is a leading innovator in micro financing, and Bolivian micro-financing organizations/banks are recognized internationally for their innovativeness. We also found that these banks have developed a practice of evaluating and improving their products and services continuously, e.g. new and innovative ways to evaluate customers for credits and new ways of interacting with the customers. This includes, in the case of Banco Sol's, development of a new software program that supports credit-analysis used in handheld computers.
2. *Micro-financing requires continuous education* – Prodem, which is the pioneering micro-financing organisation, has a presence throughout Bolivia – from the largest cities to the smallest villages and towns. Due to the lack of knowledge regarding loans, how to manage the pay back process, and the lack of accounting knowledge and experience, Prodem spends a lot of its resources in training local people in good business practices. They recognize as well, that the vast majority of the micro and very small companies are not formal businesses. As a result they are re-evaluating how to find a way to support this

informal sector and how to help them in a transition to a more formal business practice.

3. *Financing for SME is complicated* – Although Bolivia has a well built-up system for micro-financing, it is still complicated to find financing for SME, as was the case also in Honduras and Nicaragua. Traditional banks typically do not work with SMEs, as they cannot fulfil traditional bank demands on security, e.g. the collateral being demanded. And if the banks offer any type of loan, the interest rates are extremely high, close to 30% (which is the maximum interest allowed by the State). The traditional banks also stated that over 90% of SME are not formal companies, and thus do not qualify for their banking services.
4. *Financing for innovation is limited* – We learned from the various stakeholders that rules and regulations for the Banking sector are not stable, as they are changed with every change of government. As a result, long term financing is impossible to get from the Banking sector, which of course is a problem when a firm has an ambition to develop new products or new markets. However, in the past few years a very innovative form of financing was created by SIBTA, in the Ministry of Agriculture – called PITAs and PIENs. This financing was used primarily for financing innovation projects within the agribusiness sector (see next section).

Government Focus and Perspective

1. *Science and Technology suffer from lack of Government Policy* – We found that there is a lack of relationship between science and technology activities in universities, research institutes, enterprises and government agencies. At the time of our visit, no government agency, university or research institute had defined a policy for science and technology. There was little evidence of any activities regarding scientific development or research, in any of the enterprises we visited. We did however find exciting islands of research taking place in the universities and research institutes. When we asked each of the stakeholders about the science and technology policy for Bolivia, all responded that it was much needed – but did not exist yet. They did add that many of the studies that are conducted to serve as a base for an S&T plan, have been superficial and not useful. Coincidently, on the final day of our work in Bolivia, we were presented with the long awaited Science and Technology Program that was produced by the Ministry of Education.
2. *National Science and Technology Plan* – As stated above, a National Science and Technology Plan was finally published and presented at our final workshop in La Paz, on 30 July 2004. Now that the plan had been developed, a challenge for authors will be to disseminate this plan and to inform all of the stakeholder groups affected by this plan. In addition, it will be a challenge for the office behind this plan (in the Ministry of Education) to get the feedback and an active dialogue going around this plan. If they can succeed, it will increase their chances of ensuring that it will be a living document.

   The plan itself includes a definition of an innovation system and presents an analysis of the strengths and weaknesses of the Bolivian national innovation systems. Also included in this plan are the three different areas prioritised for support: sector programs, horizontal programs and mobilizing programs. In total the support for the programs is US dollar 30 million during a 5 year period.

There are six sector programs for agriculture, medicine and health, renewable resources & biodiversity, science & technology for industrial production, minerals & energy, and transport & communication.

The horizontal programs concern the

a. development of basic science, economics and social science,
b. development of researchers through education and mobility, and finally
c. popularisation of science & technology.

Finally, the mobilizing programs concern the need of developing a national system of innovation, the need of mobilizing technical innovation at firm level, and the development of an information society and its technologies.

3. *Intellectual Property* is a weak link in the innovation process – The Law on Intellectual Property was developed in 1988. Unfortunately this law has been very weak in both its diffusion (for application) as well as in its protection processes. Based upon our investigation, we found a number of issues that impede the further development of intellectual property in Bolivia:
   a. It is interesting to note that stealing or copying 'protected property' is not a penal crime in Bolivia, and no charges are brought before a court of law if this law is violated. From what we were able to observe, no procedures exist in the government that give direction and rules on how to follow up on such violations of protection.
   b. The Agency for Intellectual Property has also had a tough history regarding where in the government it 'fits in'. Over the years, this Agency has had too many homes, and most often been located within 2 government ministries. Currently, it has 2 homes, as the authority over it is split between the Ministry of Economic Development and the Ministry of Industry. And making this matter even more complicated, the protection of software is still based under the authority of the Ministry of Culture.
   c. Another key issue hindering the development of the intellectual property process is the fact that there is a limited competence resource base in the local market available to work with this issue. For example, there are only 20 lawyers in Bolivia trained to work with Intellectual Property. And there are only 6 persons that have achieved a Masters Degree in this area. So of course, with such a limitation in the number of competent professionals in this area, it is hard to develop any concerted effort to change the current status.
   d. Given these poor conditions, it was not surprising to have learned that of the applications for IP, 90% of the patents, trademarks and copyright protection is from abroad, while only 10% of IP applications are from local business or scientific persons in Bolivia.
4. *Recent Institutional improvements* – Our findings have also uncovered a number of positive changes that are on the way in Bolivia that support the further development of the condition for IP. For example:
   a. A few Ministries and government agencies have recently signed a number of agreements to initiate increased cooperation. The agencies include: the chamber of commerce, the Ministry of industry, agency for intellectual property and universities. The goal envisioned with their relationship to the university, was for example, to access their technical competence and expertise in patent development processes.

b. The agency is also evaluating their processes for the patent application. It now takes over 2 years to get a patent and they have prioritised to investigate if it is possible to eliminate some of the bureaucracy along the way, and therefore shorten the application time.

c. The Agency has also developed a relationship with the Patent office in Lima Peru. An exchange of experience and procedures is planned.

d. The Agency is also attempting to pull all of the property protection processes under their agency – which in the future can support industrial property and copyright issues with administrative and legal actions under one authority.

5. *Innovative approaches* – We also found some interesting innovative activities in the government agencies. For example:

   a. *A new Agro-Industrial financial system* – was initiated by the Ministry of Agriculture. This new system includes the introduction of competitive bidding led by SIBTA (since 2002). While the concepts and processes are well developed and in place, this system has not yet been that successful in practice.

      i. This bidding process requires a level of sophistication that many of the producers are not capable of fulfilling. Many of the producers are not used to defining their needs so explicitly and systematically.

      ii. The bidding process also requires at least 3 bids for each project. And on many occasions, there have not been enough bidders to make the competition valid. It has also been found that universities and other research institutes that have the competence to apply as a supplier, do not have the processes and capabilities yet to apply for public tenders.

      iii. There is a lack of systematic communication between the SIBTA organisation and the stakeholders. We found that it was necessary to improve the communication with the universities in order to explore various methods for cooperation.

   b. *Productivity and competitiveness* – 14 or 15 value chains were identified in Bolivia (the number varied a little depending on which government agency that was visited).

      1. cereal (primarily quinoi)
      2. wood and handicraft
      3. leather and handicraft
      4. banana
      5. textiles
      6. hearts of palm (palmito)
      7. tourism
      8. grapes and wine
      9. chicken and corn
      10. wheat (trigo)
      11. castania nuts
      12. camels (llama)
      13. cow – meat, milk
      14. soya

Table 10: List of Value Chains in Bolivia that have been prioritised by the Productivity and Competitiveness Unit of Ministry of Economic D

Each chain was very well defined, evaluated and a strategy of development was formulated. For many of the chains, concrete steps were also created to improve their competitiveness. When asked about the development of the work around the chains, the Office of Competitiveness indicated that they are working together with the universities, enterprises and the communities. No one in the group we interviewed talked about 'clusters' directly, but they appeared to be interested and open to be working in a collaborative way in the future.

Linking Organisation Focus and Perspective

1. *Many organisations act as linking organisations* – It appears from our findings that many organisations want to behave and act as a linking organisation. Evidence stems from the number of government agencies that prefer to work as a link between the market and the suppliers. This work is prioritised over setting policy, laws and organizing other important procedures that are sorely missing in the business, science and research infrastructure.
2. *Linking organisations are often multi-functioned* – It is interesting to note that one of the key characteristics of linking organisations we interviewed in Bolivia is that they are very self sufficient and multi-functional. Not only do they have the business idea of supporting the producers to produce according to market needs and demands. Not only do they have the idea of supporting the suppliers to develop their competence in order to offer more qualified services and support. Not only do they have a fund or group of funds that they can disperse to their stakeholder groups as needed (i.e. micro financing). Not only have they created processes and procedures that support the evaluation of needs and processes of the market and to link them to suppliers. Not only do they work with the individual persons and firms, but have created data bases as well. Hence, linking organisations have roles and responsibilities that range from being bankers, advisors, policy makers and consultants. Interesting examples of such organisations include, for example, SIBTA (La Paz), UPC (Cochabamba), ANAPO (Santa Cruz) and CIDRE (Cochabamba).
3. *Linking organizations have been supporting cluster development* – There are a number of interesting examples of clusters being developed through the assistance of linking organizations. A pioneering cluster development has been facilitated by ANAPO to create cooperative links across growers of 'oleaginosas'. Experiences from this development was that it can be very difficult to change the mentality and start working together, i.e. hinders can be of a very practical nature, and needed actions could be to make persons meet and start cooperating instead of only competing.

7. A Summary of Findings and Key Conclusions

The main purpose of the study was to identify and analyze the current status of *local innovation* and *cluster activities. This included the goals to identify key stakeholders* active in innovation and to analyze the *relationships* between the various stakeholder and cluster groups. More specifically we were also interested in analyzing the *university's role* in innovation activities. Finally, our aim was to *identify supports and hinders* to innovation activities and the emergence of innovation clusters

Using our interview data from Bolivia, Honduras and Nicaragua for the analysis, it was found that there were many similarities across the three countries. The first section which follows will present these common issues found in all the countries. In the second section, we will present a summary of the key issues identified for each stakeholder group.

1. To identify key stakeholders and the relationships and issues around them

a. General issues:
   i. The cluster model (based on Sölvell et al. 2003) that we used was a good starting point – but not sufficient. We needed to adjust and adapt it during our research process and had to add 4 key stakeholders which were missing
      1. Unions
      2. Aid community
      3. Development banks
      4. Indigenous community
   ii. Sharing and competition
      1. there are good examples – but they are not known, not shared and not looked for
      2. there are many parallel efforts – competition is both good and bad
      3. there is no diffusion of competence, learning and know-how
   iii. Research and science is not on the agenda – and not connected to industry
   iv. Lack of a research culture

1. no market for PhD
2. no incentives to teachers to do research – time or money
3. lack of funding

v. Confusion regarding definition of innovation

vi. Mentality or culture – inhibits innovation and entrepreneurship
1. risk avoidance
2. low esteem in locally grown

vii. Limited resources for innovation

viii. Intellectual property rights (IPR) are poorly developed and mainly used in a defensive way. There is a need of developing IPR competencies with links to business development.

b. Universities and Research Institutes

i. Public universities
1. have most of the state research money as well as money from donors
2. have very limited contact with industry and nearly no services provided
   a. no relationship with industry in research projects
   b. no products or services being offered to market
3. market does not trust the students –
   a. grades are often politically driven (not competence)
   b. courses are too theoretical and not practical
4. found some great examples of research being conducted – fi nancing for research and advanced degrees provided by international donor organisations
5. however, the researchers act as islands – not telling anyone about their research activities
6. so research is note visible at all –
   a. no lists
   b. no documentation
   c. few presentation
7. lacks a research culture
   a. teachers have no time for research
   b. promotion and prestige does not value research
   c. when PhD return to home country – the market does not know what to do with them – instead of utilizing their competencies for research/research education, they are frequently put in administrative positions
8. research that exists – is not linked to the market – no com mercialization of research

ii. Private universities
1. a recent phenomenon – during the last 10 years
   a. focused on education
   b. very ambitious and competing hard against the public universities
2. excellent contacts with industry
   a. many of the private universities were started by the chamber of commerce or other industrial groups

3. no research tradition yet
    a. few exceptions
        i. e.g. Zamorano – conducting applied research

iii. Research Institutes

1. excellent example of a well functioning and market driven research institutes in Cochabamba, Bolivia

c. Industry

i. in general not making innovation and do not budget for innovation and R & D activities
    1. found good examples of innovative activities in all three coun tries – primarily in organisation innovation and product innovation.

ii. do not train people to develop their competence – more copy cats

d. Government

i. Policies

1. Policies for Innovation, Industry, Science and technology – either non existent or weak or hiding behind 'private sector facades'.

ii. Institutions
    1. weak agencies or institutions that drive Science and Technology
    2. good impression of the vision and focus and competence for institutes driving the competitiveness perspective and strategy
        a. although could improve link to industry

iii. Innovative approaches
    1. in government for agro business (Bolivia)
        a. bidding system – to link suppliers and producers
        b. linking organisations
    2. Financing innovation in SMEs and starting to support cluster development (Nicaragua)
    3. good examples for financing of micro businesses (Nicaragua, Bolivia)

e. Financial organisations

i. Traditional banks do not support SMEs

ii. Traditional banks do not give loans for innovation

iii. International donor agencies are important actors when it comes to financing – and they have their own agendas, which do not necessarily coincide with National goals

iv. Innovative approaches
    1. CIDRE (B)
    2. IDR (N)
    3. Prodem – NGO (B)
    4. Banco Sol – private (B)

v. Government
    1. SIBTA (B)
    2. Ministry of industry (N)

vi. High interest rates – both in traditional banks and in micro-financing

vii. No strategy or business idea to support innovation in companies

f. Linking Organisations
    i. Various types of organizations perform the role of linking organizations and the services provided can include financing which make them a stronger player
    ii. Good examples of organisations and experts developing a more demand driven market –
        1. on the demand side – they are helping the producers define their needs, join together and then linking this information to the supply side.
        2. on the supply side – they are trying to help the suppliers define their competences, join together and offer quali fied services and products

g. Laws and Regulations
    1. Tax incentives for foreign investment is a disincentive for local entrepreneurs
    2. Tax free zones – create islands of industry – which do not interact with the local business or society and do not make any investment in the local communities (no loyalty and short term perspective)
    3. Weak Intellectual Property systems
        a. limited capacity to evaluate – i.e.: very few lawyers trained in this area, lack computer systems to document and organize this information
        b. mainly foreigners (90%) apply for patents
        c. not seen as strategic – rather – a defensive move based on foreign pressure
        d. universities offer no courses or information to students or teacher on IP and IP process
        e. IP function does not have a clear ´home´ inside the govern ment – so lack resources – fall between the cracks – (between ministries of culture, industry, commerce, etc.)

8. Conference in Ottawa

As reviewed above, the main purpose of the Latin American project in Bolivia, Honduras and Nicaragua, was to introduce and develop *a process* that will *increase awareness, cooperation* and *debate* on the role and opportunity that *'innovation clusters'* may have in the development of innovations.

This main purpose was subdivided into two different main parts. The first part was to identify and analyze the current status of *local innovation* and *cluster activities*. The results of this analysis were presented in Chapters 6 and 7 above. The second part was to *increase the connectivity* between the key stakeholders active in innovation activities both locally in within the wider region. The result of this work, is presented in 2 sections.

As a first step towards initiating connectivity, the interviewees and some additional stakeholders were invited to meet and discuss the preliminary findings of our work in a *workshop* at the end of our visit in each Latin American country. The insights developed and results achieved during these workshops are presented in the Methodology section above.

The second step was to select and invite a select group of stakeholders from each country to participate in the 7th Global Innovation *Cluster Conference in Ottawa*, Canada in the end of September 2004. This chapter presents some of the experiences and results from this Conference.

a) Purpose of the trip to attend conference in Canada

As the main purpose of the project was to develop a process to increase the awareness of innovation processes and innovation clusters, a number of persons from each country were invited to a cluster conference in Canada. The intention was that they would be able to learn directly from other practitioners as well as academics from all over the world who are involved in developing, financing or researching innovation clusters.

In additional to simply participating in the cluster conference (i.e.: listening to presentations, asking questions and meeting during the breaks, etc.) the Latin American group developed their own learning process and goals. This learning activity included an ongoing reflection process during the conference week as well as a Latin American conference panel where the delegates made their own presentations. Finally, in a final workshop the Latin American group also divided into country teams to summarize the most important learning from the conference and its possible implications for their own country. The result of this work established a preliminary list of recommendations for action in their own country (see Appendix 3 for an example).

b) Who was invited

Our original plan was to identify (from the numerous persons we interviewed and met during our visit) 3 key stakeholders from each country to present their work at the conference in Ottawa. However, in Bolivia because we had visited three major regions, La Paz, Cochabamba and Santa Cruz we invited 3 persons from each of these regions (instead of 3 from the country) in order to increase the chances of creating a stronger network and create a greater impact in each region of Bolivia. Once identified, each potential delegate, was asked to develop a package of materials motivating what they would like to present, why they would like to attend this conference and what they would like to accomplish if they had a chance to attend this conference. We also asked for the CV and other background information on their organisation.

After receiving these personal motivation packages, we presented this information to Sida/ASDI to make the final decision on who should be invited. In the end, Sida invited 16 persons to the conference. Of these persons invited, a total of 13 persons attended:

- 7 persons from Bolivia, and
- 3 from Honduras and
- 3 from Nicaragua

They represented the following stakeholder categories:

- The majority (8) came from public (4) and private universities (4),
- 3 government organizations,
- one financial organization and
- one linking organization.

3 of the invited persons were not able not attend the conference in the final moments, due to a demand in their work situation, (2 from government organizations and one in transition from a linking organization).

c) Design of the week

Sunday, the group from the three countries met for the first time in the afternoon and had some time to get to know each other during a group dinner.

Monday, the group met in the morning to discuss their goals and decide upon the working process. This included: defining the goals for the group, introducing an ongoing reflection process, instructions on how to write the summary of the experiences and a final report.

In the afternoon, the group subdivided and joined 2 industry cluster tours, to:

- a Photonics/Integrated Circuit Cluster and
- a Biotech Incubation Center and Local Linking Organization in Ottawa.

Tuesday, started with a number of presentations on the current academic research activities related to clusters and innovations. The Latin American group was then invited to attend a cluster training workshop provided by the ICT in the afternoon. In the late afternoon the group met to reflect upon what had been learned for 2 days of study visits and training workshop and to formulate the questions that still had to be answered during the week.

Wednesday, was the first day of the main conference and the delegates attended various self selected sessions, based upon their own interests. In a special evening session, the delegation from Tanzania and Uganda presented their experiences from the East African cluster initiative, including what was learned from the workshop in Bagamoyo in February 2004. At dinner, the discussion continued between the Latin American group and the East African delegates.

Thursday, after listening to the initial presentation in plenum, the Latin American group had a chance to present their own work. These presentation and panel discussions took place during the entire day. For the full Latin American program, see next section d) "Presentation by participants" and Appendix 4 and 5.

Friday, morning opened with a keynote presentation and an expert panel. In the afternoon, the Latin American group participated in our (internal) final workshop, in order to reflect upon what had been learned during the whole conference week and to discuss what remained to be done. Please see the results of this workshop, that are presented below in section e) Outcomes and Recommendations. The country teams then worked on developing a tentative country action strategy (see Appendix 3).

d) Delegate presentations

The presentations were organized around four main themes that were selected based on our research findings of important issues to consider. A panel was developed around each theme, and a chairman was selected to lead the discussion. See the table 11 below, outlining the various Panels (and Appendix 4 and 5 for more a more detailed description).

The first theme concerned the *entrepreneurial* university – something that to a large extent is missing in Latin America, but the delegates from Honduras and Bolivia could present interesting new initiatives to entrepreneurship training and advisory services towards incubation.

The second theme, *financing innovation*, is a major general weakness in Latin America, but once again the delegates from Bolivia, Honduras and Nicaragua could present innovative initiatives to micro-financing and financing of local innovation.

The third theme concerned another problem area, to make *policy function in practice* or to create the needed link between policy and practical cluster initiatives. Here, the presenters from Bolivia and Nicaragua showed how cluster formation could be facilitated in practice, but they also commented upon what demands will be put on a policy working in practice, including the need of strengthening institutions for intellectual property.

Finally, theme four concerned the problems in *commercialisation* that are presently hindering *university research* from reaching practical applications. Examples were provided of both research for potential commercial application and of experiences of commercialization. See Appendix 4 for a more detailed outline of the different issues focused on in the panels. The presentations from the panels are attached as Appendix 5.

Panel	Themes	Stakeholder	Persons	Chairman
1	Entrepreneurial universities	Zamorano Univ. UNAH UPSA UPB	Luis Velez (H) Juan Del Cid (H) Monica Rivero (B) Luis Arteaga (B)	Sverker Alänge
2	Financing innovation	Banco Sol Dicta MIFIC	Carlos Tores (B) Julio Barahona (H) Regina Lacayo (N)	Sari Scheinberg
3	From Policy to Practical Experience of Clusters	Cidre FUNICA UCB	Julio Alem (B) Maria Briones (N) Carlos Aguirre (B)	Sari Scheinberg
4	From Research to Commercialization	UMSA UMSS UNA	Alberto Gimenez (B) Franz Vargas (B) Freddy Alemán (N)	Carlos Aguirre

H = Honduras, B = Bolivia and N = Nicaragua

Table 11: Latin America Panel Presentations at the TCI Conference, October, 2004

e) Outcome and Recommendations

During the final day the Latin American workshop was designed as follows:

1. Individual work – 30 minutes
   a. what did I learn
   b. what am I confused about
   c. what I want to do next personally
   d. what my organisation can do
   e. what my region can do
   f. what my country can do
2. Country group work – 60 minutes
3. Total group work – 2 hours

The country teams presented their reflections on what had been learnt, what was still confusing and what would be possible to do next. Each country team presented a tentative action strategy. Below are the minutes taken from the country presentations – and attached in Appendix 3 is the proposed action strategy for Nicaragua.

Nicaragua group – Reflections and learning

1. What stands out?

a. cluster methodology is interesting – many ideas in practice
b. but we need to know how innovation can be integrated into cluster methods
   i. how cluster methods can be integrated into innovation
   ii. when start solving problems for productive sector – many people – look for innovation – and links work – and then can develop clusters
c. cluster happen – it takes time
   i. they need public policy incentives
d. university role in innovation and cluster development
   i. need to find out what to do next
   ii. currently – universities are doing research that is applied and directly with the farmers and making prototypes
   iii. what and who takes the various roles during the process of innovation

e. public policy – and funding innovation by government is necessary for competitiveness – there are no other sources for funding
    i. university needs it
    ii. enterprises need it

2. *How do we go forward personally?*
    a. to present to our organisations what we learned
    b. we all want to deliberate on these topics and bring it to the national innovation technology network that we have – 23 institutes – during the last week of October 2004, – primarily – agriculture and environment
    c. want to do workshop on competitive funds – matching grants and impact on productive processes and cluster development – set date after January 2005
        i. will present the science and technology policy for discussion
    d. planning workshop on policies – with the members of the network – so can go Bogotá – in January – to present to you

3. *What do we need?*
    a. to strengthen the capacity of local actors
        i. study – what are the institutional capacities needed in Nicaragua
            1. need to focus and prioritize – clusters to be strengthened
        ii. human capital development
            1. innovation
            2. science, technology and development
            3. PhD – long distance learning – sandwich program idea
        iii. mechanism to promote – incentives on the local level – to promote cluster development

4. *Cooperation between us?*
    a. virtual network – electronic – to share information among ourselves – easily done
    b. identify actions among ourselves – what we can do to support each other in other countries

Honduras group – Reflections and learning

1. *What was the main thing that impacted us?*
    a. importance of the cluster and value chain
    b. interest in the incubator as a method of supporting business development
    c. government is – corn and bean value chains
        i. this agribusiness chain – is not the same as a cluster – more is needed to be a cluster – need innovation to be built in

2. *What can I do personally?*
    a. will set up a meeting with the ministry of agriculture
    b. give a copy of the white book to various stakeholder groups
    c. Transfer knowledge
        ii. extension – to take what we learn – to bring it to where people can use it

3. What do we need to do next?

a. need to promote the development of the clusters

iii. what is our basic competence – in forestry mostly

1. to study how cluster in this industry can be or it

a. wood

b. water sheds

c. energy

iv. value chain wood ……furniture

v. value chain – sea food

1. shrimp

2. fish

b. need to develop entrepreneurship, innovation and learning

vi. we need to promote entrepreneurship

1. in university

2. in high school level

4. Ideas for cooperation?

b. to contact Banco Sol in Bolivia – to look into possibilities of creating something similar in Honduras

c. to bring Emiliano to Honduras – to present to a core group – to promote the development of this work and to educate this group

Bolivia – a common perspective

1. Learning and impressions

a. the approach of innovation systems and clusters seem natural

b. when systematically organized – can be useful for leading sectors

c. mechanics of such systems – seen – personal skills, leadership and communication – are most important

d. expectations and ambitions not to be brought to impossible levels

e. enterprises – need to be at the core of cluster development

f. technologies – not the main issue

g. Bolivia – has a basis with the productive and competitiveness

i. Values chains are defined

h. Will to initiate linkages among states, universities, associations and financing entities

i. Local and regional government structure – are there and strong for support

j. Issues –

i. Culture is not homogeneous – a large mix and actors that have to be taken into account

ii. To overcome vested interests – needs more time and specific approaches

iii. Social capital building – is critical and be prioritized

iv. Universities – lack knowledge and scientific competences for markets and production needs –

1. universities could provide environments for space and introduction of methodology – and facilities for networking and growth of needed links

2. *Short term ideas*
    a. group decided to become a formal network – to present an action plan within a month – to maintain our links
    b. our group – will try to have a proactive action – on existing processes on clusters and innovation systems – institutionally
        i. work with competitiveness committees
        ii. science and technology
        iii. work with government
        iv. contact with experts – to introduce methodology – Spanish experts
    c. adopt the commitment to support Chalmers report
        i. to design program for the future – conference??
3. *Long term ideas*
    a. we will be the facilitators on our own institutions – La Paz, Cochabamba, Santa Cruz
    b. to keep in touch with the competitiveness councils – and give our own ideas
    c. through mechanisms – to develop relationship with government, universities,
    d. develop a workshop – to see what they are doing in each city – on the value chain work – and then how to proceed – to share these experiences with other countries
    e. national conference – need to learn more – to strengthen the regions
    f. to build a communication network – to share information
    g. to exchange professors, students, etc.
    h. universities – can go more exchange across borders
4. *To have a cluster team*
    a. to study this methodology
    b. then to become experts in Bolivia – in order to share this methods across the country
    c. then to organize workshops – across Bolivia –
    d. UMSS – can use a website – to have interactive processes and work
5. *University projects are not necessary built upon necessity*
    a. our institutions need to adjust a bit to figure out how we can cooperate
    b. To work and make a difference on what is there

Tentative country action strategy

The Conclusions and Recommendations from Nicaragua have been attached (see Appendix 3).

In addition to the above suggestion from the three person delegation from Nicaragua, we have received a direct request from the Presidential Commission on Competitiveness of assistance in developing an innovation cluster policy and practice.

9. Suggestions for the future

The suggestions have been arranged according to a number of key project areas:

- Exchange of Ideas and Experiences and the Creation of Networks
- Government Policy and its Links to Practices
- Corporate Strategy and Innovation
- Entrepreneurial University
- Financing Innovation and Innovative Finance
- Intellectual Property
- Innovation Clusters – history and present status
- Innovation Clusters – pilot project
- Knowledge Development

These project areas have not been prioritized as they are all essential areas for the three countries studied, neither has a specific recommendation been made for individual countries. Instead, the intention was to provide a starting point for discussion and decision making based on the specific interests that exist in the respective country, either to develop projects internally or in cooperation with other countries. Within each of these areas there are ample opportunities for learning across countries.

Project Areas

Based on our analysis of hinders and facilitators for innovation and clustering, we believe that in-depth analyses and projects need to be developed in the following areas.

Exchange of Ideas and Experiences and the Creation of Networks

Purpose: To provide opportunities for experience sharing and development of awareness of innovation and innovation systems/clusters

Key goals/steps:

- International conferences
  - In South Africa – March 2005
  - TCI in Hong Kong – November 2005
  - TCI in Latin America – or other LA conference

– Local and/or regional conferences
  - In each country: Bolivia, Honduras or Nicaragua
  - Central America
  - Bolivia with Chile, Peru etc.
– Local competence development: can take various forms, e.g. seminars, training courses, in-the-projects training/learning, research education, research, and can be built with a network approach
– Creation of "movement" and local networks – content wise preferably built around projects (see below)

Partners: Any stakeholder – e.g. linking organizations, university, government

Government Policy and its Links to Practices

Purpose: To further develop policies for innovation and mechanisms to link policies to practice

Key goals:
– review of existing innovation policies and make recommendations to the development of a national/regional innovation policy including cluster/systems
– review of present ways of deploying policies and make suggestions to mechanisms for connecting policies to practice
– develop a common innovation vision for the country and deploy this vision into the different Ministries' and Government agencies' policies and strategies, e.g. Min. of Economy, Min. of Industry, Min. of Commerce, Min. of Agriculture, Min. of S&T, Min. of Education

Partners: Government or university

Corporate Strategy and Innovation

Purpose: To develop awareness and motivation for local industry to develop corporate strategies that include innovation and cluster/relationship considerations

Key goals:
– conduct a study of selected industries/sectors to examine their current status of innovations and cluster opportunities
– review of company strategy, is it survival or innovation
  - internal/external (including system/cluster)
  - all innovation culture – mentality
– develop a forum to explore clustering opportunities
– Pilot project

Partners: Firm, Industry association, government organization or university

Entrepreneurial University

Purpose: To develop the university to be more entrepreneurial and take an active role in innovation processes in the society

Key goals:
– develop university vision and strategy
  - leadership group development
    – benchmarking in Latin America and Sweden – experiencing in order to get ideas and common view

- develop a research culture at universities
  - incentive system
  - competence of professors to do research
  - financing of research
  - integration of research into education
    - research-based learning
    - train teachers – companies on value of R&BL
- develop links from research to the market
  - analyze the research process from idea until market
  - documenting research that exists – making it accessible and visible
  - diffusion of results of research to commercialization
- improve entrepreneurship education
  - analyze existing education, pedagogy and incubator activities
  - create learning opportunities/mechanisms between universities
  - create linking mechanisms to the market and to the financial community
  - create intellectual property education and support functions for teachers/researchers and for students
  - explore market need of consultancy in IPR for SMEs
- Pilot project

Partners: University or government organization (e.g. Ministry of Education)

Financing Innovation and Innovative Finance

Purpose: To analyze the role and functioning of the various financing organizations in relation to innovation

Key goals:

- Conduct interviews with financing organizations on their views and current practices on financing of innovation
- Create experience sharing between different countries
- Benchmarking financing approaches in other countries
- Pilot project: Financing of university research-based projects

Partners: Financial institution, government organization or university

Intellectual Property

Purpose: Develop an awareness among stakeholders of the need for IPR in connection with innovation and entrepreneurship

Key goals:

- Research specific conditions for IPR and develop different strategic action alternatives (to be tested in pilot project) – including competence need analysis, e.g. business development IPR
- Developing the competence and functioning of the intellectual property board into a strategic leadership group for IPR
- Benchmarking IPR approaches – including links to entrepreneurial universities – in order to create improved IPR
- Creation of a seminar series – action learning for industry and universities on IPR
- Competence development based on needs analysis

– Pilot project: Creation of IPR process for a select number of cases – e.g. university research, SME and local communities

Partners: IP agency or university

Innovation Clusters – history and present status

Purpose: To document and evaluate existing clusters from a regional perspective or from a sector perspective in order to learn from experience

Key goals:

– To map existing clusters and analyze the strengths and weaknesses from an all stakeholder perspectives on innovation and clustering
– To map the existing clusters to analyse the types of relationship that exist and to examine what supports or hinders the further development of the relationship needed to develop the cluster activities
– Analyze the life cycle of a cluster
– What can be learned from local experiences and to what extent are they different from clustering experiences from other parts of the world

Partners: Government organization or university

Innovation Clusters – pilot project

Purpose: To create and test a process for developing clusters based on local experiences

Key goals:

– Creation of process for cluster development based on analysis of existing clusters (see project above) and internationally accumulated knowledge
– Selection of innovation area and geographical space for pilot project
– Clustering activities during a specified time period (2–5 years)
– Simultaneous evaluation and feedback to cluster actors – action research approach
– Final evaluation of pilot project and diffusion of what has been learnt

Partners: Government (central or regional), university, industry or other stakeholder

In addition to a few additional outcomes are considered important to supplement the projects listed above. There is a need for the further development of knowledge and materials to be used in the work defined above:

Knowledge Development

Book for SAREC

Purpose: Provide a review of innovation system and cluster experience and a critical analysis of the applicability in developing country contexts

Key steps:

– review of theory
  • NIS/cluster/network/development bloc/industrial district
  • intervention
– review of practical experience
  • developed/developing countries (UNIDO/IDS etc.)
  • case studies? (original data collection)
  • intervention methodology

Knowledge development within all project areas

- Ph.D. sandwich programs to build competence
  - IPR – research based competence on link between IPR and business development
  - Innovation systems/cluster – interventions
- Master theses
  - finance
  - IPR (biotech case)
  - other areas involving students from Bolivia, Honduras, Nicaragua or Sweden

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Appendix 1:

List of organizations interviewed (Jul – Aug 2004)

Honduras

Industry

ANAPROFAR – Asociación de Fabricantes de Productos Farmacéuticos de Honduras
Description: Is the association of pharmaceutical producers in Honduras, organize 25 different enterprises dedicated to the Pharmaceutical Sector in the country and strives to enhance the potential of the that industry.

Laboratorios Andifar
Description: Is the second biggest pharmaceutical producer in Honduras, their variety of products goes from generic medicine production to some skin beauty treatment.

Academy

UNAH – Universidad Nacional Autónoma de Honduras
Description: Is the most important and bigger Public University in Honduras and coordinates the activities of the other high education centres. Also has a close relation to Sida-SAREC. The University offers a broad scope of scientific and business careers.

ZAMORANO – Escuela Agrícola Panamericana Zamorano
Description: Private non-profit higher education centre specialized in sustainable agriculture, agro-business, agro-industry, natural resources management and rural development.

UNITEC – Universidad Tecnológica Centroamericana
Description: A private university founded in 1986 focus on engineering, business administration and law careers.

Government

DIGEPIH – Secretaria de Industria y Comercio, Dirección General de Propiedad Intelectual and Oficina de Comercio Exterior.
Description: SIC is equivalent to the Ministry of Industry and Commerce of Honduras, it has the duties concerning external and internal commercial issues and intellectual property. They direct the negotiation process with the USA as part of the Central American Free Trade Agreement, CAFTA.

DICTA – Dirección de Ciencia y Tecnología Aplicada
Description: As part of the SAG, Secretaria de Agricultura y Ganadería the Ministry of Agriculture and livestock, DICTA is the direction of agricultural science and technology and their mission is to elevate the technical levels of generation and transfer of technology to ensure food availability, diversification of the production and the sustainability of natural resources.

COHCIT – Consejo Hondureño de Ciencia y Tecnología
Description: The Honduran Council of Science and Technology depends directly from the Presidency of the Republic and is responsible to guide the scientific and technological development of the nation.

Collaboration

FIDE – Fundación para la Inversión y desarrollo de Exportaciones
Description: The Foundation for Investment and Exportation Development is a private non-profit institution created in 1984 to support the country effort to promote sustainable development based on international investment and exportations, therefore is in charge for the program of national competitiveness in Honduras.

COHEP – Consejo Hondureño de la Empresa Privada
Description: The Honduran Council of Private Enterprises was founded in 1968 and groups 54 organizations representing all the productive sectors of the country. It operates from a technical and political side to support the interests of the entire industrial sector.

Finance

Banco Neopolitano
Description: Financing Institutions for SME´s offering micro-financing services.

IDB – International Development Bank
Description: The IDB Group is the main source of multilateral financing for economic, social and institutional development in Latin America and the Caribbean. It also plays a leading role in regional integration.

Nicaragua

Industry

Industrias Callejas
Description: This is a old family industry founded 54 years ago dedicated to the production of jelly, marmalade, Jam and juice from fruits as Guava, Pineapple, Mango, Tamarindo, Marañón and Nuts.

MC2 Consulting
Description: Is a local consultancy firm dedicated to manage technical projects and programs, oriented to training, consulting and facilitation.

CTN – Centro de Trabajadores de Nicaragua (Workers Union of Nicaragua)
Description: A Labour Union part of the Permanent Congress of Employees and is dedicated to organize groups of people working in Industries in order to defend they rights as part of the labour force sector.

Academy

CNU – Consejo Nacional de Universidades, (Council of National Universities)
Description: National Council in charge of organizing the activities concerning the University National Group. The following Universities are part of the CNU, Universidad Nacional Autónoma de Nicaragua (UNAN-León, UNAN-Managua), Universidad Centroamericana (UCA), Universidad Politécnica de Nicaragua (UPOLI), EIAG, UC-ATSE, Universidad Nacional de Ingeniería (UNI), Universidad nacional Agraria (UNA), Universidad de las Regiones Autónomas de la Costa Caribe Nicaragüense (HURACÁN), Bluefields Indian & Caribbean University (BICU).

UNA – Universidad Nacional Agraria (Nacional Agrarian University).
Description: This is the contact University in Nicaragua, dedicated to the Agrarian field, has a developed relation to Sida.

INTA – Instituto Nicaragüense de Tecnología Agropecuaria, (Nicaraguan Institute of Agropecuarian Technology)
Description: A Government Institution created to the technology applied by small and medium producers, their mission is to conduct research transfer this knowledge to the growers.

CATIE – Centro Agronómico Tropical de Investigación y Enseñanza, (Tropical and Agronomic Centre for Research and Education)
Description: This organization was created in 1942 in Costa Rica to support the Agriculture Research of the American Countries focussed to train the national working force. Actually is located in Belice, Colombia, El Salvador, Guatemala, Honduras, México, Nicaragua, Panamá, República Dominicana, and Venezuela.

Government

MIFIC – Ministerio de Fomento, Industria y Comercio, (Ministry of Industry and Commerce)

– PAIT, Programa de Apoyo a la Innovación Tecnológica, (Technological Innovation Support Program)

Description: This project started in 2001 with the support of the Interamerican Development Bank to use a matching grants model to support small and medium enterprises to finance technical innovations.

– CPC, Consejo Presidencial para la Competitividad, (Presidential Council for Competitiveness)

Description: CPC is an organization created directly by the Presidency of Nicaragua to develop and implement the competitiveness program. They use the cluster perspective as part of the competitive approach.

– RPI, Registro de la Propiedad Intelectual (Intellectual Property Register)

Description: This Office is part of MIFIC, is in charge of the registration of the Intellectual Property figures as patents, trade marks and so, also they deploy information about the field to other organizations.

– INPYME, Instituto para la Pequeña y Mediana Industria (Small and Medium Enterprises Institute)

Description: This organization coordinates the technical and financial support of SME´s in Nicaragua and belongs to MIFIC.

– CAFTA, Central American Free Trade Agreement

Description: This office is on charge of all the organization concerning the negotiation of CAFTA.

– DTNM, Dirección de Tecnología, Normalización y Metrología, (Technology, Normalization, and Metrology and Direction)

Description: This Project is intended to deploy norms and rules needed to meet international standards of quality certifications, metrology and normalization and all the activities related to those fields.

IICA – Instituto Interamericano de Cooperación para la Agricultura y Empresa Agropecuaria, (Inter.-American Institute for Cooperation on Agriculture).

Description: IICA is a specialized agency of the Inter-American system and its purposes are to encourage and support the efforts of its member states to foster agricultural development and rural well-being in their territories. The members are grouped in 6 sectors, representing 36 countries of the Americas, the Caribbean and Spain.

IDR – Instituto de Desarrollo Rural, (Rural Development Institute)

Description: Since 1995 the mission of this organization is to support the productive development of small and medium producers of the rural sector by executing, managing and coordinating programs and projects to increase their productivity, raise employment and improve the living standards of the rural sector. IDR has agencies located in several strategic places around the country. The president coordinates directly the activities of the IDR.

MAGFOR – Ministerio Agropecuario y Forestal, (Agropecuarian and Forestry Ministry)

Description: This Ministry as part of the Government is intended to foster the policies of the agricultural sector to promote and ensure the economical, social and political improvement of the man of the rural community and their participation in the national life.

CONICYT – Consejo Nicaraguense de Ciencia y Tecnología, (Nicaraguan Science and Techonolgy Council)

Description: Subscribed to the Ministry of Economy and Development and coordinated directly by the Vice-presidency, this Organism was created to promote and coordinate the Nacional System of Science and Technology.

Collaboration

FUNICA – Fundación Nicaragüense para el Desarrollo Tecnológico Agropecuario y Forestal, (Nicaraguan Foudation for the Agropecuarian Technological Development)

Description: FUNICA is a civic organization, non-politic, non-profit oriented, constituted by public and private organizations, universities, NGO´s, producer associations, professional unions related to science and technology of the agriculture sector in Nicaragua. Their mission is to develop the institutional framework to foster the forestry and agricultural technological development.

INPYME – Instituto de la Pequeña y Mediana Industria, (Small and Médium Enterprise Institute)

Description: As part of MIFIC, this organization was created in 1994 to promote the development of the micro, small and medium enterprises

striving to improve their productivity and competitiveness through actions of systems of information, technological management, and enhancement of a financial and no-financial services networks to support programs and projects in the sector. The main objectives are to facilitate the access to credit for SME's and improve their productivity and competitiveness though the promotion of programs and projects. They don't allocate credits directly

Finance

FNI – Financiera Nicaraguense de Inversiones, (Nicaraguan Finance Body of Investment)
Description: Is a second level bank, controlled by the Superintendence of Nicaragua and oriented also to support financially the SME's sector.

BID – Banco Interamericano de Desarrollo, (Interamerican Development Bank)
Description: The IDB Group is the main source of multilateral financing for economic, social and institutional development in Latin America and the Caribbean. It also plays a leading role in regional integration.

WB – Banco Mundial, (World Bank)
Description: The World Bank Group's mission is to fight poverty and improve the living standards of people in the developing world. It is a development Bank which provides loans, policy advice, technical assistance, and knowledge sharing services to low and middle income countries to reduce poverty.

Bolivia

Industry

Inti Raymi – La Paz
Interviewee: Ing. Mario Columba
Description: Inti Raymi's mine at Kori Kollo, the most important mine in Bolivia, was a highly visible operation. Nowadays their operations are closed, and they are running a three years project to clean up the environment and reduce pollution produced by mining activities.

La Coronilla – Cochabamba
Interviewee: CEO Martha Eugenia Wille
Description: La Coronilla is a medium enterprise that produces different kind of pastas and snacks base on Andean cereals like Quinoa. They are exporting 80% of their production, 10 final products developed made of quinoa.

Unicueros – El Alto de la Paz
Interviewee: Ing.Eduardo Ibañez / CEO Jose King
Desription: Unicueros is a company which treats the leather and produce jackets and coats. The company has 12 years of operation and 60 employees. Mostly part of their production is exported to Asia. A principal problem is the environmental impact; Unicueros had invested 150,000 USD in water treatments and waste control in response to governmental policies.

Chalalan ecological community
Interviewee: Sandro Valdez
Description: Ecological reserve financed by the BID in order to promote the sustainability of the community "San Jose de Uchupia" through ecotourism development.

Academy

UMSA – Universidad Mayor de San Andres – La Paz
Interviewee: Dr. Alberto Jiménez – Biotechnology / Maria Teresa Alvarez, Bio-chemical
Miguel Velásquez, Ing. Chemist, Environment and Food, Miriam Mallea, School of Economical Science and Financing
Luis Morales, Coordinator Biodiversity
Roberto Aguilar – Rector, Reseca School of Economics
Jorge Ocampo – Vice Rector
Margarita Toro- Head of Research and Post Graduate studies.

Description: Public University founded in 1830, UMSA is the largest university in Bolivia with 75,000 students, 36 research institutes, 2500 teachers and 1500 administrative personnel.

UMSS – Universidad Mayor de San Simon – Cochabamba
Interviewee: Rector: Ing. Frank Vargas / Dr. Roberto Soto, Director Biotechnology /
Dr. Antonio Vilaseca, Agri-chemist / Licda. Suzana Usqueda, Jefe Dpto. Educación Popular / Lic. José Décker, Dir. Relaciones Internacionales / Lic. Raúl Montán, Dir. Interacción Social / Octavio Chávez A, Dir. Investigación Científica y Tecnológica

Description: Public University founded in 1832, UMSS has 50,700 students, 1,045 teachers and 828 administrative personnel.

Universidad Católica Boliviana – La Paz
Interviewee: Dr. Carlos Aguirre

Description: Private University founded in 1966. This university has subsidiaries in La Paz, Cochabamba, Sta. Cruz y Tarija.

UPB- Univesidad Privada Boliviana – Cochabamba
Interviewee: Rector Edwin Duran / Ing. Grover Zurita / Ing. Luis Arteaga / Ing. Pablo Zegarra / Ing. Humberto Calderon

Description: Founded in 1992, very active in innovation processes. Focused in the engineering field, supported and sponsored by private entrepreneurs mainly in cochabamba.

UPSA – Universidad Privada de Santa Cruz de la Sierra
Interviewee: Vice rector Lauren Muller / Lic. Monica Rivero / Ing. Rene Gaston / MSc. Jvier Alanoca / Mgs. Jorge Estenssoro

Description: UPSA founded in 1984 is a non profit, private institution for higher scientific and professional training, sponsored by the Fundación Santa Cruz de la Sierra.

Fundacion I. Simon Patiño – Pairumani Center for Phytoecongentic Research
Interviewee: Teresa Avila Alba – biotechnology program
Description: The Pairumani Hacienda has 500 Ha., in 1970 was found the Foundation Simon Patiño oriented to conduct and diffuse research in the agriculture field. It has three research centers called Granja Modelo, Fitoecogeneticas Center and Seed Center.

PROINPA – Programa de Investigacion de la Papa
Interviewee: Ing. Gino Aguirre / Ximena Cadima – genetic resources area / Jorge Rochas – head of laboratory / Oscar Barea – crop rotation area

Description: Non-profit institution founded in 1998, oriented to promote and conduct research of Andean products. PROINPA works in two main areas: food security and strength productive chains of Andean crops.

Government

MACA – Ministerio de Asuntos Campesinos y Agropecuarios
Interviewee: Ing. Miguel Angel Pedregal – Technological innovation

Description: MACA is in charge to give policies in the agriculture field as well as to promote peasant wealth and prosperity.

SIBTA – Sistema Boliviano de Tecnología Agropecuaria
Interviewee: Ing. Roberto Arteaga, , Oscar Humerez, Rosendo Mendoza.

Description: SIBTA is an official program created in 2000, in behalf of the Ministry of Agriculture. Their mission is to consolidate a model in which the private and public sector works together to develop technological innovations and reach competitive markets.

MDE – Ministerio de Desarrollo Económico
UPC – Unidad de Productividad y Competitividad
Interviewee: Marcello Barron – Executive director / Patricia Choque – Coordinator of technology and innovation

Description: The Unit of Productiveness and Competitiveness is oriented to sign agreements between stakeholders (private and public) in order to support the 14 productive chains prioritized in Bolivia.

Ministerio de Educación
S&T Office – Secretaria Nacional de Ciencia y Tecnología
Interviewee: Lic. Patricia Escobar

Description: The S&T office is in behalf of the Ministry of Education has the mission to create the National Plan for S&T. This plan (2004–2009) will give the policies to support future endeavors in terms of productiveness and competitiveness.

Municipality El Alto
RASIM – Reglamentos de Normas Ambientales en el Sector Industrial
Interviewee: Ing. Efrain Argani – environment / Ing. Virginia Salueiro / Ing. Willie Quispe Cháves / Ing. Ninoska Flores

Description: The municipality of El alto is working actively in environmental issues. RASIM is a program in which the Municipality is registering all enterprises (mainly SMEs) that will compromise themselves in pollution controls. They have one year to present a document informing about the status of their industrial waste and presents proposals to solve the problem. One example is the pollution generated from tanneries, skins and hides treatments with tannic acid so as to convert them into leather.

Prefecture El Alto
Interviewee: Lic. Astrid Boutier – Technician in Environmental Control

Description: The prefecture is in charge of the environmental control. They interact directly with the Industry doing studies and given space for student to conduct research or projects. Bolivia has no waste control system; the majority of industrial waste is transported to "some where", dirty water and mud are clear examples of environmental pollution.

Prefecture Cochabamba
CDC – Consejos Departamentales de Competitividad
Interviewee: Ing. Gastón Méndez / Guillermo Gutierrez – Desarrollo Departamental

Description: The Prefecture of Cochabamba is working actively in CDC. Gathering the public and private sector to promote cooperation between them, this meeting place has a coordination role developing productive chains.

SENAPI – Servicio Nacional de Propiedad Intelectual
Interviewee: Paola Oropesa – lawyer

Description: SENAPI was created in 1998 in response mainly to the lack of industrial property regulations like trademarks, and copy rights. This organization is under the Ministry of Economic Development, but still SENAPI depends to the Vice Ministry of Industry and Commerce.

Collaboration
ANCB – Academia Nacional de Ciencias de Bolivia
Interviewee: Ing. Jose Telleria Geiger – Secretary General / Dr. Antonio Saavedra Munoz – President / Jose Antonio Zalaya – vice president

Description: The National Academy of Science was founded in 1960, this institution was in charge to promote research and give S&T policies to asses the government in this field.

Asociación de Inventores
Interviewee: Interview: Ana Maria Perez

Description: Association of Bolivian Inventors founded in 1996 is part of the National Academy of Science. Their role is to diffuse inventions, promote patents and support inventors with legal information.

ANAPO – Asociación de Productores de Oleaginosas y Trigo
Interviewee: Ing. Miguel A.Guzman Mendoza / Ing. Daniela Echalar

Description: ANAPO is a private institution formed by small, medium and large growers, founded in 1974. They work together with 14000 growers in Santa Cruz, conducting research, giving technical assistance, commercializing seeds, price and market advisors, and technological transfer.

CADEPIA – Cámara Departamental de la Pequeña Industria y Artesania
Interviewee: Don Carlos Rivera – President / Ronny Lujajun – executive director

Description: This organization of small industries and handicraft activities has 9 offices in each of the 9 departments in Bolivia. It is an independent organization that works in training programs, technical assistance, quality management, marketing, implementation of computer systems, and finance.

National Chamber of Industy – La Paz
Interviewee: Mariana Indaburu – National Coordinator

Description: This chamber has 196 enterprises associated in La Paz, and in total works actively in 8 departments with 860 enterprises associated. Mainly this chamber is working actively in quality standards together with IBNORCA.

CAINCO – Chambers of Industry, Commerce, Services and Tourism in Sta. Cruz
Interviewee: Mario Cirbian Antero – Sub Manager / Daniel Velasco Oyola – entrepreneurals services / Julio Silvia Sandoval – National Coordinator

Description: Chamber formed by 1500 enterprises associated, are following competitiveness agreements in a regional magnitude, promoted by UPC. They also give services like legal information to start up a company (Funda Empresa) and quality trainings in cooperation with private universities.

IBNORCA – Instituto Boliviano de Normalización y Calidad
Interviewee: Kory Eguino – Director

Description: Private non profit organization. Their main task is to develop Bolivian quality standards, IAC (electronical standards), ISO, CODEX (food standards), COPAN technical norms, and observers of MERCOSUR standards. Together with the metrology and certification institute, they are working together to raise SMEs competitiveness and reach international markets.

Finance

BCB – Banco Credito de Bolvia
Interviewee: Ing. Jose Ortiz – Manager , Branch Sta. Cruz

Description: BCB starts operations in 1994, when the peruvian bank BCP decided to invest in Bolivia. Now they have 46 offices and 600 employees,

BANCOSOL – Banco Solidario
Interviewee: Carol Torres – Chief executive, Branch Sta. Cruz

Description: First bank in micro financing (world wide). BANCOSOL is an spin-off of PRODEM foundation, founded in 1992. Now they have 50000 customers and 35 branches, their patrimony is calculated in 16 millions USD.

PRODEM – PRODEM Fondo Financiero Privado
Interviewee: William P. Blacutt Chief executive

Description: Spin off of Fundacion Prodem, a project conducted by US AID to promote micro financing. Now they are a private fund, financing micro and SMEs with an average of 35000 active loans and 85000 customers. Their patrimony is calculated in 7 millions USD.

CIDRE – Centro de Investigación y Desarrollo Regional
Interviewee:
Description: It is a non-profit private organization founded in 1981. Since 1990 they are giving financing services for local development. They had giving 19 millions USD in loans helping 14,475 families for different development projects

Appendix 2:

List of the material gathered during the visit to Honduras, Nicaragua and Bolivia, summer 2004.

Honduras

Sistema Nacional de Ciencia, Tecnología e Innovación, Marzo 2004. *Consejo Hondureño de Ciencia y Tecnología (COHCIT) y Centro de Aprendizaje a Distancia, (CAT).*

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UNILAB, Industria y Ambiente. *Universidad Tecnológica Centroamericana (UNITEC).*

Fundación para la Inversion y Desarrollo de Exportaciones (FIDE)

1. Mapa de Honduras para Inversionistas.
2. Estudio de Mercado de Muebles de Madera en Costa Rica.
3. Estudio de Mercado de Muebles de Madera en El Salvador.
4. La Transformación de FIDE, Programa Nacional de Competitividad.
5. Una Nueva Estrategia para Promover la Inversion Directa Extranjera.
6. Programa para Promover la Competitividad y las Exportaciones de Productos Agrícolas no Tradicionales y Productos de Madera.
7. Expo-Energía 2005.
8. Why invest in Honduras.
9. Honduras Datos Importantes.
10. Honduras Industrial Parks.
11. Applicable Laws to Exporting Companies.
12. Looking after your Investment.
13. Annual Report 2003.
14. Programa Nacional de la Competitividad (PNC).

Zamorano University

15. Video, VHS. El Reto que hace la Diferencia.
16. Calendario 2004.
17. Campus Guide.
18. Carrera de Ciencia y Producción Agropecuaria.
19. Carrera de Agroindustrias.
20. Carrera de Gestión de Agronegocios.
21. Carrera de Desarrollo Socioeconómico y Ambiente.
22. Lo que debe saber para poder ingresar al Zamorano.
23. University Brochure. Labor Omnia Vincit
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– Cuarto Encuentro Nacional Empresarial ENAE, Consejo Hondureño de la Empresa Privada (COHEP).
– Reactivación Memoria 2002. Consejo Hondureño de la Empresa Privada (COHEP).
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Organización Sindical. Confederación Central de Trabajadores de Nicaragua (CTN).

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2. Strategic Plan 2003–2012.
3. Escuela de Posgrado. Formando una nueva generación de líderes.
4. Boletín Informativo del CATIE en Nicaragua. Abril 2002.
5. Boletín Informativo del CATIE en Nicaragua. Junio 2003.

6. Investigación, Proyección y Educación.
7. Magazine – Enlace.
8. Coffee, Quality, Ecology and Diversification. Building Capacity in producers associations to produce and market quality coffee.
9. Coffee, Quality, Ecology and Diversification. Environmental services in multistrata coffee plantations in Latin America.
10. Coffee, Quality, Ecology and Diversification. CATIE`s International Coffee Collection.
11. Coffee, Quality, Ecology and Diversification. Strengthening the capacity of environmentaly friendly coffee farmers.
12. Coffee, Quality, Ecology and Diversification. Large multiplication of F1 coffee hybrids through somatic embryogenesis.
13. Coffee, Quality, Ecology and Diversification. Diversification of production and income for coffee farmers in Central America.
14. Coffee, Quality, Ecology and Diversification. Ecological efficiencies in coffee production in Central America.
15. Coffee, Quality, Ecology and Diversification. Agricultural agroforestry department.
16. Coffee, Quality, Ecology and Diversification. Ecologically based participatory implementation of integrated pest management and coffee agroforestry.
17. Presentation. About education.

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La Paz

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Description. Simón I. Patiño Foundation.
Acvities Report. Simón I. Patiño Foundation.
La Hacienda Pairumani. Simón I. Patiño Foundation.

Brochure and Product Description. La Coronilla, Pastas y Snacks.
Desarrollando empresarios Líderes / Brochure. Cámara de la Pequeña Industria y Artesania Productiva de Cochabamba (CADEPIA).
Raíces y Tubéculos Andinos / Cultivos Andinos, Importancia Nutricional y Posibilidades de Procesamiento / Tercer Congreso Boliviano de Protección Vegetal. Fundación PROINPA.
Brochure. Promotion and Research of Andine Products. Fundación PROINPA.
Catálogo de variedades locales de Papa y Oca de la zona de Candelaria. Fundación PROINPA.
Catálogo Ocas Bolivianas. Fundación PROINPA.
Recetario en base a Quinua / Recipies of Quinua, Kañagua, Amaranto and Taruri. Fundación PROINPA.
Catálogo de Quinua Real. Fundación PROINPA.
Uso Racional de la Tracción Animal. Department for International Development. Universidad Mayor de San Simón, UMSS.
Brochure. Description. Universidad Mayor de San Simón, UMSS.
Universidad en Cifras 2003. Universidad Mayor de San Simón, UMSS.

– Digital information:

1. Diagnóstico de Competitividad y Cadenas, UPB.
2. Nuestros Sectores de Producción, Desarrollando Empresarios Líderes. CADEPIA.
3. Revista de Agricultura. Memorias Cochabamba.
4. Biotechnology. UMSS.

Appendix 3:

Conclusions and recommendations 7Th annual global conference The competitiveness institute September 26–October 1, 2004 Ottawa

Nicaragua

WHAT STANDS OUT

1. How can innovation be integrated and complementary to cluster development methodology and how can cluster development be integrated into innovation systems. Cluster development needs incentives and public policies. Innovations Systems need incentives and public policies.
2. Clusters happened, it takes time cycles. Government can't force their development or create them by law. They are a tool for development and competitiveness.
3. University's role in cluster development is key element for innovation and competitiveness. Nicaragua has experiences in this: example UNA: Farming System Research and Development of Prototypes.
4. Public policies and government funding for Innovation is necessary for development and competitiveness in developing countries because the normal banking systems do not have funding available for technological risk.

How we can go forward

October–November 2004:

1. Share our experiences within our own institutions, and receive feed back.
2. Share Results with members of the National Technological Network (Red de Innovación Tecnológica) and receive feedback

January–February 2005:

3. Workshop on
   a. Competitive Funds for Innovation and Their Impact on Productive Process and SME
   b. Cluster Development and Competitiveness
4. Planning Workshop
   a. Discussion on National Science & Innovation Policies
   b. Discussion on Priorities and Best Practices
   c. Action Plan 2005–2006

5. Strengthening Different Actors
    a. Review Study on Institucional Capacities for Innovation (Estudio sobre Capacidades Institucionales para Innovación)
    b. Human Capital Development (PH D Programs)
6. Incentives for local Innovation as a tool for cluster development at the regional level.

Cooperation

7. Organize a network for communication and cooperation, sharing experiences and information: Nicaragua, Bolivia, Honduras
8. Identify common interests and possibilities for cooperation among the three groups, and different institutions.
9. Participate in Regional Meeting Bogotá TCI Conference February 2005 and learn from Latin American Experience in Innovation Systems: Colciencias (Colombia), Argentina and Chile.

Appendix 4:

Latin America Section for Ottawa Conference

Overview of Panels for Thursday 30 September 2004

Panel	Themes	Organisations	Persons	Chairman/ Comments
1	Entrepreneurial universities	Zamorano	Luis Velez (H)	Sverker Alänge
		UNAH	Juan Del Cid (H)	
		UPSA	Monica Rivero (B)	
		UPB	Luis Arteaga (B)	
2	Financing innovation	Banco Sol	Carlos Tores (B)	Sari Scheinberg
		Dicta	Julio Barahona (H)	
		MIFIC	Regina Lacayo (N)	
3	From Policy to Practical Experience of Clusters	Cidre	Julio Alem (B)	Sari Scheinberg
		FUNICA	Maria Briones (N)	
		UCB	Carlos Aguirre (B)	
		Ministry of Ed.	Patricia Escobar (B)	
4	From Research to Commercialization	UMSA	Alberto Gimenez (B)	Carlos Aguirre
		UMSS	Franz Vargas (B)	
		UNA	Freddy Alemán (N)	

H = Honduras
B = Bolivia
N = Nicaragua

1 Entrepreneurial universities

Panel – Themes	Organisations	Persons	Chairman/Comments
Entrepreneurial Universities	Zamorano UNAH UPSA UPB	Luis Velez (H) Juan Del Cid (H) Monica Rivero (B) Luis Arteaga (B)	Sverker Alänge

Purpose of this panel:

1. What is the current status of entrepreneurial activity existing in your university today
   a. what courses on entrepreneurship are being given and to whom
   b. what services and activities are being offered to the market – and to whom
2. How is intellectual property being managed today in your university
   a. examples of how IP is being protected
   b. ideas for how to improve the protection for IP

3. What supports and what hinders this entrepreneurial activities and IP in your university
   a. internal factors – in the university – i.e.:
      i. culture of doing research
      ii. money, budget
      iii. materials and resources
      iv. cooperation activities
      v. structure in the organisation
   b. external factors– in the market
4. What is needed in the future – ideas for next steps for improving entrepreneurial activity

5 minute Introductory Presentation
Please prepare at most 6 OH slides for your introduction presentation – aimed to answer the questions posed above.

Optional (not required, only if you want):
Summary description – 2 to 3 pages for a handout

1. Please describe the courses and programs you are now conducting that teach entrepreneurship
2. Who are the customers of these courses
3. What are the main goals of these courses
4. What are the results you have achieved
   a. how many students completed training
   b. how many businesses started
      i. what ideas
5. A list of ideas of what is needed for the future

2. Financing and innovation

Panel – Themes	Organisations	Persons	Chairman/Comments
Financing and innovation	Banco Sol Dicta MIFIC	Carlos Torrez (B) Julio Barahona (H) Regina Lacayo (N)	Sari Scheinberg

Purpose of this Panel:

A. Innovative financing:

1. Describe the innovations in the financial area – that you have been involved in developing
2. Who has been involved in developing these financial innovations
   a. 'in house' only (developed only within your organisation)
   b. consultants
   c. customers
   d. universities or research institutes
   e. government
   f. other financial organisations
   g. other?
3. What are these new instruments that are available for financing – please describe
4. How would you describe the success (or not) of these instruments

B. Financing Innovation

5. What is your experience in financing innovation?
    a. Overview – how many projects did you finance during the past year
    b. Give an example of an innovation project that you have financed
    c. Based on your experience, what are the strengths and weak nesses of the present way of financing innovation projects
6. What recommendations do you have to improve the process of financing innovation

5 minute Introductory Presentation
Please prepare at most 6 OH slides for your introduction presentation – aimed to answer the questions posed above.

Optional (not required, only if you want):
Summary description – 2 to 3 pages for a handout

1. of your organisation
2. of the financial instruments you are working with
3. of the innovation projects you are working on

3. From Policy to Practical Experience of Clusters

Panel – Themes	Organisations	Persons	Chairman/Comments
From Policy to Practical Experience of Clusters	Cidre	Julio Alem (B)	Sari Scheinberg
	Funica	Maria Briones (N)	
	UCB	Carlos Aguirre (B)	
	Ministry of Education (S&T)	Patricia Escobar (B)	

Purpose and Focus of this Panel:

A. Policy

1. What policies exist on the National level – that support innovation and innovation cluster development?
2. How are these policies being implemented – and what are the practical results?
3. Do you believe that the policies are working and support the innovation activities as needed
4. What recommendations do you have to improve the policies

B. Practical examples of innovation clusters

5. Present a cluster you are working with –
    a. Show this cluster in a visual way – indicating the various groups or organisations involved in your cluster
6. Present your experience in working with innovation clusters
    a. The development of the clusters
    b. The work of the clusters
    c. The results achieved in the clusters
7. What barriers, resistances and problems have you met that have made it difficult for you in working with and through innovation clusters
8. What will you do differently next time.
9. What questions remain to be proposed, solved, discussed?

5 minute Introductory Presentation
Please prepare at most 6 OH slides for your introduction presentation – aimed to answer the questions posed above.

Optional (not required, only if you want):
Summary description – 2 to 3 pages for a handout

1. of your organisation
2. of the polices on innovation, clusters, Science and Technology
3. of the cluster you are working with
4. of your experiences and recommendations for improvement

4. From Research to Commercialization

Panel – Themes	Organisations	Persons	Chairman/Comments
From Research to Commercialization	UMSA UMSS UNA Chalmers	Alberto Gimenez (B)) Franz Vargas (B) Freddy Aleman (N) Sverker Alänge (S)	Carlos Aguirre

Purpose of this Panel:

1. Presentation of the key research being conducted
   a. What research is being conducted in your university
   b. To what extent is this research being comm ercialized
   c. List the key research that has been commercialized
   d. If research is not commercialized, please describe why not
   e. How would you describe the market conditions for commercializing your research
2. Experience from a major innovation project – during the last 3 years
   a. What was the innovation
   b. Who was involved
   c. What was the experience of working in this configuration/cluster
   d. What results
      i. Technical
      ii. Commercial
   e. What were the biggest supports or hinders to this innovation process?
   f. Was the innovation protected (patent, pattern protection)
   g. What issues need to be addressed in the future –
   h. What will your next step be – to make improvements in your university

5 minute Introductory Presentation
Please prepare at most 6 OH slides for your introduction presentation – aimed to answer the questions posed above.

Optional (not required, only if you want):
Summary description – 2 to 3 pages for a handout

1. of your organisation
2. a list of your research areas
3. a list of your research that has been commercialized

Appendix 5:

Presentations for the Latin America Workshop. TCI Conference, Ottawa October 2004.

Presentations of Honduras:

- Zamorano. An Entrepreneurial University.
- UNAH. Business Management and Entrepreneurial Centre Department.
- DICTA. Re-plantation of coconuts trees tolerant to LYD.

Presentations of Nicaragua:

- MIFIC. Proyecto de Apoyo a la Innovación Tecnológica.
- UNA. La Investigación en la UNA.
- FUNICA. De la política a la práctica.

Presentations of Bolivia:

- Ministry of Education. Innovation Policies in Bolivia.
- UC. Comment. From Policy to Practical Experience of Clusters in Bolivia.
- UMSS. Research and Entailment at UMSS Structure.
- UPB. Universidad Privada Boliviana.
- CIDRE. From Policy to Practical Experience of Clusters.
- UPSA. About UPSA.
- Banco Sol. Of the Micro Credit to the Micro Finances.

For additional information or any questions, please:

Contact Recomate AB:
Sari Scheinberg or Sverker Alänge
Tel. +46 31 41 53 00
E-mail: sari@recomate.se

Honduras

Strategy for the Replantation of the Atlantic Coast of Honduras with Coconut Trees tolerant to the LYD.

Lethal Yellowing Disease Dissemintion

The Life Tree

126 Products:

Leaves

Stem

Kernel

Fiber

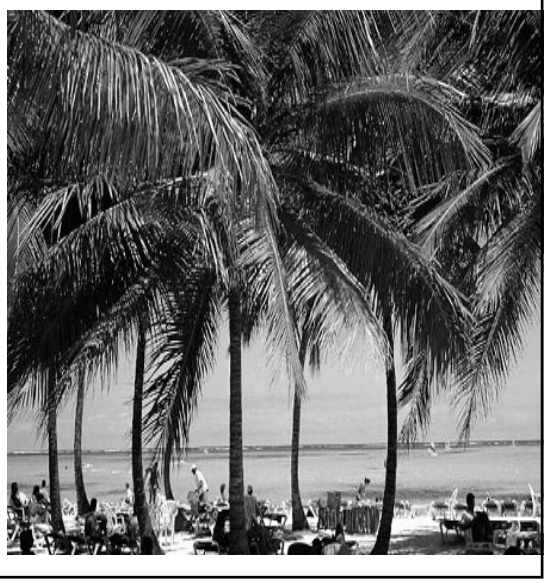
Husk

Beauty

ECONOMY

Before LYD

- **7,000 hectares**
- **1,300,000 trees**
- **8,400,000 coconuts**
- **US $ 2,200,000**



The Disease

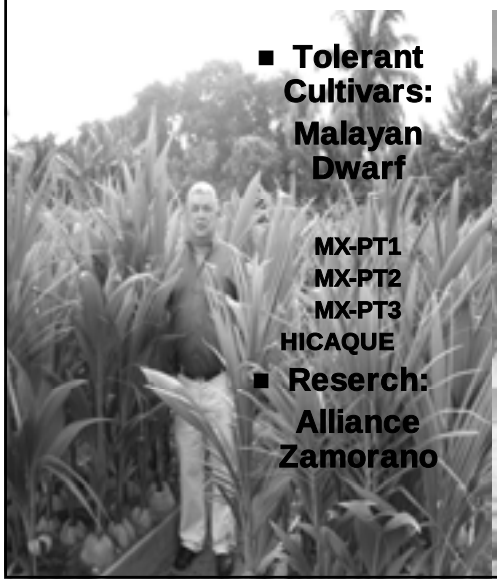
- **Cause: *Phytoplasm***
- **Vector: *Mindus crudus* Van Duzce**
- **No control**

Dissemination:

Present in Florida, Mexico, Guatemala, Belice, Honduras, Jamaica, Dominican Republic.

- **1995: Detected in Honduras**
- **2002: 90 % of coconut trees destroyed**

What are we doing?



- **Tolerant Cultivars:**

Malayan Dwarf

MX-PT1
MX-PT2
MX-PT3
HICAQUE

- **Reserch:**

Alliance Zamorano

Financing Strategy

- To replant 6,000 hectares would require over US $ 6,000,000
- Support from Japan:
  US $ 400,000
- 30 Mother Orchards:
  50 hectares.
- Alliance with about 25 Institutions and NOG's.

RED WAFALUMA

ADMINSTRATIVE ECONOMICAL AND ACCOUNTABLE SCIENCES FACULTY

BUSINESS MANAGEMENT AND ENTREPRENEURIAL CENTER DEPARTAMENT

UNAH

ACTUAL STATUS OF THE ENTREPRENEURIAL ACTIVITY

UNAH

- THE COURSES CURRENTLY GIVEN START FROM ENTERPRISES I
- TOTAL STUDENT POPULATION IS OF 289 STUDENTS
- THE TOTAL NUMBER OF BUSINESSES IN CREATION IS 25, OF SERVICE IS 16, OF INDUSTRIES IS 9, THE TOTAL NUMBER OF STUDENTS IS 187
- BUSINESS II 5
  SERVICE 3
  INDUSTRIES 2
  TOTAL STUDENTS 28

- BUSINESS III 7
  SERVICES 6
  INDUSTRIAL 1
  TOTAL STUDENTS 32

- BUSINESS IV 0

- BUSINESS V 10
  SERVICE 7
  INDUSTRIAL 3
  TOTAL STUDENTS 42

SERVICES AND ACTIVITIES OFFERED TO THE MARKET

- TILAPIA COMMERCE
- HONDURAN NATIONAL/TYPICAL CANDY
- HONDURAN WINE
- HANDMADE CRAFTS
- LEATHER ARTICLES
- FOOD AND DRINKS
- HONDURAN HONEY
- HONDURAN ECO-TOURS
- TOUR SERVICES
- GRAPHIC DESIGNS
- SPORTWEAR
- WOMENS´ CLOTHING SEAMING

INTELLECTUAL PROPERTY

- CONGRESS APPROVED GENERAL LAW
- THERE IS NO CONTRACT BETWEEN THE UNIVERSITY AND THE INTELLECTUAL PROPERTY INSTITUTE OF RECENT CREATION
- REGISTERING A MARK IS VERY EXPENSIVE FOR THE STUDENTS

IDEAS TO IMPROVE THE PROTECTION OF INTELLECTUAL PROPERTY

- MAKE A CONTRACT BETWEEN UNAH AND INTELLECTUAL PROPERTY INSTITUTE
- THE INSTITUTE HAS TO KEEP A REGISTRATION BOOK OF THE INTELLECTUAL PRODUCTS OF THE UNAHN AND ITS REQUISITES

SUPPORT AND OBSTACLES TO THE ENTREPRENEURIAL ACTIVITIES AND INTELLECTUAL PROPERTY-UNAH

- INTERNAL FACTORS OF THE UNAH

LITTLE INVESTIGATIVE CULTURE

TO THE ECONOMICAL SCIENCES FACULTY, A BUDGET IS ASSIGNED FOR TEACHER´S PAY RATHER THAN TO INVESTIGATION

RESOURCE MATERIAL FOR THE EDUCATIONAL-LEARNING PROCESS IS ALSO VERY LITTLE

EXCELLENT COOPERATIVE ACTIVITIES ARE MADE

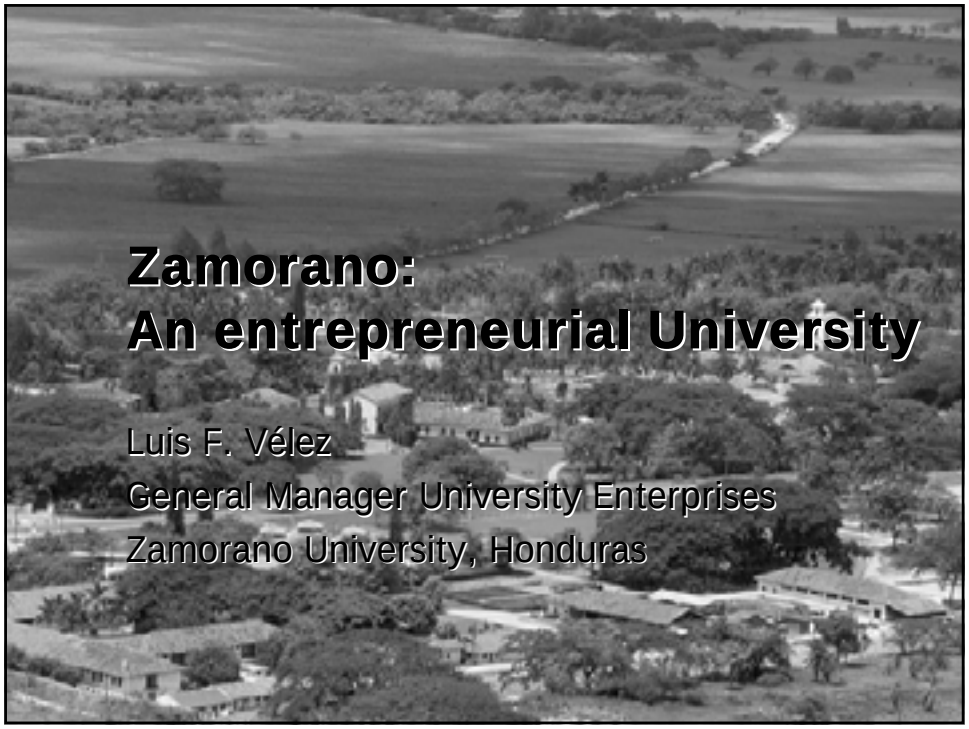
THERE IS AN ORGANIZATIONAL STRUCTURE THAT ANSWERS TO THE FACULTY´S NEEDS

EXTERNAL FACTORS

- THERE IS SCARCE CONNECTION WITH THE BUSINESS SECTOR
- THERE ARE VERY GOOD OPORTUNITIES TO CREATE AND OPERATE BUSINESSES IN THE DIFFERENT ECONOMICAL SECTORS

SOME IDEAS TO IMPROVE THE STUDENT´S ENTREPRENEURIAL ACTIVITIES

- ESTABLISH A PHYSICAL SPACE IN THE UNIVERSITY CAMPUS APPROPRIATE TO OPERATE THE BUSINESSES CREATED INT THE ENTREPRENEURIAL CENTER
- AFTER HAVING COURSED THE 5 BUSINESS FORMATIVE LEVELS, THEY SHOULD BE TRANSFERRED TO OPEN MARKET
- FORTIFY THE FINANCIAL CENTER CREATED BY THE TEACHERS AND STUDENTS OF THE ENTREPRENEURIAL CENTER WITH A FEE NO LESS THAN **$ 54,000.00** AND FROM THIS FIGURE, FINANCE BUSINESS PROJECTS TO STUDENTS UP TO **$ 600.00**. ONCE THIS STAGE IS COMPLETED, PLACE THE SINGLE MOTHER TAHT WORKS IN HOUSEKEEPING AND THAT IS INTERESTED IN CREATING AND OPERATING HER OWN MICROBUISNESS, THE ENTREPRENEURIAL CENTER WILL ELABORATE AN ANALYSIS AND THE FIANACILA CENTER WILL AID HER.
- INTEREST RATE FOR THESE STAGES WILL NOT BE GREATER THAN 10% IN LOCAL CURRENCY



The challenges

- Rural poverty
  - Latin America's rural sector has both one of the lowest levels of per capita income and one of the most unequal income distributions
- Environmental sustainability
  - Latin America is rapidly destroying its forests and sources of water
- Global competitiveness
  - Latin America's rural sector may be unable to compete under free trade (as proposed by the Free Trade Agreement of the Americas and/or Central American Free Trade Agreement)

Scenario 1

- Agricultural sector unable to compete under CAFTA
  - No increase in exports
  - Imported food and feed replace local production
- Increase in rural poverty and urban migration
- Increase in illegal immigration to North America
- Further environmental degradation as rural poor seek means of survival
- Cycle of poverty leads to further economic and political instability

Scenario 2

- Agricultural sector develops sustainable competitive advantage
  - Development and transfer of sustainable technology and management practices in production, processing, and marketing of agricultural products
  - Small farmers incorporated into agribusiness value chain
- Improved natural resource management through use of sustainable technologies and economic opportunities

Zamorano Entrepreneurship Center

Mission

To foster entrepreneurial spirit and to develop entrepreneurial skills among Zamorano students and rural communities serviced by Zamorano

Objectives

To motivate target groups to initiate their own business and to prepare them with appropriate skills to do so.

To accompany new businesses in the initial phase of formation.

Zamorano Entrepreneurship Center

Results

- ✓ Training biz plan writing and negotiation techniques
- ✓ Biz plan contest; five finalists
- ✓ Celebration of entrepreneur´s day
- ✓ Case writing on successful Zamorano graduate biz
- ✓ Micro-enterprise development in rural high schools

Six school based businesses:

Small furniture shop
Three bakeries
Sports clothing production
Welding shop

Nicaragua

Ministerio de Fomento, Industria y Comercio

Proyecto de Apoyo a la Innovación Tecnológica en Nicaragua

Préstamo BID No.1079/SF-NI

Objetivo General

Crear las bases para un

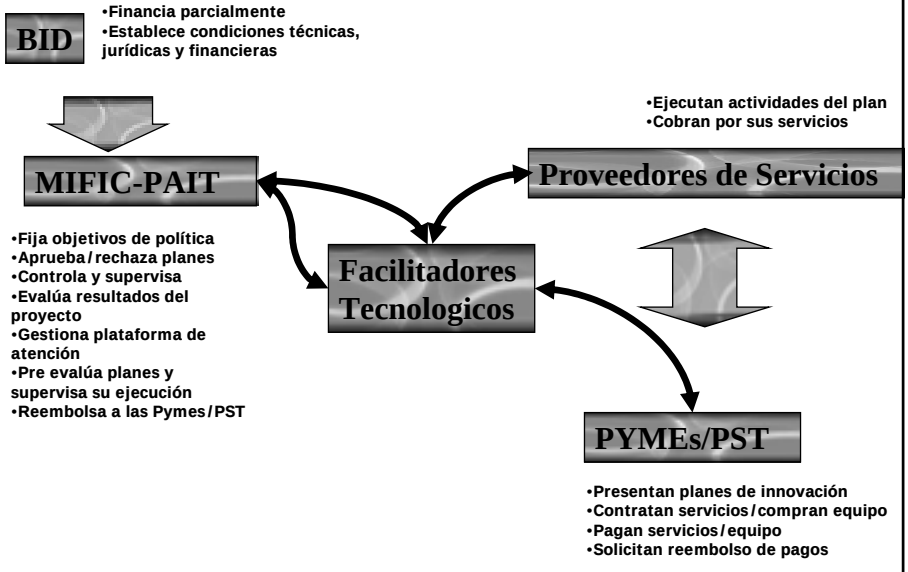
Sistema Nacional de Innovación (SNI) que apoye las innovaciones tecnológicas en las empresas nicaragüenses

Objetivos Específicos

Financiamiento no reembolsable para Planes de Innovación de Pequeñas y Medianas Empresas (PYMEs) y Prestadores de Servicios Tecnológicos (PST: Laboratorios, Universidades, Centros de Servicios Tecnològicos)

Fortalecimiento de organismos públicos vinculados a la innovación (CONICYT, DTNM y LABAL)

¿Cómo está funcionando el proyecto?



Definición de Innovación Tecnológica

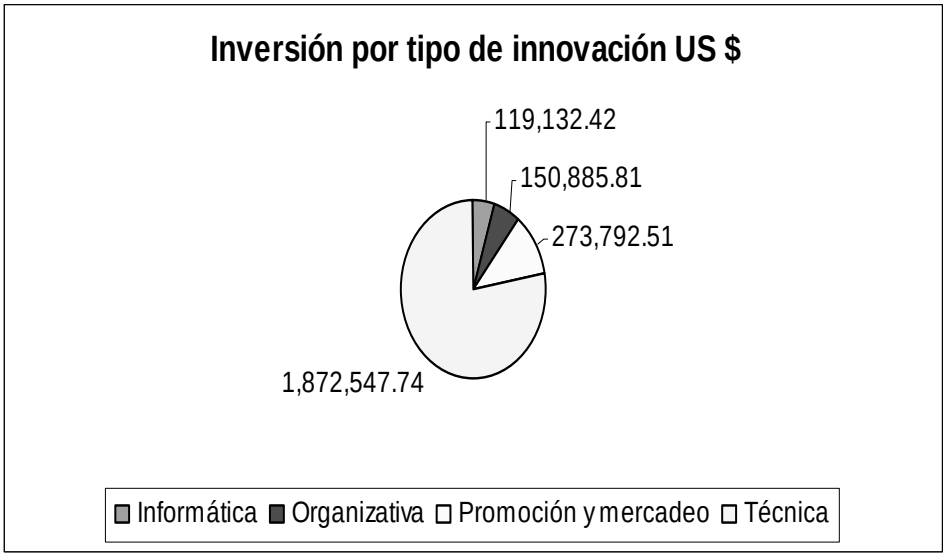
Introducción de un nuevo proceso, producto o servicio que permita obtener mayor eficiencia, calidad , productividad y una reducción en los costos de producción.

- **Nuevo producto**
- **Nuevo proceso**
- **Nueva estrategia de negocios**
- **Nuevo mercado**
- **Nueva norma de calidad**
- **Nuevo empaque, registro de marcas, patentes, diseño de prototipos, maquinarias**

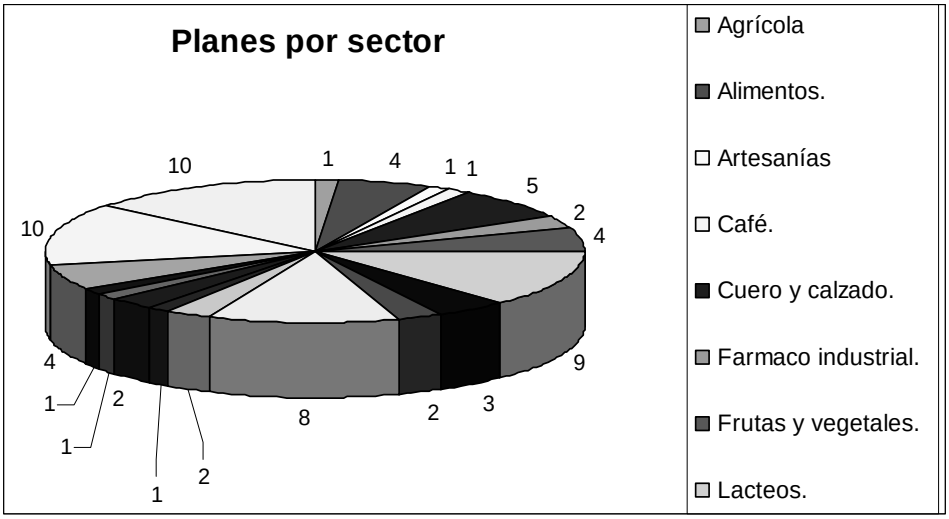
METAS Y AVANCES

	META	MONTO US $	AVANCE	%	MONTO US $	%
PYME	60	US$ 2.1M	47	78%	$881,037	42%
PAS	-	-	14	23%	$933,840	44%
PST	8	$800,000	10	125%	$652,458	82%
TOTAL	68	US$ 2.9M	71	104%	$2.467M	85%

Destino de los Fondos



Nº de planes por sector



Hacienda San Rafael

Matagalpa, Nicaragua

Organic coffee, grown and processed according to the ecological and organic regulations of Starbucks

New Process.....

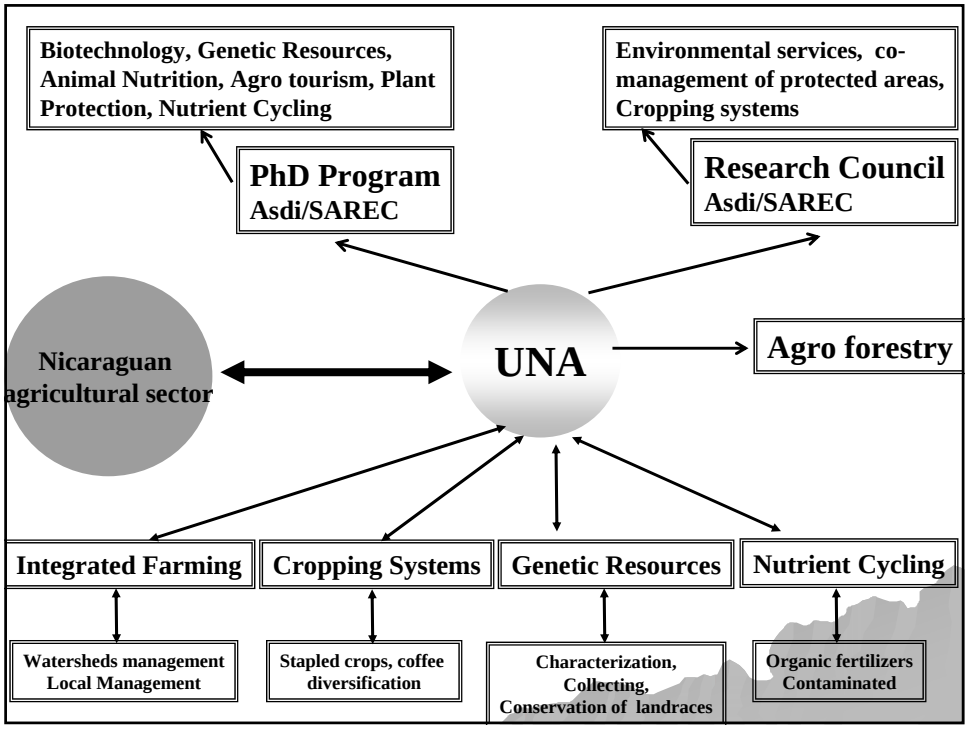
Final Product

Muchas Gracias

UNIVERSIDAD NACIONAL AGRARIA

MANAGUA, NICARAGUA

1. Presentation of the Key research being conducted



b)To what extent is this research being commercialized

- **Few research at UNA are commercialized**
- **Some technologies are produced in small scales**

c) List the key Research that has been commercialized

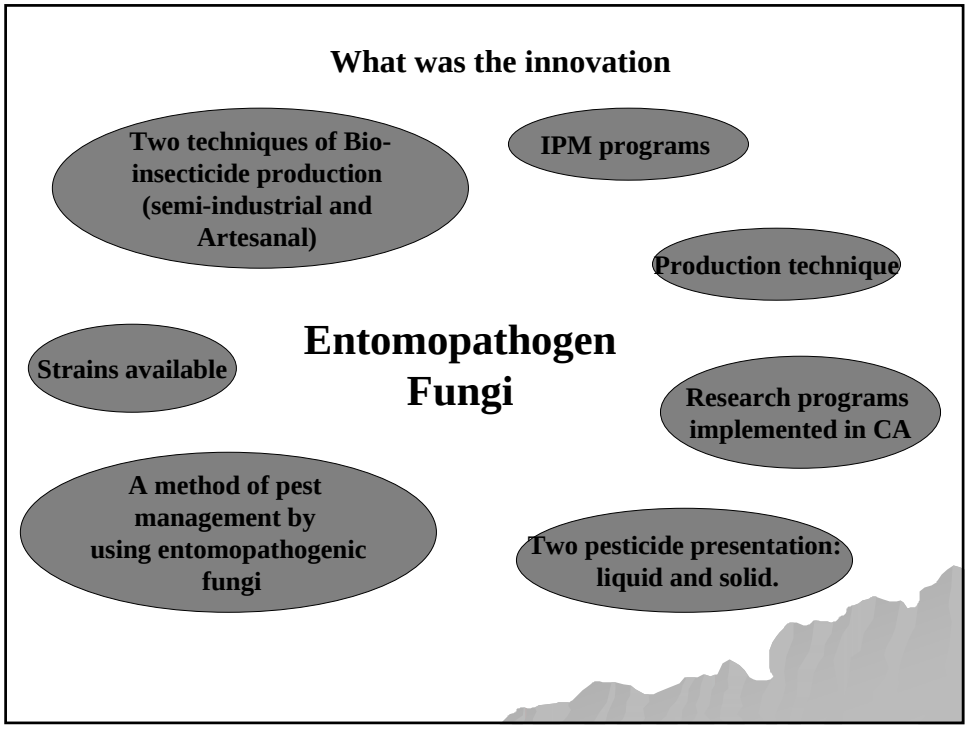
- **Rapid multiplication techniques in Cocoyam, Taro, plantain and bananas (Green house techniques).**
- **In vitro propagation (pineapple, cocoyam, taro, plantain and banana), healthy plant material.**
- **Use and management of landraces for animal feeding**
- **Use of entomopatogens fungi**

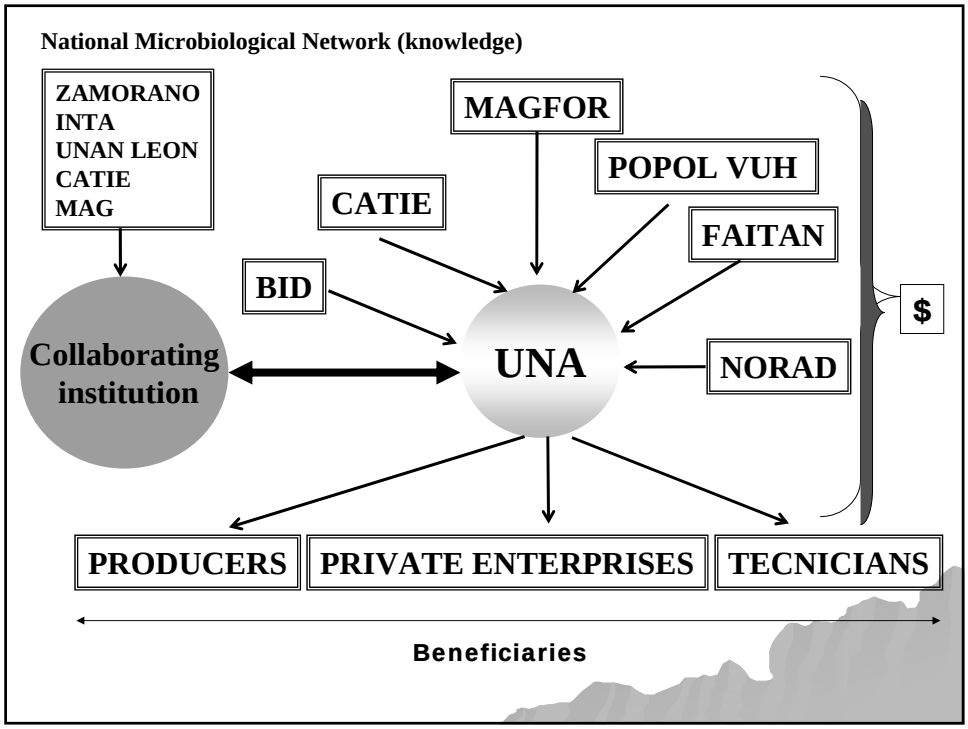
d) If Research is not commercialized, please describe why not

•Technology for small farmers, for small industry.
•Role of the University to generate the technology, but not to commercialized.
•Farmers organization or private sector should take care of commercial production
•Difficult to initiate industrial production of the products of research.
•Financial support
•University have done commercialization at small scale, but it limit our mission.
•Huge demand of technology, but not possibilities of commercial development.
•Cluster not organized

e) How would you describe the market conditions for commercializing your research

❖


What was the innovation
Two techniques of Bio-insecticide production (semi-industrial and Artesanal)
IPM programs
Production technique
Entomopathogen Fungi
Strains available
Research programs implemented in CA
A method of pest management by using entomopathogenic fungi
Two pesticide presentation: liquid and solid.


National Microbiological Network (knowledge)
ZAMORANO
INTA
UNAN LEON
CATIE
MAG
MAGFOR
POPOL VUH
CATIE
FAITAN
BID
$
Collaborating institution
UNA
NORAD
PRODUCERS
PRIVATE ENTERPRISES
TECNICIANS
Beneficiaries

c) What was the experience of working in this configuration / cluster

Working as a network

Teachers / Researchers working outside the University

d) What results

Technical

- **Mass production methods for insect pathogenic fungi: Semi – industrial production and Artesanal production**
- **IPM Program on Sugarcane, Coffee, Banana and Plantain, Cabbage, Sweet Pepper**
- **•An impact of the technology, people abroad are interested in the technology**

Commercial

- **•A volume of production (6 000 ha year-1)**
- **•A Signed deal with a major Agro industrial sugar cane factory**
- **•Improvement of the technology to produce the fungi**
- **• New Isolates collected**
- **•Two formulated and unformulated products available**

What were the biggest support or hinders to this innovation process?

- **Financial support**
- **Organization**
- **Inter - institutional linkages (CATIE)**

Was the innovation protected? **No,**

- **Natural product**
- **It is possible to protect the process, but it is already published**

- **There is a process of registration of the pesticide.**

Issues that need to be addressed in the future

- **Production processes (very rudimentary)**
- **To pass from semi industrial to industrial production**
- **Modern equipment (appropriated)**
- **Molecular characterization of the strains**
- **To improve the formulation of the product**
- **To enlarge the spectrum of fungi (at the present time six strains).**
- **Collection and production**

h) What will your next step be – to make improvement in your University

- **Infrastructure**
- **To improve conditions for drying, harvesting, infrastructure)**

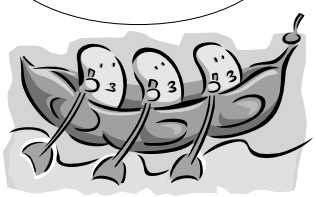
DE LA POLITICA A LA PRACTICA

Nicaragua

FUNICA

ONG´s (4)
CESADE
CIPRES
CEPAD
RELATA

Instituciones Públicas (4)
INTA, INATEC,
MAG-FOR, IDR



Asociaciones de Productores (7)
UNAG
UPANIC
APENN
ANPROSOR
ANAR
UNICAFE
UNCAFENIC

Universidades (5)
UNA
UNAN-León
UNAN-Managua
UCA
URACAAN

Gremios de Profesionales (2)
CIAN, ANIFODA

Nuestra Misión:

"FUNICA es una instancia interinstitucional que crea y fortalece capacidades para el desarrollo rural, con énfasis en tecnología agropecuaria, forestal y ambiental, enfocada a la competitividad, equidad y el mercado".



Política de Innovación en Nicaragua

- **El país ha entrado en un proceso de planificación con visión de mediano y largo plazo**
- **La política de Ciencia y Tecnología y de innovación en el país es de reciente creación**
- **Los esfuerzos en Ciencia y Tecnología y de innovación estaban regidos por enfoques externos**


Plan Nacional de Desarrollo

- **Abarca todos los sectores del país**
- **Es el primer esfuerzo de planificación del país con visión de futuro**
- **El concepto que sustenta el plan, es la "competitividad" y cadenas agroalimentarias**
- **Considera tres aspectos importantes:**
  - **Negocios e inversión privada**
  - **Promoción de exportaciones**
  - **Infraestructuras y desarrollo local**

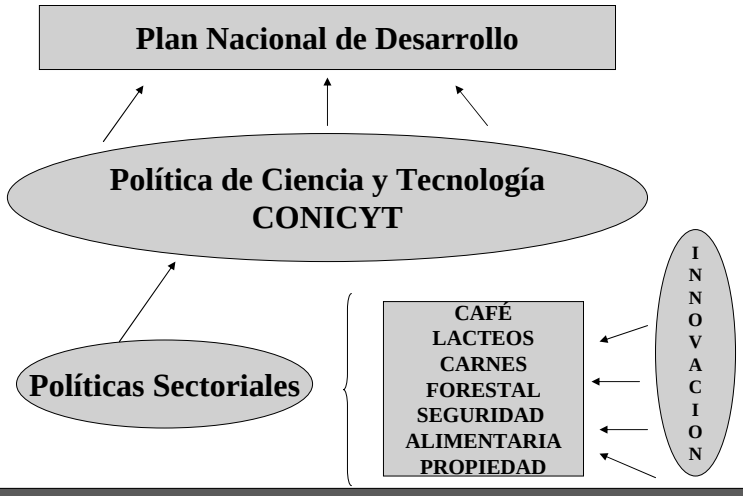
Política Sectorial

- **Principios**
  - **Cadenas Agroalimentarias**
  - **Territorialidad**
  - **Aprovechamiento de ventajas comparativas**
  - **Desarrollo de ventajas competitivas**
  - **Infraestructura**

Lineamientos de la Política de Innovación del Sector

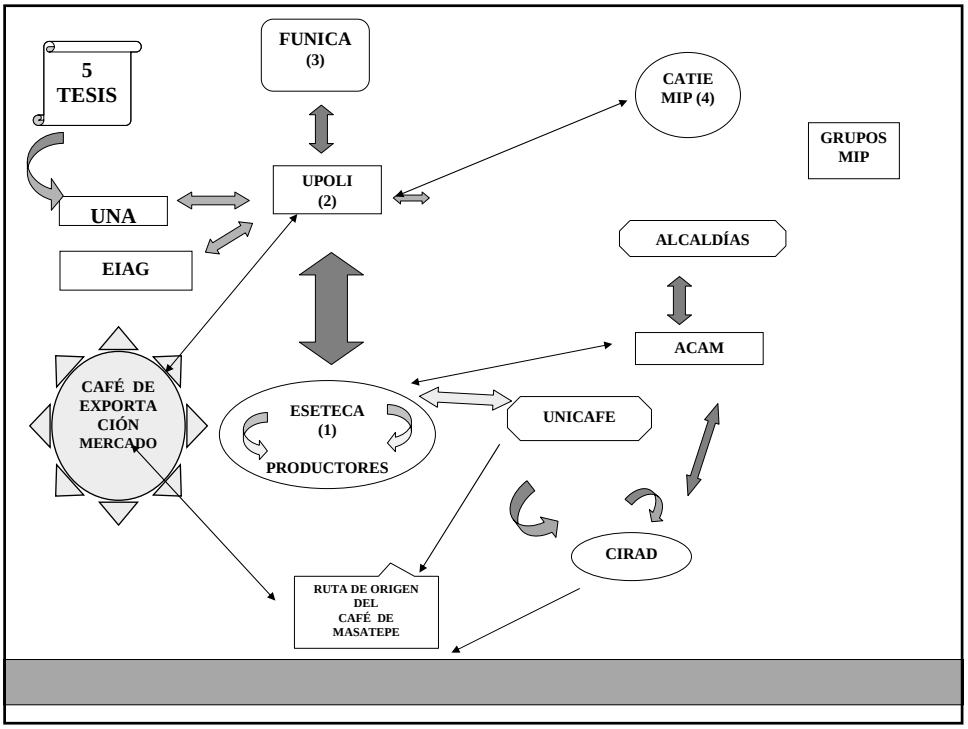
- **Impulso al marco institucional para el desarrollo tecnológico**
- **Promoción del mercado de servicios tecnológicos públicas y privadas**
- **Fortalecimiento del SINTAR**
- **Promoción de redes locales de innovación**
- **INIA entidad rectora de la investigación y extensión**
- **Fortalecimiento del sistema nacional de semilla**

Articulación de las políticas nacionales

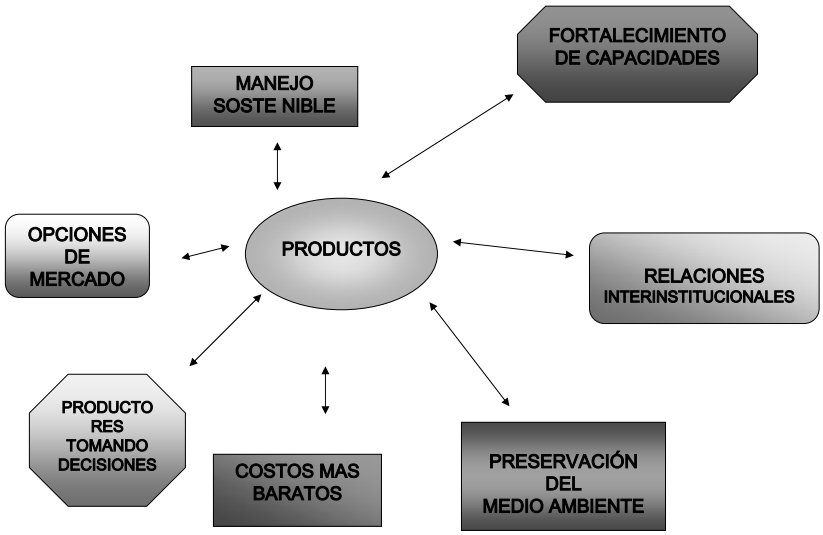


Resultados del PNTFTA-FUNICA

- **Desarrollado un marco institucional aunque incipiente del desarrollo tecnológico**
- **Ampliado el mercado de servicios tecnológicos**
- **Fortalecida la capacidad del sistema de innovación nacional**
- **Ampliada la participación del sector privado en la construcción de la política de innovación del país**
- **Articulado la extensión-educación-investigación**
- **Desarrollado mecanismos competitivos como una herramienta para el desarrollo tecnológico**



PRODUCTOS



Conclusiones y Recomendaciones

- **El desarrollo de conglomerados requiere de políticas claras y un marco jurídico legal que garantice su sostenibilidad , fomente la organización y la inversión de capital privado.**
- **Romper con barreras culturales de aislamiento y desarticulación en los territorios se vuelve una condición para consolidar los conglomerados.**
- **El involucramiento de los actores en los procesos de Planificación garantiza la apropiación de los procesos y sus ventajas.**

¡¡¡Gracias !!

FUNICA

Bolivia

BancoSol
Juntos crecemos

BANCOSOL and the Innovations in MICRO FINANCES

"OF THE MICRO CREDIT TO THE MICRO FINANCES"

Carlos Jesús Tórrez T.

"7th Annual Conference of The Competitiveness Institute"
Ottawa Canada

BancoSol
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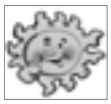
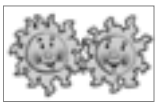
¿WHO WE ARE?

MISSION VISIÓN

VALUES


SERVICE


INTEGRITY


RECIPROCITY


COMPROMISE


COHERENCE

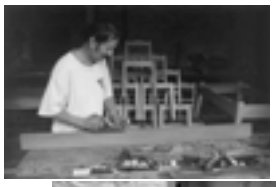

RESPONSIBILITY

TECHNOLOGICAL INNOVATIONS

- Scorings.
- Proceses Automation.
- Diversification of Products.
- Creation of aggregate value for the Products.

SCORINGS DEVELOPED

- Scoring of **Selection**



- Scoring of **Segmentation**

- Scoring of **Recovery**

¿HOW WE MAKE IT POSIBLE?

- Committee of projects and Innovations

Benefit to Client

EVALUATES
Social Impact
Economic Cost
Inverted Time

Beneficit Institutional

Beneficit to the Functionary

- Work Team the Innovation

Functinarys
Institutions
Consultants
Purveyors

EXPERIENCES

- OBSTACLES
  - Fear for the unknown
  - Resistance to the change
  - Uncertainty
  - Change of habits
- EXPERIMENTAL WORK TEAM
  - To Plane work
  - To assign responsable
  - Indicator of quality
  - Ejecution time
  - Opportunity of the decisions
  - Involving to all the team
  - To assuming responsabilities
  - To center in the benefits
  - Productive meetings
  - Contingency plans

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Testimonies

The **Scoring of Collection**, permitted to the agency to have a work but organized, for manage to reach our budget of placements, two days before balance closing, the environment lived in it finalizes week, of the month, was of greater tranquility, the advisors were not anguished by carrying out its routine works.

Ma. Aidee Sandoval Y. **Manager Ag. El Pari**

Really it is a lot of aid, because other charge for my, the day of the balance, is a normal day; i felt rested, not as in other occasions, finished the day, exhausted without desires for the following day.

María Tordoya **Assesses of Credit**

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Thank You, very much

www.bancosol.com.bo

UNIVERSIDAD PRIVADA BOLIVIANA

7th Global Conference of The Competitiveness Institute

Ottawa September 2004

University Description

- National University (Cochabamba, La Paz, Santa Cruz, Oruro, Tarija)
- Grounded in 1992 from a businessmen initiative stated in 1986.
- Faculties of Engineering, Economic and Entrepreneurial Sciences, Applied Research, Postgraduate Studies and Student Affairs
- 17 undergraduate and 9 postgraduate programs
- 1000 undergraduate students and 350 postgraduate or continuing professionals (1/10)

2

Entrepreneurial Teaching

- **Basic Courses**: Accounting, Finance, Marketing, SME Planning, Administration and Management, Human Resources Development, Project Formulation, Evaluation & Management, Research Techniques, Consulting Competencies
- **Advanced Interactive Courses**: Business Simulation, Product Development Simulation, Stock Investment Simulation, Team Business Creation, Entrepreneurial Training

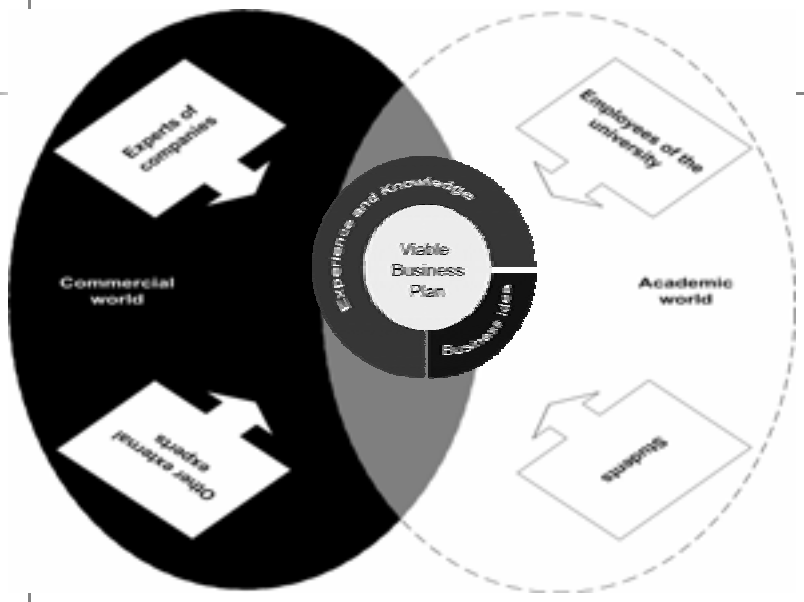
3

Entrepreneurial Activities

- International Student Internships (17 TU Delft Students)
- Entrepreneurs Programme for Undergraduate Students
- Associated Applied Research (Industrial & Business Solutions)
- Consultancy Office (SME export promotion)
- University Project's Office

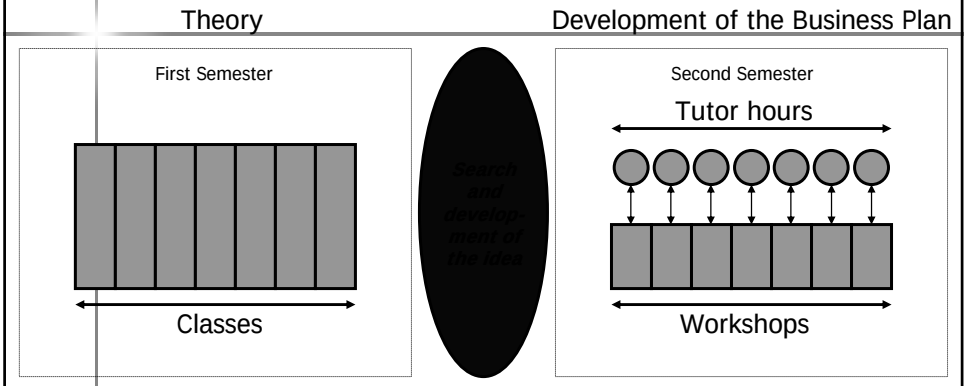
4

Combining two worlds



5

Model



6

Support to Entrepreneurship

- University's Mission and Vision
- Academic Structure
- Recognition of local and international IP regulations and practices
- Bolivian System of Productivity and Competitiveness
- Scientific Community (Applied Research)

7

Hinders to Entrepreneurship

- Lack of scientific culture and funding
- Local mistrust between universities and industries
- "Foreign is Better" attitude among consumers
- Low Intellectual Property protection
- Difficult and expensive industrial funding

8

Next Steps

- Enhancement of scientific capacities
- Diffusion and Training in clustering Best Practices
- Catalysis of formal networks
- Promotion of international joint ventures
- Affordable risk funding

9

MINISTRY OF EDUCATION

Office of Science and Technology

Innovation policies in Bolivia:
The Plan of STI
(2004-2009)

September-October, 2004
Ottawa, Canada

THIS PLAN IS …

- Instrument of the scientific policy of the Bolivian Estate
- Instrument of management of knowledge:

  - **Creation, adaptation, etc.**
  - **Application to:**
    - » **Social use**
    - » **Productive use**

2

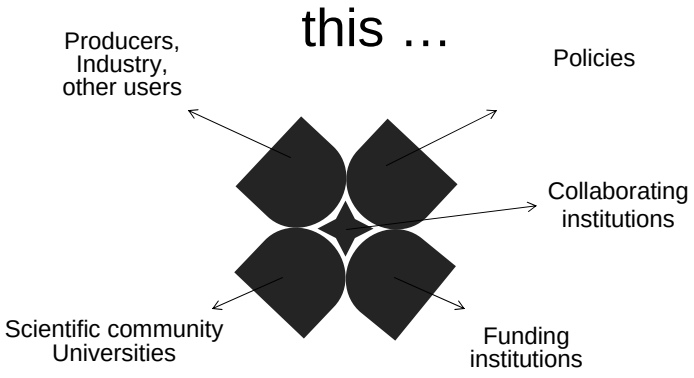
… SO FAR …

- No overall & longstanding policy on support of R & I

Isolated and/or sectoral/ sporadic initiatives only

3

Therefore, rather than looking like this …

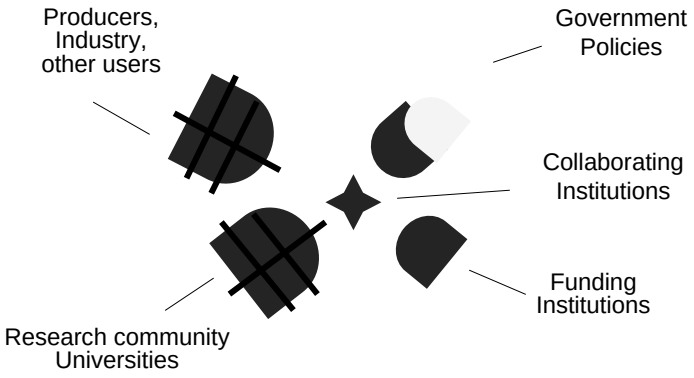


The Cluster Initiative Greenbook
Sölvell et al.2003
Cited by Alänge, S.

4

The Bolivian Innovation System …so far ..

looks like this …



5

OBJECTIVES SET IN THE PLAN …

.. ARE AIMED AT:

- *Fostering and orienting R & I*
- *Enhancing capabilities of actors*
- *Promoting/building interactions*

6

BY MEANS OF ….

.. Undertaking the execution of:

PROGRAMS

Functional units
of implementation

7

… Comprising:

- R&I sectoral programs (6)
- Horizontal Programs (3)
- “Mobilizing” programs (3)

8

AND MANAGEMET FEATURES …

.. including:

- Open calls
- Competitive funds
- *Ex ante* assessment of applications

9

With the overall purpose of …

▲ **contribution of S&T**

▼

Development of the country

10

… AS ….

APPLICATION OF KNOWLEDGE

SOCIO-ECONOMIC OBJECTIVES

INCREASES EFECTIVENESS OF DEVELOPMENT INSTRUMENTS

11

THANK YOU .. THE END

12

FROM POLICY TO PRACTICAL EXPERIENCE OF CLUSTERS

Julio Alem - Bolivia

CONTENT OF THE PRESENTATION

1. NATIONAL POLICIES TO PROMOTE PRODUCTIVITY AND COMPETITIVENESS

2. INNOVATION EXAMPLE FOR THE DEVELOPMENT OF QUINUA CLUSTER IN BOLIVIA

BOLIVIAN POLICIES FOR CLUSTER'S DEVELOPMENT

1. It is the State responsibility to promote and orientate the development of the productivity and competitiveness in the country (Executive Government Organization Law)
2. The Decree 26391 (8/Nov/2001) defines the lineaments, the national policies and the institutional framework to encourage and to promote the productivity and national competitiveness
3. Institutional framework
   - Executive representatives
   - Academy representatives
   - Private sector representatives
4. The coordination of the System is in charge of the Competitiveness and Productivity Unit (UPC) depending on the National Ministry of Economical Development

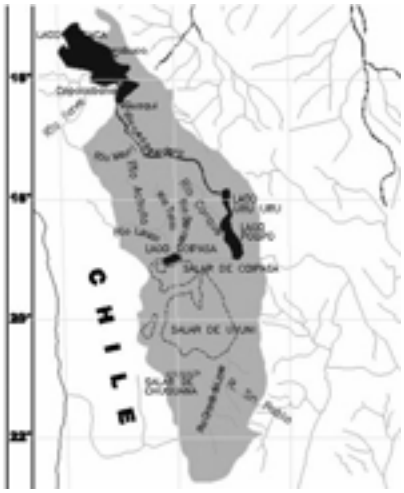
METODOLOGY TO DEFINE AND EXECUTE THE POLICIES

1. Interministerial Agreement (Economical Development, Agriculture, External Commerce and Investment)
2. Strategical Planning and Cluster Priorities
3. To promote Competitiveness Agreement for Chains defined as priority in the national level. Committee of Competitiveness for product, with the participation of public institutions, municipalities, universities, SIBTA and the direct economic actors of the cluster.
4. Sign of "Share Responsibility Agreements" or Framework of Commitment and Actions are in charge of everyone of the public and private institutional actors.

EVALUATION OF THE REACHED GOALS

1. **After 15 years of structural adjustment policies that limited the public investments in the economic level, this is the only and first group of state interventions. Even though, it is a very low level of implementation of the Share Responsability Agreements.**
2. **15 Agreements signed between 2001 and 2004, with the participation of national government and producers involved. (Cotton and Textiles, Poultry, Banana, Meat, Camelids, Brazilian Nuts, Leather and Manufactures, Beans, Wood, Palm heart, Quinoa, Soy, Wheat, Tourism, Grapes and Wine)**
3. **In all the signed Agreements, it is verified the absence of de academic and financial institutions**
4. **It has been assigned a lot of emphasis in the level of the production factors: natural resources and labour conditions. But, in the other side, there´s been few articulation with the knowledge and financial capital factors.**

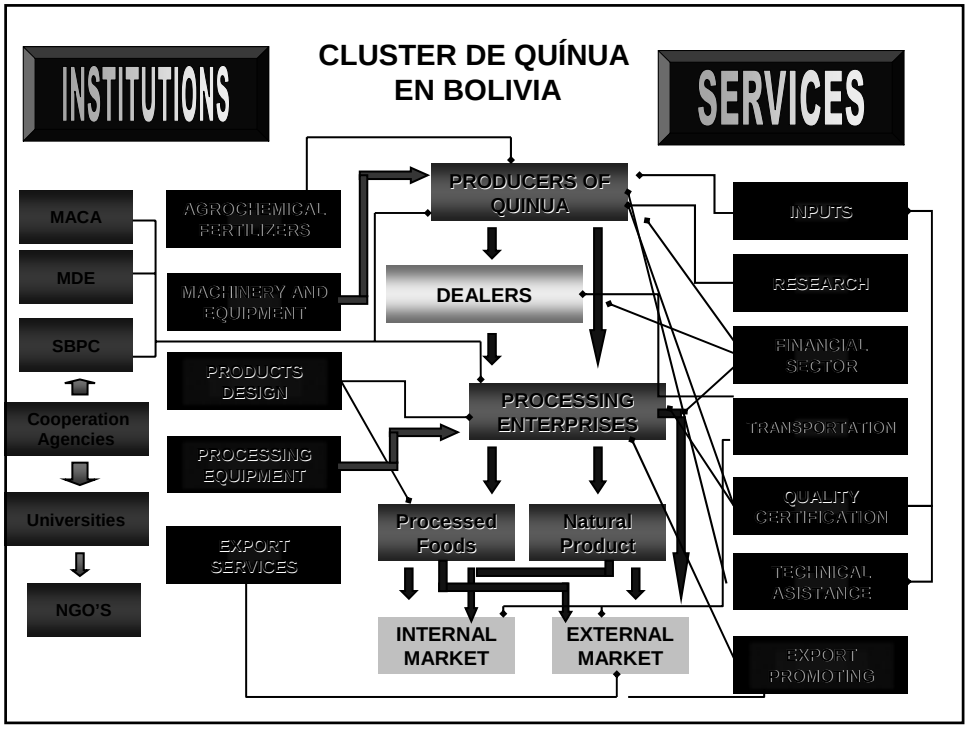
EXAMPLE OF THE ROYAL QUINUA CLUSTER



REGIONES PRODUCTORAS	% Pobreza	Población
MUNICIPIOS ORURO		46,487
Challapata	90.3%	24,370
Quillacas	92.3%	3,305
Salinas de García Mendoza	96.7%	8,723
Pampa Aullagas	97.1%	2,975
Sabaya	95.2%	4,684
Coipasa	98.9%	616
Chipaya	99.3%	1,814
MUNICIPIOS POTOSÍ		40,777
Colcha "K"	88.8%	9,645
San Pedro de Quemes	95.4%	815
San Pablo de Lipez	99.8%	2,523
Mojinete	98.3%	716
San Antonio de Esmoruco	99.8%	1,666
Uyuni	58.3%	18,705
Llica	88.7%	2,901
Tahua	99.7%	2,166
San Agustín	98.7%	1,640
MUNICIPIOS LA PAZ	97.2%	49,183
TOTAL	93.8%	136,447

Population: 2% of the national population
Surface: 90.000 Km^2
8% national surface

CHALLENGE: TO DEVELOP A SECTOR WICH HAVE A WIDE ECONOMIC POTENTIAL WITH A POPULATION IN THE EXTREME POVERTY



STRATEGICAL VISION FOR THE QUINUA CLUSTER

BOLIVIA: PRINCIPAL WORLD'S PRODUCER OF CERTIFIED QUINUA

Sustainable Production of 40.000 metric tons / year, throughout:

- ***Incorporation of Technology to double the actual yield***
- ***Farmer traditional organizations producing the 50% of the national exports***
- ***State active promotion between every actor involved***

Problems between cluster agents	Problems related with the government
Reduced integration (vertical and horizontal) between cluster agents	Deficiencies in the export promoting role of quinoa
Absence of entrepreneur vision in the different agents of the chain	Absence of financial services
Limited technological development	Reduced public investments in infrastructure
Deficiencies to conserve quality of organic quinoa	Absence of legal securities

ANOTHER POINT OF VIEW OF THE PROBLEMS

PEASANTS FAMILIES

1. Lack of Infrastructure for Irrigation to assure production
2. Reduced availability of machinery to soil preparing, sewing, harvesting
3. Organic Quality Certifying
4. Culture rotation
5. Fertility, erosion and risk of salinity of soils
6. Integrated plague control
7. Quality of seeds
8. Post-harvesting technologies
9. Absence of guaranties for credits

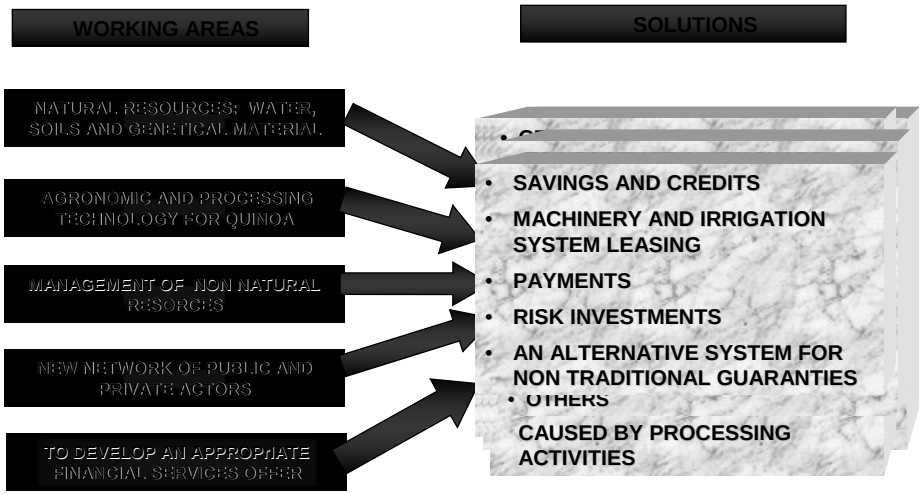
PROCESSING ENTERPRISES

1. Relationships between peasants, dealers and processing enterprises very unfavorable to the peasants
2. Technology to remove saponinnes
3. Problems in the colour control of the grains
4. Reduced degree of diversification of products
5. Credits too expensive

COMMERCIAL ENTERPRISES

1. Reduced transparency of markets
2. Distortion of markets caused for smuggling quinoa to Peru
3. Reduced development of external markets
4. Reduced degree of integration of cluster agents
5. Warrant and other kind of financial services less or underdeveloped

POSSIBLE SOLUTIONS FOR THE PROBLEMS OF CLUSTER



THANKS FOR YOUR ATENTION

From Policy to Practical Experience of Clusters in Bolivia
(A comment)

Carlos Aguirre B.
The Catholic University of Bolivia
caguirre@ucb.edu.bo

I. Policies

In the mid 1980's Bolivia led several developing countries in inserting itself into a free market economy, reducing government interference in the operation of markets and integrating economically with the rest of the world. In spite of this effort and almost 20 years after, the results of social and economic development are not very encouraging. The country remains one of the poorest in the world as measured by any indicator.

As noted by Sachs and Vial (2002), such situation reflects difficulties that go beyond a simple transition from a protected to an open economy. In the recent past, much attention has been given to deal with unemployment, inequities, fight poverty, but much less attention given to build stronger basis of continuous and sustainable growth. At the same time, there has been preoccupation of maintaining and improving democracy, but not the protection of property rights and the provision of juridical security, which is the basis for the operation of a modern economy. Further, much less attention has been given to issues such as growth, competitiveness and innovation, which are the basis on which growth and social welfare rests today.

Until the end of 2003, the economic agenda continued to consider macroeconomic stability as a fundamental condition for economic growth and social development. For 19 years different governments have given up most priority to macroeconomic variables. However, in October 2003, social unrest grew to extremes and forced a change of government and also of economic policies.

In January 2004, the new Government established (Decree No. 27321) the National Council for Industrial Development as a policy proposing organization, and in charge of coordinating policies, programs and projects between Government and private economic agents, and whose proposals would be channeled through the Ministry of Economic Development.

In February 2004, Government adopted an "Economic Program" providing a new vision of the country's economy. The "Program" consists of six parts: Austerity; Production, exports and job creation; Solidarity; Physical infrastructure; Modification of the hydrocarbons law; and Fight against fiscal deficit and new tax regulations.

Relevant to this comment is Part 2 (Production, exports and job creation) which has as objectives, among others:

a) "Buy Bolivian". Purchases from local providers will increase from a present 200 million USD to 600 million USD per year. In government bids, around eight millions USD (80% of direct government purchases of manufactured goods) will be addressed only to Bolivian firms. In the bids in which national and foreign suppliers will participate, Bolivian firms will receive a 20% bonus.

b) "Export promotion". The present special tax and financial regime applicable to four sectors: woods, gold, textiles and leather, will be extended to all export sectors. Tax duties on capital goods will be differed for three years and also imported industrial turn-key plants will be tax exempted.

c) Credit incentives. Measures are being taken so that the national financial commercial system participate more actively in production efforts. Those banks lending more will have special incentives against their assets. A special case for this sector is the so

called “enterprise hospital”, in which firms with financial problems will approach banks for reprogramming their debts, under government led funds.

d) Impulse to productive value chains will be supported by further government intervention, for example by channeling funds to specific products such as quinua (chenopodium quinoa - the Andean cereal). Such funds will be addressed to investments, risk capitals and guarantees, and will be integrated also by international funds. Mining and housing are also two sectors of priority in the Plan.

The latter policy definition is closely related to cluster development in Bolivia. In fact, the concept of value chain arose form that of a “cluster”. As such, the new policy is addressed to support cluster development. However, it should be noted that “innovation” is not referred to directly, so an important effort will be necessary to link “cluster development” to innovation and thus create a truly “innovation cluster“. This effort should be carried out both at the enterprise level as well as the academic community. Universities have a major role to play to support the transformation of present operating clusters into innovation clusters.

The existence of the Bolivian System for Agricultural Development (SIBTA) and its four foundations are key institutions to support innovation in clusters and present policy should provide ways and means to support its activities.

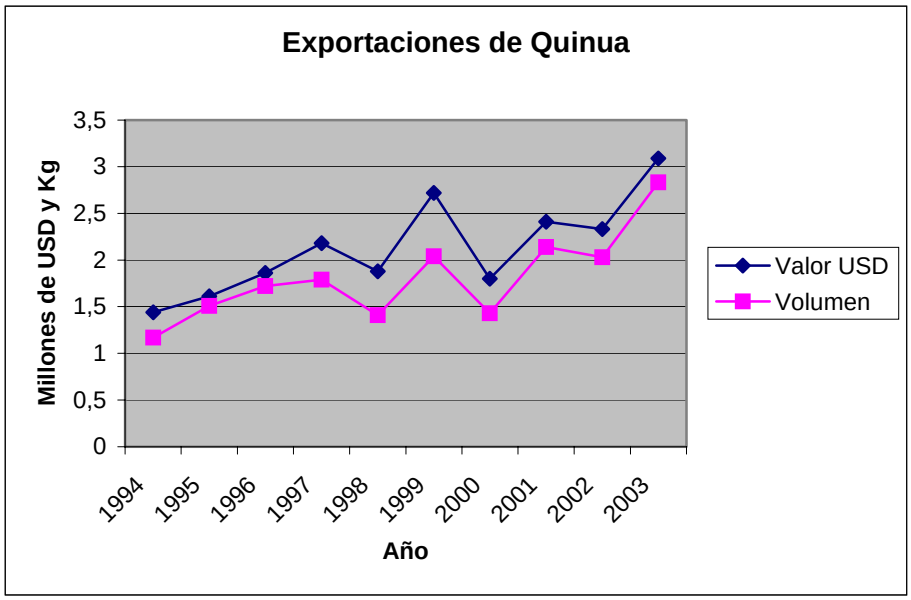
II. Examples of cluster development in Bolivia

An interesting cluster in Bolivia is that of QUINUA. It is an important native – traditional cereal with enormous potential for growth, thus providing income to thousands of poor rural dwellers who are its main source of production. OH # 1 shows the “cluster” as it stands today.

OH # 1
Quinua cluster

Some of the key problems for the operation of the cluster are:

a) Producers are dispersed and consider quinua cultivation more as a tradition than as a lucrative business. Their attitudes thus makes decision making within the cluster difficult.
b) Outside the Andean countries, quinua is still unknown in spite of its nutritive qualities and is “a natural prodct” which can open new and extensive markets.
c) Exports are growing very slowly due to lack of product innovation. OH # 2 shows the evolution in the past ten years.



d) Although Bolivia is the largest producer it is not the largest consumer, and further, its use is not valued in the urban sectors. In the cities many families do not know how to prepare it and consume it. OH # 3

OH # 3 World quinua production

e) The not so sophisticated demand has not generated an industry that would provide value added. There are few initiatives in its beginnings by entrepreneurs who are elaborating products such as pastas, snacks in small quantities. In countries such as the US, France or Peru, there are more value added quinua based products, selling at higher prices.
f) Lack of research and technology transfer hinders further productivity and the improvement of products.
g) The present cluster lacks innovative capacities.

At present, the Catholic University of Bolivia is considering its involvement in the transformation of this cluster into an “innovation cluster”. The University has several rural units in the Bolivian highlands, where the cereal is native and has also well established research groups that are willing to consider such involvement.

SYMPOSIUM ON INNOVATION CLUSTER
CHALMERS UNIVERSITY

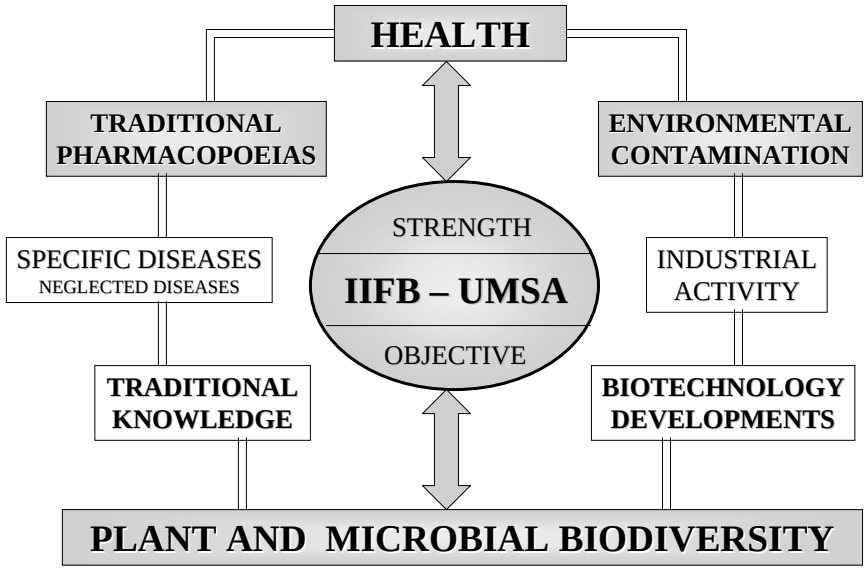
FACULTY OF PHARMACEUTICAL AND BIOCHEMICAL SCIENCES

INSTITUE FOR BIOCHEMICAL AND PHARMACEUTICAL RESEARCH - IIFB

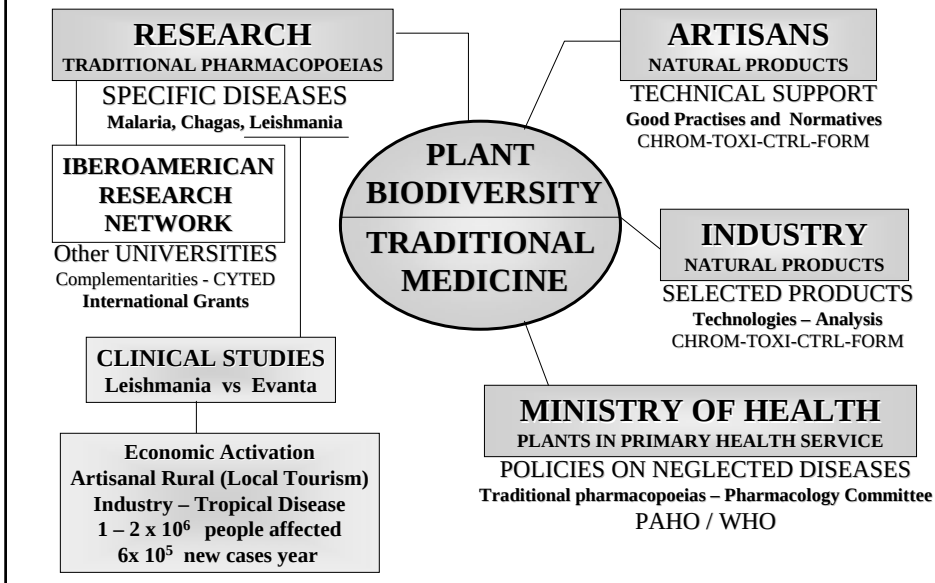
ALBERTO GIMÉNEZ TURBA
DIRECTOR - IIFB

OTTAWA, SEPTEMBER 2004

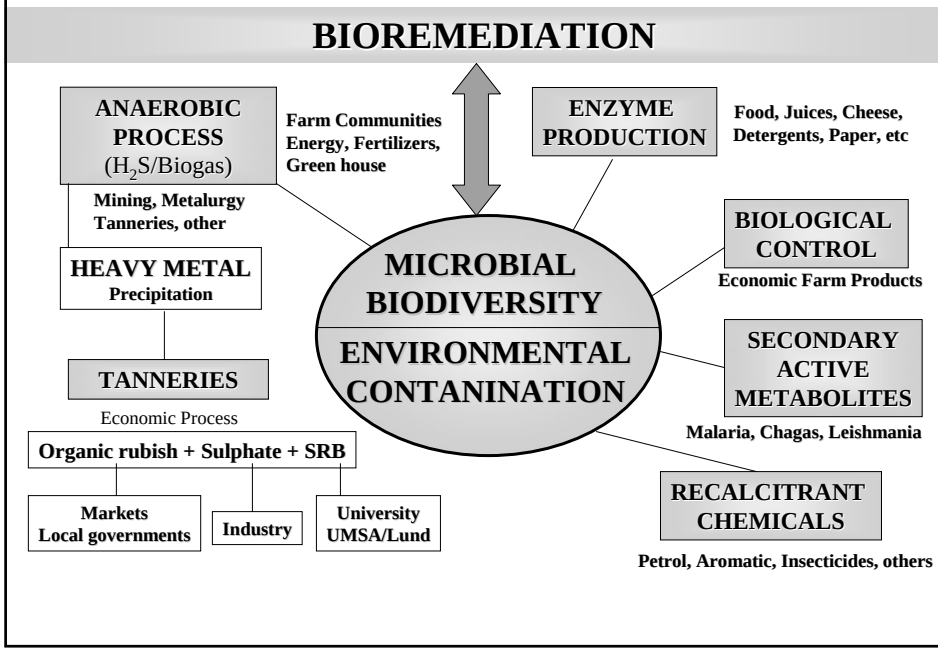
RESEARCH AREAS AT THE IIFB



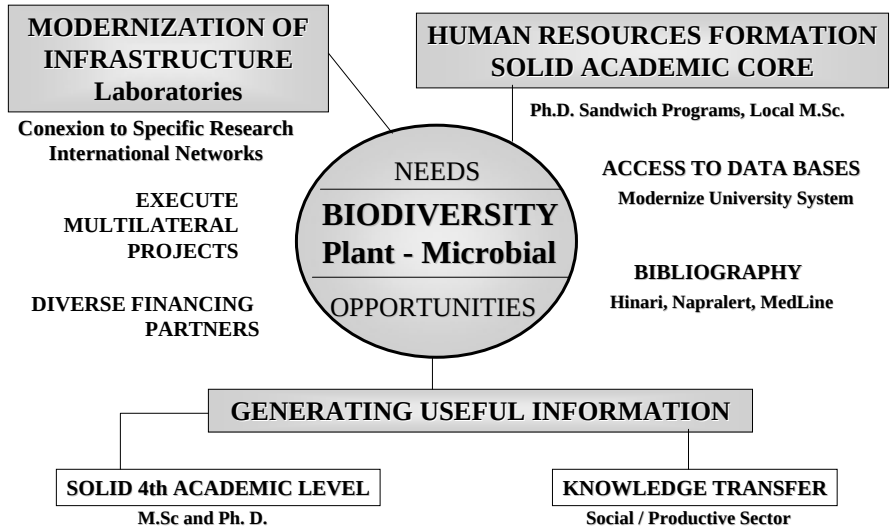
PLAYERS/UMSA-ASO–IFS–AvHS–FONAMA-CYTED/IMPACT



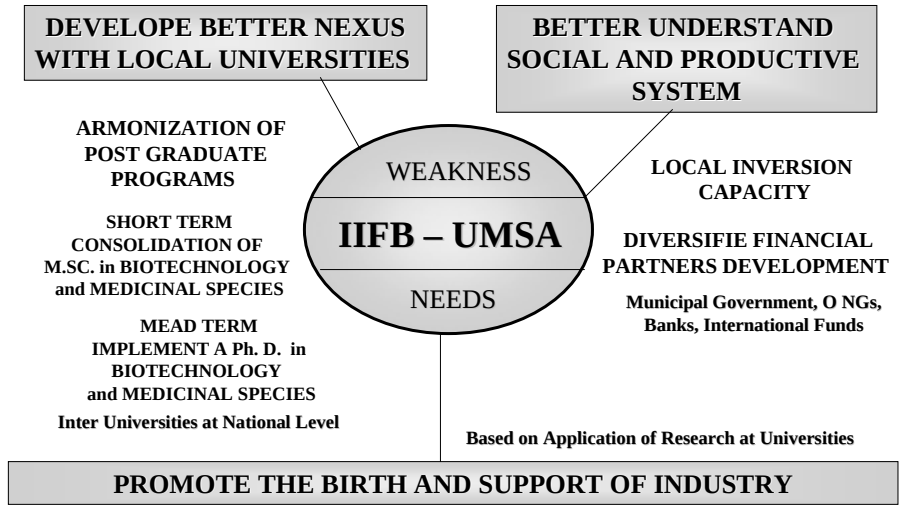
PLAYERS / UMSA-Sida–SAREC–LUND / IMPACT



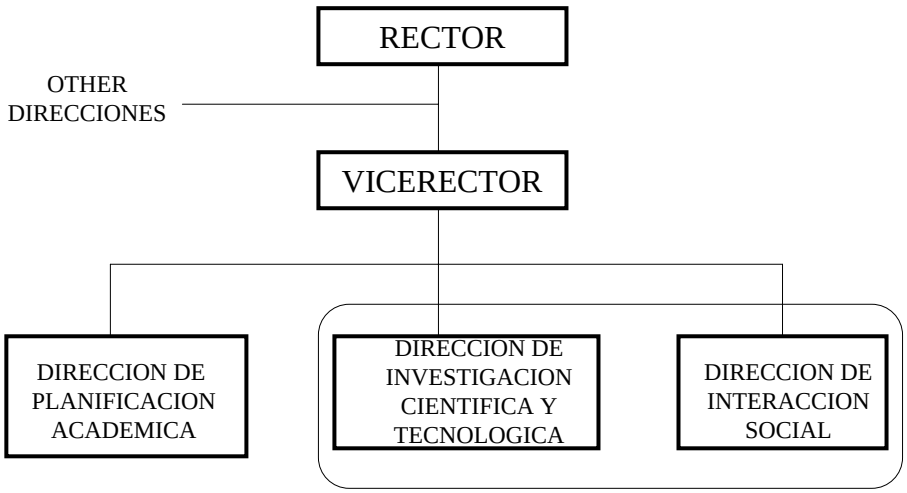
RESEARCH PROJECTIONS/ SOLUTIONS TO WEEK POINTS



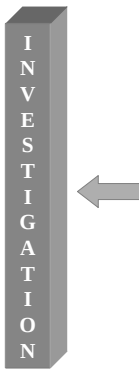
QUESTIONS TO SOLVE - CHALLENGES



Research and Entailment at UMSS' Structure.



Research and Entailment at UMSS



LOCAL SUSTAINABLE DEVELOPMENT

UMSS

DIALOGE BETWEEN LOCAL BELIEFS AND SCIENTIFIC KNOWLEDGE

UNIVERSITY

Scientific knowledge

- Training Programs.
  - •Undergraduate.
  - •Masters.
  - •Ph.D.
- Field practice.
- Support in management.

Dialogue and Constant Feedback

CIVIL SOCIETY

Local beliefs

- Local technologies (farmers-peasant).
- Forms of local Organization.
- Economy and local Markets
- Local Management (Municipalities, syndicates, ayllus).

SOCIO-ECONOMICAL RESEARCH IN GROUND PROTECTION AND AGRO-ECOLOGY

- Forms of reciprocal cooperation (Ayni, Minka,
  - •Weather prediction
- Practices of ground conservation with reciprocal cooperation
  - •Terraces of absorption-slow Formation
  - •Ditches of infiltration

INNOVATION AND TECHNOLOGICAL TRANSFERENCE IN FOR FORRAGE

SEFO was born in 1969 in the Faculty of Agronomy at UMSS, with the support of the Swiss Technical Cooperation.

In 1977 the enterprise phase under the legal structure of a university company began.

In 1986 it became a mixed company, whose partners are UMSS with 51% and producers with 49%.

At the moment more than 40 species for forage are being commercialized in the country and 50% of the production is exported. In addition inoculates for leguminous are being commercialized.

More than a thousand families of seeds small producers from different regions are working on this project.

There are in every region centers for counseling, storing and preparation of seed.

Production of essential oils in rural areas

- Because of its characteristics, the project has been selected to be presented in the fair Hannover 2000.

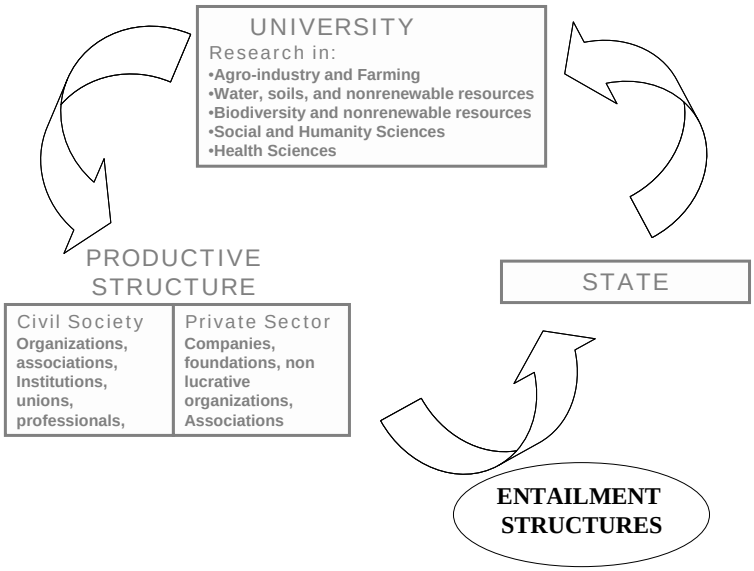
- In spite of the recognized vegetal biodiversity, before implementing the project in Bolivia the technology of essential oil extraction was unknown.

- At the moment there are 4 plants operating in different regions of the country in the production of eucalyptus essential oil and another one of native species.

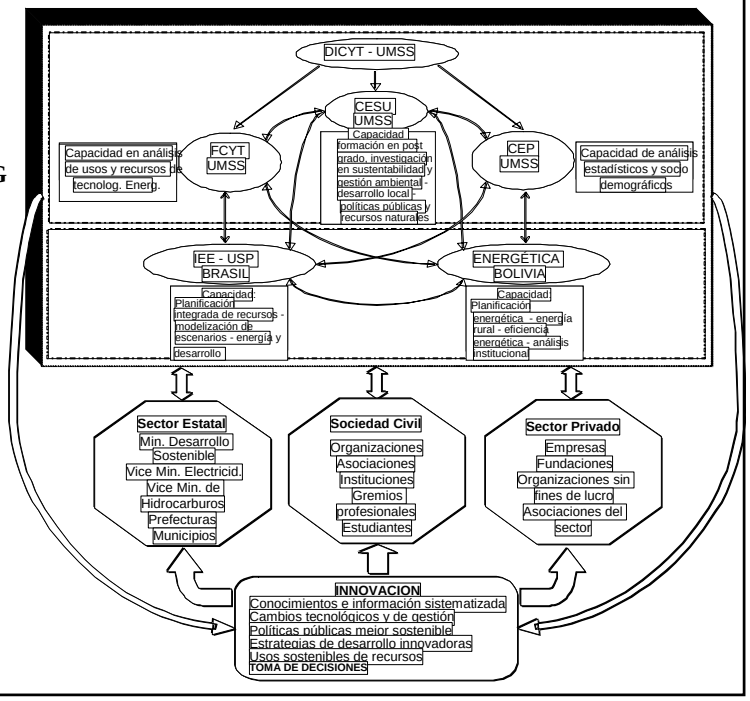
- Technologies has been developed in the Center of Agro-industrial Technology at UMSS.

- We have counted with support of the International Research Center for Development, Canada.

STRENGTHENING OF THE ENTAILMENT



STRENGTHENING OF THE ENTAILMENT



7th. International Conference of the Competitiveness Institute
"Creating Competitiveness, Growth and Prosperity through Innovation and Clusters"

September 27 – October 1st, 2004
Ottawa, Canadá,

Mónica Rivero A.
Chief – Entrepreneurial Consultancy Centre – CENACE/UPSA
Bolivia

UNIVERSIDAD PRIVADA DE SANTA CRUZ DE LA SIERRA

UPSA was inaugurated in March, 12th, 1984 as a non profit, private institution for higher scientific and professional training, sponsored by the Fundación Santa Cruz de la Sierra.

"To educate professional leaders, with entrepreneurhip spirit, high sense of ethics, levels of excellence and international competitiveness committed with the community"

PANEL: Entrepreneurial Universities

Current status of entrepreneurial activity at UPSA

Undergraduate Programs

Target Market: *mainly senior high school students*

Entrepreneurial Sciences School

- Marketing and Publicity
- Business Administration
- Auditing
- International Trade
- Commercial Engineering
- Economics Engineering
- Financial Engineering
- Financial Analysis
- Accounting

Postgraduate Programs

Target market : *general managers, chief executives, directors,, professionals of other sciences from the public and private sector*

Master´s Degree Programs

MBA
Global MBA
Marketing
Financial Engineering
Entrepreneurial Legal Advice
Environmental Management

Diploma

Strategic Human Resources Management

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PANEL: Entrepreneurial Universities

Services and activities offered to the market

CENACE

MISSION

"Contribute to the potential development of the organizations and its human resources, generating excellence in services and technology in order to reach levels of competitiveness"

- ***QUALITY UNIT***

Advisory for Implementing Quality Systems Management ISO 9001:2000; ISO 14001, OHSAS 18001.
Internal Audits
Diagnosis Audits
Advisory for Integral Systems Management ISO 9001, ISO 14001 and OHSAS 18001.

- *Leadership in Bolivia in implementing Quality Systems Management (not certification).*
- *Expertise and know how, adjusted to the local and national market needs*

- ***CONSULTANCY AND ADVISORY UNIT***

Strategic Management: Business Plan, Market Research, Strategic Marketing, Competitive Strategy, Strategic Planning, Human Resources Management, Organizational Development, Project Appraisals, Feasibility Projects; Entrepreneurial Legal Advice, Economic Law, Commercial Law

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PANEL: Entrepreneurial Universities

Courses on Entrepreneurship/ Continuing Education (customized courses and permanent programs)

- **Courses, Workshops (In Company and Permanent Programs)**
  Promote and continous upgrade of knowledge according to different educational methodologies
- **Seminars (In Company and Permanent Programs)**
  Upgrade knowledge through practical aplication in different innovative themes and areas.

Target market : *general managers, chief executives, directors, employees professionals from public and private sector, professors, students*

Entrepreneurial Management

- *Outsourcing*
- *Balanced Scoredcard*
- *Entrepreneurial leadership*
- *Theory and Tools – Harvard Negotiation Project _ Generating Productive Conversations*
- *Conflict Management Internatonal Group CMIG*
- *The Director as Coach of the employees*
- *Training High performance of team work*
- *Basic topics of Consultancy and Project Management*
- *Customer Service*
- *Stock Management*
- *Emotional Intelligence oriented to Customers´Service*

UNIVERSIDAD PRIVADA DE SANTA CRUZ DE LA SIERRA 5

Courses on Entrepreneurship/ Continuing Education

Marketing
Strategic Marketing
E-business and E-marketing
Strategic Marketing for Services
Merchandising: the silent seller

Accounting and Financial Management
Internal Audit Report of Financial Statements according to General Accepted Audit Norms
Tax Management
Gas and Petroleun Accounting

Legal Entrepreneurial Advice
Arbitrage
Labor Contracts
Strategic Allience Models
Risk Management

Human Resources Management
Emotional Intelligence Competencies
Personal Development: Selfsteem; Stress, Life Project
Performance Evaluation 360ª
PNL

IT
Scada Control Systems
Market Intelligence

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Courses on Entrepreneurship/ Continuing Education Strategic Alliences

EXECUTIVE PROGRAMS -CHAMBER OF COMMERCE, SERVICES AND TOURISM – CAINCO

- Strategic Management Program
- Social Security and Labor Law
- Training Companies for Export
- Professional Seller
- Finance for non Specialists
- Human Resources Development

LOCAL ACADEMIES

- CISCO NETWORKING ACADEMY PROGRAM
- AUTHORIZED ACADEMIC TRAINING PROVIDER MICROSOFT
- TESTING VUE CENTRE

PROFESSIONAL TRAINING PROGRAM IN QUALITY SYSTEMS MANAGEMENT - TÜV RHEINLAND GROUP

- ISO 9001:2000
- ISO 14001:1996
- OSHAS 18001:1999

PROFESSIONAL DEVELOPMENT PROGRAM – AMERICAN SOCIETY OF MECHANICAL ENGINEERING

LANGUAGES

- English for Speakers of other Languages – ESOL – Tompkins Cortland Community College, New York State University
- Language and Italian Culture, Sponsored by the Italian Government

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Protection of Intellectual Property

- **Basic Scientific Research**: Research Centers in Academic Units
- **Applied and Technological Research:** CENACE, CIA, CITI
- **Institutional Research:** Strategic Planning of the University
- **Educational Research:** Professors and Faculty Staff

RESEARCH PROFESSORS CATEGORIES

- Principal Researchers
- Associate Researchers
- Assistant Researchers
- Invited Researchers
- Part time and full time researchers
  minimum: 4 hours/week maximum:16 hours/week

PROTECTION

- Research Regulation for undergraduate, postgraduate level, extension
- Intellectual property: *The University acknowledges researchers IP contributions to knoledge, discoveries, patents or innovations, cultural, scientific, technical y social books or documents.*
- UPSA has the property of the results obtained as part of research activities.
- The University aknowledges the author´s royaty according to specific contracts.
- Rewards in money or species can also be performed

UNIVERSIDAD PRIVADA DE SANTA CRUZ DE LA SIERRA 8

Internal factors: Culture of doing research

Industrial Technological Research Center (CITI)

- Different survey, asphalt, industrial, pneumatics, fluid mechanics and chemestry laboratories
- Practical and academic research oriented to extension work and linkage with the production sector

Environmental Research Center (CIA)

- Tests in environment impact and pollution
- Access to specialized advise from international institutions
- First and unique Bolivian Center certified at international level by TÜV Rheinland Group
- Link to establish interactive relationship between businesses and the academic – research sector

UPSA Editorial

- Sponsors and edits the intellectual production of local authors, UPSA´s professors or researchers and writers
- Encourages cultural and scientific dissemination through publishing texts, books and specialized collections.
- More than 80 texts, magazines and scientific publications to support lectures and research

Internal factors

Budget, materials, resources

❖*According to the budget possibilities, UPSA allocates a special budget for research to each academic unit*
❖*Other projects may be financed through specific programs run by CENACE, DIP*
❖*All the materials, other resources and equipment obtained as part of specific research programs are the University´s property*
❖*Contracts for specific projects ordered to the* University by *third parties have their own budget*
❖*Some projects have external finance*

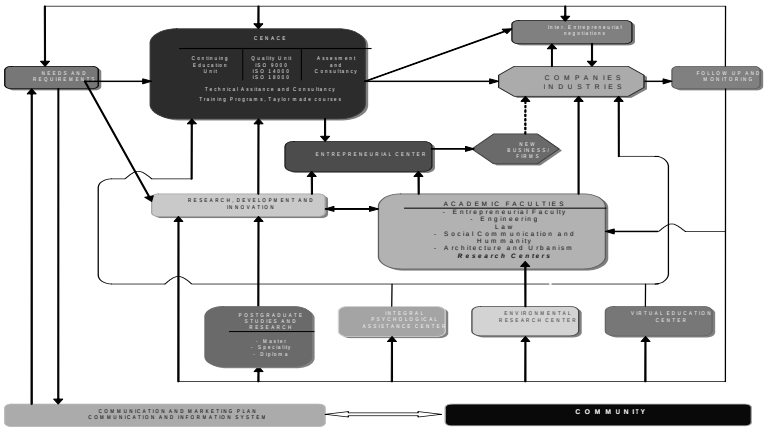
Cooperation activities

❖*Strategic Alliances with some public and private institutions involved in specific projects e.g. Export Projects, Businesses´Competitiveness Management Program, Industrial Engenieering Wood Technology Career, Diploma, Master´s Program (CAINCO, CADEX, IBCE, BOLFOR, CADEFOR, INFOCAL, CFB, ASDI, INDUSTRIAL COMPANIES, TECHNICAL INSTITUTES, INTERNATIONAL UNIVERSITIES: BIO BIO, LINKÖPING)*
❖*Member of the Competitiveness Regional Council: 10 meeting tables*
❖*EXPO UPSA : cultural, intellectual and artistic expositions shown to the community*
❖*TECNO UPSA: Technologic meeting, specific projects:*

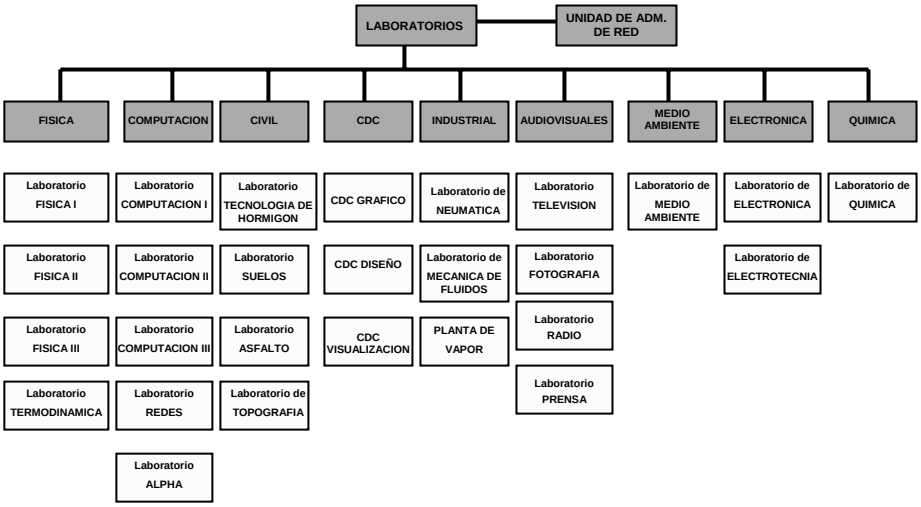
✓*Software engineering*
✓*Technological Material applications*
✓*Hydraulic Models*
✓*Industrial Design*
✓*Electric and Electronic Circuits designs*

Students participate in projects for the industies

University System



Laboratories



Collaborative Activities

External Factors

- Lack of confidence and commitment within the University System, as well as among industries
- Short term companies planning and expectations
- New intermediaries are articulating demands of others: Chambers of Commerce, Associations, local and national authorities
- Few companies willing to invest in R&D, limited access to technology
- Many isolated projects instead of working in joint strategies
- Value added productive chains are being prioritized
- Companies/universities/government are not aware of the importance of intellectual property

...Ideas

- Need of motivated people to build a competitive advantage
- Motivation is not the only thing – education and further training is essential
- Focus on people development, human resources being always upgraded linked to strategic objectives on both organizations and the region
- Product assesment, research, development and innovation is also needed
- Need of policies and procedures to involve the institutions experience in order to market and transfer intellectual property (e.g. Adjust structure, focus on IP Management)
- Build networks: associate governance/ interpersonal relations/universities active role in capacity building
- Enhance linkage university (research, teaching, service to community) vs. Region/companies (Skills, innovation, culture)
- Financial support for collaborative projects (shared vision to build mechanisms for regional interface, e.g. Competitiveness Regional Council)

...Ideas

- Work on knowledge transfer through general consultancy services, teaching and continouos research
- Regional engagement and commitment as a means of supporting universities which are more aware of the economy and community needs.
- Focus on applied research and support the needs of the value added productive chains in each region, through training programs, R&D
- Build long term relations with partners and different actors
- Work on outcome measures and perfomance indicators to measure impacts Promote and recognize achievements within university communities and industries
- Promote and recognize outstanding ideas whether they are not selected or do not access to finance
- Establish criteria to select programs, project ideas to achieve excellence and competitiveness
- Companies in permanent contact with the education system to describe the appropiate skills and competencies required in new professionals

International Memberships

Asociación Universitaria Iberoamericana de Postgrado
AUIP

Asociación Latinoamericana de Capacitación en Comercio Internacion
ALACCI

Asociación de Universidades de América Latina y el Caribe
AUALCPI

Televisión Educativa Iberoamericana
ATEI

Organización Universitaria Interamericana
OUI

Federación Latinoamericana de Facultades de Comunicación Social
FELAFACS

Centro Universitario de Desarrollo Universitario
CINDA

Red Latinoamericana de Cooperación Universitaria

Consorcio Iberoamericano de la Ciencia y la Tecnología para la Educación
ISTEC

Asociación de Facultades Colegiadas de Arquitectura
ACSA

Asociación Nacional de Universidades Privadas
ANUP

International Membership

Infraestructure

Campus	**:**	**67,150 m2**
New Campus	**:**	**200,000 m2**
Built areas	**:**	**14,200 m2**

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Más allá de la tecnología…más allá de las ideologías, nos importa el ser humano...

UNIVERSIDAD PRIVADA DE SANTA CRUZ DE LA SIERRA 20

Halving poverty by 2015 is one of the greatest challenges of our time, requiring cooperation and sustainability. The partner countries are responsible for their own development. Sida provides resources and develops knowledge and expertise, making the world a richer place.

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